

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

(Problem Solving and Programming)
Annual Examination, 2016

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 the concept of storage class in C. Draw a flowchart and write a program to calculate the first smallest divisor of a number *using break* statement.
3. Explain different types of decision making statements in C with examples? Write a program in C to swap the values of two variables using pointers concept.
4. What is call by value? Give example. Write a program that initializes 3 names in an array of strings and displays them.
5. Explain recursion program with a suitable example. Write a program to print first 10 even numbers using *goto* statement.
6. Explain Function Prototypes with an example for each. Write a program to perform the comparison of two strings (use string function).
7. Write a program in C to sort list of n integers, using any of the sorting algorithms.
8. Write a program to test whether the given string is a palindrome or not. Write a macro to demonstrate #define, #if, #else preprocessor commands.
9. Describe different types of data types in C with examples of each.
10. Write short notes on any four of the following :—
 - (a) Constants in C
 - (b) Function in C
 - (c) Structures
 - (d) Union in C
 - (e) <conio.h>

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Examination Programme, 2016
MCA, Part-I

<i>Date</i>	<i>Papers</i>	<i>Time</i>	<i>Examination Centre</i>
12.05.2016	Paper-I	8.00 AM to 11.00 AM	Nalanda Open University, Patna
14.05.2016	Paper-II	8.00 AM to 11.00 AM	Nalanda Open University, Patna
16.05.2016	Paper-III	8.00 AM to 11.00 AM	Nalanda Open University, Patna
18.05.2016	Paper-IV	8.00 AM to 11.00 AM	Nalanda Open University, Patna
20.05.2016	Paper-V	8.00 AM to 11.00 AM	Nalanda Open University, Patna
24.05.2016	Paper-VII	8.00 AM to 11.00 AM	Nalanda Open University, Patna
26.05.2016	Paper-VIII	8.00 AM to 11.00 AM	Nalanda Open University, Patna
28.05.2016	Paper-IX	8.00 AM to 11.00 AM	Nalanda Open University, Patna
30.05.2016	Paper-X	8.00 AM to 11.00 AM	Nalanda Open University, Patna
01.06.2016	Paper-VI (Practical)	8.00 AM to 11.00 AM	Nalanda Open University, Patna

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

(Computer Organization And Assembly Language Programming)
Annual Examination, 2016

Time : 3 Hours.

Full Marks : 80

Answer any Five Questions.
All questions carry equal marks.

1. (a) Convert the following:
 - (i) $10001100_2 = ()_{10}$
 - (ii) $(456)_8 = ()_{16}$
 - (iii) $(11001100110)_2 = ()_{16}$
 - (iv) $(A2CD)_{16} = ()_8$(b) Explain the concept of ASCII code, EBCDIC code and BCD numbers.
2. Simplify the following using Karnaugh's map in terms of SOP and draw the circuit for the output expression: **F (A, B, C, D) = E (0, 1, 3, 5, 7, 8, 10, 11, 13)**
3. What is the difference between combinational circuit and sequential circuit? Draw the circuit of half adder and full adder and give its equation and truth table.
4. Compare and contrast the various flip-flops with their characteristic tables. Also draw the circuit of each type of flip-flop.
5. What are multiplexers and de-multiplexers? Draw the circuit of 16 X 1 Multiplexer? Also give its characteristic table.
6. Explain the difference between synchronous and asynchronous counter and draw the circuit of both the counters. What is the use of counters in computer circuits?
7. What are the different types of Instructions used in computers? Explain with examples.
8. Write an assembly language program to find the maximum in a group of 10 numbers stored in memory. Store the result in AL register.
9. What is RAID? Describe different levels of RAID with three features at each level.
10. Write short notes on any four:
 - (a) Programmable Logic Array (PLA)
 - (b) Universal gates
 - (c) Fundamental gates
 - (d) Decoder
 - (e) Types of memories.

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

(Discrete Mathematics)
Annual Examination, 2016

Time : 3 Hours.

Full Marks : 80

Answer any Five Questions.
All questions carry equal marks.

1. (a) Define proposition, conditional and biconditional with its truth table. \sim
(b) Show that $(p \rightarrow \sim q) \wedge (p \rightarrow \sim r) \equiv \sim [p \wedge (q \vee r)]$.
2. Design a logic circuit to operate a light bulb by two switches x_1 and x_2 .
3. Use mathematical induction to prove that $1 + \frac{1}{4} + \frac{1}{9} + \dots + \frac{1}{n^2} \leq 2 - \frac{1}{n} \forall n \in \mathbb{N}$.
4. (a) Prove that, 'If $x, y \in \mathbb{Z}$ such that xy is odd then both x and y are odd', by proving its contraposition.
(b) Show that $\sqrt{7}$ is Irrational.
5. (a) Find the power set of set $A = \{a, e, i, o, u\}$.
(b) If $x = \{a, b, c\}$ and $y = \{1, 2, 3\}$ find (i) $x \times x$, (ii) $x \times y$, (iii) $x \times \phi$.
6. (a) If there are 7 men and 5 women how many circular arrangements are possible in which women do not sit adjacent to each other.
(b) In how many distinct ways is it possible to seat eight persons at around table ?
7. (a) How many different 7 persons committee can be formed each containing 3 women and 4 men, from a set of 20 women and 30 men ?
(b) Evaluate $c(6, 2)$, $c(7, 4)$ and $c(9, 3)$.
8. Suppose A and B are mutually exclusive events such that $P(A) = 0.3$ and $P(B) = 0.4$. What is the probability that,
(a) A does not occur.
(b) A or B occurs.
(c) Either A or B does not occurs.
9. Write down all the Partitions of 7. Also find P_7^4 and P_7^5 .
10. There are 4 women and 5 men. A committee of three, a President, a Vice-president and a Secretary, has to be formed from them. In how many ways can this be done if
(a) The Vice President should be a women.
(b) Exactly one out of the Vice President and the Secretary should be a women.
(c) There is at least one women in the committee.

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

(Systems Analysis and Design)
Annual Examination, 2016

Time : 3 Hours.

Full Marks : 80

Answer any Five Questions.
All questions carry equal marks.

1. What is an Information System ? Explain classification of systems in brief. Also Explain the need of SDLC for proper development of a system.
2. What is SRS ? Briefly explain any four characteristics of SRS. Develop an SRS for Library Management System. Make appropriate assumptions.
3. What is coupling ? Explain advantages and disadvantages of a highly coupled system. Explain basic guidelines for user interface design.
4. What is the need of documentation in System Development? Explain, in brief, any two categories of documentation.
5. What is CASE tool ? Categories various types of CASE tools. What are the various security issues in a computer system? Explain how an organization may prevent security concerns from data stored in its centralized and distributed databases.
6. What are Forms ? Also explain the process of Form design. Why is a proper database design essential for a successful information system ?
7. Explain rules for designing tables, fields and constraints. What is a flow chart ? Draw a flow chart to find the average marks of 10 students in a batch.
8. What are the advantages of modular system design? Draw a structure chart for Banking Management System.
9. What is the need of system maintenance? Explain different types of maintenance with examples.
10. Write short notes on any **Four** of the following :—
 - (a) Expert System
 - (b) Prototyping Model
 - (c) Decision Table
 - (d) System Testing
 - (e) Decision Tree.

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

(Communication Skill)
Annual Examination, 2016

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.
 - (a) Give a suitable title for the passage. 4
 - (b) What is unique about the IT industry in the present economic scenario ? 4
 - (c) Why did the IT industry go through a fundamental change ? 4
 - (d) What are the major factors responsible for the downfall of the hardware sector ? 4
 - (e) Pick out suitable synonyms from the passage for the following words :— 4
yearly, vital, change, compelled
2. Fill in the blanks choosing the most suitable word from those given in brackets :— 5x2
 - (i) Manorama acted ----- her first film at a young age. (at, in, for)
 - (ii) -----1985, she had acted in more than 1000 films. (From, By, For)
 - (iii) He left-----Mumbai yesterday on some important business. (to, for, on)
 - (iv) What are you doing----- Sunday afternoon ? (in, on, at)
 - (v) It hasn't stopped raining ----- last night. (for, since, from)
3. Fill in the blanks choosing the most suitable phrasal verb from those given below :— 5x2
(Make changes in the form of the verbs where necessary)
blow up, ask around, bring up, chip in, get along, fall down.
 - (i) I _____but nobody had seen my wallet.
 - (ii) The racing car _____after it crashed into the fence.
 - (iii) His grandparents _____him_____ after the death of his parents.
 - (iv) If everyone_____, we can get the kitchen painted by noon.
 - (v) I was surprised how well my new girlfriend and my sister_____
4. Write down the text of a group discussion between three participants on the issue of 'Changing role of Indian women'. 10
5. Write a letter of application along with your Curriculum Vitae (CV) for the job of a Tele-caller in response to the following advertisement :— 10
Position : Tele-caller
Job-profile : Graduation Degree, Good Communication Skills, Knowledge of Company's profile and products i.e. HCL
6. You are Ramesh Pokhriyal, Head, Publicity Division, Gurung Times. Write a memo to all the sales executives to come for a review meeting on April 20th with a detailed activity report of all the assignments and targets achieved by them in the last quarter. 10
7. Write an essay on Process of Communication. (250 words) 10

NALANDA OPEN UNIVERSITY
Master of Computer Application (MCA), Part-I
PAPER-VII
(Design and Analysis of Algorithms)
Annual Examination, 2016

Time : 3 Hours.

Full Marks : 80

Answer any Five Questions.
All questions carry equal marks.

1. Write an- algorithm to build a heap from a given sequence. Illustrate the heap sort algorithm on the sequence 10, 5, 12, 6, 9, 2, 8, 16.
2. Explain recurrence with an example. Prove that $f(n) = 2n^3 + 3n + 5$ is $O(n^3)$.
3. List the major differences between Divide and Conquer and dynamic programming design techniques for solving problems.
4. Define fractional Knap-Sack problem, and give a greedy algorithm to solve this problem efficiently.
5. What is a binary tree? Give a recursive function to find the height of a binary tree. What is the running time of this algorithm?
6. Identify the tree edges, back edges and forward edges. Give an algorithm for topological sort. Obtain a topological ordering for the following graph:
7. Explain the Kruskal-algorithm for Minimum Spanning Tree (MST) construction. Derive the running time of the algorithm.
8. Define Regular Languages. Write regular expression corresponding to the following Languages over alphabet $\{a, b\}$.
 - (i) Strings with even length.
 - (ii) Strings with odd number of a's and even number of b's.
9. Write context free grammar for the following languages.
 - (i) Even palindromes over $\{a, b\}$
 - (ii) Odd palindromes over $\{a, b\}$.
10. Write short notes on the following :—
 - (i) Clique problem
 - (ii) Vertex Cover
 - (iii) Turing machine.

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

(Advanced Discrete Mathematics)
Annual Examination, 2016

Time : 3 Hours.

Full Marks : 80

Answer any Five Questions.
All questions carry equal marks.

1. Define the following with example :—
 - (a) Null Graph
 - (b) Pseudo Graph
 - (c) Complete Graph

2. Using Induction, verify that $\sqrt{5} f_n = \left(\frac{1 + \sqrt{5}}{2}\right)^n - \left(\frac{1 - \sqrt{5}}{2}\right)^n, n \geq 1.$

3. Find the complete solution of the recurrence $a_n = 3a_{n-1} - 4n, n \geq 1.$

4. Prove the Binomial Identity
$$c(n, 1) + 3c(n, 3) + 5c(n, 5) + \dots = n(2)^{n-2} = 2c(n, 2) + 4c(n, 4) + 6c(n, 6) + \dots$$

5. Solve the recurrence relation for Catalan numbers given by
$$a_n = a_{n-1} a_1 + a_{n-2} a_2 + \dots + a_2 a_{n-2} + a_1 a_{n-1}, n \geq 2$$
 with $a_n \geq 0 (\forall n)$ and $a_1 = 1.$

6.
 - (a) Find the edge chromatic number of $C_n.$
 - (b) Give an edge colouring of the Peterson graph.

7.
 - (a) Show that C_6 is bipartite and K_3 is not bipartite.
 - (b) Is the sub graph of a bipartite graph bipartite ? Give reasons for your answers.

8.
 - (a) Prove that the sum of the degree of all the vertices of any graph is even.
 - (b) Prove that any graph can only have an even number of odd vertices.

9.
 - (a) Draw at least 3 non-Isomorphic graphs on four vertices.
 - (b) Is every sub graph of a regular graph regular ? Give reasons for your answer.

10.
 - (a) For which values of m and n is $K_{m, n}$ a tree ?
 - (b) For which values of n is K_n Eulerian ?



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

(Data Communication and Computer Networks)
Annual Examination, 2016

Time : 3 Hours.

Full Marks : 80

Answer any Five Questions.
All questions carry equal marks.

1. Differentiate between 'Client/Server' and 'Peer to Peer' architecture. Draw the diagrams for both the architectures.
2. What is the purpose of PCM? Explain the different components of PCM encoder. How are quantization levels chosen in PCM?
3. Describe the protocols of Data Link Layer. Data link protocol almost always puts CRC in trailer rather than in a header. Why?
4. Explain token bucket algorithm and compare its performance against the leaky bucket algorithm. Describe the layer of OSI model which is responsible for these algorithms.
5. Explain the operation of congestion control algorithm in TCP and the operation of Reverse path forwarding algorithm.
6. Discuss how the message is transmitted in telephone networks. Compare and contrast circuit switching, packet switching and message switching.
7. Explain the difference between OSI model and TCP/IP model by comparing each layers of both the models.
8. Discuss the process of link state routing. Explain how it overcomes the problem of Count-to-infinity for distance vector routing.
9. Illustrate congestion detection and congestion avoidance phases in TCP. Draw TCP Header format and explain the use of TCP header fields.
10. Write short notes on the following :—
 - (a) Class in IP
 - (b) Nagle's algorithm
 - (c) IEEE 802.11
 - (d) OSPF



NALANDA OPEN UNIVERSITY
Master of Computer Application (MCA), Part-I
PAPER-X
(Principles of Management and Information System)
Annual Examination, 2016

Time : 3 Hours.

Full Marks : 80

Answer any Five Questions.
All questions carry equal marks.

1. Briefly describe the procedures preferred by managers to evaluate the investments. Give the formula that establishes the relation between the procedures?
2. What is an organizational structure? Explain the basic principles used for designing an organizational structure.
3. List and explain all acceptable stages of the Organization life cycle, accompanied with their respective characteristics and the desired action to be performed for the sustained good health of the Organization.
4. What are business ethics? Why business ethics are important requirement for management? Explain.
5. What is Transaction Processing System? Explain the features of a transaction processing system with an example.
6. What are office Automation System? How do they help in improving the productivity of an organization? Name three common office automation products and mention what they do.
7. How neural networks method, can be used 5 in market analysis? Explain with the help of an example. Explain the term "Discounted Cash Flow". Discuss the relation between Discounted Present Value and Future Value.
8. What is portfolio management? Explain the different objectives of portfolio management. Also, explain the methods used for balancing the portfolio.
9. What is Customer Relationship Management (CRM)? How is CRM different from ERP ? Explain.
10. Write short notes on the following :—
 - (a) RTI Act
 - (b) Cyber Crime and its types
 - (c) Total Cost of ownership
 - (e) Distinctive ways of ERP implementation

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Revised Examination Programme, 2016 for
MCA, Part-I, Paper-VI

<i>Date</i>	<i>Papers</i>	<i>Time</i>	<i>Examination Centre</i>
01.06.2016	Paper-VI (Practical)	12.00 Noon to 3.00 PM	School of Computer Education (IT) Nalanda Open University, 12 th Floor, Biscomaun Tower, Patna-800001

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

(Object Oriented Analysis and Design)
Annual Examination, 2016

Time : 3 Hours.

Full Marks : 80

Answer any Five Questions.
All questions carry equal marks.

1. (i) Classify each of the following relationship as either a class, an instance of a class, inheritance relationship, an aggregation relationship, association relationship.
 (a) Person - Student (b) Car - Driver (c) Class - Student
 (d) Computer - Keyboard (e) Vehicle
 (ii) Draw a state diagram of a process (*a state program in the running state*).
2. A Computer Science Department wants to schedule meetings. There may be different kinds of meetings as School Board Meeting, faculty meeting, print committee meeting and budget planning committee meetings. There is a list of members along with their addresses and other details about different meetings, schedule of meeting needs booking of a conference room, fixing date and time and informing members through e-mail/ telephone. Members are also paid honorarium and transport allowances for attending meeting. Do the following tasks for the above system.
 (i) Draw a class diagram (ii) Draw an object diagram
 (iii) Draw a use case diagram (iv) Draw a generalization and association diagrams.
3. Differentiate between the followings with examples:
 (a) Collaboration diagram and an interaction diagram.
 (b) Generalization and inheritance
 (c) Class diagram and object diagram
 (d) Conceptual scheme
4. With appropriate examples and diagrams for each, explain the following Modeling techniques.
 (a) Object Modeling (b) Dynamic Modeling
5. With the help of an example, explain the Concurrency Identification concept for the real life objects.
6. "Object design is a very iterative process in which several classes, relationships between objects, are added when you move from one level to another level of the design". Explain all the steps in detail to be followed for the Object Design.
7. Draw a DFD for the student admission/registration process for Nalanda Open University. Assumptions can be made wherever necessary. Draw the DFD's till level - 2.
8. Define persistent data. How do we identify persistent data? Define serialization. Where it can be used and why?
9. With the help of an appropriate example, explain how the associations are implemented as classes. List and describe the elements of a State Diagram.
10. Write short notes on the following :—
 (a) Referential and Domain Integrity:
 (b) Multiple Inheritance
 (c) Collaboration diagram
 (d) Factors to be considered for Design optimization of an object.



Examination Programme, 2016
Master of Computer Application, Part-II

Date	Papers	Time	Examination Centre
02.06.2016	Paper–XII	12.00 Noon to 3.00 PM	Nalanda Open University, Patna
04.06.2016	Paper–XIII	12.00 Noon to 3.00 PM	Nalanda Open University, Patna
06.06.2016	Paper–XIV	12.00 Noon to 3.00 PM	Nalanda Open University, Patna
08.06.2016	Paper–XVI	12.00 Noon to 3.00 PM	Nalanda Open University, Patna
10.06.2016	Paper–XVII	12.00 Noon to 3.00 PM	Nalanda Open University, Patna
14.06.2016	Paper–XVIII	12.00 Noon to 3.00 PM	Nalanda Open University, Patna
16.06.2016	Paper–XIX	12.00 Noon to 3.00 PM	Nalanda Open University, Patna
18.06.2016	Paper–XI (Practical)	12.00 Noon to 3.00 PM	Nalanda Open University, Patna
20.06.2016	Paper–XV (Practical)	12.00 Noon to 3.00 PM	Nalanda Open University, Patna
22.06.2016	Paper–XX (Practical)	12.00 Noon to 3.00 PM	Nalanda Open University, Patna

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

(Software Engineering)
Annual Examination, 2016

Time : 3 Hours.

Full Marks : 80

*Answer any Five Questions.
All questions carry equal marks.*

1. Explain various approaches for the Formal Technical Review. Also, mention the expected results from the respective approaches.
2. Explain the following with an example :—
 - (i) Work Break through structure
 - (ii) Flow Graph
3. Explain any two techniques of software prototype development. Compare prototype model with spiral model. Also mention the pros and cons of prototyping.
4. With the help of a neat diagram, explain cleanroom software engineering. Define CASE tools. Explain any two categories of CASE tools.
5. What are the various metrics to be measured and analyzed for the web -applications? Explain them briefly.
6. Explain the step-by-step evolutionary view of the software Reengineering life-cycle. List all the elements of a Good Interface design.
7. Software Requirements Specification (SRS) is generated as the output of Requirement Analysis." Explain the properties and the outlines of the SRS. Also mention various features which makes the requirements analysis difficult.
8. With the help of any example, explain the concept of Mutation testing strategy. Write a suitable program segment and illustrate the Boundary-Value Analysis testing strategy.
9. Draw levels - 0, 1 and 2 DFD's for a university who wants to automate the registration, scheduling of classes and attendance system of the students. The main objectives of the system are :—
 - (a) Online Enquiry
 - (b) Online registration
 - (c) To view the scheduling of classes, online.
 - (d) Availability of online records of teachers and students.
 - (e) Online view of the attendance by the students.
 - (f) Practical-batch scheduling.
10. Write short notes on the following :—
 - (a) Key Process Areas (KPA) of Maturity level.
 - (b) Domain Engineering
 - (c) Coverage Based Testing
 - (d) Iterative Enhancement Model.



NALANDA OPEN UNIVERSITY
Master of Computer Application (MCA), Part-II
PAPER–XIV
 (Accounting & Financial Management)
Annual Examination, 2016

Time : 3 Hours.

Full Marks : 80

*Answer any Five Questions.
 All questions carry equal marks.*

1. Describe different kinds of accounting.
2. Frame a Trading Account with appropriate items. What is the difference between Trading Account and Profit & Loss Account ?
3. What is balance sheet ? What are its objectives and importance. Give an example of Balance Sheet.
4. What ratios would you like to calculate for testing profitability, liquidity and solvency of a business ? Give examples.
5. What is fund flow statement ? How is it prepared ? Give an example.
6. From the following Balance Sheets of Sen & Co. prepare Cash Flow Statement for the year ended 31st December 2015.

Liabilities & Capital	2014 Rs.	2015 Rs.	Assets	2014 Rs.	2015 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.

7. Describe the tasks and responsibilities of a modern financial manager.
8. What is working capital ? Describe its sources.
9. What assets are considered to be current assets ? Explain the factors influencing capital requirements.
10. Define Accounting and throw light on its scope.



NALANDA OPEN UNIVERSITY
Master of Computer Application (MCA), Part-II
PAPER—XVI
(Data and File Structures)
Annual Examination, 2016

Time : 3 Hours.

Full Marks : 80

Answer any Five Questions.
All questions carry equal marks.

1. Design algorithms for various operations performed on circularly linked list.
2. Explain the depth first search algorithm with example.
3. Write a procedure to find minimum cost spanning tree for a graph using Prim's algorithm.
4. Explain the process of creating a Splay Tree using an example. Explain the operations of Red-Black Trees.
5. Write an algorithm for implementing insertion and deletion operations in a singly linked list using arrays.
6. Write a procedure to create, insert and delete an element in queue.
7. Compare and contrast different sorting algorithms with examples of each type.
8. Write a procedure to sort the following sequence using heap sort :—
25, 57, 48, 37, 12, 92, 86, 33.
9. Write the algorithms for each of the following for binary trees :—
 - (i) Inorder traversal
 - (ii) Preorder traversal
 - (iii) Postorder traversal
10. Write a detailed note on sequential file organization. Discuss about the linear search in detail.



NALANDA OPEN UNIVERSITY
Master of Computer Application (MCA), Part-II
PAPER–XVII
(Operating System Concepts and Networking Management)
Annual Examination, 2016

Time : 3 Hours.

Full Marks : 80

*Answer any Five Questions.
All questions carry equal marks.*

1. What are the two modes in which Windows 2000 system works? Explain its architecture with the help of a diagram.
2. What is the default networking protocol in Windows 2000? What are its features? What are the different states of a process in Linux?
3. What is protocol? How does a Token Bus Network Work? In what ways is its working different from token ring?
4. Explain the process used by Kerberos to **authenticate** network clients logging onto a Windows 2000 domain.
5. (a) Write the Linux/Unix commands for the followings :—
 - (i) List all files having three or more characters in their name.
 - (ii) Link two files in a directory.
 - (iii) To communicate to another user logged on by writing to the bottom of their terminal.
 - (iv) To change the priority of a process.(b) Explain the characteristics of multimedia operating system.
6. What is the role of transmission media in networking? Differentiate between guided and unguided media with suitable examples.
7. What is a repeater? At which level of OSI model is it used? List and explain all application level protocols.
8. What is a shell script? Write a shell script which will redirect the output of the data command without the time into a file. Also, make the flow chart of this shell script.
9. What are the security services provided by the IPSec? Explain the Window 2000 IPSec components. Also, explain the policy options for IPSec implementation.
10. Differentiate between the following :—
 - (a) Simplex, Half duplex, and Full Duplex Communication.
 - (b) Symmetric and asymmetric Cryptography
 - (c) LAN, MAN and WAN
 - (d) Packet Filtering Gateways and Stateful Packet Filtering



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

(Database Management Systems)
Annual Examination, 2016

Time : 3 Hours.

Full Marks : 80

Answer any Five Questions.
All questions carry equal marks.

1. List the data models, used to structure the data in Database systems.
2. Compare the following :—
 - (i) File-based system and DBMS
 - (ii) Logical and Physical Levels of DBMS
 - (iii) GROUP BY clause and HAVING clause in SQL.
3. Discuss the different process of authorisation permitted on database items with the help of examples? Define Super key, Alternate key, and Primary key.
4. Define foreign key. Explain its significance. Using operators of relational algebra/SQL, perform Queries for the relations given below :—

Supplier (S#, S_name, status, city)
Parts (P#, P_name, color, weight)
Supply (S#, P#, Quantity)

 - (i) Find the part code (P#) of the parts which are supplied by a supplier.
 - (ii) Find the part name of all the parts that are supplied by suppliers who are in "Mumbai".
5. Compare sequential file organization with Heap files organization. Discuss the advantages and disadvantages of sequential file organization. What are the differences between BST-Tree and B tree Indexes.
6. What is transaction in DBMS? Explain the ACID properties of transactions in Database system with an example..
7. Explain Normalization. What are the rules of normalization? Justify "Any relation which is in BCNF is in 3NF but converse is not true".
8. In SQL, what is the need of VIEW mechanism? How views differs from tables? Give an example and the syntax required to create a view.
9. Explain Generalization and Specialization in an E-R diagram with the help of an example? How would you map the following ER constructs into relations? Give suitable example.
 - (i) Weak Entity
 - (ii) Generalization
 - (iii) Ternary Relationship.
10. Explain the following terms with proper examples :—
 - (i) Equi Join
 - (ii) Data Replication
 - (iii) Entity Integrity Constraints.

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

(Object Oriented Technologies and Java Programming)
Annual Examination, 2016

Time : 3 Hours.

Full Marks : 80

Answer any Five Questions.
All questions carry equal marks.

1. Discuss the important features of Java. Bring out the difference between the string and stringbuffer classes in Java.
2. Explain the concept of inheritance. Give a suitable example by declaring a class and showing two levels of inherited classes with the methods of each.
3. There are some classes that reside in a public package called myPackage. Give three ways in which these can be accessed in the default unnamed package. If one of the classes in myPackage has the same name as a class in the default package, how can it be referred to in the default package ?
4. What are the steps involved in creating a distributed application using Remote Method Invocation? What is polymorphism? Write a program to illustrate late binding in Java.
5. Explain the concept of nested classes in Java with examples? Write a Java program that finds the area of a circle.
6. What are the conditions necessary for a class to be serializable? Explain with examples. When is the "this" keyword used and why?
7. Explain the concept of abstract classes and differentiate it with interface. Define StreamTokenizer with an example.
8. Explain constructor overloading with example. Write a Java program to read a text file and output the number of occurrences of the sequence of letters "the" in it.
9. What are Java controls and containers? Write an applet that displays three labels and four non-exclusive checkboxes on the screen.
10. Construct a programming problem where the switch statement cannot be used for taking decisions. Now write a Java program to solve the problem. Explain how to compile and run a Java Servlet.



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

(Operating Systems)
Annual Examination, 2016

Time : 3 Hours.

Full Marks : 80

Answer any Five Questions.
All questions carry equal marks.

1. Define Operating system? What are its functions? Explain different types of operating systems with examples.
2. Explain the Non-continuous (Indexing and Checking) disk space management methods. Explain with an example the difference between Acyclic-graph directory and General-graph directory.
3. Explain how memory management is done in Windows 2000 OS. Discuss file management in UNIX OS in comparison with WINDOWS OS file management.
4. Explain the concept of virtual memory. Discuss any two page replacement policies of virtual memory. Also explain the difference between paging and segmentation.
5. What is Context Switching? Explain the overhead incurred due to context switching on process and thread. Give an example of a Deadlock situation. Also explain how Deadlock can be prevented.
6. What is Concurrent Programming? Explain Sleeping Barber Problem with the help of an example.
7. For the given 4 processes arriving at time 0 (zero) in the order with length of CPU time in milliseconds :—

Process	Processing Time
P1	05
P2	08
P3	06
P4	02

Obtain average waiting time and turnaround time for RR, SJF and FCFS scheduling algorithms for the above mentioned processes.

8. Write and explain Lamport's algorithm for ordering of events in a distributed environment with an example.
9. What is Distributed Operating System? List any three design goals of Distributed Operating System. How is Distributed Operating System different from Network Operating System?
10. Explain the following in brief :—
 - (i) Locks
 - (ii) System Calls
 - (iii) Cache Memory
 - (iv) I/O Buffering

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

(Advanced Database Management Systems)
Annual Examination, 2016

Time : 3 Hours.

Full Marks : 80

Answer any Five Questions.
All questions carry equal marks.

1. How do UML diagrams help in designing the database? Discuss with the help of an example. How does data granularity affect the performance of concurrency control? Do you think that data granularity and database security are interrelated ? Justify your answer.
2. Consider the following situation :—
"A company has two employee named "A" and "B". The company has two projects P1 and P2. Project P1 uses languages C and C++, whereas project P2 uses languages C and JAVA. Employee whose name is "A" works on both the projects P1 and P2, whereas employee named "B" works on project P2 only."
 - (i) Represent the information given above as a relation/ tables.
 - (ii) List the FDs and MVDs in the table above.
 - (iii) Normalize the table upto 4th Normal Form.
3. Compare and contrast the distributed DBMS environment with the centralized DBMS environment. What are semantic databases? List the features of semantic databases. Explain the process of searching the knowledge in these databases.
4. What do you mean by Deadlock? How can we prevent Deadlock? Write an algorithm that checks whether the concurrently executing transactions are in deadlock or not.
5. What is a data warehouse? Describe the process of ETL(Extract, Transform and Load) for a data warehouse. What are datamarts? Briefly discuss the method of creating the data marts.
6. Explain the role of Query Optimizer in Oracle. Explain the algorithm and cost calculation for Simple Hash Join.
7. Differentiate between the following :—
 - (i) Embedded SQL and Dynamic SQL
 - (ii) XML and HTML
 - (iii) 2 PC and 3 PC Protocol
 - (iv) JDBC versus ODBC
8. What are cursors, stored procedures and triggers? Give SQL syntax for each and discuss the utility aspect of each.
9. Write a short note, with suitable example, for each of the following :—
 - (i) Vendor-Specific Security
 - (ii) Multilevel Security
10. Explain the following with the help of an example and diagram :—
 - (i) Role of system catalogue
 - (ii) Nested loop join
 - (iii) Timestamp and its use
 - (iv) Fragmentation and allocation schema



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

(Advanced Internet Technologies)
Annual Examination, 2016

Time : 3 Hours.

Full Marks : 80

Answer any Five Questions.
All questions carry equal marks.

1. How do we call the servlets with parameters in URL? If your parameter and value are "name = Amit", write the code fragment to perform some action for names other than Amit.
2. Discuss the different categories of session beans. What are the advantages of XML over HTML? Why is SGML not used over the web?
3. Explain the different development goals of XML document. What is a message-driven bean? Why are the transactional attributes of these beans important during deployment?
4. Explain the advantages of using Java's multiple-layer security implementation. How do we recover from a trusted system failure? Write down the points that need to be taken care of during the recovery.
5. Write a program fragment to implement an access control list to be able to read a payroll file. How can servlets collaborate using properties? Demonstrate with a code fragment that sets a parameter that is later used by another servlet.
6. Write a servlet to use a user-id and password stored in a database to authenticate a user. What is JNDI authentication? Explain with suitable example.
7. Write down the benefits of EJB architecture for the developers and users. Describe all the types of JDBC drivers with the advantages and disadvantages of each.
8. Write an HTML script with an embedded script to print the current time. Discuss the JSSE set of packages that support and implement the SSL.
9. Assume that there is a table named Customer in MS-Access with fields (Cust_id, Cust_name, Cust-phone, Cust-address). Write a code for Servlet which will display all the fields of Customer Table in tabular manner.
10. Differentiate between the following :—
 - (a) Generic Servlet and HTTP Servlet
 - (b) XML and SGML
 - (c) Covert storage channel and Covert Timing channel
 - (d) Low level introspection and High level introspection

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NALANDA OPEN UNIVERSITY
Master of Computer Application (MCA), Part-III
PAPER—XXV
(Computer Graphics And Multimedia)
Annual Examination, 2016

Time : 3 Hours.

Full Marks : 80

Answer any Five Questions.
All questions carry equal marks.

1. Explain how frame buffer is used to store picture information. Explain the need of Homogeneous coordinate system in 2D transformation.
2. What are touch panels? List different touch panels that are currently available for use.
3. Explain DDA line drawing algorithm. What are the disadvantages of this algorithm?
4. Differentiate the following :—
 - (i) Bitmap vs Vector graphics
 - (ii) JPEG vs GIF
 - (iii) Hypertext vs Hypermedia
5. Derive an expression for Phong Specular Reflection Model. Explain Isometric projection. Differentiate among Isometric, Dimetric and Trimetric projections.
6. Suggest with reasons a potential application of multimedia other than the applications in the field of entertainment and education.
7. Explain the following 3D transformations with their 3D transformation matrix :—
 - (i) Scaling with respect to origin
 - (ii) Rotation with respect to $z = 0$ plane
 - (iii) xy -Shearing
8. Given a triangle ABC, whose coordinates are A(1, 1), B(5, 2) and C(4, 3).
 - (i) Reflect the given triangle about x axis.
 - (ii) Reflect the given triangle about y axis.
 - (iii) Reflect the given triangle about $y = x$ axis.
9. Explain Z-Buffer Algorithm for hidden surface removal. What are its demerits? What are the differences between Gouraud Shading and Phong Shading methods ?
10. Explain the following terms :—
 - (i) Card based authoring tools
 - (ii) Raster and Random Scan
 - (iii) Sound editing tools
 - (iv) Anti-aliasing
 - (v) Ambient light
 - (vi) Plasma panel



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

(Artificial Intelligence and Knowledge Management)
Annual Examination, 2016

Time : 3 Hours.

Full Marks : 80

Answer any Five Questions.
All questions carry equal marks.

1. In context of the objections to the Turing Test, briefly discuss the Chinese Room Test. Describe 'Means-End Analysis' as a problem solving technique.
2. Explain the following terms with examples :—
 (i) Resolution and Unification (ii) MYCIN and EMYCIN
3. What are S-Expressions in LISP? Draw tree structure to classify the various categories of S-Expressions. Write a recursive program in LISP to find factorial of a number given by the user.
4. What is a fuzzy set? Explain various operations on fuzzy sets with an example for each. Determine *Concentration* and *Normalization* of a Fuzzy set A where,
 $A = \{\text{Mohan}10.5, \text{Sohan}10.9, \text{John } 10.7, \text{Abdul } 10, \text{Abraham}10.2\}$
5. What are Expert Systems? Briefly discuss the various categories of software tools, used for the development of expert systems. Write Well Formed Formula (WFF) for the following statements :—
 (i) Every person has a father. (ii) There is a man and he is the father of Ram.
6. What is the application of semantic networks in Artificial Intelligence? Draw a Semantic Network for "ALBERT STRUCK LUCY IN THE GARDEN WITH A SHARP KNIFE, LAST MONTH".
7. Name the form, to which the FOPL is finally transformed, such that it can be used for solving a problem with the Resolution method. Write the steps to bring FOPL to the form that can be used for resolution.
8. Symbolize and construct a proof for the following valid arguments, using rules of inference :—
 (i) If you smoke or drink too much, then you do not sleep well, and if you do not sleep well or do not eat well, then you feel down.
 (ii) If you feel down, you do not exercise well and do not study enough.
9. (a) Write a Prolog Program that adds an element X to a given set L.
 (b) Evaluate the following S-Expressions :
 (i) $(+ (\text{setq } x \ 7) (\text{setq } y \ 3))$
 (ii) $(+ (* \ 2 \ 3 \ 4) (- \ 89) (\text{truncate} (15 \ 7)))$
10. Compare and contrast the following pairs:
 (i) Associative Networks and Conceptual Graphs
 (ii) Predicate Logic and Propositional Logic
 (iii) Frames and Scripts
 (iv) Abductive Inference and Analogical Inference



Revised Examination Programme, 2016
Master of Computer Application, Part-III

Date	Papers	Time	Examination Centre
30.06.2016	Paper—XXVII	8.00 AM to 11.00 AM	Nalanda Open University, Patna
02.07.2016	Paper—XXVIII	8.00 AM to 11.00 AM	Nalanda Open University, Patna
04.07.2016	Paper—XXIX	8.00 AM to 11.00 AM	Nalanda Open University, Patna
07.07.2016	Paper—XIII (Practical)	12.00 Noon to 3.00 PM	School of Computer Education (IT) Nalanda Open University, 12 th Floor, Biscomaun Tower, Patna-800001
08.07.2016	Paper—XXVI (Practical)	12.00 Noon to 3.00 PM	
11.07.2016	Paper—XXX (Project Viva Voce)	12.00 Noon to 3.00 PM	

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

(Numerical and Statistical Computing)
Annual Examination, 2016

Time : 3 Hours.

Full Marks : 80

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

1. (a) Which of the following numbers has the greatest precision ?
 (i) 4.3201 (ii) 4.32
 (iii) 4.320106
- (b) What is the accuracy of the following numbers ?
 (i) 95.763 (ii) 0.008472
 (iii) 0.0465000 (iv) 3600.00
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 $x^3 - 2x - 5 = 0$, correct to 2 decimal places with the help of Bisection formula.

3. Solve the following systems using the Gauss elimination method

$$\begin{aligned} 3x_1 + 2x_2 + 3x_3 &= 5 \\ x_1 + 4x_2 + 2x_3 &= 4 \\ 2x_1 + 4x_2 + 8x_3 &= 8 \end{aligned}$$

4. Solve by Gauss-Seidel method the following system of linear equations.

$$\begin{aligned} 2x_1 - x_2 + x_3 &= -1 \\ x_1 + 2x_2 - x_3 &= 6 \\ x_1 - x_2 + 2x_3 &= -3 \end{aligned}$$

5. Obtain the estimate of the missing figure in the following table :—

x	1	2	3	4	5	6	7	8
f(x)	1	8	—	64	—	216	343	512

6. From the following data estimate the value of $f(2.25)$ using forward difference formula :—

x	0	0.5	1.0	1.5	2.0	2.5
f(x)	1.0	3.625	7.000	11.875	19.000	29.125

7. Find the interpolating polynomial that fits the data using the Lagrange's Interpolation formula :—

x	0	1	2	5	7	10
f(x)	2	3	12	147	198	226

8. (a) Evaluate the integral $\int_0^1 \frac{dx}{1+x}$ using Simpson's $\frac{3}{8}$ th rule with $h = \frac{1}{3}$.
 (b) Evaluate the integral $\int_1^4 x^2 dx$ using Weddle's rule with $h = 0.5$.

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

10. What is the utility of residual plots ? What is the disadvantage of residual plots ?

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

(Application Development with .Net Framework)
Annual Examination, 2016

Time : 3 Hours.

Full Marks : 80

Answer any Five Questions.
All questions carry equal marks.

1. Define .NET framework? Explain CTS (Common System Type) of .NET Framework in detail.
2. Explain Common Language Runtime features. Why are they used?
3. Describe the guidelines for project deployment. Explain how Windows-Client applications are deployed.
4. Explain the different stages in web form processing. What is Page life cycle?
5. Explain following terms :—
 - (a) ADO Objects.
 - (b) ADO Data Control.
 - (c) SQL
6. Explain ASP.NET configuration concept in detail. How they are helpful in application development?
7. What is Session State in ASP.NET? Explain in detail with an example.
8. Explain different types of Looping Statements in VB.NET with examples.
9. Describe different types of errors that may be found in an application. Explain the error detection and Error handling concepts.
10. Explain Universal Data Access. What is ODBC?



Revised Examination Programme, 2016
Master of Computer Application, Part-III

Date	Papers	Time	Examination Centre
04.07.2016	Paper–XXIX	8.00 AM to 11.00 AM	Nalanda Open University, Patna
07.07.2016	Paper–XXIII (Practical)	12.00 Noon to 3.00 PM	School of Computer Education (IT) Nalanda Open University, 12 th Floor, Biscomaun Tower, Patna-800001
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