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R. V. COLLEGE OF ENGINEERING

Autonomous Institution affiliated to VTU

IV Semester B. E. Examinations April/May-18

Computer Science and Engineering

DESIGN AND ANALYSIS OF ALGORITHMS

Time: 03 Hours ***Maximum Marks: 100***

Instructions to candidates:

1. Answer all questions from Part A. Part A questions should be answered in first three pages of the answer book only.
2. Answer FIVE full questions from Part B.In Part B question number 2, 7 and 8 are compulsory. Answer any one full question from 3 and 4 & one full question from 5 and 6

PART A

1	1.1	What is an algorithm?	01
	1.2	Find the average case efficiency of a sequential search algorithm.	01
	1.3	What are the different ways in which graphs can be represented for computer algorithms?	01
	1.4	Define greedy method.	01
	1.5	What is an optimal and feasible solution?	01
	1.6	Denote the time complexity of quick sort algorithm for work case.	01
	1.7	Define binomial coefficient.	01
	1.8	State the principle of backpacking.	01
	1.9	Differentiate between recursive and non-recursive algorithms.	02
	1.10	Write the control abstraction of divide-and-conquer method.	02
	1.11	Compare and contrast DFS and BFS.	02
	1.12	Define the transitive closure of a graph.	02
	1.13	State single source shortest path problem.	02
	1.14	Compare NP-complete and NP-hard problems.	02

PART B

2	a	Discuss with a neat flow chart, the process of algorithm design and analysis.	06
	b	Explain asymptotic notations used in algorithm analysis.	06
	c	If $t_1(u) \in O(g_1(u))$ and $t_2(u) \in O(g_2(u))$, Prove that $t_1(u) + t_2(u) \in O(max\{g_1(u), g_2(u)\})$.	04
3	a	State and discuss to sort a list of elements using merge sort.	04
	b	Discuss how quicksort works to sort an array and trace for the following dataset. $65, 70, 75, 80, 85, 60, 55, 50, 45$. Also draw the tree of recursive calls made.	06
	c	Apply Strassen's algorithm to compute: $\begin{bmatrix}1 & 0 & 2 & 1\\4 & 1 & 1 & 0\\0 & 1 & 3 & 0\\5 & 0 & 2 & 1\end{bmatrix} \times \begin{bmatrix}0 & 1 & 0 & 1\\2 & 1 & 0 & 4\\2 & 0 & 1 & 1\\1 & 3 & 5 & 0\end{bmatrix}$	06

OR

4 a Give a suitable algorithm for finding a minimum edge path between two given vertices in any given graph. Apply that algorithm to the graph shown in Fig Q4(a) showing the tree that identifies the minimum edge path from a to g. 04

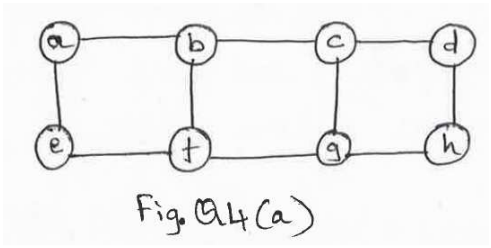

Fig. Q4(a)

b Define topological sorting. Apply DFS-based algorithm to solve the topological sorting problem for the given graph Fig Q4(b). 06

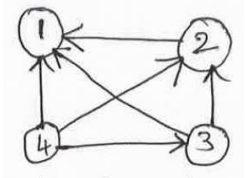

Fig Q4(b)

c Write the Johnson Trother algorithm for generating permutations. Generate all permutations of {3,5,7} using the following: 06

i) Bottom up minimal change algorithm.

ii) Johnson Trother algorithm. 06

5 a Sort the list in non-decreasing order using heep sort. Show the heapification at every step. List: $1, 8, 6, 5, 3, 7, 4$. 06

b Explain the construction of $2-3$ tree and construct a $2-3$ tree for the list. $10, 6, 9, 4, 3, 5, 8$. 06

c What is AVL tree? Explain the four types of rotations used to construct the AVL tree. 04

OR

6 a State Horspool's algorithm for pattern matching. Apply the same to search for the pattern Brown in a text given below:
Text: $That\_color\_is\_not\_Brown$ 08

b Discuss Boyer-Moore algorithm for string matching. Find the pattern $BAOBAB$ in a given text.
Text: $BESS\_KNEW\_ABOUT\_BAOBAB$ 08

7 a Give the recurrence used to solve Knapsack problem using dynamic programming and explain in brief the same. Solve the following Knapsack problem using dynamic programming. Capacity $w = 5$. 06

$Item$	1	2	3	4
$Weight$	2	1	3	2
$Value$	12	10	20	15

	b	Write an algorithm to find the all-pairs shortest path problem for the digraph with the weight matrix. $\begin{bmatrix} 0 & \infty & 3 & \infty \\ 2 & 0 & \infty & \infty \\ \infty & 7 & 0 & 1 \\ 6 & \infty & \infty & 0 \end{bmatrix}$	04
	c	Construct a Hauffman code for the following data: $\begin{array}{\|c\|c\|c\|c\|c\|c\|} \hline Char & A & B & C & D & E \\ \hline Probability & 0.1 & 0.15 & 0.15 & 0.2 & 0.4 \\ \hline \end{array}$ Encode the text $BECAD$.	06
8	a	With the help of a state space tree, solve the following instance of the Knapsack problem using branch-and-bound technique. Knapsack capacity = 10. $\begin{array}{\|c\|c\|c\|c\|c\|} \hline Item & 1 & 2 & 3 & 4 \\ \hline Weight & 4 & 7 & 5 & 3 \\ \hline Value & 40 & 42 & 25 & 12 \\ \hline \end{array}$	06
	b	Explain backtracking concept used to solve Subset_Sum problem. Apply to solve for $S = \{6,5,3,7\}$ and $d = 15$.	06
	c	Define the following. i) Class P ii) Class NP.	04

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R. V. COLLEGE OF ENGINEERING

Autonomous Institution affiliated to VTU

IV Semester B. E. Examinations April/May-18

Computer Science and Engineering

OBJECT ORIENTED PROGRAMMING USING JAVA

Time: 03 Hours ***Maximum Marks: 100***

Instructions to candidates:

3. Answer all questions from Part A. Part A questions should be answered in first three pages of the answer book only.
4. Answer FIVE full questions from Part B.In Part B question number 2, 7 and 8 are compulsory. Answer any one full question from 3 and 4 & one full question from 5 and 6

PART A

1	1.1	List the major elements of the object model.	01
	1.2	_____ feature can be implemented using encapsulation.	01
	1.3	Distinguish between links and aggregation.	02

	1.4	What is the output of the following program?
		class exam
		{
		public static void main (*string args* [ ])
		{
		int $a = 1, b = 2, c = 3;$
		$a\| = 4;$
		$b >>= 1;$
		$c <<= 1;$
		$a\hat{} = c;$
		System.out.println $(a + "\backslash t" + b + "\backslash t" + c);$
		}
		}
			02

	1.5	What is the output of the following program?
		class Exam
		{
		public static void main (*String args* [ ])
		{
		*int ar*1[ ] = {1, 2, 3};
		*int ar*2[ ] = {1, 2, 3};
		if (*ar*1 == *ar*2)
		System.out.println(*"Same"*);
		else
		System.Out.Println(*"Not Same"*);
		}
		}
			02

	1.6	Differentiate between "super" and "this" keyword.	02
	1.7	List the exception handling keywords with syntax.	02

	1.8	Identify the missing code in the following program and provide the necessary statement at that place. The code should display the name of the thread created.
		public class Exam
		{
		public void run( )
		{
		}
		public static void main (*string args* [ ])
		{
		*Exam t*1 = *new Exam* ( );
		*t*1.*run* ( );
		}
		}
			02

	1.9	_____ method is used to start a thread execution.	01
	1.10	Java Array List Class uses a dynamic array for storing the elements. It extends _____ class and implements _____ interface.	01
	1.11	What does \[^(]* regular expression indicate?	01
	1.12	Write the syntax for creating the following Java *FX* controls i) TextField ii) RadioButton.	01
	1.13	List the various *JSP* tags.	01
	1.14	Mention the different types of *JDBC* statements available.	01

PART B

2	a	Explain the five metrics that measures the quality of abstraction.	08
	b	Draw the state of a car as an aggregation of part states (ignition, transmission, accelerator, brake).	08
3	a	Distinguish between method overloading and method overriding in Java with suitable examples.	04
	b	Develop a Java program to remove duplicate elements in unsorted array.	05
	c	List and explain the different types of inheritance. Explain how multiple inheritance is achieved in Java.	07
		OR	
4	a	Develop a Java program to calculate the absolute difference between the sums of the diagonals of a square matrix of size $N \times N$. Example: Sample Input: 3 $\begin{bmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \\ 7 & 8 & 9 \end{bmatrix}$ output: 2	06
	b	Define package. Write a Java program to create a package balance containing account class with Display_Balance method and import this package in another program to access method of Account Class.	06
	c	Demonstrate with a sipnet handling multiple catch clauses.	04
5	a	What is synchronization? Explain the role of synchronization with producer and consumer problem.	06

	b	Develop a Java program to implement the following using Lambda expression for a functional interface "Numeric Interface" i) Factorial of a number ii) Check whether a number is prime or not.	06
	c	Differentiate between ArrayList and LinkedList.	04
		OR	
6	a	Explain the Thread life cycle in Java with the help of a neat diagram.	06
	b	Differentiate between Iterator and List-Iterator interface.	04
	c	Develop a Java program to perform the following operations on Vector class i) Adding elements ii) Get total number of elements.	04
	d	Discuss the static method reference in Lambda expression.	02
7	a	What is the purpose of console class? Demonstrate with an example.	04
	b	Create a JavaFX application with a label and two buttons named India and Srilanka. When either of the buttons pressed, it should display respective label with its icon. Refer the image icons "India.gif" and Srilanka.gif". set the initial label as "Press the Button".	06
	c	Develop a Java program to validate email address using regular expression.	06
8	a	What is ResultSet? How to set scroll options to ResultSet? Explain.	05
	b	Define *JSP*. Explain the different types of *JSP* tags by taking suitable examples.	06
	c	What is bean persistence property? Explain the purpose of introspection.	05

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R. V. COLLEGE OF ENGINEERING

Autonomous Institution affiliated to VTU

IV Semester B. E. Examinations April/May-18

Computer Science and Engineering

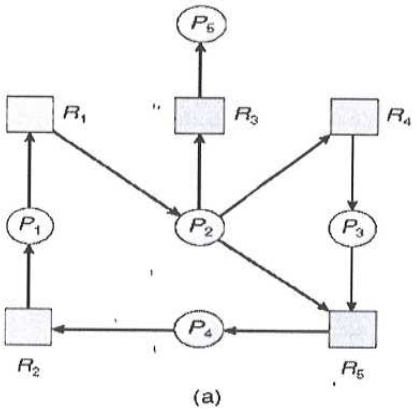
OPERATING SYSTEMS

Time: 03 Hours ***Maximum Marks: 100***

Instructions to candidates:

5. Answer all questions from Part A. Part A questions should be answered in first three pages of the answer book only.
6. Answer FIVE full questions from Part B.In Part B question number 2, 7 and 8 are compulsory. Answer any one full question from 3 and 4 & one full question from 5 and 6

PART A

1	1.1	In a multiprogramming environments, an I/O-bound program should have _____ priority than a CPU-bound program.	01
	1.2	Consider three CPU-intensive processes, which require $10, 20$ and 30 time units and arrive at times $0, 2$ and 6 respectively. How many context switches are needed if the operating system implements a shortest remaining time first scheduling algorithm? Do not count the context switches at time zero and at the end.	02
	1.3	List and explain briefly explain the benefits of multithreading.	02
	1.4	Differentiate program, process and threads.	02
	1.5	Construct a wait-for-graph for resource allocation graph below and determine if there exist a deadlock.  (a)	02
	1.6	Suppose a process requests $12KB$ of memory and memory manager currently has a list of unallocated blocks of $6KB, 14KB, 19KB, 11KB$ and $13KB$ blocks. Identify the block allocated by best fit, first fit and worst fit strategy.	02
	1.7	What is virtual memory? What are methods used to implement virtual memory?	02
	1.8	CPU scheduling policy used by $XV6$ is _____.	01

	1.9	Assuming $1KB$ page size and 32,768 logical address space size, what are the page numbers and offsets for the following address references: a) 3275 b) 19366.	02
	1.10	Name the algorithm that selects the request with minimum seek time from the current head position.	02
	1.11	Consider a paging system with TLB. If it takes 20 ns to search TLB and 100 ns to access the memory what is the effective memory access time with 98-percent hit ratio?	02

PART B

2	a	List the approaches to design the operating system structure, explain any one in detail.	06
	b	Differentiate user threads and kernel threads.	04
	c	What is context switching? With the help of neat diagram explain context switching between processes.	06
3	a	An operating system uses shortest remaining time First ($SRTF$) process scheduling algorithm. Consider the arrival times and execution times for the following processes: ***Process*** | ***Execution time*** | ***Arrival time*** $P1$ | 20 | 0 $P2$ | 25 | 15 $P3$ | 10 | 30 $P4$ | 15 | 45 Draw the Gantt chart and calculate waiting time, turnaround time, average waiting time and average turnaround time for the process.	08
	b	Define race condition. Give an example and mention approaches to avoid race condition.	06
	c	Why spinlocks are not appreciate for uniprocessor systems and are suitable for multiprocessor systems.	02
		OR	
4	a	What is a critical section problem? Mention the requirements that must be satisfied by a critical section problem solution.	04
	b	The following processes arrive for execution at times indicated ***Process*** | ***Arrival time*** | ***Burst time*** $P1$ | 0 | 1.5 $P2$ | 1.5 | 3 $P3$ | 3 | 1 $P4$ | 3 | 7.5 Draw a Gantt chart and calculate waiting time and turnaround time for: • $FCFS$ scheduling. • Preemptive SJF scheduling.	08
	c	What are spin locks? Mention advantages and disadvantages of spin locks.	04
5	a	Design a starvation and deadlock free solution to dining philosopher problem using any synchronization construct.	06

	b	Consider the following snap-shot of a system. $$\begin{array}{c\|ccc\|ccc\|ccc} & \multicolumn{3}{c\|}{Allocation} & \multicolumn{3}{c\|}{Max} & \multicolumn{3}{c}{Available} \\ & A & B & C & A & B & C & A & B & C \\ \hline P0 & 0 & 1 & 0 & 7 & 5 & 3 & 3 & 3 & 2 \\ P1 & 2 & 0 & 0 & 3 & 2 & 2 & & & \\ P2 & 3 & 0 & 2 & 9 & 0 & 2 & & & \\ P3 & 2 & 1 & 1 & 2 & 2 & 2 & & & \\ P4 & 0 & 0 & 2 & 4 & 3 & 3 & & & \end{array}$$ i) What is the content of matrix $NEED$? ii) Is the system in $SAFE$ state? If so, give the $SAFE$ sequence. iii) If a request from process $P1$ arrives for $(1,0,2)$ can the request be granted immediately?	10
		OR	
6	a	Discuss the classical readers-writers synchronization problem and write a pseudo code using semaphores.	08
	b	Consider the following snap-shot of a system: $$\begin{array}{c\|ccc\|ccc\|ccc} & \multicolumn{3}{c\|}{Allocation} & \multicolumn{3}{c\|}{Request} & \multicolumn{3}{c}{Available} \\ & A & B & C & A & B & C & A & B & C \\ \hline P0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ P1 & 2 & 0 & 0 & 2 & 0 & 2 & & & \\ P2 & 3 & 0 & 3 & 0 & 0 & 0 & & & \\ P3 & 2 & 1 & 1 & 1 & 0 & 0 & & & \\ P4 & 0 & 0 & 2 & 0 & 0 & 2 & & & \end{array}$$ Using bankers algorithm to detect deadlock i) Check if there is a safe sequence. If so give the safe sequence. ii) If $P2$ requests an additional instance of resource type C i.e $(0,0,1)$, is there a safe sequence?	08
7	a	What is demand paging? With the help of a neat diagram list and explain the steps for handling a page fault.	08
	b	Consider the following page reference string 1,2,3,4,2,1,5,6,2,1,2,3,7,6,3,2,1,2,3,6 How many page faults will occur for $FIFO$, Optimal page replacement algorithms, assuming 4 free frames?	08
8	a	Suppose on a disk with 5000 cylinders, numbers 0 to 4999. The drive is currently serving a request at cylinder 143. The queue of pending requests, in $FIFO$ order is 86,1470,913,1774,948,1509,1022,1750,130. Starting from the current position what is the total number of disks moves for the following algorithms. i) $SSTF$ ii) $SCAN$ iii) $LOOK$.	06
	b	With the help of a neat diagram briefly explain layers of $XV6$ file system.	05
	c	List the different file allocation methods. Explain any one method.	05

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R. V. COLLEGE OF ENGINEERING

Autonomous Institution affiliated to VTU

IV Semester B. E. Examinations April/May-18

Computer Science and Engineering

THEORY OF COMPUTATIONS

Time: 03 Hours ***Maximum Marks: 100***

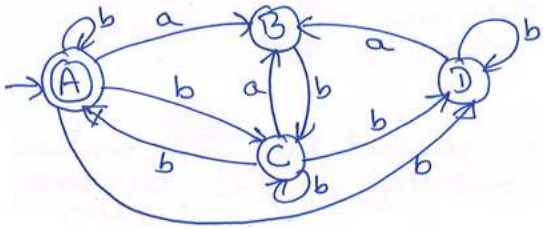
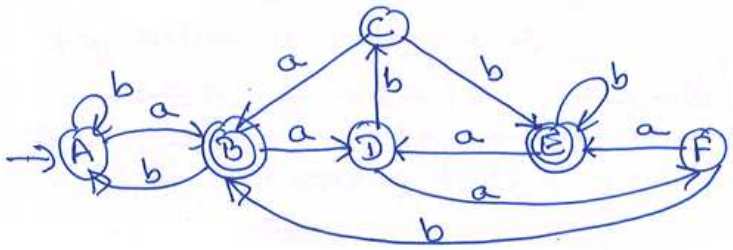
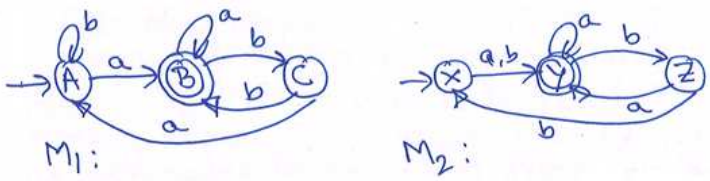
Instructions to candidates:

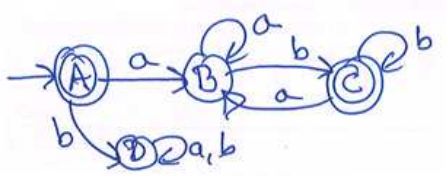
7. Answer all questions from Part A. Part A questions should be answered in first three pages of the answer book only.
8. Answer FIVE full questions from Part B.In Part B question number 2, 7 and 8 are compulsory. Answer any one full question from 3 and 4 & one full question from 5 and 6

PART A

1	1.1	Give DFA accepting the language over $\Sigma = \{0,1\}$, the set of all strings that either begin or end (or both) with 01.	02
	1.2	Find the string of minimum length in $\Sigma = \{0,1\}$ not in the language corresponding to the regular expression $0^*(100^*)^*1^*$.	01
	1.3	Consider two regular expressions $r = 0^* + 1^*$ and $s = 01^* + 10^* + 1^*0 + (0^*1)^*$. Find a string corresponds to r but not to s.	01
	1.4	For the regular expression $((ab)^*b + ab^*)^*$ find an equivalent $NFA-\epsilon$ by applying the Klein's theorem part . Do not attempt to simplify the answer.	01
	1.5	What is the language generated by the CFG with the productions $S \rightarrow aSa\|bSb\|\epsilon$.	01
	1.6	Define leftmost derivation. Give leftmost derivation for the string abaaba in the grammar with productions: $S \rightarrow aSaSbS\|aSbSaS\|bSaSaS\|\epsilon$	02
	1.7	Define deterministic pushdown automata.	01
	1.8	Give the transition diagram for PDA recognizing the language for PDA recognizing the language $L = \{w\|w \in \{a,b\}^* \; such\; that\; n_a(w) = n_b(w)\}$.	02
	1.9	Construct $DPDA$ equivalent to the PDA whose transition table is as below. There state A is the start state and state C is final state. | | 0 | 1 | | A | B | A | | B | B | C | | C | B | A |	02
	1.10	Say whether the following statement is $TRUE$ or $FALSE$. "Every regular language can be accepted by a $DPDA$ with only two states in which there are no ϵ – transitions and no symbols are ever removed from the stack.	01
	1.11	Identify useless variables in the CFG below: $S \rightarrow A\|B\|C, A \rightarrow aAa\|B\|a, B \rightarrow bb\|bB, C \rightarrow aCaa\|D, D \rightarrow baD\|abD$.	01
	1.12	Recursively enumerable languages are also called as _____.	01
	1.13	Obtain Turing machine to accept the language $L = \{w\|w \in \{a,b\}^* \; and\; w\; ends\; with\; 011\}$.	02
	1.14	Algorithm written for Turing machine that always halts is said to be _____.	01
	1.15	If L_1 and L_2 are recursively enumerable language over Σ then $L_1 \cap L_2$ is _____.	01

PART B

2	a	Define regular expressions. Give regular expression which generates the following languages over the alphabet $\Sigma = \{0, 1\}$. i) Strings that do not end with 01. ii) Strings that do not contain the substring 00.	06
	b	Consider the NFA below, using the subset construction method draw the DFA accepting the language which is same as the language accepted by NFA.  	06
	c	For the DFA below, use the minimization algorithm to find a minimum state DFA recognizing the same language [By table filling approach].  	04
3	a	State and prove pumping lemma for regular languages.	05
	b	Using pumping lemma show that the language $L = \{xy \mid x, y \in \{0,1\}^* \text{ and } y \text{ is either } x \text{ or } x^r\}$ is not regular.	05
	c	Let M_1 and M_2 are the $DFAs$ as shown below accepting languages L_1 and L_2 respectively. Draw $DFAs$ accepting the following languages: i) $L_1 \cap L_2$ ii) $L_1 - L_2$  	06
		OR	
4	a	Define CFG and language generated by CFG. Construct CFG to generate the following languages: i) $L_1 = \{a^i b^j c^k \mid i = j + k\}$ ii) $L_2 = \{a^i b^j c^k \mid j = i \text{ or } j = k\}$	06
	b	Define ambiguity in CFG. Show that the CFG below is ambiguous: $S \rightarrow ABA$ $A \rightarrow aA/\in$ $B \rightarrow bB/\in$	04
	c	Given below a $CFG\ G$, find a $CFGG'$ in GNF generating $L(G) - \{\in\}$ $S \rightarrow AB \mid ABC$ $A \rightarrow BA \mid BC \mid a \mid \in$ $B \rightarrow AC \mid CB \mid b \in$ $C \rightarrow BC \mid AB \mid A \mid c$	06

5	a	Define PDA and Instantaneous description (ID). Construct PDA to accept set of all palindromes over $\{a, b\}$. Show by IDs the string $aabaabaa$ is accepted.	06
	b	List the steps to convert the given CFG to equivalent PDA by empty stack. Convert the CFG below to its equivalent PDA by empty stack. Show that the string $a + (a * b)$ is generated by the given grammar and the same is accepted by the equivalent PDA. $S \rightarrow S + S \mid S * S \mid S - S \mid (S) \mid a \mid b$	04
	c	Find the equivalent CFG for the PDA below $\delta(q_0, a, Z) = (q_0, AZ)$ $\delta(q_0, a, A) = (q_0, AA)$ $\delta(q_0, b, A) = (q_1, \in)$ $\delta(q_1, b, A) = (q_1, \in)$ $\delta(q_1, \in, Z) = (q_0, Z_0)$ Show that the string $aaabbb$ is accepted by the given PDA and the same is generated by its equivalent grammar.	06
		OR	
6	a	State and prove pumping lemma for CFLs. Show that the language $L = \{a^i b^j c^k \mid i < j < k\}$ is not context free.	06
	b	Let $L_1 = \{a^i b^j c^k \mid i \geq j \text{ or } i \geq k\}$ and $L_2 = \{a^i b^j c^k \mid i \neq j \text{ or } i \neq k\}$. Show that $L_1 and\ L_2$ are context free but $L_1 - L_2$ is not context free.	06
	c	Give an example of a $DPDA\ M$ accepting a language L for which the language accepted by the machine obtained from M by reversing accepting and non-accepting states is $\overline{L}$.	04
7	a	Describe the language generated by the regular grammar given below. Draw its equivalent NFA. $S \rightarrow aA \mid bC \mid b, A \rightarrow aS \mid bB$ $B \rightarrow aC \mid bA \mid a, C \rightarrow aB \mid bS$	04
	b	For the DFA accepting L shown below, find an equivalent left linear grammar generating $L - \{\in\}$. Show that the string $aabab$ is generated by the grammar. 	04
	c	Define Linear Bounded Automata. Construct LBA to accept the language $L = \{a^n b^n c^n \mid n \geq 1\}$. Show that the string $aabbcc$ is accepted.	04
	d	Defend context sensitive grammar. Give context sensitive grammar to generate the language $L = \{ww \mid w \in \{a, b\}^*\}$. Show that the string $abaaba$ is generated.	04
8	a	Define Turing machine and the language of TM. Design TM to perform the string copy operation. The string is constructed over $\Sigma = \{a, b\}$. Trace the machine for string bab.	06
	b	Define unrestricted grammar. Give unrestricted grammar to generate the language $L = \{a^n b^n c^n \mid n \geq 1\}$. Show that the string $aabbcc$ is generated.	04

c	Define post corresponding problem. Solve the following instance of post correspondence problem $\begin{array}{\|c\|c\|c\|}\hline & List\ A & List\ B \\ \hline i & w_1 & x_i \\ \hline 1 & 10 & 101 \\ \hline 2 & 01 & 100 \\ \hline 3 & 0 & 10 \\ \hline 4 & 100 & 0 \\ \hline 5 & 1 & 010 \\ \hline \end{array}$	06

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R. V. COLLEGE OF ENGINEERING

Autonomous Institution Affiliated to VTU

IV Semester B. E. Examinations April/May-18

Common to AS / CV / BT / CH / ME / IM

BRIDGE COURSE C PROGRAMMING

Time: 03 Hours ***Maximum Marks: 100***

Instructions to candidates:

9. Answer all questions from Part A. Part A questions should be answered in first three pages of the answer book only.
10. Answer FIVE full questions from Part B. In Part B question number 2, 7 and 8 are compulsory. Answer any one full question from 3 and 4 & one full question from 5 and 6.

PART-A

1	1.1	What is the output of the following code?
		$main()$
		{
		$int\ b, a\ =\ 10;$
		$b\ =\ a++;$
		$printf("\%d\%d", a, b);$
		}
			02

	1.2	Differentiate between getchar() and putchar() functions.	02

	1.3	Write the output of the following code:
		$main()$
		{
		$if\ (-3)$
		$printf("Welcome");$
		$printf("C\ language");$
		}
			02

	1.4	_____ is the default return type of the function in C language.	01
	1.5	Write a for statement to print the series: 2 4 6 8 10	02
	1.6	What is the difference between break and continue statements?	02
	1.7	List out the pointer operators and its usage.	02
	1.8	Define the structure Employee with the members: empname, age, salary, empno.	02
	1.9	Which of the following array declaration and initialization statements are invalid? Why? a) $int\ a[2][\ ] = \{1,2,3,15,20,33\};$ b) $int\ b[5] = \{25,36,48,51,62,74,82\}.$	02
	1.10	Evaluate the following expression: $2 * ((a\%5) * (4 + (b - 3)/(c + 2)))$, where $a = 8, b = 15$ and $c = 4$.	01

	1.11	Find the output of the following program:
		$main()$
		{
		$int\ i\ =\ 10;$
		$switch(i)$
		{
		$case\ 6;\ printf("A");$
		$break;$
		$case\ 10:\ printf("B");$
		$case\ 12:\ printf("C");$
		$case\ 11:\ printf("D");$
		$case\ 13:\ printf("E");$
		$default\ :\ printf("Error");$
		$break;$
		}
		}
			02

PART-B

2	a	Write an algorithm to find the area of a circle.	05
	b	Draw a flowchart to find the smallest of three numbers.	05
	c	Define keywords and identifiers with examples. List out the rules for identifiers.	06
3	a	Explain the following operators with examples: i) conditional operator ii) relational operator iii) bitwise operator.	08
	b	Write a C program to perform the arithmetic operations of a simple calculator using switch construct.	08
		OR	
4	a	Differentiate between while and do-while loop. Give an example for each.	06
	b	Explain the following decision making statements with an example for each: i) simple if ii) if else iii) else if ladder.	10
5	a	Explain the following string handling functions with examples: i) strlen() ii) strcpy() iii) strcmp() iv) strcat().	10
	b	Explain compile time initialization of one dimensional and two-dimensional array with an appropriate example.	06
		OR	

6	a	Write a C program to find the sum and average of all elements given in an array using single dimensional array concept.	08
	b	Write a C program to find the addition of two matrices of the order $m \times n$.	08
7	a	Discuss the following components of a user defined function with suitable examples: i) function definition ii) function call iii) function declaration	10
	b	Using examples, explain declaration and different ways of initializing the members of a structure.	06
8	a	Write a program in C to find the sum of all elements stored in an array using pointers.	08
	b	Compare the following functions and write the code fragment to illustrate the following functions: i) fopen() and fclose() ii) fscanf() and fprintf().	08