BCA/3/CC/14

### Student's Copy

## Professional Course (Odd) Examination, 2024 (CBCS)

(3rd Semester)

#### BACHELOR OF COMPUTER APPLICATIONS

( Data Structure Using C )

Full Marks: 75

Time : 3 hours

The figures in the margin indicate full marks for the questions

( PART : A-OBJECTIVE )

( Marks : 25 )

SECTION-I

(Marks: 15)

A. Tick (✓) the correct answer in the brackets provided : 1×10=10

- How is the 2nd element in an array accessed based on pointer notation?
  - (a) a + 2 (b) a + 2 (c) (b) a + 2 (c)
  - (c) (a + 2) (d) (a + 2) (e)
- 2. Which of the following is a linear data structure?
  - (a) Graphs () (b) Array () (c) Binary tree () (d) AVL Tree ()

/386

1

() rsion? )
( ) rsion? ) st time
st time
) st time
st time
st time
st time
st time
st time
namic
ement
ement
ement
ement
namic

/386

	9.	The	post-or	der	travers	sal ha	as a s	equend	e					
		(a)	left-rig	ht-ro	ot	(	)	(b)	left-	right-le	eft	(	)	
		(c)	left-roo	ot-rig	ht	(	)	(d)	right	t-root-l	eft	(	)	
	10.	Wha tree	at is the ?	max	kimum	num	ber of	childre	en a n	ode ca	n hav	e in a	in n-	ary
		(a)	n	(	)			(b)	0	(	)			
		(c)	1	(	)			(d)	2	(	)			
в.	Sta a T	te wl ick (	hether t	he fo k :	ollowin	ig sta	temen	ts are	True (	(T) or <i>F</i>	alse	(F) by	putt	ing 1×5=5
	1.	The	malloc	:() fu	nction	initia	alizes	allocat	ed me	emory	to ze	ro.		
										(	Т	/	F	)
	2.	Rec	cursive	algo	rithms	are i	mplen	nented	using	g while	loop			
										(	Т	/	F	)
	3.	The	e numb ue of th	er of ne se	key co earch i	ompai tem.	risons	in a se	quenc	ce sear	ch de	pend	s on	the
										(	Т	1	F	)
	4.	A 1	inked li	ist is	a ran	ndom-	acces	s data	struct	ture su	ich a	s an	аггаз	
										(	Т	/	F	)
	5.	Tre	es can	be e	empty.						_		_	× .
										(	Т	/	F	)
							SECTI	ON—II						
						)	( Mark	cs:10)						
С	. Ar	iswei	r the fo	llowi	ng que	estion	s :							2×5=10
	1.	W	hat are	non	linear	data	struc	tures?	Give	examp	les.			
	2.	W	hat is r	ecur	sive fu	nctio	n? Exp	plain ir	brie	f.				
	3.	w	hich of	the	sorting	tech	nique	s is fas	test?	Why?				
	4.	Ho	w is lir	nked	list ef	ficien	t in te	erms of	mem	ory ov	er an	arra	y?	
	5.	. Me	ention t	he a	pplicat	ions	of tree	es.						
/3	86							3						[ Contd.

# ( PART : B-DESCRIPTIVE )

## ( Marks : 50 )

(a) What is dynamic memory allocation? Explain the four dynamic memory allocation functions with their syntax.
 2+8=10

#### OR

- (b) What are the different operations of data structure? 5
- (c) Write an illustration to understand the pointer of array.
- 2. (a) Find the prefix and postfix of the following :

 $A + (B / C - (D^*E^{F}) + G)^*H$ 

(b) By mentioning every step, evaluate the following postfix expression: 4 74-3\*15+/\*

#### OR

- (c) Explain the working principle of stack with appropriate diagram. Explain its operations with an algorithm.
- (d) What are the applications of queues?
- (a) Write a C program to implement a binary search. Explain the concept and working principles of Binary search with appropriate examples.

6+4=10

6

4

10

5

6

8

2

#### OR

(b) Explain in detail how a selection and merge sort work for the following data :

32, 16, 4, 11, 38, 7

- (c) Write a C program of bubble sort.
- 4. (a) What are the different types of linked list? Explain any four with appropriate diagram. Mention two advantages and two disadvantages of each linked list.

| Contd.

- (b) Write a C program to implement a circular linked list that inserts at any given position, deletes and displays items. 10
- (a) From the following numbers, form the binary search tree : 45, 34, 18, 90, 23, 68, 45, 9
  - (b) From the following binary tree, write down the in-order, pre-order and the post-order traversals :



(c) Explain DFS and BFS using the following graph, starting from the node 0. Mention two differences of DFS and BFS : 4+4+2=10



5

4

б

BCA/3/CC/14

## Student's Copy

## **Professional Course (Odd) Examination, 2024**

(CBCS)

(3rd Semester)

#### BACHELOR OF COMPUTER APPLICATIONS

( Data Structure Using C )

Full Marks : 75

Time : 3 hours

The figures in the margin indicate full marks for the questions

( PART : A-OBJECTIVE )

(Marks: 25)

SECTION-I

(Marks: 15)

A. Tick (1) the correct answer in the brackets provided :

- 1×10=10
- How is the 2nd element in an array accessed based on pointer notation?
  - (a) a+2 (b) a+2 (c)

(c) (a + 2) ( ) (d) (a + 2) ( )

- 2. Which of the following is a linear data structure?
  - (a) Graphs () (b) Array ()
  - (c) Binary tree () (d) AVL Tree ()

/386

3.	Which of the following is not the type of queue?
	(a) Priority queue () (b) Single-ended queue (
	(c) Circular queue () (d) Ordinary queue ()
4.	Which of the following data structures finds its use in recursion?
	(a) Arrays () (b) Linked list ()
	(c) Queues () (d) Stacks ()
5.	What is the time complexity of the Binary search algorithm?
	(a) $O(n)$ (b) $O(1)$ (c)
	(c) $O(\log 2n)$ ( ) (2) $O(r^{2}n)$ ( )
6	$(a) O(n^2) (a) O(n^2) (b)$
о.	Which of the following sorting algorithms provides the best time complexity in the worst-case scenario?
	(a) Merge sort ( )
	(b) Insertion sort ( )
	(c) Selection sort ()
	(d) Quick sort ( )
7.	Which of the following can be done with linked list?
	(a) Implementation of stack and queue
	(b) Implementation of Binary tree ( )
	(c) Implementation of data structure that can simulate dynamic arrays ( )
	(d) All of the above ()
8.	In linked list implementation of a queue, where should a new element be inserted?
	(a) At the head of linked list ()
	(b) At the center position in the linked list
	(c) At the tail of the linked list ()
	(d) At any position in the linked list ()
	2

/386

Contd.

)

9.	The	post-or	der	travers	al h	as a se	queno	e					
	(a)	left-rig	ht-ro	oot	(	)	(b)	left-1	right-le	eft	(	)	
	(c)	left-roo	ot-rig	ght	(	)	(d)	right	t-root-l	left	(	)	
10.	Wh	at is the	e ma	ximum	num	ber of	childre	en a n	ode ca	n hav	e in a	in n-a	агу
	(a)	n	(	1			(b)	0	(	)			
	(c)	1	è	, )			(d)	2	i	j			
				·					·				
<b>B.</b> St a	B. State whether the following statements are True (T) or False (F) by putting a Tick (✓) mark : 1×5=5										ing 1×5=5		
1	. Th	ne mallo	oc() f	unction	init	ializes a	allocat	ed m	emory	to zer	ro.		
									(	Т	1	F	)
2	2. R	ecursive	algo	orithms	are	implen	nented	usin	g while	e loop	•		
									(	Т	1	F	)
3	3. T	he num	ber c	of key c	ompa	risons	in a se	equen	ce sea	rch de	pend	s on	the
	Va	alue of	the s	search	item.				8	_		-	14
									(	Т	/	F	)
4	4. A	linked	list	is a ra	ndon	n-access	s data	struc	cture s	uch a	s an	arra	y.
									(	T	/	F	)
	5. T	rees ca	n be	empty						-			· .
									(	Т	/	F	)
						SECT	ION—I	I					
						( Mark	cs : 10	)					
c.	Ansv	ver the	follo	wing qu	iestio	ns :							2×5=10
	1.	What ar	e no	n-linea	r dat	a struc	tures?	Give	exam	ples.			
	2.	What is	recu	irsive f	uncti	on? Ex	plain	in bri	ef.				
	3.	Which o	of the	e sortir	ng teo	hnique	s is fa	stesti	Why?	<b>,</b>			
	4.	How is	linke	ed list o	efficie	ent in t	erms (	of men	mory o	ver ar	n arra	ay?	
	5	Mentior	the	applic	ation	s of tre	es.		÷				
				~ppno									

### ( PART : B-DESCRIPTIVE )

(Marks: 50)

 (a) What is dynamic memory allocation? Explain the four dynamic memory allocation functions with their syntax.
 2+8=10

#### OR

	(b)	What are the different operations of data structure?	5
	(c)	Write an illustration to understand the pointer of array.	5
2.	(a)	Find the prefix and postfix of the following :	
		$A + (B / C - (D^*E^F) + G)^*H$	6
	(Ь)	By mentioning every step, evaluate the following postfix expression :	4
		$74 - 3^{*}15 + / *$	

#### OR

(c)	Explain the working principle of stack with appropriate diagram	
	Explain its operations with an algorithm	
(1)	i algorium.	8

- (d) What are the applications of queues?
- 3. (a) Write a C program to implement a binary search. Explain the concept and working principles of Binary search with appropriate examples.

6+4=10

2

#### OR

(b)	Explain in detail how a selection and merge sort work for the following data :	
	32, 16, 4, 11, 38, 7	

- (c) Write a C program of bubble sort.
- 4. (a) What are the different types of linked list? Explain any four with appropriate diagram. Mention two advantages and two disadvantages of each linked list.

4

10

6

4

OR

## /386

(b) Write a C program to implement a circular linked list that inserts at any given position, deletes and displays items.
10

- 5. (a) From the following numbers, form the binary search tree : 4 45, 34, 18, 90, 23, 68, 45, 9
  - (b) From the following binary tree, write down the in-order, pre-order and the post-order traversals :



(c) Explain DFS and BFS using the following graph, starting from the node 0. Mention two differences of DFS and BFS : 4+4+2=10



5

G25-210

6

BCA/5/CC/25

## Student's Copy

### Professional Course (Odd) Examination, 2024

## (CBCS)

(5th Semester)

#### BACHELOR OF COMPUTER APPLICATIONS

(Software Engineering-I)

Full Marks : 75

Time : 3 hours

The figures in the margin indicate full marks for the questions

### ( PART : A-OBJECTIVE )

(Marks: 25)

SECTION-I

(Marks: 15)

**A.** Tick ( $\checkmark$ ) the correct answer in the brackets provided :  $1 \times 10 = 10$ 

- 1. During software development, which factor is most crucial?
  - (a) People ( )
  - (b) Product ()
  - (c) Process ()
  - (d) Project ()

/391

- 2. Which one of the following models is not suitable for accommodating any change?
  - (a) Build and Fix model ()
  - (b) Prototyping model ( )
  - (c) RAD model ()
  - (d) Waterfall model ()
- 3. Use case approach was developed by
  - (a) B. Littlewood ()
  - (b) J. D. Musa and others ()
  - (c) I. Jacobson and others ()
  - (d) None of them ()

4. Level-0 DFD is similar to

- (a) use case diagram ()
- (b) context diagram ( )
- (c) system diagram ( )
- (d) None of the above ()

5. The importance of software design can be summarized in a single word

- (a) accuracy ()
  (b) complexity ()
  (c) efficiency ()
- (d) quality ()

/391

6. Which one of the following is not a strategy for design?
(a) Bottom-up design ( )
(b) Top-down design ( )
(c) Embedded design ()
(d) Hybrid design ()
7. Software science measures are developed by
(a) B. Littlewood ( )
(b) M. Halsted ( )
(c) T. J. McCabe ()
(d) G. Rothermel ()
8. COCOMO stands for
(a) Constructive Cost Model ()
(b) Comprehensive Cost Model ( )
(c) Constructive Cost Estimation Model ()
(d) Complete Cost Estimation Model ()
9. Which of the following testings is related to the boundary value analysis?
(a) White-box and black-box testing ( )
(b) White-box testing ( )
(c) Black-box testing ()
(d) None of the above ()

/391

| Contd.

10. Software reliability is defined with respect to

- (a) time () (b) bugs () (c) failures () (d) quality ()
- B. State whether the following statements are True (T) or False (F) by putting a Tick (✓) mark in the brackets provided : 1×5=5
  - 1. System testing is the first step in the software development life cycle.

2. Requirements analysis is an iterative process.

 When using structured design methodologies, the process of stepwise refinement is unnecessary.

(T / F)

4. Cyclomatic complexity is not a size metric.

(T / F)

5. Mean Time To Repair (MTTR) is the time needed to repair a failed hardware module.

(T / F)

Contd.

## SECTION-II (Marks: 10)

C. Answer the following questions :

- 1. Define the term 'software engineering'. Mention its objective.
- 2. What are DFDs and data dictionaries?
- 3. What is software design? Mention the goal of software design.
- 4. Define organic and embedded projects with examples.
- Define maintainability and adaptability with respect to software quality.

#### ( PART : B-DESCRIPTIVE )

( Marks : 50 )

D. Answer the following questions :

- (a) Explain the spiral model and discuss the various activities in each phase with suitable diagram and mention the disadvantages of such a model.
  - (b) Explain the reasons for difficulties in improving software process. 4

#### OR

(c) Describe the following software development life cycle models :

5×2=10

- (i) Waterfall model(ii) Evolutionary process model
- (a) Discuss the various methods of requirement elicitation.
   (b) What are throw-away and evolutionary prototyping approaches?
   4

5

/391

2×5=10

10×5=50

6

,
١.

- (c) Explain the different characteristics of a good SRS document.
- (d) Discuss the inputs and outputs of the requirements validation process.
- (a) Describe any five types of cohesion with suitable examples. 3.
  - (b) Explain the three strategies of design.

#### OR

- (c) Discuss the concepts of object-oriented design. 6
- (d) Write a short note on function-oriented design.
- Mention the importance and the disadvantages of COCOMO model. 4. Discuss the three types of COCOMO model-basic, intermediate and detailed with suitable examples. 4+6=10

#### OR

- (a) What are information flow metrics? Explain the basic information flow model.
- (b) Discuss the problems during the implementation of metrics in any organization. What are the various categories of software metrics?
- (a) With suitable diagrams, explain the different levels of testing. 5. 6
  - (b) Differentiate between the following :

(i) Alpha and Beta testings

(ii) Verification and Validation

#### OR

- (c) What is software maintenance? Describe the various categories of maintenance. Which category consumes maximum effort and why?
- (d) Explain the phases of software maintenance process with suitable

5

5

6

4

5

5

4

5

5

4

/391

\*\*\*

## Professional Course (Odd) Examination, 2024

(CBCS)

(5th Semester)

## BACHELOR OF COMPUTER APPLICATIONS

(Software Engineering-I)

Full Marks : 75

Time : 3 hours

The figures in the margin indicate full marks for the questions

( PART : A-OBJECTIVE )

(Marks: 25)

SECTION-I

(Marks: 15)

**A.** Tick ( $\checkmark$ ) the correct answer in the brackets provided :  $1 \times 10 = 10$ 

- 1. During software development, which factor is most crucial?
  - (a) People ( )
    (b) Product ( )
    (c) Process ( )
    (d) Project ( )

/391

Ń

BCA/5/CC/25

- 2. Which one of the following models is not suitable for accommodating any change?
  - (a) Build and Fix model ()
  - (b) Prototyping model ( )
  - (c) RAD model ()
  - (d) Waterfall model ()
- 3. Use case approach was developed by
  - (a) B. Littlewood ()
  - (b) J. D. Musa and others ()
  - (c) I. Jacobson and others ( )
  - (d) None of them ()

4. Level-0 DFD is similar to

- (a) use case diagram ()
- (b) context diagram ( )
- (c) system diagram ( )
- (d) None of the above ()

5. The importance of software design can be summarized in a single word

- (a) accuracy ()
- (b) complexity ( )
- (c) efficiency ( )
- (d) quality ()

/391

Contd.

6. Which one of the following is not a strategy for design?
(a) Bottom-up design ( )
(b) Top-down design ( )
(c) Embedded design ()
(d) Hybrid design ()
7. Software science measures are developed by
(a) B. Littlewood ()
(b) M. Halsted ( )
(c) T. J. McCabe ()
(d) G. Rothermel ()
8. COCOMO stands for
(a) Constructive Cost Model ( )
(b) Comprehensive Cost Model ( )
(c) Constructive Cost Estimation Model ()
(d) Complete Cost Estimation Model ()
9. Which of the following testings is related to the boundary value analysis?
(a) White-box and black-box testing ( )
(b) White-box testing ( )
(c) Black-box testing ( )
(d) None of the above ()

Ì

1

10. Software reliability is defined with respect to

- (a) time ()
- (b) bugs ( )
- (c) failures ( )
- (d) quality ()
- B. State whether the following statements are True (T) or False (F) by putting a Tick (✓) mark in the brackets provided : 1×5=5

1.15

- 1. System testing is the first step in the software development life cycle.
- 2. Requirements analysis is an iterative process.
- When using structured design methodologies, the process of stepwise refinement is unnecessary.
  - (T / F)

(T / F)

(T / F)

4. Cyclomatic complexity is not a size metric.

- (T / F)
- 5. Mean Time To Repair (MTTR) is the time needed to repair a failed hardware module.

(T / F)

/391

4

Contd.

## SECTION-II (Marks: 10)

C. Answer the following questions :

- 1. Define the term 'software engineering'. Mention its objective.
- 2. What are DFDs and data dictionaries?
- 3. What is software design? Mention the goal of software design.
- 4. Define organic and embedded projects with examples.
- Define maintainability and adaptability with respect to software quality.

### ( PART : B-DESCRIPTIVE )

( Marks : 50 )

D. Answer the following questions :

- (a) Explain the spiral model and discuss the various activities in each phase with suitable diagram and mention the disadvantages of such a model.
  - (b) Explain the reasons for difficulties in improving software process. 4

#### OR

(c) Describe the following software development life cycle models :

5×2=10

- (i) Waterfall model(ii) Evolutionary process model
- 2. (a) Discuss the various methods of requirement elicitation. 6
  - (b) What are throw-away and evolutionary prototyping approaches? 4

/391

| Contd.

10×5=50

6

2×5=10

OR

	(c)	Explain the different characteristics of a good SRS document.	6
	(d)	Discuss the inputs and outputs of the requirements validation process.	4
3.	(a)	Describe any five types of cohesion with suitable examples.	5
	(b)	Explain the three strategies of design.	5

#### OR

(C)	Discuss the concepts of object-oriented	design.	6
(d)	Write a short note on function-oriente	d design.	4

 Mention the importance and the disadvantages of COCOMO model. Discuss the three types of COCOMO model—basic, intermediate and detailed with suitable examples.
 4+6=10

#### OR

(a)	What are information flow metrics? Explain the basic information	
	flow model.	5

- (b) Discuss the problems during the implementation of metrics in any organization. What are the various categories of software metrics? 5
- 5. (a) With suitable diagrams, explain the different levels of testing. 6
  - (b) Differentiate between the following :
    - (i) Alpha and Beta testings
    - (ii) Verification and Validation

#### OR

- (c) What is software maintenance? Describe the various categories of maintenance. Which category consumes maximum effort and why?
- (d) Explain the phases of software maintenance process with suitable diagram.

\* \* \*

4

5

5