



Tribhuvan University
Faculty of Humanities & Social Sciences
OFFICE OF THE DEAN
2019

Bachelor in Computer Applications
Course Title: Data Structures & Algorithms
Code No: CACS 201
Semester: III

Full Marks: 60
Pass Marks: 24
Time: 3 hours

Center:

Symbol No:

Candidates are required to answer the questions in their own words as far as possible.

Group A

Attempt all the questions.

[10 × 1 = 10]

1. Circle (O) the correct answer.

- i) What is the measurement for time complexity of an algorithm?
- a) Counting microseconds b) Counting kilobytes of algorithms
- c) Counting number of key operations d) Counting number of statements
- ii) Which of the following is the result of evaluation of $5 \ 7 \ 4 - * \ 8 \ 4 / +$?
- a) 5 b) 8 c) 10 d) 17
- iii) What is the recursive formula for post order traversal of binary tree?
- a) Left-Root-Right b) Root-Left-Right
- c) Left-Right-Root d) Right-Left-Root
- iv) What is the number of disk movement in TOH with 4 disks?
- a) 9 b) 14 c) 17 d) 15
- v) What is the Big-Oh of best case complexity of insertion sort?
- a) $O(n)$ b) $O(n \log n)$ c) $O(1)$ d) $O(n^2)$
- vi) How does the rear index incremented in circular queue?
- a) $\text{front} = (\text{rear} + 1) \% \text{SIZE}$ b) $\text{rear} = (\text{rear} + 1) \% \text{SIZE}$

c) $\text{rear} = \text{rear} + 1$

d) $\text{rear} = (\text{rear} - 1) \% \text{SIZE}$

vii) A variation of linked list in which none of the node contains NULL pointer is

a) Singly b) Multiple c) Circular d) Doubly viii) Which of the following data

structure is used in depth first search of graph?

a) Stack

b) Queue

c) Linked List

d) None of the above

ix) Which of the following is true for B-Tree of order M?

a) Leaf nodes should be at different level

b) All the key values within a node must be in descending order

c) Every node has at least M children

d) All non-leaf nodes with M-1 keys must have M number of children

x) Which of the following is not a hash function?

a) Division remainder

b) Folding

c) Chaining

d) Mid square



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Group B

Attempt any SIX questions.

[6 × 5 = 30]

2. What is Data Structure? Show the status of stack converting following infix expression to postfix $P + Q - (R * S / T + U) - V * W$ [1+4]
3. Write binary search. Consider a hash table of size 10; insert the keys 62, 37, 36, 44, 67, 91 and 107 using linear probing. [2+3]
4. What are deterministic and non-deterministic algorithms? Explain greedy algorithm. [3+2]
5. Draw a BST from the string DATASTRUCTURE and traverse the tree in post order and preorder. [3+2]
6. Define circular queue? How does circular queue overcome the limitation of linear queue? Explain. [2+3]
7. What is singly linked list? Write an algorithm to add a node at the beginning and end of singly linked list. [1+4]
8. Define AVL tree. Construct AVL tree from given data set: 4, 6, 12, 9, 5, 2, 13, 8, 3, 7, 11. [2+3]

Group C

Attempt any TWO questions.

[2 × 10 = 20]

9. What is stack? List the applications of stack. Write an algorithm or procedure to perform PUSH and POP operation in stack. [1+2+7]

10. What is heap? Explain quick sort algorithm with Big-oh notation in best case, average case and worst case and trace it to sort the data: 8, 10, 5, 12, 14, 5, 7, 13. [2+2+6]
11. Define graph and tree data structure. Explain breadth first traversal and depth first traversal with example.



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Group A

Attempt all the questions.

[10 × 1 = 10]

1. Circle (O) the correct answer.

i) Which one of the following is not a valid java bitwise operator?

a) >> b) <<

c) >>> d) <<<

ii) Which one of the following keyword is used to declare an exception?

a) throws b) throw

c) try d) catch

iii) Which of these is an incorrect array declaration?

a) `int ary[] = new int[5];` b) `int[] ary = new int[5];`

c) `int ary = int[5] new;` d) `int ary[]; ary = new int[5];`

iv) Which one of the following access specifier is appropriate for members of superclass to access only from subclass?

a) private b) protected

c) public d) default

v) Which one of the following is not a collection class defined in java?

- a) Linked List b) Hash Set
- c) Tree Set d) Graph Set
- vi) Which one of the following inheritance is best implanted using interface in java?
- a) single inheritance b) multi-level inheritance
- c) multiple inheritance d) hierarchical inheritance
- vii) Which one of the following method is called only once during the run time of your applet?
- a) stop() b) paint()
- c) init() d) start()
- viii) Which of these method of class String is used to compare two String objects for their equality?
- a) equals() b) Equals()
- c) is Equal() d) Is Equal()
- ix) What is the default value of priority variable MIN_PRIORITY and MAX_PRIORITY?
- a) 0 & 63 b) 1 & 10
- c) 0 & 1 d) 1 & 32
- x) Which one of the following is not java swing container?
- a) Panel b) Tabbed Pane
- c) Scroll Pane d) Scroll bar



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Group B

Attempt any SIX questions.

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2. Define OOP. Explain features of Object Oriented Programming Language. [1 + 4]
3. Explain different types of control statements used in java. [5]
4. Define Abstract Class. Explain different types of Access controls available in java. [1 + 4]
5. Define method overriding? Write any program to implement concept of multiple inheritance in Java.
[1 + 4]
6. Why it is important to handle exception in java? Write a program to illustrate the use of exception handling. [1 + 4]
7. Define the use of **static** keyword. Write any four String methods used in java with example.
[1 + 4]
8. Define **super**, **final** and **this** keyword in java. Explain the concept of MVC in brief.
[1 + 1 + 1 + 2]

Group C

Attempt any TWO questions.

[2 × 10 = 20]

9. a) Define multithreading. Write a java program to show the inter-thread communication.
[1 + 4]
b) Define Stream. Write a program in java to copy the content from one file to another.
[1 + 4]
10. a) Define Collection Class. Explain different Wrapper classes and associated methods in java.
[1 + 4]
b) Define AWT. Explain different types of Layout Managers in java.
[1 + 4]

11. a) List and explain any five swing controls with their uses. [5]

b) Define JDBC. Write a program to display all records from a table of database.

[1 + 4]

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Group A

Attempt all the questions.

[10 × 1 = 10]

1. Circle (O) the correct answer.

i) How many types of data on the basis of sources of data collection?

a) 1 b) 2 c) 3 d) 4 ii) Which is more appropriate central tendency to

find the average of profit?

a) Arithmetic mean

b) Median

c) Mode

d) All

iii) What is the range of Correlation?

a) 0 to ∞

b) $-\infty$ to ∞

c) -1 to 1

d) 0 to 1

iv) If $r=0.2$ then coefficient of determination implies that

a) 20% of total variation in dependent variable has been explained by independent variable.

b) 40% of total variation in dependent variable has been explained by independent variable.

c) 2% of total variation in dependent variable has been explained by independent variable.

d) 4% of total variation in dependent variable has been explained by independent variable.

v) What is the minimum value of Probability?

a) 1

b) 100

c) 0

d) None of above

vi) In case of Normal distribution

a) Mean > Median

b) Mean = Median

c) Mean $\leq$ Median

d) Mean $\geq$ Median

vii) The regression line of X on Y and Y on X are intersect at the point

- a) $(\mu, 0)$ b) (a, b) c) (X, Y) d) $(\bar{X}, \bar{Y})$

viii) In case of systematic sampling

- a) sample mean is biased estimator population mean.
b) sample mean is unbiased estimator population mean.
c) sample mean can't estimate population mean.
d) sample mean may equal to population mean.

ix) Mean of Chi-Square distribution with n degrees of freedom is

- a) 1 b) 0 c) 2n d) n

x) How do you obtain degree of freedom in one-way ANOVA?

- a) $(k, n-1)$ b) $(k, n-k)$
c) $(k-1, n-1)$ d) $k-1, n-k)$



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Group B

Attempt any SIX questions.

[6 × 5 = 30]

2. Describe scope and limitation of Statistics.
3. Determine average wages from following data:

Wages	25-30	30-35	35-40	40-45	45-50	50-55	55-60	60-65	65-70
No. of Worker	10	13	18	21	24	28	20	11	8

4. Calculate Karl Pearson's correlation coefficient from the following data:

Sales	43	41	36	34	50
Expenses	10	22	13	19	17

5. Estimate the marks in JAVA when the marks in Statistics is 65 by using following data:

Marks in Statistics	57	58	59	59	60	61	62	64
Marks in JAVA	77	78	75	78	82	82	79	81

6. Fit Binomial Distribution from the following data where $p = 0.5$

No. of heads	0	1	2	3	4
Frequency	28	62	46	20	4

7. How do you determine sample size in sampling? Explain briefly.
8. Write short notes on simple random sampling.

Group C

Attempt any TWO questions.

[2×10 =

20]

9. Student's age in the regular daytime BCA program and the morning time BCA program of a campus are described by two samples. If the homogeneity in age of the class is positive factor in learning make suggestion, with reason, which of two groups will be easier to teach?

Regular BCA program		Morning BCA program	
Age	No. of Students	Age	No. of Students
23	9	27	10
29	2	31	8
28	5	30	5
22	10	29	4
30	1	28	6
21	4	33	5
25	11	34	5
26	6	35	11
27	3	36	2
24	9	32	4
Total	60	Total	60

10. Given a normal distribution with mean 200 and s.d. 20, find the probability that

i) $P(X > 180)$

ii) $P(X < 220)$

iii) $P(160 < X < 240)$

iv) $P(X > 220)$

v) $P(X < 180 \text{ or } X > 220)$

vi) 10% of the values are less than what values of X?

11. The labor productivity indexes of Nepal are recorded as below:

Sector	Year		
	2015	2016	2017
Agriculture	100	125	138
Manufacturing	100	60	53
Community and Social service	100	89	80

Does the labor productivity index vary due to the;

- i) difference in the sector ii) difference in the time period?



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Group A

Attempt all the questions.

[10 × 1 = 10]

2. Circle (O) the correct answer.

- i) Which of the following Information systems are aimed at improving the routine business activities on which all organizations depend?
 - a) Management Information systems
 - b) Decision support systems
 - c) Transaction Processing Systems
 - d) Executive Information
- ii) The project life cycle consists of
 - a) Understanding the scope of the project
 - b) Objectives of the project
 - c) Formulation and planning various activities
 - d) Word Processor
- iii) Which is the most important feature of spiral model?
 - a) Quality Management
 - b) Efficiency Management
 - c) Risk Management
 - d) Performance Management
- iv) includes the existing system, the proposed system, system flow charts, modular design of the system, print layout charts and data file designs.
 - a) Feasibility Report
 - b) Functional Specification Report
 - c) Design Specification Report
 - d) Terms of Reference

- v) For the best Software model suitable for the project, in which of the phase the developers decide a roadmap for project plan?
- a) Software
 - b) System Analysis
 - c) Coding
 - d) Testing
- vi) Using the approach, a new system is tested in one part of the organization before being implement in others.
- a) Direct
 - b) Parallel
 - c) phased
 - d) pilot
- vii) extends the software beyond its original functional requirements.
- a) Adaptive maintenance
 - b) Perfective maintenance
 - c) Corrective maintenance
 - d) Preventive maintenance
- viii) Which normal form looks at removing partial dependencies?
- a) First Normal Form
 - b) Second Normal Form
 - c) Third Normal Form
 - d) Fourth Normal Form
-) ix) In constructing ER diagrams, double ovals are used to denote
- a) Multi-value table
 - b) Multi-value entity
 - c) Multi-value attributes
 - d) Multi-value key
- x) Testing beyond normal operational capacity is
- a) Performance testing
 - b) Stress testing
 - c) Recovery testing
 - d) None of the above



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Group B

Attempt any SIX questions.

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3. When would you use agile methodologies? How is it different from waterfall approach to system development?
4. Why is project management important? Briefly explain the activities performed by the project manager during project execution.
5. List various methods of interacting with a system. Briefly explain the factors to be considered while designing a form?
6. What are the deliverables from coding and testing? Briefly explain the different approaches to installation.
7. Why is normalization required? State second normal form and explain it with a proper example.
8. Construct an E-R Diagram for football club that has a name and a ground and is made up for players. A player can play for only one club and a manager identified by his name manage a club. A footballer has a registration number, name and age. A club manager also buys players. Each club plays against other clubs in the league and matches have a date, venue and score.
9. Maintenance is an on-going process. Do you agree? Explain the process of maintaining information systems.

Group C

Attempt any TWO questions.

[2 × 10 = 20]

10. Develop a context diagram and top level logical DFD for the system made up of the following.
B & B is a mail-order company that distributes CDs, DVDs of music, games, movies, software at discount prices to club members.

- When an order processing clerk receives an order form, he or she verifies that the sender is a club member by checking the Member file.
- If the sender is not a member, the clerk returns the order along with a membership application form.
- If the customer is a member, the clerk verifies the order item data by checking the item file.
- Then the clerk enters the order data and saves it to the Daily Order file. The clerk also prints an invoice and shipping list for each order, which are forwarded to the Order Fulfillment Department.

10. With proper reasoning, explain how CASE Tools aid in information system development? You have been hired as a system analyst in a TU tech software development company and you are asked to analyze the way the system works. What qualities do you need to have to analyze such type of systems?
11. a) Why do software projects often fail? Explain different types of software testing?
- b) List of OOAD. Differentiate between structured methodologies and object-oriented methodologies.



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Bachelor of Arts in Computer Application
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Group A

Attempt all the questions.

10□1 = 10

1. Circle (O) the correct answer.

i) Which of the following provide additional information about HTML elements?

- a) Headings b) Paragraphs c) Attributes d) Styles

ii) Which of the following is NOT an inline element?

- a) `<img>` b) `<span>` c) `<input>` d) None of the above

iii) How can you make an e-mail link?

- a) `<a href="mailto:xxx@yyy">` b) `<mail href="xxx@yyy ">`

- c) `<mail>xxx@yyy </mail>` d) `<a href="xxx@yyy ">`

iv) For XML document to be valid?

- a) Document need to be well formed also
b) Document need not to be well formed
c) Document need to be well formed & valid
d) Document validity has no relationship with well formedness

v) W3C is stands for

- a) World Wide Web Center
 - b) World Wide Web Company
 - c) World Wide Web Consortium
 - d) World Wide Web Certificate
- vi) XSL is,
- a) AN XML based language to create style sheets
 - b) Extensible solution language
 - c) A language which is not used in XML
 - d) Extended stylesheet language
- vii) CSS uses dot (.) for,
- a) Element selector
 - b) Class selector
 - c) ID selector
 - d) Attribute selector
- viii) Namespace in XML is used to,
- a) Distinguishes one XML vocabulary from another
 - b) Provides the spaces into name
 - c) Querying language
 - d) Make duplicate of XML validation
- ix) A cookie is often used to identify a
- a) User
 - b) Browser
 - c) Web page
 - d) Client
- x) Server side scripts is
- a) Visible to the end user
 - b) Invisible to the end user
 - c) Defined to user
 - d) None



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Group B

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2. What is CSS? Discuss types of CSS with example.
3. What is XML? Differentiate XML schema with DTD.
4. List common application of web server, Explain how session works.
5. Describe the tags and attributes for a form in HTML document?
anonymous access? Discuss about Integrated windows authentication
6. What is
7. Explain tire technology with examples?
8. Write short note on following:
 - Cookies.
 - XML DOM

Group C

Attempt any TWO questions.

[2×10= 20]

9. Differentiate between tags and attributes? Write a HTML and CSS code design your curriculum vitae (CV) using different html elements like (table, image, formatting tags, links).
10. Develop a simple web page that asks the users input (name, email, phone, gender) and store into database using server side script.
11. What are the rules for creating XML document? Write a XML code to store following information about student.
 - Each student has a name, address, phone and website element.
 - Address might appears multiple times
 - Address has attribute named “type” with value permanent and temporary ☐ Phone must be 10 digit.