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Third Semester B.E. Degree Examination, Dec.2018/Jan.2019 Analog and Digital Electronics

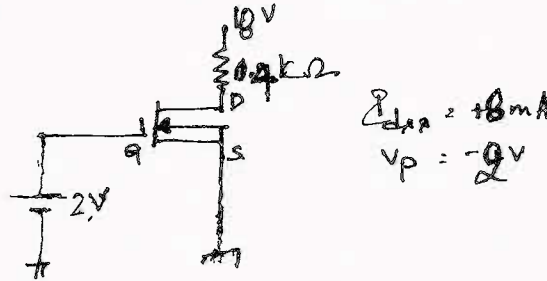
Time: 3 hrs.

Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

- 1 a. Explain construction and working principle of operations of n-channel D-MOSFET along with its drain and trans-conductance characteristics. (10 Marks)
- b. Write the difference between JEFT's and MOSFET's. (05 Marks)
- c. For a given self-bias configuration in Fig.Q.1(c), determine: i) I_{DQ} and $V_{g'seq}$ ii) V_{ds} and V_D . (05 Marks)



OR

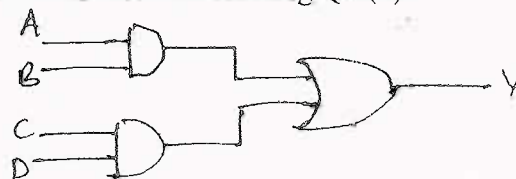
- 2 a. List of differences between ideal and practical op-amp amplifier. (06 Marks)
- b. With a neat diagram and waveform explain astable multivibrator using 555 timers. (07 Marks)
- c. With neat diagram and waveform explain the working of relaxation oscillation oscillator. (07 Marks)

Module-2

- 3 a. Explain positive and negative logic. List the equivalence between them. (08 Marks)
- b. Find the minimal SOP form for the given min-terms using K-map.
 $F(A, B, C, D) = \sum m(4, 5, 6) + d(10, 12, 13, 14, 15)$. (06 Marks)
- c. Find the minimal POS form for the given MAX-TERM using K-map.
 $f(a, b, c, d) = \pi M(5, 7, 8, 9, 12) + d(0, 6, 10, 15)$. (06 Marks)

OR

- 4 a. Using Quine-Mc-Clusky method simplify the following Boolean equation.
 $f(a, b, c, d) = \sum m(0, 1, 10, 11, 13, 15) + d(2, 3, 12, 14)$. (10 Marks)
- b. Define Hazard. Explain different types of Hazards. (06 Marks)
- c. Write the VHDL code for the circuit shown in Fig.Q.4(c): (04 Marks)



Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and /or equations written eg, 42+8 = 50, will be treated as malpractice.

Module-3

- 5 a. What is multiplexers? Design 8:1 multiplexer using 2:1 multiplexers. (08 Marks)
 b. Explain the purpose of using parity generators and checkers using suitable illustrations. (06 Marks)
 c. What is magnitude comparator? Explain 1 bit magnitude comparator. (06 Marks)

OR

- 6 a. Design 7-segment decoder using PLA. (06 Marks)
 b. With neat logic diagram and truth table, explain negative edge triggered J-K flip-flop. (06 Marks)
 c. What is an Adder? Explain with truth table the half Adder, full Adder, half subtractor and full subtractor. (08 Marks)

Module-4

- 7 a. With a neat logic diagram and truth table explain the working of J-K master slave flip-flop using NAND gates. (08 Marks)
 b. Give characteristic table, characteristic equation and excitation table for S-R, D and J-K flip-flop. (08 Marks)
 c. Write a VHDL code for D-flip-flop. (04 Marks)

OR

- 8 a. What is a register? With neat diagram explain 4-bit parallel-in-serial out shift register. (08 Marks)
 b. Explain with a neat diagram how a shift register can be applied for serial-addition. (06 Marks)
 c. Differentiate between synchronous and asynchronous counters. (06 Marks)

Module-5

- 9 a. Define counter. Design a synchronous counter for the sequence, $0 \rightarrow 3 \rightarrow 1 \rightarrow 2 \rightarrow 6 \rightarrow 7 \rightarrow 0 \rightarrow 3$ using J-K flip flop. (12 Marks)
 b. Explain with neat diagram the working principle of Digital Clock. (08 Marks)

OR

- 10 a. Explain the binary ladder with digital input of 1000. (06 Marks)
 b. Explain 2-bit simultaneous A/D converter. (08 Marks)
 c. Explain the terms accuracy and resolution for D/A converters. (06 Marks)

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Third Semester B.E. Degree Examination, Dec.2018/Jan.2019 Data Structure and Applications

Time: 3 hrs.

Max. Marks: 100

Note: Answer any FIVE full questions, choosing
ONE full question from each module.

Module-1

- 1 a. Define data structure. List and explain data structure operations. (05 Marks)
b. Write the bubble sort algorithm. (05 Marks)
c. List and explain in detail, three types of structures used to store the strings. (10 Marks)

OR

- 2 a. Explain dynamic memory allocation. (05 Marks)
b. Explain about the representation of two dimensional arrays in memory. (05 Marks)
c. What do you mean by pattern matching? Let P and T be strings with lengths R and S respectively and are stored as arrays with one character per element. Write a pattern matching algorithm that finds index P in T. Also discuss about this algorithm. (10 Marks)

Module-2

- 3 a. Define stack. Write the procedure for two basic operations associated with stack. (05 Marks)
b. Write a short note on priority queues. (05 Marks)
c. Define recursion. What are the properties of recursive procedure? Write recursive procedure for : i) Tower of Hanoi ii) Factorial of a number. (10 Marks)

OR

- 4 a. Define queues. Write QINSERT and QDELETE procedures for queues using arrays. (10 Marks)
b. Write the postfix form of the following expression.
 $A + (B * C - D/E \uparrow F) * G) * H.$ (05 Marks)
c. Write a note on Ackermann function. (05 Marks)

Module-3

- 5 a. Write the following algorithm for singly linked list.
i) Inserting ITEM as the first node in the list
ii) Deleting the node with the given ITEM of information. (10 Marks)
b. Write the node structure for linked representation of polynomial. Write the function to add two polynomials represented using linked list. (10 Marks)

OR

- 6 a. Write the functions to perform the following :
- Inverting a singly linked list
 - Concatenating the singly linked list
 - Finding the length of a circular list. (10 Marks)
- b. Write a note on header linked list. (05 Marks)
- c. For the given sparse matrix, write the diagrammatic linked list representation.
- $$\begin{bmatrix} 2 & 0 & 0 & 0 \\ 4 & 0 & 0 & 3 \\ 0 & 0 & 0 & 0 \\ 8 & 0 & 0 & 1 \\ 0 & 0 & 6 & 0 \end{bmatrix}$$
- (05 Marks)

Module-4

- 7 a. What is a tree? write the routines to traverse the given string using
- Pre-order traversal
 - In-order traversal
 - Post-order traversal. (10 Marks)
- b. Define binary search tree. Write the recursive search and iterative search algorithm for a binary search tree. (10 Marks)

OR

- 8 a. Write the routines for :
- Copying binary trees
 - Testing for equality of binary trees. (10 Marks)
- b. List the rules to construct the threads. Write the routines for inorder traversal of a threaded binary tree. (10 Marks)

Module-5

- 9 a. Write an algorithm for an insertion sort. Also discuss about the complexity of insertion sort. (10 Marks)
- b. Write an algorithm for : i) Breadth first search ii) depth first search. (10 Marks)

OR

- 10 a. Define graph. Explain in detail about directed graphs. (10 Marks)
- b. Explain in detail about static and dynamic hashing. (10 Marks)

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17CS34

Third Semester B.E. Degree Examination, Dec.2018/Jan.2019 Computer Organization

Time: 3 hrs.

Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

- 1 a. Explain with a neat diagram the connection between the processor and the computer memory. (05 Marks)
- b. Explain the Basic Instruction types with example. (05 Marks)
- c. Define Addressing mode, explain the various addressing modes with example. (10 Marks)

OR

- 2 a. Write an assembly program that reads a line of characters and display it. (05 Marks)
- b. What are assembler directives? Point out and explain the various directives with example. (05 Marks)
- c. Point out various shifts and rotate instruction and example with a neat diagram and example. (10 Marks)

Module-2

- 3 a. Define interrupt. Point out and explain the various ways of enabling and disabling interrupts. (07 Marks)
- b. What are Exceptions? Point out and explain the different kinds of exceptions. (05 Marks)
- c. What is interrupt nesting, explain with a neat diagram the implementation of interrupt priority, using individual interrupt request and acknowledge lines. (08 Marks)

OR

- 4 a. What is Bus Arbitration? Explain centralized and distributed arbitration. With a neat diagram. (10 Marks)
- b. Explain Universal serial Bus tree structure and split bus operation with a neat diagram. (10 Marks)

Module-3

- 5 a. Explain synchronous DRAMS with a block diagram. (05 Marks)
- b. Define ROM ; point out and explain various types of ROMS. (05 Marks)
- c. Define cache memory, explain various types of it with a neat block diagram. (10 Marks)

OR

- 6 a. What is Virtual memory? Explain virtual memory organization. (07 Marks)
- b. Explain the optical disk organization with a neat diagram. (10 Marks)
- c. Define Hit rate and miss penalty. (03 Marks)

Module-4

- 7 a. Draw 4-bit carry-look ahead adder and explain. (10 Marks)
- b. Perform multiplication for -13 and + 9 using Booth's Algorithm and explain Booth's Algorithm process. (10 Marks)

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OR

- 8 a. Explain with a neat figure the circuit arrangement for binary division. (10 Marks)
b. Explain IEEE standard for floating point number. (10 Marks)

Module-5

- 9 a. Explain three – bus organization of the datapath with a neat block diagrams. (06 Marks)
b. Explain Hard Wired Control Unit Organization in a processing unit. (06 Marks)
c. Write the control sequence for execution of the Instruction. Add (R_3), R_1 in the execution of a complete instruction. (08 Marks)

OR

- 10 a. Explain briefly the block diagram of a digital camera. (10 Marks)
b. With a neat block diagram, explain the working of microwave oven in an embedded system. (10 Marks)

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17CS35

Third Semester B.E. Degree Examination, Dec.2018/Jan.2019

Unix and Shell Programming

Time: 3 hrs.

Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

- 1 a. By writing a neat diagram, explain the architecture of UNIX. (10 Marks)
b. Discuss the following commands
i) ls ii) who iii) cat iv) echo (10 Marks)

OR

- 2 a. Explain the features of UNIX. (10 Marks)
b. Explain the commands used to add, modify and delete users. (10 Marks)

Module-2

- 3 a. What is a file? Explain different categories of files. (10 Marks)
b. By giving example, explain the following commands.
i) pwd ii) cd iii) mkdir iv) rmdir. (10 Marks)

OR

- 4 a. Discuss ls commands with options. (10 Marks)
b. Explain absolute method of changing permissions by giving example. (10 Marks)

Module-3

- 5 a. Explain different modes of Vi editor (10 Marks)
b. Discuss ex-mode commands of Vi editor. (10 Marks)

OR

- 6 a. Explain shell interpretive cycle. (04 Marks)
b. Which are standard files used in UNIX? Explain. (08 Marks)
c. By giving examples, explain extended regular expression. (08 Marks)

Module-4

- 7 a. With example, explain logical operators in shell programming. (05 Marks)
b. Discuss for statement in shell script with example. (05 Marks)
c. Write a shell program to do the following :
i) List of files ii) Processes of user iii) Today's date vi) Users of the system.
Using case conditional. (10 Marks)

OR

- 8 a. Discuss head and tail commands along with its options. (10 Marks)
b. By specifying examples, explain hard and soft links. (10 Marks)

Module-5

- 9 a. Along with the options and examples, explain ps command. (10 Marks)
b. By giving example, explain nice and nohup commands. (10 Marks)

OR

- 10 a. Explain string handling function of perl. (06 Marks)
b. With example, explain split and join function of perl. (06 Marks)
c. What is subroutine? Explain by giving example. (08 Marks)

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17CS36

Third Semester B.E. Degree Examination, Dec.2018/Jan.2019 Discrete Mathematical Structures

Time: 3 hrs.

Max. Marks: 100

Note: Answer any FIVE full questions, choosing one full question from each module.

Module-1

- 1 a. Define proposition, tautology, contradiction. Determine whether the following compound statement is a tautology or not.
 $\{(p \vee q) \rightarrow r\} \leftrightarrow \{\neg r \rightarrow \neg(p \vee q)\}$ (06 Marks)
- b. Using the laws of logic, show that $(p \rightarrow q) \wedge [\neg q \wedge (r \vee \neg q)] \leftrightarrow \neg(q \vee p)$ (07 Marks)
- c. Establish the validity of the following argument
- $$\begin{array}{l} \forall x, p(x) \vee q(x) \\ \exists x, \neg p(x) \\ \forall x, \neg q(x) \vee r(x) \\ \forall x, s(x) \rightarrow \neg r(x) \\ \hline \therefore \exists x, \neg s(x) \end{array}$$
- (07 Marks)

OR

- 2 a. Define converse, inverse and contra positive of a conditional. Find converse, inverse and contra positive of $\forall x, (x > 3) \rightarrow (x^2 > 9)$, where universal set is R. (06 Marks)
- b. Test the validity of the following arguments:
- i) If there is a strike by students, the exam will be postponed but the exam was not postponed.
 \therefore there was no strike by students.
- ii) If Ravi studies, then he will pass in DMS.
 If Ravi doesn't play cricket, then he will study.
 Ravi failed in DMS.
 \therefore Ravi played cricket (06 Marks)
- c. Define dual of logical statement. Write the dual of the statement $(p \vee T_0) \wedge (q \vee F_0) \vee (r \wedge s \wedge T_0)$. (02 Marks)
- d. Let $p(x) : x \geq 0$
 $q(x) : x^2 \geq 0$ and $r(x) : x^2 - 3x - 4 = 0$
 Then, for the universe completing of all real numbers, find the truth values of :
- i) $\exists x \{p(x) \wedge q(x)\}$ ii) $\forall x \{p(x) \rightarrow q(x)\}$ iii) $\exists x \{p(x) \wedge r(x)\}$ (06 Marks)

Module-2

- 3 a. Prove that for any positive integer n, $\sum_{i=1}^n \frac{F_{i-1}}{2^i} = 1 - \frac{F_{n+2}}{2^n}$, F_n denote the Fibonacci number. (06 Marks)
- b. How many positive integers n can we form using the digits 3, 4, 4, 5, 5, 6, 7 if we want n to exceed 5,000,000? (07 Marks)
- c. Determine the coefficient of $a^2 b^3 c^2 d^5$ in the expansion of $(a + 2b - 3c + 2d + 5)^{16}$. (07 Marks)

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OR

- 4 a. Prove by using principle of mathematical induction

$$\sum_{i=1}^n i \cdot 2^i = 2 + (n-1) \cdot 2^{n+1}$$

(06 Marks)

- b. A committee of 12 is to be selected from 10 men and 10 women. In how many ways can the selection be carried out if
- There are no restrictions
 - There must be six men and six women
 - There must be an even number of women.
- (07 Marks)
- c. Determine the number of integer solutions of $x_1 + x_2 + x_3 + x_4 = 32$ where $x_i \geq 0$, $1 \leq i \leq 4$.
(07 Marks)

Module-3

- 5 a. If $A = \{1, 2, 3, 4, 5\}$ and there are 6720 injective functions $f: A \rightarrow B$, what is $|B|$? (03 Marks)
- b. Let m, n be positive integers with $1 < n \leq m$ then prove that,
 $s(m+1, n) = s(m, n-1) + ns(m, n)$ (05 Marks)
- c. If $f: \mathbb{R} \rightarrow \mathbb{R}$ defined by $f(x) = x^2$, determine whether the function is one-to-one and whether it is onto. If it is not onto, find the range. (06 Marks)
- d. Let $A = \{1, 2, 3, 4, 5\} \times \{1, 2, 3, 4, 5\}$ and define R on A by $(x_1, y_1) R (x_2, y_2)$ if $x_1 + y_1 = x_2 + y_2$, verify that R is an equivalence relation on A . (06 Marks)

OR

- 6 a. If $f: \mathbb{R} \rightarrow \mathbb{R}$ defined by $f(x) = x^3$, determine whether f is invertible and if determine f^{-1} . (05 Marks)
- b. Define the relation R for two lines ℓ_1 and ℓ_2 by $\ell_1 R \ell_2$ if ℓ_1 is perpendicular to ℓ_2 . Determine whether the relation is reflexive, symmetric, antisymmetric or transitive. (05 Marks)
- c. Let $A = \{1, 2, 3, 6, 9, 18\}$ and R on A by xRy if $x|y$. Draw the Hasse diagram for the poset (A, R) . (05 Marks)
- d. For $A = \{1, 2, 3, 4\}$, let $R = \{(1, 1) (1, 2) (2, 3) (3, 3) (3, 4)\}$ be a relation on A . Draw the directed graph G on A that is associated with R . Do likewise for R^2, R^3 . (05 Marks)

Module-4

- 7 a. Determine the number of positive integers n where $1 \leq n \leq 100$ and n is not divisible by 2, 3 or 5. (06 Marks)
- b. How many derangements are there for 1, 2, 3, 4 and 5? (07 Marks)
- c. Solve the recurrence relation $2a_{n+3} = a_{n+2} + 2a_{n+1} - a_n$, $n \geq 0$, $a_0 = 0$, $a_1 = 1$, $a_2 = 2$. (07 Marks)

OR

- 8 a. In how many ways can the 26 letters of the alphabet be permuted so that none of the patterns car, dog, pun or byte occurs? (06 Marks)
- b. Find the root polynomial for 3×3 board using the expansion formula. (07 Marks)
- c. The number of bacteria in a culture is 1000 (approximately) and this number increases 250% every two hours. Use a recurrence relation to determine the number of bacteria present after one day. (07 Marks)

Module-5

- 9 a. Show that the graphs Fig. Q(a)(i) and (ii) are isomorphic.

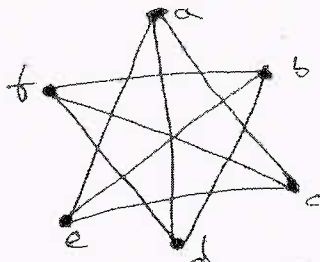


Fig. Q(a)(i)

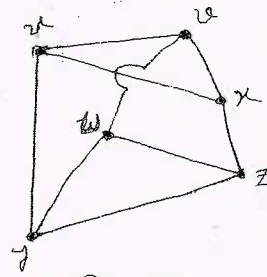


Fig. Q(a)(ii)

(06 Marks)

- b. Let $G = (V, E)$ be an undirected graph or multigraph with no isolated vertices. Then prove that G has an Euler circuit if and only if G is connected and every vertex in G has even degree. (07 Marks)
- c. Construct an optimal prefix code for the symbols a, b, c, d, e, f, g, h, i, j that occur with respective frequencies 78, 16, 30, 35, 125, 31, 20, 50, 80, 3. (07 Marks)

OR

- 10 a. Let $G = (V, E)$ be a connected undirected graph. What is the largest possible value for $|V|$ if $|E| = 19$ and $\deg(v) \geq 4$ for all $v \in V$? (06 Marks)
- b. For every tree $T = (V, E)$ if $|V| \geq 2$, then prove that T has atleast two pendant vertices. (07 Marks)
- c. For the tree shown in Fig. Q10(c), list the vertices according to a preorder and a postorder traversal.

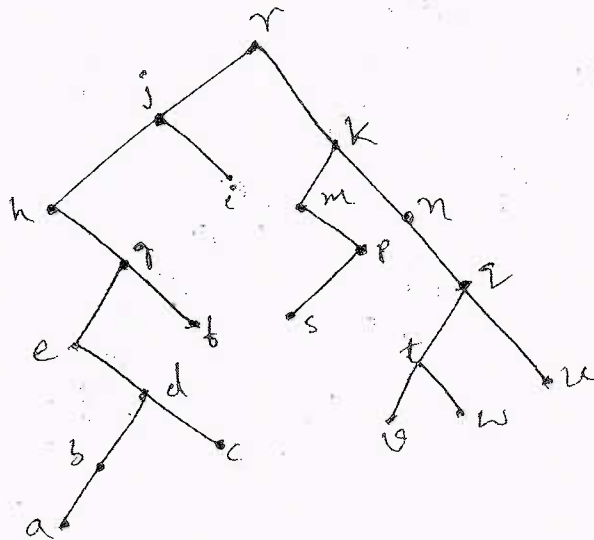


Fig. Q10(c)

(07 Marks)

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Third Semester B.E. Degree Examination, Dec.2018/Jan.2019 Analog and Digital Electronics

Time: 3 hrs.

Max. Marks: 80

Note: Answer FIVE full questions, choosing one full question from each module.

Module-1

- 1 a. Explain the working of N-channel MOSFET, with the help of neat diagram. (08 Marks)
 b. What are applications of FET? (04 Marks)
 c. What are the ideal characteristics of op-amp? (04 Marks)

OR

- 2 a. Explain the performance parameters of op-amp. (08 Marks)
 b. Explain the relaxation oscillator, with the help of neat diagram. (08 Marks)

Module-2

- 3 a. Minimize the following Boolean function using K-map method,
 $F(A, B, C, D) = \sum m(0, 2, 3, 8, 10, 11, 12, 14)$ (06 Marks)
 b. Apply Quine Mc-Cluskey method to find the essential prime implicants for the Boolean expression,
 $F(A, B, C, D) = \sum m(0, 1, 2, 3, 10, 11, 12, 13, 14, 15)$ (10 Marks)

OR

- 4 a. Minimize the following Boolean function using K-map method.
 $F(A, B, C, D) = \prod M(0, 1, 2, 3, 4) + \sum d(5, 7)$ (06 Marks)
 b. What is Hazard? Explain its types with examples. (10 Marks)

Module-3

- 5 a. Implement the following function using 8 : 1 multiplexer
 $F(A, B, C, D) = \sum m(1, 2, 5, 7, 8, 10, 11, 13, 14, 15)$ (06 Marks)
 b. Realize the following function using 3 : 8 decoder
 (i) $F(A, B, C) = \sum m(1, 3, 4)$
 (ii) $F(A, B, C) = \sum m(3, 5, 7)$ (04 Marks)
 c. Design a priority encoder using the truth table. The order of priority for three inputs is $X_1 > X_2 > X_3$ (06 Marks)

Truth Table

S	Input			Output	
	X ₁	X ₂	X ₃	A	B
0	X	X	X	0	0
1	1	X	X	0	1
1	0	1	X	1	0
1	0	0	1	1	1
1	0	0	0	0	0

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OR

- 6 a. Design seven segment decoder using PLA. (08 Marks)
b. Design Half adder and Full adder. (08 Marks)

Module-4

- 7 a. Explain Smith contact bounce circuit. (08 Marks)
b. Give state transition diagram and characteristic equations for SR-FF and JK-FF. (08 Marks)

OR

- 8 a. With neat diagram, explain Ring and Johnson counter. (08 Marks)
b. What is shift register? With neat diagram, explain 4-bit parallel in serial out shift registers. (08 Marks)

Module-5

- 9 a. Define counter. Design mod-8 up synchronous counter using JK-FF. (12 Marks)
b. Write VHDL code for mod-8 up counter. (04 Marks)

OR

- 10 a. Explain the binary ladder with digital of 1000. (06 Marks)
b. Explain with neat diagram, single slope A/D converters. (10 Marks)

CBCS SCHEME

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15CS33

Third Semester B.E. Degree Examination, Dec.2018/Jan.2019

Data Structures and Applications

Time: 3 hrs.

Max. Marks: 80

Note: Answer any FIVE full questions, choosing one full question from each module.

Module-1

- Write a C program with an appropriate structure definition and variable declaration to read and display information about an employee, using nested structures. Consider the following fields like Ename, Eid, DOJ(Date, Month, Year) and Salary (Basic, DA, HRA). (06 Marks)
 - Consider 2 polynomials $A(x) = 2x^{1000} + 1$ and $B(x) = x^4 + 10x^3 + 3x^2 + 1$, show how these polynomials are stored in the 1-D array also give its C representation. (04 Marks)
 - Write a C function to add 2 polynomials A and B store the result in polynomial C. (06 Marks)

OR

- Consider the pattern ababab, construct the table and the corresponding labeled directed graph used in the second pattern matching algorithm. (06 Marks)
 - Write transpose algorithm to transpose the given sparse matrix, express the given sparse

matrix as triplets and find its transpose (10 Marks)

$$\begin{bmatrix} 15 & 0 & 0 & 22 & 0 & -5 \\ 0 & 10 & 2 & 0 & 0 & 0 \\ 0 & 0 & 0 & -4 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 \\ 91 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 28 & 0 & 0 & 0 \end{bmatrix}$$

Module-2

- Implement push and POP functions for stack with stack full (using dynamic arrays) and stack empty conditions. (06 Marks)
 - Define recursion, write a function for tower of hanoi. (06 Marks)
 - Write a note on Dequeues and Priority Queues. (04 Marks)

OR

- Write a 'C' function to insert and delete an item into a circular queue. Explain how it is advantageous over linear Queue. (06 Marks)
 - Convert the following infix expression to postfix form, (i) $a + (b + c) + (b/d) * a + z * u$
(ii) $A - B/C(C * D * E)$ (04 Marks)
 - Write a 'C' function to evaluate the postfix expression and trace the given postfix expression using stack $623 + -382 / + * 2 \$ 3 +$ (06 Marks)

Module-3

- Write 'C' function to perform the following:
 - To insert a node at front end of the single linked list.
 - To delete a node at rear end of S.L.L.
 - To create an ordered S.L.L
 - To concatenate 2 S.L.L. (12 Marks)
 - What are the advantages of double linked list over single linked list? Explain with an example. (04 Marks)

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OR

- 6 a. Write a C function to perform the following operations on double linked list:
 (i) Inserting a node at the beginning.
 (ii) Deleting a node at the rear end
 (iii) Inserting an item at a specified position. (09 Marks)
- b. Write a C function to add 2 polynomials represented as circular list with header nodes. (07 Marks)

Module-4

- 7 a. Define tree, for the tree given below define the following terminologies:
 (i) Degree
 (ii) Non Terminals and terminals nodes.
 (iii) Siblings
 (iv) Ancestors
 (v) Level
 (vi) Height or depth

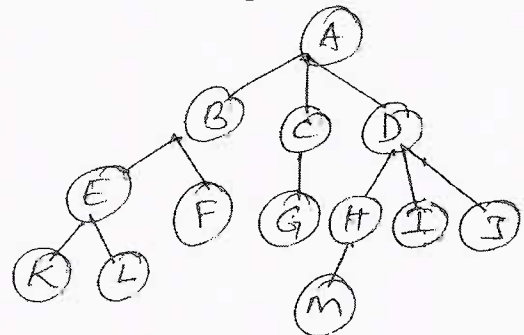


Fig. Q7(a)

- b. Explain Binary tree using Array representation and linked representation, which representation is more suitable and why? (05 Marks)
- c. Write a note on threaded binary trees and write the rules to construct the threads. (06 Marks)
- (05 Marks)

OR

- 8 a. Define binary search tree, write a function for recursive or iterative search for BST. (06 Marks)
- b. For the given data draw a binary search tree 1, 3, 8, 5, 7, 9, 10, 12, 15, 14, 13, 11, 6 (04 Marks)
- c. For a tree given below traverse the tree using inorder, preorder, postorder, traversals, write the C routines for any traversal. (06 Marks)

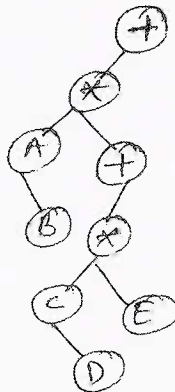
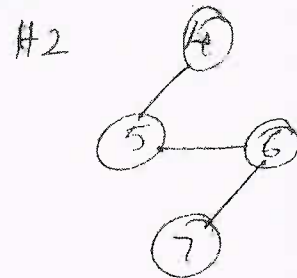
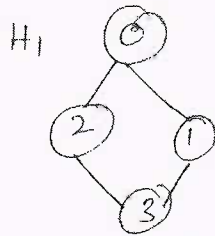


Fig. Q8(c)

Module-5

- 9 a. Define Graph, for the given graph G show adjacency matrix and adjacency list representation of the graph.

Graph with 2 components



- b. What are the methods used for traversing a graph, explain any one with example and write the function for the same. (08 Marks)

(08 Marks)

OR

- 10 a. Sort the following list of numbers using Radix sort:
45, 37, 05, 09, 06, 11, 18, 27
- b. What are the types of file organization? Explain any two.
- c. Explain binary files, how are they different from text files.

(04 Marks)

(08 Marks)

(04 Marks)

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Third Semester B.E. Degree Examination, Dec.2018/Jan.2019 Computer Organization

Time: 3 hrs.

Max. Marks: 80

**Note: Answer any FIVE full questions, choosing
ONE full question from each module.**

Module-1

- 1 a. Define the functions of following processor registers :
 i) MAR ii) MDR iii) IP iv) IR. (04 Marks)
 b. How to measure the performance of a computer? Explain. (05 Marks)
 c. Compute the content of 8 bit register namely R1 and R2 containing a value of $-17_{(10)}$ and $+98_{(10)}$ with initial carry bit as 1 after performing following shift or rotate operations by 2 times. i) SHR R1, 2 ii) SAR R1, 2 [Arithmetic shift]
 iii) ROR R2, 2 iv) RCR R2, 2 [Rotate right with carry]. (07 Marks)

OR

- 2 a. What is the need of processor stack? Explain a commonly used layout for information in a subroutine stack frame. (06 Marks)
 b. With relevant examples briefly explain about any 2 encoding types of machine instruction. (05 Marks)
 c. With a memory layout starting at address 'i' represent how "ABCD" data is stored in big endian and little endian assignment scheme in a system of word length 16 bits. (05 Marks)

Module-2

- 3 a. Explain how simultaneous interrupt requests from several I/O devices can be handled by processor through a single INTR line. (06 Marks)
 b. What is bus arbitration? With neat diagram explain about distributed arbitration process. (06 Marks)
 c. With a neat diagram, explain about how data is read in asynchronous bus scheme. (04 Marks)

OR

- 4 a. Explain with a neat block diagram, the hardware components needed for connecting a keyboard to a processor. (08 Marks)
 b. With a neat sequence diagram explain the process of, how output operation is carried between processor and output device connected to host through USB hub. (08 Marks)

Module-3

- 5 a. With a neat diagram, explain the design of $2M \times 32$ memory module using $1M \times 8$ memory chips. (07 Marks)
 b. Consider a cache consisting of 256 blocks of 16 words each, for a total of 4096 words and assume main memory is addressable by 16 bit address and it consists of 4K blocks. How many bits are there in each of Tag, block/set and word fields for different mapping techniques? (09 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and /or equations written eg. 42+8 = 50, will be treated as malpractice.

OR

- 6 a. Explain the process of address translation with a neat diagram. (06 Marks)
 b. With a neat diagram discuss about organization of magnetic disk. (06 Marks)
 c. Calculate the average access time experienced by processor if miss penalty is 17 clock cycles and Miss rate is 10% and cache access time is 1 clock cycle. (04 Marks)

Module-4

- 7 a. Design and explain the working of 16 bit carry look ahead adder built from 8 bit carry look ahead adder. Compare its performance with 16 bit ripple carry adder built from 8 bit ripple carry adder. (10 Marks)
 b. Calculate the product of $-2_{(10)}X + 14_{(10)}$ using bit pair recording multiplier method. Why bit pair method is better than Booth algorithm? (06 Marks)

OR

- 8 a. Perform the non restoring division for the given binary numbers where dividend is $1011_{(2)}$ and divisor is $0101_{(2)}$ with all cycles. (08 Marks)
 b. Represent $0.0625_{(10)}$ in double precision format and calculate the decimal value of A floating point number represented in single precision format as 44900000H. (08 Marks)

Module-5

- 9 a. Write and discuss about micro-routine for complete execution of instruction Add (R1), R2 in single bus organization. (08 Marks)
 b. With a detailed block diagram explain about hardwired control unit. (08 Marks)

OR

- 10 a. With a block diagram explain briefly about an embedded processor. (06 Marks)
 b. Explain briefly about different ways of implementing multiprocessor system with supportive diagrams. (06 Marks)
 c. Write the control sequence for instruction Add R4, R5, R6 for 3 bus organization. (04 Marks)

CBCS SCHEME

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15CS35

Third Semester B.E. Degree Examination, Dec.2018/Jan.2019 UNIX and Shell Programming

Time: 3 hrs.

Max. Marks: 80

Note: Answer any FIVE full questions, choosing one full question from each module.

Module-1

- 1 a. Explain the UNIX architecture with a neat sketch. (08 Marks)
b. Explain the following commands: i) man-k ii) apropos iii) what is iv) ls-r. (04 Marks)
c. What is the output of the following commands:
i) date + % h ii) date + "% h % m" iii) echo "\$x" iv) cal. (04 Marks)

OR

- 2 a. Explain how to create a user or group. Along with the updations made in /etc/passwd file. (08 Marks)
b. What is the difference between internal and external command give example? (04 Marks)
c. Write a note on file and process. (04 Marks)

Module-2

- 3 a. Explain the parent child relationship UNIX. (08 Marks)
b. Write the output and tree structure for the following commands; assume present working directory is /home /vtu.
mkdir scheme
cd scheme
mkdir 2002/Branch 2006/Branch
cd 2002/Branch
mkdir CSE ECE ME
cd ../2006/Branch
mkdir CSE ECE ME
cd ../2002/Branch/ECE
pwd
cd ../2006/CSE
pwd. (08 Marks)

OR

- 4 a. What is the difference between absolute and relative path? (04 Marks)
b. Explain the output of ls-l command. (04 Marks)
c. Files current permissions are rw - r - xr - - specify chmod expression required to change them for the following:
i) rwxrwxrwx
ii) r - - r - - - -
iii) - - - - -
iv) - - - r - - r - - (08 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and /or equations written eg. 42+8 = 50, will be treated as malpractice.

Module-3

- 5 a. Explain the different modes in vi editor. (05 Marks)
 b. What is the output of the following commands:
 i) `ls [ijk] * .doc`
 ii) `ls [a-Z] ????.txt`
 iii) `ls foo * ? .txt`
 iv) `ls . * . *` (08 Marks)
 c. Explain the 3 standard UNIX files. (03 Marks)

OR

- 6 a. Write a note on shell variables. (04 Marks)
 b. With a suitable example. Explain the grep command and its various options. (08 Marks)
 c. Explain the following environmental variables i) SHELL ii) PATH (04 Marks)

Module-4

- 7 a. What is shell programming? Write a shell program that will do the following tasks in order:
 i) Clear the screen ii) Print current directory iii) Display current login users. (08 Marks)
 b. Explain the shell features of 'while' and 'for' with syntax. (04 Marks)
 c. Explain the following commands: i) umask ii) tail iii) head iv) pr. (04 Marks)

OR

- 8 a. What is the difference between hard link and soft link? (08 Marks)
 b. Write a shell script to test file attributes. (08 Marks)

Module-5

- 9 a. Write a Perl program to print numbers that are accepted from keyboard using 'for'. (08 Marks)
 b. Explain the mechanism of process creation. (08 Marks)

OR

- 10 a. Explain the process status command with its various options. (08 Marks)
 b. Write a Perl program to convert decimal number to binary. (08 Marks)

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15CS36

Third Semester B.E. Degree Examination, Dec.2018/Jan.2019 Discrete Mathematical Structures

Time: 3 hrs.

Max. Marks: 80

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

- 1 a. Define Tautology. Verify the following compound proposition is a tautology or not :
 $\{(p \vee q) \rightarrow r\} \leftrightarrow \{\sim r \rightarrow \sim (p \vee q)\}$. (04 Marks)
- b. Check whether the following argument is valid or not :
 If I study, then I will not fail in exam.
 If I do not watch TV in the evenings, then I will study.
 I failed in exam.
 \therefore I must have watched TV in the evenings. (04 Marks)
- c. Define : i) open sentence ii) quantifiers. Write the following proposition in symbolic form and find its negation : "All integers are rational numbers and some rational numbers are integers". (04 Marks)
- d. Give a direct proof of the statement, "For all integers K and l, if K and l are both even then $K + l$ is even and Kl is even". (04 Marks)

OR

- 2 a. Define converse, inverse and contra positive of an implication. Hence find converse, inverse and contra positive for " $\forall x, (x > 3) \rightarrow (x^2 > 9)$ " where universal set is the set of real numbers R. (04 Marks)
- b. Using the laws of logic, prove the following logical equivalence :
 $[(\sim p \vee \sim q) \wedge (F_0 \vee p) \wedge P] \Leftrightarrow p \wedge \sim q$. (04 Marks)
- c. What are bound variables and free variables. Identify the same in each of the following expressions :
 i) $\forall y, \exists z \{ \cos(x + y) = \sin(z - x) \}$
 ii) $\exists x, \exists y \{ (x^2 - y^2) = z \}$. (04 Marks)
- d. Verify the validity of the following argument : If a triangle has two equal sides, then it is isosceles. If a triangle is isosceles, then it has two equal angles. The triangle ΔABC does not have two equal angles. $\therefore \Delta ABC$ does not have two equal sides. (04 Marks)

Module-2

- 3 a. Prove by mathematical induction $1.3 + 2.4 + 3.5 + \dots + n(n+2) = \frac{n(n+1)(2n+7)}{6}$. (04 Marks)
- b. Give a recursive definition for each of the following integer sequence :
 i) $a_n = 7n$ ii) $a_n = 2 - (-1)^n$ for $n \in \mathbb{Z}^+$. (04 Marks)
- c. How many positive integers can be formed by using the digits 3, 4, 4, 5, 5, 6, 7 to exceed 5,000,000? (04 Marks)
- d. In how many ways can we distribute seven apples and six oranges among four children so that each child receives at least one apple? (04 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and /or equations written eg, 42+8 = 50, will be treated as malpractice.

OR

- 4 a. If F_0, F_1, F_2, \dots are Fibonacci numbers, then prove by induction $\sum_{i=1}^n \frac{F_{i-1}}{2^i} = 1 - \frac{F_{n+2}}{2^n}$. (04 Marks)
- b. A sequence $\{a_n\}$ is defined recursively as $a_1 = 7$ and $a_n = 2a_{n-1} + 1$ for $n \geq 2$. Find a_n in explicit form. (04 Marks)
- c. Find the number of arrangements of all the letters in the word "TALLAHASSEE". How many of these arrangements have no adjacent A's? (04 Marks)
- d. Find the coefficient of $w^3x^2yz^2$ in the expansion of $(2w - x + 3y - 2z)^8$. (04 Marks)

Module-3

- 5 a. Define Cartesian product of two sets. For any three non-empty sets A, B and C. Prove that $A \times (B - C) = (A \times B) - (A \times C)$. (04 Marks)
- b. Let f and g be two functions from R to R defined by $f(x) = 2x + 5$ and $g(x) = \frac{x-5}{2}$. Show that f and g are invertible to each other. (04 Marks)
- c. Define partition of a set. If R is a relation defined on $A = \{1, 2, 3, 4\}$ by $R = \{(1, 1), (1, 2), (2, 1), (2, 2), (3, 3), (3, 4), (4, 3), (4, 4)\}$, determine the partition induced by R. (04 Marks)
- d. Let $A = \{a, b, c\}$, $B = P(A)$ where P(A) is the power set of A. Let R be a subset relation on A. Show that (B, R) is a POSET and draw its Hasse diagram. (04 Marks)

OR

- 6 a. Let R be an equivalence relation on set A and $a, b \in A$. Then prove the following are equivalent :
 i) $a \in [a]$
 ii) $a R b$ iff $[a] = [b]$
 iii) if $[a] \cap [b] \neq \phi$ then $[a] = [b]$. (04 Marks)
- b. Prove that a function $f: A \rightarrow B$ is invertible iff it is one - one and onto. (04 Marks)
- c. State Pigeonhole principle. Show that if any seven numbers from 1 to 12 are chosen, then two of them will add to 13. (04 Marks)
- d. Show that the set of positive divisors of 36 is a POSET and draw its Hasse diagram. Hence find its i) least element ii) greatest element. (04 Marks)

Module-4

- 7 a. Out of 30 students in a hostel, 15 study history, 8 study economics and 6 study geography. It is known that 3 students study all these subjects. Show that 7 or more students study none of these subjects. (04 Marks)
- b. Define derangement. Find the number of derangements of 1, 2, 3, 4. List all these derangements. (04 Marks)
- c. Find the rook polynomial for the following board [refer Fig.Q7(c)] :

1	2			
3	4			
			5	6
			7	8
		9	10	11

Fig. Q7(c)

(04 Marks)

- d. The number of virus affected files in a system is 1000 (to start with) and this increases 250% every two hours. Use a recurrence relation to determine the number of virus affected files in the system after one day. (04 Marks)

OR

- 8 a. Determine the number of integers between 1 and 300 (inclusive) which are
 i) divisible by exactly two of 5, 6, 8 ii) divisible by at least two of 5, 6, 8. (04 Marks)
 b. In how many ways can the integers 1, 2, - - -, 10 be arranged in a line so that no even integer is in its natural place. (04 Marks)
 c. An apple, a banana, a mango and an orange are to be distributed to four boys B_1, B_2, B_3, B_4 . The boys B_1 and B_2 do not wish to have apple, the boy B_3 does not want banana or mango, B_4 refuses orange. In how many ways the distribution can be made so that no boy is displeased? (04 Marks)
 d. Solve the recurrence relation $F_{n+2} = F_{n+1} + F_n$ for $n \geq 0$ given that $F_0 = 0, F_1 = 1$. (04 Marks)

Module-5

- 9 a. Define the following with an example for each :
 i) Complete graph ii) regular graph iii) bipartite graph iv) complete bipartite graph. (04 Marks)
 b. Define isomorphism of two graphs. Verify the following graphs are isomorphic or not :
 [Refer Fig.Q9(b)] (04 Marks)



Fig.Q9(b)

- c. Show that a tree with n vertices has $n - 1$ edges. (04 Marks)
 d. Construct an optimal prefix code for the symbols a, o, q, u, y, z that occur with frequencies 20, 28, 4, 17, 12, 7 respectively. (04 Marks)

OR

- 10 a. Explain Konigsberg bridge problem. (04 Marks)
 b. Define the following with an example :
 i) subgraph ii) spanning subgraph
 iii) induced subgraph iv) edge-disjoint and vertex-disjoint subgraphs. (04 Marks)
 c. If a tree T has four vertices of degree 2, one vertex of degree 3, two vertices of degree 4 and one vertex of degree 5, find the number of leaves in T . (04 Marks)
 d. Obtain an optimal prefix code for the message ROAD IS GOOD. Indicate the code. (04 Marks)

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Third Semester B.E. Degree Examination, June/July 2019 Analog and Digital Electronics

Time: 3 hrs.

Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

- 1 a. List any 4 differences between JFET and MOSFET. (04 Marks)
- b. Explain with help of neat diagram the working of N-channel JFET and sketch its characteristics. (08 Marks)
- c. With help of block diagram, explain the operation of a astable multivibrator using IC 555. (08 Marks)

OR

- 2 a. Sketch and explain the working of peak detector. (06 marks)
- b. State and explain any four performance parameters of an operational amplifier. (08 marks)
- c. Illustrate the various types of filters with neat diagram and definations. (06 Marks)

Module-2

- 3 a. Use a Karnaugh map to find minimum 80p form for the following Boolean function :
 $f(a, b, c, d) = \sum m(0, 2, 3, 5, 6, 7, 8, 9) + d(10, 11, 12, 13, 14, 15)$.
 Also draw the logic circuit diagram for the simplified SOP. (10 Marks)
- b. Apply Quine Mc-clusky method to find essential prime implicants for the Boolean function
 $f(a, b, c, d) = \sum m(1, 3, 6, 7, 10, 12, 13, 14, 15)$.
 Write prime implicant table. (10 Marks)

OR

- 4 a. There are 4 adjacent parking slots in Mega Inc. executive parking area. Each slot is equipped with sensor whose output is asserted high when a car is occupying the slot. Write a truth table so that the output is high if two or more vacant parking is available.
 - i) Write truth table
 - ii) Find the expression of the system that will signal the existence of two or more vacant slots
 - iii) Simplify the expression
 - iv) Draw the logic diagram for simplified expression. (10 Marks)
- b. Briefly explain an HDL implementation models. And write the HDL program for the following circuit shown in using in figure Fig.Q4(b) using structural model. (07 Marks)

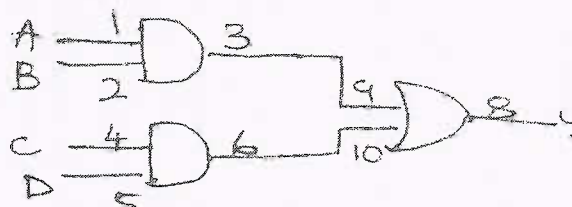


Fig.Q4(b)

- c. What is hazards? List the types of hazards. (03 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and/or equations written eg. 42+8 = 50, will be treated as malpractice.

Module-3

- 5 a. Implement the full adder outputs using 3 – 8 decoder. (07 marks)
 b. Design one bit magnitude comparator and implement it using de-multiplexer (08 Marks)
 c. Distinguish between combinational and sequential circuit. (05 Marks)

OR

- 6 a. Design a seven segment display using PLA. (10 Marks)
 b. Show how 1 : 4 de-multiplexer is used to get 1 : 16 de-multiplexer. (04 Marks)
 c. With the help of block diagram explain PAL and PLA. (06 Marks)

Module-4

- 7 a. The sequence 1011 is applied to the output of a 4 bit serial shift register that is initially cleared. With the help of diagram show how sequence is being entered serially into the register. (08 Marks)
 b. Design a self correcting modulo-6 counter in which all the unused state leads to state ABC = 000. (08 Marks)
 c. Draw the logic diagram, truth table and waveforms for a two flip-flop ripple counter. (04 Marks)

OR

- 8 a. Sketch a ring counter and Johnson counter and write its truth table. (08 Marks)
 b. Explain how toggle flip-flop is used as frequency divider circuit. Sketch the output waveforms. (08 Marks)
 c. A 4-bit binary asynchronous counter is connected. With a clock of 500 KHz frequency. Find the time period of the wave forms at the o/p of all the flop-flops. (04 Marks)

Module-5

- 9 a. Design synchronous counter for the sequence 1 – 3 – 5 – 7 – 1 using J-K flip-flop. (12 Marks)
 b. Explain digital clock with neat diagram. (04 Marks)
 c. Explain the terms accuracy and resolution for D/A converter. (04 Marks)

OR

- 10 a. Explain with block diagram the operation of successive approximation ADC. (08 Marks)
 b. Explain the binary ladder with digital input 1100. (08 Marks)
 c. For a 5 bit resistive divider, determine the following :
 i) Weight assigned to binary
 ii) Weight assigned to second and third LSB
 iii) The change in output voltage due to a change in the LSB, the second LSB and the third LSB
 iv) The output voltage for a digital input of 10101.
 Assume 0 = 0V and 1 = +10V.

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17CS33

Third Semester B.E. Degree Examination, June/July 2019 Data Structures and Applications

Time: 3 hrs.

Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

- 1 a. Define Data structures. Give its classification. What are the basic operations that can be performed on data structure? (08 Marks)
- b. Give the ADT for sparse matrix. Express the given sparse matrix in the triplet form and find its transpose.

$$A = \begin{bmatrix} 10 & 0 & 0 & 25 & 0 \\ 0 & 23 & 0 & 0 & 45 \\ 0 & 0 & 0 & 0 & 32 \\ 42 & 0 & 0 & 31 & 0 \\ 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 30 & 0 & 0 \end{bmatrix}$$

(08 Marks)

- c. Consider the given 2 polynomials,
 $A(x) = 4x^{15} + 3x^4 + 5$ and $B(x) = x^4 + 10x^2 + 1$
 Represent the polynomials using Array of structures. (04 Marks)

OR

- 2 a. Explain the dynamic memory allocation functions in detail. (08 Marks)
- b. Write a C program using pointers to (i) Concatenate two strings, (ii) reverse a string. (06 Marks)
- c. Apply Knut-Morris-Pratt (KMP) pattern matching algorithm to search the pattern "abcdabcy" in the text "abcxabcdabxabcdababcdabcy". (06 Marks)

Module-2

- 3 a. Define stack data structure and give the ADT for stack. Write C functions for push() and pop() operations. (08 Marks)
- b. Convert the given infix expressions to postfix and prefix expression.
 (i) $(a + b) * d + e / (f + g * h) + i$
 (ii) $((a / (b - c + d)) * (e - f) * g)$ (06 Marks)
- c. Write an algorithm for evaluation of postfix expression. Trace the same for the expression $ab/c - de * t ac * t$ where $a = 6, b = 3, c = 1, d = 2, e = 4$. (06 Marks)

OR

- 4 a. Define recursion. Write C recursive functions for the following :
 (i) Tower of Hanoi (ii) Factorial of a give number. (07 Marks)
- b. Write C functions for insertcq() and deletcq() operations on a circular queue. (05 Marks)
- c. Explain in detail multiple stacks, with relevant functions in C. (08 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
 2. Any revealing of identification, appeal to evaluator and /or equations written eg. 42+8 = 50, will be treated as malpractice.

Module-3

- 5 a. Define linked lists. Explain in detail, the primitive operations performed on Supply Linked List (SLL). List the different types of linked lists. (12 Marks)
- b. Write C functions for the following operations on Doubly Linked List (DLL). (08 Marks)
- Concatenation of two DLL.
 - Search the DLL for the given key element.

OR

- 6 a. Write a C program to implement linked stacks. (08 Marks)
- b. Write an algorithm to add 2 polynomials using circular simply linked list (SLL). And also represent the given polynomial using CSLL. (08 Marks)
- $$P(x, y, z) = 6x^2y^2z - 4yz^5 + 3x^3yz + 2xy^5z - 2xyz^3$$
- c. For the given sparse matrix give the linked list representation. (04 Marks)

$$A = \begin{bmatrix} 0 & 0 & 4 & 0 & 0 \\ 6 & 5 & 0 & 0 & 0 \\ 0 & 3 & 0 & 1 & 0 \\ 0 & 0 & 0 & 0 & 2 \end{bmatrix}$$

Module-4

- 7 a. Define tree data structure. Represent the tree given in Fig.Q7(a) using (i) List representation (ii) Left-Child Right-Sibling representation (iii) Degree-two or Binary tree representation.

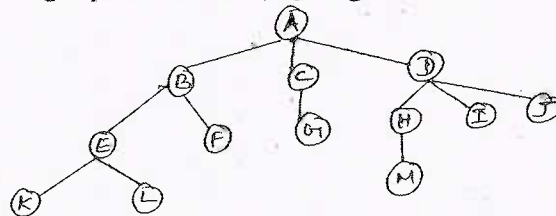


Fig.Q7(a)

(08 Marks)

- b. Write recursive C functions for in-order, pre-order, post-order traversals of binary tree (BT). Also give the 3 traversals for the BT shown in Fig.Q7(b). (12 Marks)

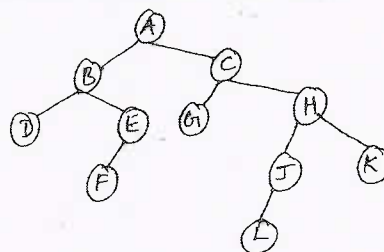


Fig.Q7(b)

OR

- 8 a. Define Binary Search Tree (BST). Construct BST for the element step-by-step, 100, 85, 45, 55, 110, 20, 70, 65, 113, 145, 132, 96 (08 Marks)
- b. Define threaded binary trees. Given in-order sequence: DJGBHEAFKIC and post-order sequence : JGDHEBKIFCA, construct BT for the same. (08 Marks)
- c. Write an algorithm for deleting a key element from BST. (04 Marks)

Module-5

- 9 a. Define the terminologies with example for graph data structure.
 (i) Graph (ii) Multigraph (iii) Complete graph. (06 Marks)
- b. Give the adjacency matrix and adjacency list representation for the weighted graph given in Fig.Q9(b). (06 Marks)

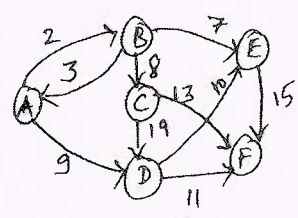


Fig.Q9(b)

- c. Write an algorithm for BFS and DFS graph traversal methods. (08 Marks)

OR

- 10 a. Apply insertion sort technique for the following elements : 77, 33, 44, 11, 88, 22, 66, 55. (08 Marks)
- b. Explain Hashing and collision. What are the methods used to resolve collision. (08 Marks)
- c. What are the basic operations that can be performed on a file? List the methods used for file organization (any 2). (04 Marks)

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17CS34

Third Semester B.E. Degree Examination, June/July 2019
Computer Organization

Time: 3 hrs.

Max. Marks: 100

**Note: Answer any FIVE full questions, choosing
 ONE full question from each module.**

Module-1

- 1 a. Write the basic performance equation. Explain the role of each of the parameters in the equation of the performance of the computer. (04 Marks)
- b. Draw and explain the connections between the processor and the main memory. (08 Marks)
- c. Write a program to evaluate the arithmetic statement $Y = (A + B) * (C + D)$ using three – address, two-address, one-address and zero – address instructions. (08 Marks)

OR

- 2 a. What is an addressing mode? Explain any four addressing modes with examples. (08 Marks)
- b. Explain the concept of stack frames, when subroutines are nested. (06 Marks)
- c. Explain the shift and rotate operations with examples. (06 Marks)

Module-2

- 3 a. Give comparison between memory mapped I/O and I/O mapped I/O. (04 Marks)
- b. Explain the following methods of handling interrupts from multiple devices.
 i) Interrupt nesting /priority structure (08 Marks)
 ii) Daisy chain method. (08 Marks)
- c. What is bus arbitration? Explain distributed arbitration with a neat diagram. (08 Marks)

OR

- 4 a. Draw neat timing diagrams and explain :
 i) Multicycle synchronous bus transfer for a read operation.
 ii) Asynchronous bus transfer for a write operation. (12 Marks)
- b. Explain the following with respect to USB.
 i) USB architecture
 ii) USB addressing. (08 Marks)

Module-3

- 5 a. With a neat diagram, explain the internal organization of a $2M \times 8$ dynamic memory chip. (08 Marks)
- b. Distinguish between SRAM and DRAM. (04 Marks)
- c. Describe any two mapping functions in cache. (08 Marks)

OR

- 6 a. What is virtual memory? With a diagram, explain how virtual memory address is translated? (08 Marks)
- b. Define the following :
 i) Memory latency ii) Memory bandwidth iii) Hit-rate iv) Miss-penalty. (04 Marks)
- c. Describe the working principle of a typical magnetic disk. (08 Marks)

Module-4

- 7 a. Convert the following pairs of decimal numbers to 5-bit signed 2's complement binary numbers and add them. State whether overflow has occurred.
i) -5 and 7 ii) -10 and -13 iii) -14 and 11. (06 Marks)
- b. Draw 4-bit carry-look ahead adder and explain. (06 Marks)
- c. Explain Booth's algorithm, multiply +15 and -6 using Booth's multiplication. (08 Marks)

OR

- 8 a. Explain the concept of carry-save addition for the multiplication operation $M \times Q = P$ for 4-bit operands, with diagram and suitable example. (08 Marks)
- b. Explain IEEE standard for floating - point numbers. (06 Marks)
- c. Perform the non-restoring division for $8 \div 3$ by showing all the steps. (06 Marks)

Module-5

- 9 a. Draw and explain multiple bus organization of CPU. And write the control sequence for the instruction Add R_4, R_5, B_6 for the multiple bus organization. (10 Marks)
- b. Explain with block diagram the basic organization of a micro programmed control unit. (10 Marks)

OR

- 10 a. With block diagram, explain the working of a microwave oven. (10 Marks)
- b. Explain the structure of general-purpose multiprocessors with diagrams. (10 Marks)

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17CS35

Third Semester B.E. Degree Examination, June/July 2019 UNIX and Shell Programming

Time: 3 hrs.

Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

- 1 a. With a neat diagram, explain the architecture of UNIX operating system. (08 Marks)
 b. Differentiate between internal and external commands in UNIX with suitable examples. (05 Marks)
 c. Write down the key combinations for managing the non-uniform behavior of key board and terminal for the following :
 i) Backspacing doesn't work
 ii) Killing a line
 iii) Interrupting a command
 iv) Terminating commands input
 v) Keyboard is locked
 vi) [Enter] key doesn't work
 vii) Terminal behaves in erratic manner (command). (07 Marks)

OR

- 2 a. Explain the salient features of UNIX operating system. (08 Marks)
 b. Differentiate between 'more' and 'less' page programs in UNIX. (04 Marks)
 c. List and describe the mandatory and optional sections of man page in UNIX operating system. (08 Marks)

Module-2

- 3 a. Illustrate with a neat diagram typical UNIX file system and explain different types of files supported in UNIX. (08 Marks)
 b. Assume you are in /home/Kumar, which of these commands will work when executed in sequence? Explain the proper reasons.
`mkdir a/b/c → mkdir a a/b`
`mkdir a a/b a/b/c → rmdir a/b/c → rmdir a a/b → mkdir a/p a/q a/p/r`
 Draw the final tree structure for directory 'a'. (07 Marks)
 c. Explain the following commands with an example. i) cd ii) pwd iv) rmdir v) wc. (05 Marks)

OR

- 4 a. Which command is used for listing file attributes? Explain the significance of each field in the output. (08 Marks)
 b. Explain the following commands with an example for each.
 i) cp ii) rm iii) mv iv) cat. (04 Marks)
 c. Current file permissions of a regular file "unix" are `rw__w__x`. Write chmod expressions required to change it to the following :
 i) `_wxrwxr_x` ii) `__ _r _xrw_` iii) `rwx_ _x _ _ _` iv) `r _ _ _ wx _ _ _`.
 Using both relative and absolute methods of assigning permissions. (08 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
 2. Any revealing of identification, appeal to evaluator and/or equations written eg, 42+8 = 50, will be treated as malpractice.

Module-3

- 5 a. Explain the three modes of vi. Indicate clearly how can you switch form one mode to another. Explain the following input mode commands : i, I, a, A, r, R, o, O, s, S. (10 Marks)
- b. Explain what these wild-card pattern match
 i) `[A-Z]???? *` ii) `*[!0-9]*` iii) `*.[!t][!x][!t]` (06 Marks)
- c. Explain the navigation keys for the following types of navigations in vi editor.
 i) Movement in four directions
 ii) Word navigation. (04 Marks)

OR

- 6 a. With suitable examples, explain the 'grep' command with its various options. (06 Marks)
- b. Briefly explain Basic Regular Expression (BRE) and Extended Regular Expression (ERE) metacharacters. (10 Marks)
- c. Write a regular expression to match the following i) a decimal number which is non negative and floating point number ii) A valid 'C' variable. (04 Marks)

Module-4

- 7 a. Explain the following commands with an example for each. i) head ii) tail iii) cut iv) paste. (08 Marks)
- b. What is shell programming? Write a shell program to create a simple calculator which can perform basic arithmetic operations like addition, subtraction, multiplication or division, depending upon the user input. (10 Marks)
- c. Write the syntax for if-else-fi statement in shell programming. (02 Marks)

OR

- 8 a. Write a shell program to get the following details of the student. Name, age, USN and gender. Output all the details to the terminal. And also output whether the student is eligible to vote or not with suitable messages. (08 Marks)
- b. Distinguish between hard links and soft links. (04 Marks)
- c. Write and explain the syntax of 'while' and 'for' loops in shell programming. (08 Marks)

Module-5

- 9 a. Write a Perl script to determine whether the given year is a leap year or not. (08 Marks)
- b. What is the difference between a job and a process? How do you i) suspend the foreground job ii) move a suspended job to the background iii) bring back a suspended job to the foreground? (06 Marks)
- c. Explain the mechanism of process creation. (06 Marks)

OR

- 10 a. Explain the following string handling functions of PERL with example :
 i) length ii) index iii) substr iv) reverse. (08 Marks)
- b. Explain the following commands :
 i) at ii) cron iii) nice iv) nohup. (08 Marks)
- c. With suitable examples, explain 'split' and 'join' functions in PERL. (04 Marks)

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17CS36

Third Semester B.E. Degree Examination, June/July 2019 Discrete Mathematical Structures

Time: 3 hrs.

Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

- 1 a. Define tautology. Verify that $[p \rightarrow (q \rightarrow r)] \rightarrow [(p \rightarrow q) \rightarrow (p \rightarrow r)]$ is a tautology. (06 Marks)
- b. If statement q has truth value 1, determine all truth value assignments for the primitive statements p, r, s for which the truth value of the statement :
 $(q \rightarrow [(\neg p \vee r) \wedge \neg s]) \wedge [\neg s \rightarrow (\neg r \wedge q)]$ is 1. (04 Marks)
- c. Establish the following logical equivalence :
 i) $p \vee q \vee (\neg p \wedge \neg q \wedge r) \Leftrightarrow p \vee q \vee r$
 ii) $[(\neg p \vee \neg q) \rightarrow (p \wedge q \wedge r)] \Leftrightarrow p \wedge q$. (10 Marks)

OR

- 2 a. Establish the validity of following arguments :
- | | |
|--|---|
| $\begin{array}{l} \neg p \vee \neg q \rightarrow (r \wedge s) \\ r \rightarrow t \\ \neg t \\ \hline \therefore p \end{array}$ | $\begin{array}{l} u \rightarrow r \\ (r \wedge s) \rightarrow (p \vee t) \\ q \rightarrow (u \wedge s) \\ \neg t \\ q \\ \hline \therefore p \end{array}$ |
|--|---|
- (08 Marks)
- b. Let $p(x)$, $q(x)$ and $r(x)$ be the following open statements :
 $p(x) : x^2 - 7x + 10 = 0$ $q(x) : x^2 - 2x - 3 = 0$ $r(x) : x < 0$.
 Determine truth or falsity of following statements, where universe is all integers. If a statement is false, provide a counter example.
 i) $\forall x [p(x) \rightarrow \neg r(x)]$ ii) $\forall x [q(x) \rightarrow r(x)]$
 iii) $\exists x [q(x) \rightarrow r(x)]$ iv) $\exists x [p(x) \rightarrow r(x)]$. (08 Marks)
- c. Prove that for all integers 'k' and 'l', if 'k' and 'l' are both even, then $k + l$ is even and kl is even by direct proof. (04 Marks)

Module-2

- 3 a. Define well ordering principle and prove the following by mathematical induction :
- i) $1^2 + 3^2 + 5^2 + \dots + (2n-1)^2 = \frac{n(2n-1)(2n+1)}{3}$
- ii) $1*3 + 2*4 + 3*5 + \dots + n(n+2) = \frac{n(n+1)(2n+7)}{6}$. (12 Marks)
- b. Find the coefficients of :
- i. $x^9 y^3$ in the expansion of $(2x - 3y)^{12}$
- ii. $a^2 b^3 c^2 d^5$ in the expansion of $(a + 2b - 3c + 2d + 5)^{16}$. (08 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and/or equations written eg. 42+8 = 50, will be treated as malpractice.

OR

- 4 a. A woman has 11 close relatives and she wishes to invite 5 of them to dinner. In how many ways can she invite them in following situations,
- There is no restriction on the choice
 - Two particular persons will not attend separately
 - Two particular persons will not attend together.
- (06 Marks)
- b. How many arrangements are there for all letters in word SOCIOLOGICAL? In how many of these arrangements all vowels are adjacent. (06 Marks)
- c. For the Fibonacci sequence F_0, F_1, F_2, \dots prove that $F_n = \frac{1}{\sqrt{5}} \left[\left(\frac{1+\sqrt{5}}{2} \right)^n - \left(\frac{1-\sqrt{5}}{2} \right)^n \right]$. (08 Marks)

Module-3

- 5 a. Let $A = \{1, 2, 3, 4\}$ and $B = \{1, 2, 3, 4, 5, 6\}$.
- How many functions are there from A to B?
 - How many of these are one to one?
 - How many are onto?
 - How many functions are there from B to A?
 - How many of these are onto?
 - How many are one to one?
- (06 Marks)
- b. A computer operator is given a magnetic tape that contains 500,000 words of four or fewer lowercase letters. Can it be that the 500,000 words are all distinct? (06 Marks)
- c. Let $f, g, h : \mathbb{R} \rightarrow \mathbb{R}$ where $f(x) = x^2$, $g(x) = x + 5$ and $h(x) = \sqrt{x^2 + 2}$. Show that $(h \circ g) \circ f = h \circ (g \circ f)$. (08 Marks)

OR

- 6 a. Let $A = \{1, 2, 3, 6, 9, 18\}$ and define R on A by xRy if "x divides y". Draw the Hasse diagram for the poset (A, R). Also write the matrix of relation. (08 Marks)
- b. Consider Poset whose Hasse diagram is given below. Consider $B = \{3, 4, 5\}$. Find upper and lower bounds of B, least upper bound and greatest lower bound of B. (04 Marks)
(Ref. Fig.Q6(b)).

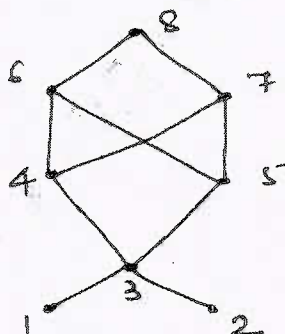


Fig.Q6(b)

- c. Let $A = \{1, 2, 3, 4, 5\} \times \{1, 2, 3, 4, 5\}$ and define R on A by $(x_1, y_1) R (x_2, y_2)$ if $x_1 + y_1 = x_2 + y_2$.
- Verify that R is an equivalence relation on A
 - Determine equivalence classes $[(1, 3)]$, $[(2, 4)]$ and $[(1, 1)]$
 - Determine partition of A induced by R.
- (08 Marks)

Module-4

- 7 a. In how many ways can the 26 letters of English alphabet be permuted so that none of the patterns CAR, DOG, PUN or BYTE occurs? (08 Marks)
- b. There are eight letters to eight different people to be placed in eight different addressed envelopes. Find the number of ways of doing this so that atleast one letter gets to right person. (04 Marks)
- c. Four persons P_1, P_2, P_3, P_4 who arrive late for a dinner party find that only one chair at each of five table T_1, T_2, T_3, T_4 and T_5 is vacant. P_1 will not sit at T_1 or T_2 , P_2 will not sit at T_2 , P_3 will not sit at T_3 or T_4 and P_4 will not sit at T_4 or T_5 . Find the number of ways they can occupy the vacant chairs. (08 Marks)

OR

- 8 a. Find the recurrence relation and the initial condition for the sequence 0, 2, 6, 12, 20, 30, 42, Hence find the general term of the sequence. (10 Marks)
- b. If $a_0 = 0, a_1 = 1, a_2 = 4$ and $a_3 = 37$ satisfy the recurrence relation $a_{n+2} + ba_{n+1} + ca_n = 0$ for $n \geq 0$, determine the constants b and c and then solve the relation for a_n . (10 Marks)

Module-5

- 9 a. Merge sort the list -1, 7, 4, 11, 5, -8, 15, -3, -2, 6, 10, 3. (06 Marks)
- b. Determine whether the following graphs are isomorphic or not. (06 Marks)

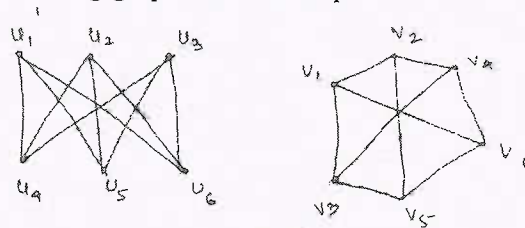


Fig.Q9(b)

- c. Define the following with an example to each.
 i) Simple graph ii) Complete graph iii) Regular graph iv) Spanning sub graph v) Induced subgraph vi) Complete Bipartite graph vii) Tree viii) Complement of graph. (08 Marks)

OR

- 10 a. Define trail, circuit, path, cycle. In the graph shown below determine : [Ref.Q10(a)]
 i. a walk from b to d that is not a trail
 ii. b-d trail that is not a path
 iii. a path from b to d
 iv. a closed walk from b to b that is not a circuit
 v. a circuit from b to b that is not cycle
 vi. a cycle form b to b. (10 Marks)

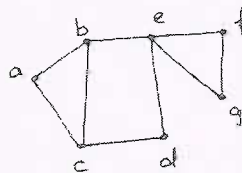


Fig.Q10(a)

- b. Define optimal tree and construct an optimal tree for a given set of weights {4, 15, 25, 5, 8, 16}. Hence find the weight of optimal tree. (06 Marks)
- c. Prove that in a graph. The sum of degrees of all vertices is an even number and is equal to twice the number of edges in the graph. (04 Marks)

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15CS32

Third Semester B.E. Degree Examination, June/July 2019 Analog and Digital Electronics

Time: 3 hrs.

Max. Marks: 80

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

- 1 a. Explain with help of a circuit diagram and characteristic curves working of N-channel Enhancement – MOSFET (E-MOSFET) (10 Marks)
- b. Explain any two applications of field Effect Transistor (FET) along with the circuit diagram. (06 Marks)

OR

- 2 a. Explain the operation of Astable multi-vibrator with a neat diagram. (08 Marks)
- b. Explain performance parameters of operational amplifiers. (08 Marks)

Module-2

- 3 a. Describe positive and negative logic. list the equivalences between them. (04 Marks)
- b. Simplify the following boolean function using k-map method.
 $F(A, B, C, D) = \pi M(0, 1, 2, 4, 5, 10) + d(8, 9, 11, 12, 13, 15)$
 Get the simplified POS form of k-map. (04 Marks)
- c. What is a Hazard? Explain Static – 0 hazard and its Hazard cover. (08 Marks)

OR

- 4 a. Give simplified logic equation using Quine-McClusky method for the following Boolean function $F(A, B, C, D) = \sum m(0, 3, 5, 6, 7, 11, 14)$. (12 Marks)
- b. Mention the different verilog HDL model and write the verilog HDL code using structural model for the circuit given in Fig Q4(b)

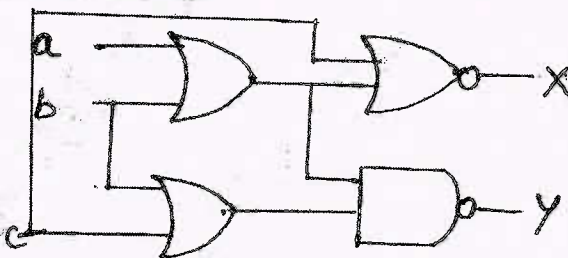


Fig Q4(b)

(04 Marks)

Module-3

- 5 a. Implement the following function using 8:1 multiplexer
 $F(A, B, C, D) = \sum m(0, 1, 5, 6, 8, 10, 12, 15)$ (06 Marks)
- b. Show that using a 3:8 decoder and multi-input OR gate, the following boolean expression can be realized $F_1(A, B, C) = \sum m(0, 4, 6)$
 $F_2(A, B, C) = \sum m(1, 2, 3, 7)$ (04 Marks)
- c. Design even parity generator. (06 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and/or equations written eg, 42+8 = 50, will be treated as malpractice.

OR

- 6 a. Design seven segment decoder using Programmable Logic Array (PLA) (08 Marks)
b. What is Magnitude comparator? Design one bit comparator using basic gates? (08 Marks)

Module-4

- 7 a. Explain the working of a JK master – slave Flip – Flop along with its implementation using NAND gates. (08 Marks)
b. Draw the state transition tables of JK, T, D and SR Flip – Flops. (08 Marks)

OR

- 8 a. Explain a 4-bit serial – In – Serial – out (SISO) registers using negative edge triggered D-Flip-Flops. Draw the waveform to shift binary number 1111 into this register. (08 Marks)
b. Write the comparison between synchronous and asynchronous counter. (04 Marks)
c. Explain Ring counter with a neat diagram. (04 Marks)

Module-5

- 9 a. Define counter. Design and Implement a MOD – 5 synchronous counter using JK Flip-Flop. (10 Marks)
b. With a neat diagram explain Digital clock. (06 Marks)

OR

- 10 a. Explain 2 bit simultaneous A/D converter. (10 Marks)
b. Explain the Binary ladder with digital input of 0100. (06 Marks)

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15CS33

Third Semester B.E. Degree Examination, June/July 2019

Data Structures and Applications

Time: 3 hrs.

Max. Marks: 80

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

- 1 a. What is a Pointer? How do you declare and initialize the pointer? How do you access the value pointed to by a pointer. (06 Marks)
- b. What is Self-referential structure? List the difference between structure and union. (06 Marks)
- c. What is String? Explain the following string functions with examples :
i) STRTOK ii) STRCAT iii) SUBSTR. (04 Marks)

OR

- 2 a. Write appropriate structure definition and variable declarations to store following information about 50 students :
Name , USN , GENDER , DOB and Marks in three subjects S₁, S₂ and S₃ . Date of birth should be a structure containing fields day , month and year. (06 Marks)
- b. What is Dynamically allocated arrays? Explain with suitable example. (05 Marks)
- c. What is pointer to pointer? Give the following declaration.
int a = 8 ;
int b = 9 ;
int *b = &a ;
int *2 = &b ;
What is the value of each of the following expression?
i) ++ a ii) ++(*p) iii) --(*q) iv) --b. (05 Marks)

Module-2

- 3 a. Define Stack? List the operations of on stack. Write the C implementation of these operations. (08 Marks)
- b. Write an algorithm for evaluating a valid postfix expression. Trace the same on
562 + * 841 - (08 Marks)

OR

- 4 a. What is Recursion? Write a C implementation for Tower of Hanoi. (08 Marks)
- b. What is a Queue? List different types of Queue. Write C implementation for insertQ() and deleteq() operation. (08 Marks)

Module-3

- 5 a. What is a linked list? List different types of linked list. Write a C function to count number of elements present in a singly linked list. (08 Marks)
- b. How can an ordinary queue be represented using a singly linked list? Write C functions for linked implementation of ordinary queue insertion and deletion. (08 Marks)

OR

- 6 a. What is doubly linked list? Write a C program to perform the following operations on doubly linked list i) Insert a node ii) Delete a node. (08 Marks)
 b. Explain the following with suitable example i) Circular linked list ii) Doubly linked list. (08 Marks)

Module-4

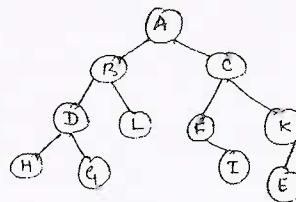
- 7 a. What is a Tree? List traversing Binary tree. Write algorithm for these tree traversal. (07 Marks)
 b. Construct a binary tree from the traversal order given below :

Preorder :	A	B	D	E	F	C	G	H	L	J	K
Inorder :	D	B	F	E	A	G	C	L	J	H	K

- (05 Marks)
 c. What is Threaded Binary tree? Explain right in an left in threaded binary trees. (04 Marks)

OR

- 8 a. Construct a binary tree for given expression $((6 + (3-2) * 5) ^ 2 + 3)$. (06 Marks)
 b. Given the following graph, write inorder, preorder and postorder traversals. (04 Marks)



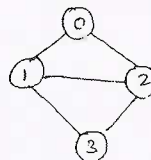
- c. Define the following : i) Binary tree ii) Complete binary tree iii) Almost complete binary tree iv) Binary search tree. (06 Marks)

Module-5

- 9 a. How an Insertion sort works? Suppose an array A contains 8 elements as follows : 77, 33, 44, 11, 88, 22, 66, 55. Trace insertion sort algorithm for sorting in ascending order. (06 Marks)
 b. What is Hashing? Explain with example hash following hashing function :
 i) Division method ii) Midsquare method iii) Folding method. (06 Marks)
 c. Define following terms : i) Graph ii) Multigraph iii) Graph with self edge iv) Subgraph. (04 Marks)

OR

- 10 a. Define Adjacency matrix and Adjacency list. Also show the adjacency matrix and adjacency List for the given graph. (08 Marks)



- b. Consider the following 4 – digit employee number 9614 , 5882 , 6713 , 4409 , 1825. Find the 2 – digit hash address of each number using
 i) The division method with = 97.
 ii) The midsquare method.
 iii) The folding method without reversing.
 iv) The folding method with reversing. (08 Marks)

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15CS34

Third Semester B.E. Degree Examination, June/July 2019
Computer Organization

Time: 3 hrs.

Max. Marks: 80

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

- 1 a. Explain the connection between processor and memory with neat diagram and show how to add $A + B$ to form C with the help of the same diagram. (08 Marks)
- b. Write short notes on :
 (i) Performance equation (ii) SPEC Rating (08 Marks)

OR

- 2 a. What do you mean by addressing mode? Explain different types of addressing modes with example. (10 Marks)
- b. Explain shift and rotate instructions with example. (06 Marks)

Module-2

- 3 Write short notes on :
 (i) Daisy chain (ii) Subroutine (iii) Interrupt hardware (iv) Exception (16 Marks)

OR

- 4 a. Explain how DMA (with register) is taking place in a system with necessary diagram. (08 Marks)
- b. Define Bus arbitration. Discuss different types of Bus Arbitration methods with diagram. (08 Marks)

Module-3

- 5 a. With diagram, describe the internal organization of a 128×8 memory chip. (08 Marks)
- b. With the diagram of basic SRAM (Static RAM) and DRAM (Asynchronous DRAM) chip (cell), explain the read and write operations on each of them. (08 Marks)

OR

- 6 a. Describe different types of cache mapping techniques (between memory to cache memory) with diagram. (10 Marks)
- b. Calculate the total capacity of a 4.8 inch disk having the following parameters:
 (i) 100 data recording surfaces (ii) 100000 tracks per surface (iii) 100 sectors per track
 (iv) Each track contains 512 bytes of data. (03 Marks)
- c. In a given system (i) hit rate (h) = 0.5 (ii) Miss penalty (M) = 100 ns (iii) Time to access cache memory (c) = 100 ns. Calculate the average access time (t_{ave}) experienced by the processor. (03 Marks)

Module-4

- 7 a. Write down the steps of Booths multiplication algorithm. (02 Marks)
- b. Perform Booths multiplication between $(+13) \times (-6)$. (08 Marks)
- c. Explain generation and propagation functions used in Carry-Look-Ahead Adder. (06 Marks)

OR

- 8 a. Explain Bit-Pair Recording / Fast multiplication with example. (08 Marks)
b. Write down the steps of restoring division algorithm. Apply Restoring division algorithm on 1000/11. (08 Marks)

Module-5

- 9 a. Describe Multiple Bus Organization (with diagram). (08 Marks)
b. Write down the control sequence for execution of the instruction Add (R₃), R₁ (08 Marks)

OR

- 10 a. What do you mean by micro-instruction? Design Basic organization of a microprogrammed control unit with diagram. (08 Marks)
b. Describe a simple microcontroller with diagram. Also mention parallel and serial I/O port in brief. (08 Marks)

Module-4

- 7 a. Explain the following environment variables with example each:
i) SHELL ii) LOGNAM iii) PATH iv) PS1 (04 Marks)
b. Explain sort command with options. (08 Marks)
c. What are hard link and symbolic links? (04 Marks)

OR

- 8 a. Explain special parameters used by the shell. (08 Marks)
b. Write a menu driven shell script to display list of files, process of user, today's date and users of the system. (08 Marks)

Module-5

- 9 a. Explain the mechanism of process creation using system in UNIX. (06 Marks)
b. Explain here document (<<) with an example. Also mention its use. (04 Marks)
c. Explain the following commands with example: (i) kill (ii) bg (iii) fg (06 Marks)

OR

- 10 a. Explain split and join functions with example. (04 Marks)
b. How is file managed in perl? Explain with an example. (04 Marks)
c. Using command line arguments, write a Perl program to find whether a given year is leap. (06 Marks)

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15CS36

Third Semester B.E. Degree Examination, June/July 2019 Discrete Mathematical Structures

Time: 3 hrs.

Max. Marks: 80

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

- 1 a. Simplify the switching network shown in Fig Q1(a)

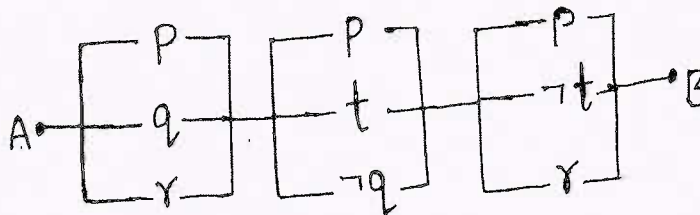


Fig Q1(a)

(08 Marks)

- b. Give a direct proof of the statement “If n is an odd integer then n^2 is also an odd integer”.
(04 Marks)
- c. Let $p(x)$, $q(x)$ and $r(x)$ be open statements that are defined for the given universe. Show that the argument.

$$\forall x, [p(x) \rightarrow q(x)]$$

$$\forall x, [q(x) \rightarrow r(x)]$$

$$\therefore \exists x, [p(x) \rightarrow r(x)] \text{ is valid}$$

(04 Marks)

OR

- 2 a. Define tautology, prove that for any proposition p , q , r the compound proposition $[(p \rightarrow q) \wedge (q \rightarrow r)] \rightarrow (p \rightarrow r)$ is a tautology using truth table.
(05 Marks)
- b. Show that RVS follows logically from the premises $C \vee D$, $C \vee D \rightarrow \neg H$, $\neg H \rightarrow (A \wedge \neg B)$ and $(A \wedge \neg B) \rightarrow (R \vee S)$.
(04 Marks)
- c. Using rules of inference shows that the following argument is valid.
 $\forall x, [p(x) \vee q(x)] \wedge \exists x, \neg p(x) \wedge$
 $\forall x, [\neg q(x) \vee r(x)] \wedge \forall x, [s(x) \rightarrow \neg r(x)]$
 $\therefore \exists x, \neg s(x)$
(07 Marks)

Module-2

- 3 a. Prove by mathematical induction that, for all integers $n \geq 1$, $1 + 2 + 3 + \dots + n = \frac{1}{2}n(n+1)$.
(06 Marks)
- b. The Fibonacci numbers are defined recursively by $F_0 = 0$, $F_1 = 1$, $F_n = F_{n-1} + F_{n-2}$ for $n \geq 2$. Evaluate F_2 to F_{10} .
(04 Marks)
- c. In the word S, O, C, I, O, L, O, G, I, C, A, L.
i) How many arrangements are there for all letters?
ii) In how many of these arrangements all vowels are adjacent?
(06 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and/or equations written eg. 42+8=50, will be treated as malpractice.

OR

- 4 a. Obtain the recursive definition for the sequence $\{a_n\}$ in each of the following cases.
 (i) $a_n = 5n$ (ii) $a_n = 6^n$ (iii) $a_n = n^2$ (06 Marks)
- b. Find the coefficient of
 i) $x^9 y^3$ in the expansion of $(2x - 3y)^{12}$
 ii) x^{12} in the expansion of $x^3(1 - 2x)^{10}$ (04 Marks)
- c. A message is made up of 12 different symbols and is to be transmitted through a communication channel. In addition to the 12 symbols, the transmitter will also send a total of 45 blank spaces between the symbols, with at least 3 spaces between each pair of consecutive symbols. In how many ways can the transmitter send such a message? (06 Marks)

Module-3

- 5 a. Let $f: \mathbb{R} \rightarrow \mathbb{R}$ be defined by

$$f(x) = \begin{cases} 3x - 5 & \text{for } x > 0 \\ -3x + 1 & \text{for } x \leq 0 \end{cases}$$
 determine $f(0)$, $f(-1)$, $f^{-1}(0)$, $f^{-1}(+3)$, $f^{-1}([-5, 5])$ (08 Marks)
- b. Define an equivalence relation. Write the partial order relation for the positive divisors of 36 and write its Hasse diagram (HASSE). (08 Marks)

OR

- 6 a. Consider the function $f: \mathbb{R} \rightarrow \mathbb{R}$ defined by $f(x) = 2x + 5$. Let a function $g: \mathbb{R} \rightarrow \mathbb{R}$ be defined by $g(x) = \frac{1}{2}(x - 5)$. Prove that g is an inverse of f . (03 Marks)
- b. State Pigeonhole principle. Let ABC is an equilateral triangle whose sides are of length 1cm each. If we select 5 points inside the triangle, prove that atleast two of their points are such that the distance between them is less than $\frac{1}{2}$ cm. (05 Marks)
- c. If $A = \{1, 2, 3, 4\}$, R and S are relations on A defined by $R = \{(1, 2), (1, 3), (2, 4), (4, 4)\}$
 $S = \{(1, 1), (1, 2), (1, 3), (1, 4), (2, 3), (2, 4)\}$ find $R \circ S$, $S \circ R$, R^2 , S^2 and write down their matrices. (08 Marks)

Module-4

- 7 a. Find the number of derangements of 1, 2, 3, 4 list all such derangements. (04 Marks)
- b. Determine the number of integers between 1 and 300 (inclusive) which are divisible by exactly 2 of 5, 6, 8. (06 Marks)
- c. The number of virus affected files in a system is 1000 (to start with) and this increases 250% every two hours. Use a recurrence relation to determine the number of virus affected files in the system after one day? (06 Marks)

OR

- 8 a. Five teachers T_1, T_2, T_3, T_4, T_5 are to be made class teachers for 5 classes C_1, C_2, C_3, C_4, C_5 one teacher for each class T_1 and T_2 donot wish become the class teachers for C_1 or C_2 , T_3 and T_4 for C_4 or C_5 and T_5 for C_3 or C_4 or C_5 . In how many ways can teachers be assigned the work (without displeasing any teacher)? (08 Marks)
- b. Solve the recurrence relation,
 $a_n = 2(a_{n-1} - a_{n-2})$, where $n \geq 2$ and $a_0 = 1, a_1 = 2$. (08 Marks)

Module-5

- 9 a. Prove that the undirected graph $G = (V, E)$ has an Euler circuit if and only if G is connected and every vertex in G has even degree. (08 Marks)
- b. Define binary rooted tree and Balanced tree. Draw all the spanning trees of the graph shown in Fig 9(b)

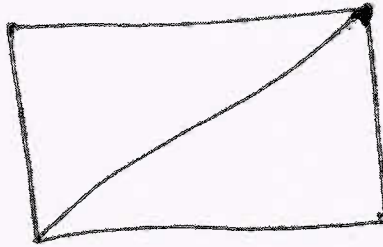


Fig Q9(b)

(08 Marks)

OR

- 10 a. Define, with an example for each Regular graph, complement of a graph, Euler trail and Euler circuit and complete graph. (10 Marks)
- b. Apply Merge sort to the list
6, 2, 7, 3, 4, 9, 5, 1, 8 (06 Marks)

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17CS42

Fourth Semester B.E. Degree Examination, June/July 2019

Object Oriented Concepts

Time: 3 hrs.

Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

- 1 a. Explain the various features of OOC. (08 Marks)
- b. What is a constructor? Mention its types. Explain the parameterized constructor with a suitable code. (08 Marks)
- c. Give the difference between procedure oriented programming and object oriented programming. (04 Marks)

OR

- 2 a. What is an inline function? Write a C++ function to find the maximum of 2 numbers using inline. (08 Marks)
- b. Why friend function is required? Write a program to add two numbers using friend function. (08 Marks)
- c. Write short note on function overloading. (04 Marks)

Module-2

- 3 a. List and explain the Java Buzzwords. (08 Marks)
- b. Describe the concept of bytecode. (04 Marks)
- c. Develop the program to calculate the average among the elements {4, 8, 10, 12} using foreach in java. How foreach is different from for? (08 Marks)

OR

- 4 a. List the different types of operators. Explain any three. (08 Marks)
- b. What is an array? List the types and explain any one with a suitable code. (06 Marks)
- c. Explain switch case with an example. (06 Marks)

Module-3

- 5 a. Explain the packages in Java with an example. (08 Marks)
- b. Explain the interfaces in java using suitable code. (08 Marks)
- c. Write short notes on "this" keyword with an example. (04 Marks)

OR

- 6 a. Explain exception handling with a suitable code. (08 Marks)
- b. Explain the java garbage collector. (08 Marks)
- c. Write short notes on "super" keyword, with an example. (04 Marks)

Module-4

- 7 a. Explain the concepts of multithreading in Java. Explain the two ways of making class threadable with examples. (10 Marks)
- b. With a syntax, explain isAlive() and join() with suitable program. (10 Marks)

OR

- 8 a. Write short notes on Event Listener interface and explain any two interfaces with syntax. (08 Marks)
b. Write short notes on Event class and explain any two with syntax. (08 Marks)
c. How inner classes are used in Java? Explain. (04 Marks)

Module-5

- 9 a. What is an applet? Explain the life cycle of an applet. (10 Marks)
b. Explain passing parameters in Applets. (10 Marks)

OR

- 10 Explain the following with a suitable code:

- i) JLabel
- ii) JTextField
- iii) JList
- iv) JTable.

(20 Marks)

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Fourth Semester B.E. Degree Examination, June/July 2019 Design and Analysis of Algorithms

Time: 3 hrs.

Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

- 1 a. Design an algorithm to search an element in a array using sequential search. Discuss the worst case, best case and average case efficiency of this algorithm. (08 Marks)
- b. Discuss adjacency matrix and adjacency list representation of a graph with suitable example. (06 Marks)
- c. Give the recursive algorithm to solve towers of Hanoi problem. Show that the efficiency of this algorithm is exponential. (06 Marks)

OR

- 2 a. Give the general plan for analyzing time efficiency of non recursive algorithms. Derive the worst case analysis for the algorithm to check whether all the elements in a given array are distinct. (08 Marks)
- b. List and define any three asymptotic notations. What are the various basic asymptotic efficiency classes? (06 Marks)
- c. Explain the following types of problems: (06 Marks)
 - (i) Combinatorial problems
 - (ii) Graph problems.

Module-2

- 3 a. Write an algorithm to sort 'n' numbers using Quick sort. Trace the algorithm to sort the following list in ascending order. (08 Marks)

80 60 70 40 10 30 50 20
- b. Discuss general divide and conquer technique with control abstraction and recurrence relation. (06 Marks)
- c. Apply DFS based algorithm and source removal method to find the topological sequence for the graph shown in Fig.Q3(c). (06 Marks)

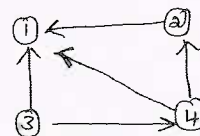


Fig. Q3(c)

OR

- 4 a. Apply Strassen's matrix multiplication to multiply following matrices. Discuss how this method is better than direct matrix multiplication method. (08 Marks)

$$\begin{bmatrix} 4 & 3 \\ 2 & 1 \end{bmatrix} \times \begin{bmatrix} 2 & 5 \\ 1 & 6 \end{bmatrix}$$
- b. Write recursive algorithm to find maximum and minimum element in an array. (06 Marks)
- c. Write an algorithm to sort 'n' number using merge sort. (06 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and/or equations written eg, 42+8 = 50, will be treated as malpractice.

Module-3

- 5 a. Write an algorithm to solve knapsack problem using Greedy technique. Find the optimal solution to the knapsack instance $n = 7, m = 15$
 $(P_1, P_2, \dots, P_7) = (10, 5, 15, 7, 6, 18, 3)$
 $(W_1, W_2, \dots, W_7) = (2, 3, 5, 7, 1, 4, 1)$ (10 Marks)
- b. Apply Prim's algorithm and Kruskal's method to find the minimum cost spanning tree to the graph shown in Fig.Q5(b). (10 Marks)

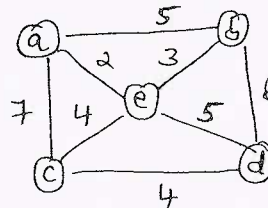


Fig.Q5(b)

OR

- 6 a. Write an algorithm to solve single source shortest path problem. Apply the algorithm to the graph shown in Fig.Q6(a) by considering 'a' as source. (10 Marks)

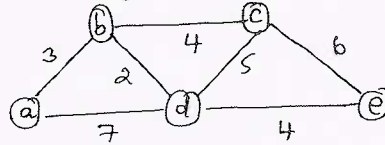


Fig.Q6(a)

- b. Define heap. Write bottom-up heap construction algorithm. Construct heap for the list 1, 8, 6, 5, 3, 7, 4 using bottom-up algorithm and successive key insertion method. (10 Marks)

Module-4

- 7 a. Define transitive closure of a directed graph. Find the transitive closure matrix for the graph whose adjacency matrix is given.

$$\begin{bmatrix} 1 & 0 & 0 & 1 & 0 \\ 0 & 1 & 0 & 0 & 0 \\ 0 & 0 & 0 & 1 & 1 \\ 1 & 0 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 & 1 \end{bmatrix}$$

(10 Marks)

- b. Find the optimal tour for salesperson using dynamic programming technique. The directed graph is shown in Fig.Q7(b). (10 Marks)

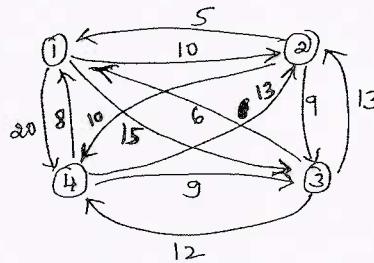


Fig.Q7(b)

OR

- 8 a. Write an algorithm to construct optimal binary search tree for the following data:

Key	A	B	C	D
Probability	0.1	0.2	0.4	0.3

(10 Marks)

- b. Apply the bottom-up dynamic programming algorithm to the following instance of the knapsack problem. Knapsack capacity
- $W = 10$
- .

Item	Weight	Value
1	7	42
2	3	12
3	4	40
4	5	25

(10 Marks)

Module-5

- 9 a. Construct state-space tree for solving four queens problem using backtracking. (06 Marks)
- b. Discuss graph coloring problem. Find different solutions for 4 nodes and all possible 3 coloring problem. (06 Marks)
- c. Write a note on: (i) Non deterministic algorithms. (ii) LC branch and bound solution to solve 0/1 knapsack problem. (08 Marks)

OR

- 10 a. What are the two additional items required by Branch and Bound technique, compared with backtracking. Solve the following assignment problem using branch and bound technique, whose cost matrix for assigning four jobs to four persons are given

$$\begin{bmatrix} 9 & 2 & 7 & 8 \\ 6 & 4 & 3 & 7 \\ 5 & 8 & 1 & 8 \\ 7 & 6 & 9 & 4 \end{bmatrix}$$

(10 Marks)

- b. Discuss the following :
- (i) Subset sum problem
- (ii) NP hard and NP complete classes. (10 Marks)

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17CS44

Fourth Semester B.E. Degree Examination, June/July 2019 Microprocessors and Microcontrollers

Time: 3 hrs.

Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

- 1 a. With a neat block diagram explain internal architecture of 8086 microprocessor. (08 Marks)
b. Explain the following with respect to 8086 microprocessor:
(i) Memory segmentation (ii) Flag Register (06 Marks)
c. Calculate the physical address in following instructions if CS = 4000H, DS = 2000H, SS = 1000H, ES = 3000H, BX = 0022H, BP = 1234H
(i) MOV AL, [BX] (ii) MOV CL, [BP] (iii) MOV ES : AX, [BX + 05] (06 Marks)

OR

- 2 a. What is an addressing mode? With example explain different addressing modes of 8086. (08 Marks)
b. What is stack? Explain the working of PUSH and POP instructions. (06 Marks)
c. What is an assembler directive? With example explain following assembler directives:
(i) assume (ii) org (iii) db (iv) equ (06 Marks)

Module-2

- 3 a. Differentiate between procedure and macro. Write a program using macros that clears the screen, sets the cursor at the centre of screen and display the message "Journey Towards Excellence". (08 Marks)
b. Explain shift and rotate instructions of 8086. (06 Marks)
c. Write a program to count number of zeros and ones in a given byte. (06 Marks)

OR

- 4 a. What is an interrupt vector table? Explain the steps a 8086 will take when it responds to an interrupt. (08 Marks)
b. With example explain the following instructions of 8086.
(i) MUL (ii) DAA (iii) CWD (iv) STD (06 Marks)
c. Write a program to find the value of $x^2 + 2x + 5$, where x is 8 bit input hex number. (06 Marks)

Module-3

- 5 a. What is data integrity? Explain the methods used for data integrity in Ram and ROM. Also find the checksum byte for 34H, 54H, 7FH, 11H, E6H and 99H. (08 Marks)
b. Explain how signed numbers are represented in 8086. Also explain the significance of overflow flag. (06 Marks)
c. Explain IN and OUT instructions. Show the design of an output port with an I/O address of 99H using 74LS373. (06 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and /or equations written eg. 42+8 = 50, will be treated as malpractice.

OR

- 6 a. Differentiate between memory mapped I/O and I/O mapped I/O. Explain the control word format of 8255. (08 Marks)
b. With example explain any five string manipulation instructions of 8086. (06 Marks)
c. Write a program to find average of n different temperatures. (06 Marks)

Module-4

- 7 a. Differentiate between RISC and CISC. (06 Marks)
b. With a neat block diagram explain ARM core data flow model. (06 Marks)
c. Explain the different operating modes of Arm. Also explain the complete ARM register set. (08 Marks)

OR

- 8 a. With a block diagram explain typical ARM based embedded system. (06 Marks)
b. With the help of bit layout diagram explain current program status register of ARM. (06 Marks)
c. Explain the concepts of core Extensions and Pipeline in ARM processor. (08 Marks)

Module-5

- 9 a. With example explain MOV and MVN instructions of ARM. (06 Marks)
b. Explain the different barrel shifter operations. (06 Marks)
c. Explain the arithmetic instructions of ARM. (08 Marks)

OR

- 10 a. Explain multiply, branch and load store instructions of ARM. (10 Marks)
b. With example explain SWAP instruction of ARM. (04 Marks)
c. Write ARM assembly language program to add two 32 bit numbers. (06 Marks)

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Fourth Semester B.E. Degree Examination, June/July 2019 Software Engineering

Time: 3 hrs.

Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

- 1 a. Define software. Explain essential attributes of good software. (08 Marks)
b. Explain different types of application software's. (06 Marks)
c. Explain Bohem's spiral model. (06 Marks)

OR

- 2 a. Explain a general model of the design process with block diagram. (06 Marks)
b. Explain the structure of requirement document. (08 Marks)
c. Explain requirement elicitation and analysis process. (06 Marks)

Module-2

- 3 a. Explain context models with an example. (08 Marks)
b. Explain : i) Generalization ii) Aggregation. (06 Marks)
c. Draw state diagram for working of microwave oven. (06 Marks)

OR

- 4 a. Explain Rational Unified Process (RUP). (08 Marks)
b. Draw UML state diagram for weather station system. (08 Marks)
c. Discuss in short about open source licensing. (04 Marks)

Module-3

- 5 a. Define testing. Explain interface testing. (08 Marks)
b. Discuss TDD(Test Driven Development) (06 Marks)
c. Explain user testing. (06 Marks)

OR

- 6 a. Define software evolution. Explain software evolution process with block diagram. (08 Marks)
b. Discuss Lehman's laws of program evolution dynamics. (06 Marks)
c. Discuss four strategic options for legacy system management. (06 Marks)

Module-4

- 7 a. Discuss factors affecting software pricing. (10 Marks)
b. Explain project scheduling process. (10 Marks)

OR

- 8 a. Discuss software quality attributes. (08 Marks)
b. Discuss the various inspection checks in program inspection. (06 Marks)
c. Discuss the relationships between internal and external quality attributes. (06 Marks)

Module-5

- 9 a. Explain two ways of coping with change and changing requirements. (10 Marks)
b. Explain extreme programming practices. (10 Marks)

OR

- 10 a. Explain the extreme programming release cycle. (08 Marks)
b. Write short note on pair programming. (06 Marks)
c. Explain SCRUM process. (06 Marks)

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15CS42

Fourth Semester B.E. Degree Examination, June/July 2019 Software Engineering

Time: 3 hrs.

Max. Marks: 80

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

- 1 a. With the help of block diagram and activity model explain an insulin pump control system. Also comment on the essential high level requirements that this system must meet. (08 Marks)
- b. Explain incremental development process in detail. Also discuss the benefits of this method compared to waterfall model. (08 Marks)

OR

- 2 a. With a neat diagram explain the different stages requirement engineering process. What are its benefits? (08 Marks)
- b. Write a short note on : (04 Marks)
- (i) Interviewing (ii) Ethnography
- c. Explain software requirement document. (04 Marks)

Module-2

- 3 a. Explain the sequence diagram for view patient information. (05 Marks)
- b. Explain use case models with example. (04 Marks)
- c. Explain the state diagram of a microwave oven with neat representation of sketch. (07 Marks)

OR

- 4 a. Describe the process of Rational Unified process in detail. (08 Marks)
- b. Describe the different proposals made about how to identify object classes in object-oriented systems. Also mention different objects identified for weather station. (08 Marks)

Module-3

- 5 a. Explain test driven development. Also mention the benefits of the same. (08 Marks)
- b. With the help of neat diagram, explain the different stages of acceptance testing process. (08 Marks)

OR

- 6 a. Define the different Lehman's laws concerning system change. (08 Marks)
- b. Explain the process of software reengineering. Also mention the advantages of the same. (08 Marks)

Module-4

- 7 a. What is the use of project plan? Describe the different sections of project plan for plan driven development. (08 Marks)
- b. What is the purpose of program inspection? Explain different fault classes and inspection checks done during program inspection. (08 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and /or equations written eg, 42+8 = 50, will be treated as malpractice.

OR

- 8 a. Give the description of different static software product metrics. (08 Marks)
b. What is software pricing? Describe the different factors affecting software pricing. (08 Marks)

Module-5

- 9 a. Explain the process of prototype development. (08 Marks)
b. With a neat diagram, explain Boehm's spiral model. (08 Marks)

OR

- 10 a. Define any eight extreme programming practices. (08 Marks)
b. Explain the process of scrum. Also mention the different key characteristics of this process. (08 Marks)

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15CS43

Fourth Semester B.E. Degree Examination, June/July 2019
Design and Analysis of Algorithm

Time: 3 hrs.

Max. Marks: 80

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

- 1 a. What is an algorithm? Summarize the properties of an algorithm. (04 Marks)
- b. Solve the following recurrence relation:
 $x(n) = x(n/2) + n$ for $n > 1$, $x(1) = 1$
 Assume $n = 2^k$ (06 Marks)
- c. Algorithm Test(n)
 // Input : A non negative integer 'n'
 $s \leftarrow 0$
 for $i \leftarrow 1$ to n do
 for $j \leftarrow 1$ to n do
 $s \leftarrow s + i * j$
 return s
 (i) What does this algorithm compute?
 (ii) What is the basic operation?
 (iii) How many times the basic operation executed?
 (iv) What is the efficiency class of this algorithm? (06 Marks)

OR

- 2 a. With neat diagram summarize the steps used to solve a given problem using computer. (06 Marks)
- b. Consider the following algorithm:
 Algorithm s(n)
 {
 If ($n = 1$) return 1,
 Else return ($s(n - 1) + n.n.n$)
 }
 What does this algorithm? What is the basic operation? How many times the basic operation executed? (04 Marks)
- c. Design a recursive algorithm for computing factorial of a number n . Set up a recurrence relation and find its efficiency. (06 Marks)

Module-2

- 3 a. Discuss how to find maximum and minimum element in an array recursively. Trace the same for the following data set 65, 70, 75, 80, 85, 60, 55, 50, 45. Also derive the worst case complexity. (06 Marks)
- b. What is stable algorithm? Is quick sort stable explain with an example. (04 Marks)
- c. Define decrease and conquer technique and mention all the variations with an example. (06 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
 2. Any revealing of identification, appeal to evaluator and /or equations written eg, $42+8 = 50$, will be treated as malpractice.

OR

- 4 a. Design recursive algorithm for mergesort and derive its complexity. (06 Marks)
- b. How would you demonstrate the steps used in Strassen's matrix multiplication. (04 Marks)
- c. What actions would you take to perform topological sort using source removal method explain with an example. (06 Marks)

Module-3

- 5 a. Recall the concept of Greedy technique. (03 Marks)
- b. In the weighted diagram given below Fig.Q5(b), determine the shortest paths from vertex '0' to all other vertices. (07 Marks)

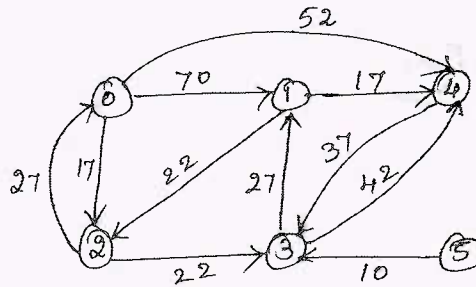


Fig.Q5(b)

- c. How would you solve the following instance of knapsack problem, using greedy algorithm.

Item	1	2	3	4
Weight	4	7	5	3
Profit	40	42	25	12

Knapsack capacity $M = 10$.

(06 Marks)

OR

- 6 a. State job sequencing with deadline. Explain algorithm for job sequencing with dead line. (08 Marks)
- b. Obtain minimum cost spanning tree for the graph given below in Fig.Q6(b), using Prim's algorithm. (08 Marks)

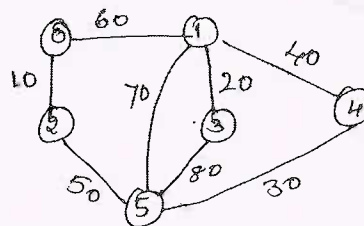


Fig.Q6(b)

Module-4

- 7 a. Using Floyd's Algorithm solve the all pair shortest path problem for the graph whose weight matrix is given below. (06 Marks)

$$\begin{bmatrix} 0 & 10 & \infty & 40 \\ \infty & 0 & \infty & 20 \\ 50 & \infty & 0 & \infty \\ \infty & \infty & 60 & 0 \end{bmatrix}$$

- b. Explain Bellman Ford algorithm.

(04 Marks)

c. State travelling sales person problem. Solve the following using dynamic programming.

0	10	15	20
5	0	9	10
6	13	0	12
8	8	9	0

Starting city = 1

(06 Marks)

OR

- 8 a. How would you define Dynamic programming? With an example illustrate multistage graph for forward approach. (06 Marks)
- b. Using dynamic programming solve the following knapsack $n = 4, M = 5$.
 $(w_1 w_2 w_3 w_4) = (2, 1, 3, 2), Profit (P_1 P_2 P_3 P_4) = (8, 6, 16, 11)$. (06 Marks)
- c. Write Warshall's algorithm. (04 Marks)

Module-5

- 9 a. Explain back tracking method? Draw state space tree to generate solutions to 4-Queen's problem. (06 Marks)
- b. What is branch and bound algorithm? How it is different from backtracking? (04 Marks)
- c. Define the following :
 (i) Class P
 (ii) Class NP
 (iii) NP complete problem. (06 Marks)

OR

- 10 a. Apply backtracking technique to solve the instance of the sum of subset problem :
 $S = \{3, 5, 6, 7\}$ and $d = 15$. (08 Marks)
- b. Apply branch and bound algorithm to solve the traveling salesman problem for the following graph in Fig.Q10(b). (08 Marks)

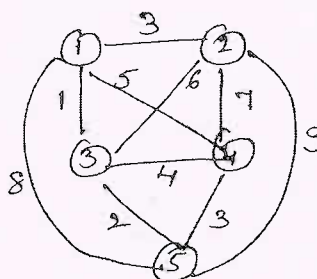


Fig.Q10(b)

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15CS44

Fourth Semester B.E. Degree Examination, June/July 2019 Microprocessors and Microcontrollers

Time: 3 hrs.

Max. Marks: 80

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

- 1 a. With a neat diagram, explain the internal block of 8088/8086 CPU. (10 Marks)
 b. Find errors if there are any and correct the same :
 (i) MOV AL, 1239H (ii) PUSH BL (iii) MOV 12H, BL
 (iv) ADD 15H, 13H (v) MUL AX, BX (vi) ROL AX, 06H (06 Marks)

OR

- 2 a. Define addressing modes. List and explain various addressing modes present in the 8086 microprocessor. (08 Marks)
 b. Assume that DS = 4500, SS = 2000, BX = 2100, SI = 1486, DI = 8500, BP = 7814 and AX = 2512.
 All the values are in HEX. Show the exact physical memory location where AX is stored in each of the following :
 (i) MOV [BX]+20, AX (ii) MOV [SI]+10, AX
 (iii) MOV [DI]+4, AX (iv) MOV [BP]+12, AX (08 Marks)

Module-2

- 3 a. Write an Assembly Language Program (ALP) to calculate the total sum of 6 bytes of data. The decimal data is as follows: 125, 235, 197, 91, 100 and 48. Write suitable comments. (06 Marks)
 b. Explain the following instructions with suitable examples.
 (i) DAA (ii) RCR (iii) RCL (iv) MUL (10 Marks)

OR

- 4 a. Write an assembly language program to convert lower case to upper case for the following sentence. "i aM pROud KanNaDIGA". Use suitable comments. (06 Marks)
 b. Explain the following :
 (i) INT 10H function 06H
 (ii) INT 10H function 02H
 (iii) INT 21H function 09H
 (iv) INT 21H function 01H
 (v) INT 21H function 02H (10 Marks)

Module-3

- 5 a. Show how the computer would represent the following bytes of data:
 (i) -5 (ii) -7 (iii) -34H (iv) -128₍₁₀₎ (06 Marks)
 b. Explain the following with suitable examples:
 (i) XLAT (ii) SCANB (05 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
 2. Any revealing of identification, appeal to evaluator and/or equations written eg. 42+8 = 50, will be treated as malpractice.

- c. Assuming that there is spelling of “VISVESVARAYA” in an electronic dictionary and a student type “VISHVESVARAYYA”. Write an Assembly Language Program that compares these two and display the following messages depending on the result.
- (i) If they are equal “The spelling is correct”
(ii) If they are not equal “Wrong spelling” (05 Marks)

OR

- 6 a. Explain briefly checksum byte and mention the methods being used to check the data integrity in the following storage types: ROM, DRAM, Hard Disks. (06 Marks)
b. Write the 8255 control word format of I/O mode. (04 Marks)
c. Explain IN and OUT instructions with examples. (06 Marks)

Module-4

- 7 a. Write the difference between microprocessors and microcontrollers. (04 Marks)
b. Explain the major design rules to implement the RISC philosophy. (08 Marks)
c. Write a short note on software abstraction layers executing on hardware. (04 Marks)

OR

- 8 a. With a neat diagram, explain registers available in ARM in user mode among with generic program status Register. (06 Marks)
b. What is pipeline in ARM? Illustrate with an example. Show the pipeline stages of ARM7, ARM9 and ARM10. (10 Marks)

Module-5

- 9 a. Explain MOVE instructions in ARM with suitable examples. (08 Marks)
b. Explain the following with examples:
(i) MLA (ii) QADD
(iii) SMULL (iv) LSL (08 Marks)

OR

- 10 a. Write the arithmetic instructions of ARM. (06 Marks)
b. Write the register transfer instructions of ARM (04 Marks)
c. Explain with example forward and backward branch in ARM. (06 Marks)

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15CS45

Fourth Semester B.E. Degree Examination, June/July 2019 Object Oriented Concepts

Time: 3 hrs.

Max. Marks: 80

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

- 1 a. Explain with example programs, how console input and console output are performed in C++. (05 Marks)
- b. Explain function overloading with an example program. (05 Marks)
- c. What are reference variables in C++? Explain with an example program. (06 Marks)

OR

- 2 a. Explain the usage of scope resolution operator with an example program. (08 Marks)
- b. Explain parameterized constructor with an example program. (08 Marks)

Module-2

- 3 a. List and explain the java Buzzwords. (08 Marks)
- b. Explain various arithmetic operators present in java with examples. (08 Marks)

OR

- 4 a. Explain with examples three uses of break statement in java. (08 Marks)
- b. Explain various iteration statements present in java with code snippets. (08 Marks)

Module-3

- 5 a. What is instance variable hiding? How it can be overcome? Explain with an example. (08 Marks)
- b. Explain method overriding with an example program. (08 Marks)

OR

- 6 a. Explain the two uses of super keyword with examples. (06 Marks)
- b. What is exception? Demonstrate working of try and catch blocks with suitable example program. (05 Marks)
- c. Explain the importance of finally clause with an example program. (05 Marks)

Module-4

- 7 a. Explain isAlive() and join() methods with an example program. (08 Marks)
- b. Explain how thread can be created by implementing runnable interface with an example program. (08 Marks)

OR

- 8 a. Explain delegation event model used to handle events in Java. (08 Marks)
- b. Briefly explain various sources of events. (08 Marks)

Module-5

- 9 a. Define Applet. Explain the skeleton of an Applet in detail. (08 Marks)
- b. How can we pass parameters to Applets? Explain with an example program. (08 Marks)

OR

- 10 a. Explain the following: i) JButton ii) JToggleButton iii) JCheckBoxes
iv) Radio Buttons. (08 Marks)
- b. Explain JTabbedPane and JScrollPane with example programs. (08 Marks)

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Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
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15CS46

Fourth Semester B.E. Degree Examination, June/July 2019

Data Communication

Time: 3 hrs.

Max. Marks: 80

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

- 1 a. What is data communication? With a neat diagram, explain the four basic topology. (06 Marks)
- b. With the help of a diagram, explain the functionalities of each layer of OSI reference model. (10 Marks)

OR

- 2 a. What is the difference between a port address, a logical address and a physical address. (06 Marks)
- b. What is line coding? Represent the sequence "01001110" using NRZ-L, NRZ-I and Manchester scheme. (06 Marks)
- c. Explain digital signal transmission methods. (04 Marks)

Module-2

- 3 a. Explain the PCM technique used for analog to digital conversion. (08 Marks)
- b. Explain Amplitude Shift Keying (ASK) and Phase Shift Keying (PSK) modulation process. (06 Marks)
- c. An analog signal carrier 4 bits per signal element. If 1000 signal elements are sent per second, find the bit rate. (02 Marks)

OR

- 4 a. What is TDM? Explain in detail. (08 Marks)
- b. Explain circuit switched network with an example and also briefly discuss the phases. (04 Marks)
- c. Explain in brief frequency hopping spread spectrum technique. (04 Marks)

Module-3

- 5 a. How does data word and codeword represented in block coding and also explain how can error be detected and corrected by using block coding. (10 Marks)
- b. Given data word 1001 and the divisor 1011:
 - i) Show the generator of the codeword at the sender site
 - ii) Show the checking of codeword at the receiver site (assume no error). (06 Marks)

OR

- 6 a. With a neat diagram, explain Go-Back-N Automatic Repeat Request protocol of noisy channel and explain how flow control and error control is achieved. (10 Marks)
- b. Explain the frame format of HDLC protocol. (06 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
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Module-4

- 7 a. What is channelization? List and explain the channelization protocols. (12 Marks)
b. Explain Carrier Sense Multiple Access with Collision Avoidance (CSMA/CA). (04 Marks)

OR

- 8 a. Describe pure ALOHA and slotted ALOHA. (04 Marks)
b. Explain the different types of addressing mechanism in IEEE 802.11. (08 Marks)
c. Define Bluetooth and explain the architecture of Bluetooth. (04 Marks)

Module-5

- 9 a. Explain in detail cellular telephony. (10 Marks)
b. Write a note on WI MAX. (06 Marks)

OR

- 10 a. Explain satellite network and its categories. (08 Marks)
b. Explain in detail IPV6 packet format. (08 Marks)

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15CS42

Fourth Semester B.E. Degree Examination, Dec.2018/Jan.2019 Software Engineering

Time: 3 hrs.

Max. Marks: 80

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

- 1 a. Explain briefly software engineering ethics. (04 Marks)
- b. With a suitable block diagram, explain water fall model. (06 Marks)
- c. Explain requirements engineering processes with suitable diagram. (06 Marks)

OR

- 2 a. With the help of neat diagram, explain insulin pump control system. (04 Marks)
- b. With a neat diagram, explain Boehm's spiral model. (08 Marks)
- c. Explain Ethnography in detail. (04 Marks)

Module-2

- 3 a. Draw a context model for Patient Management System. How the interactions are modeled? (06 Marks)
- b. With the help of a neat state diagram, illustrate the working of a microwave oven. (06 Marks)
- c. What is Model Driven Engineering? State the three types of abstract system models produced. (04 Marks)

OR

- 4 a. Illustrate how design models are the bridge between system requirements and the implementation of a system. Draw a sequence diagram describing data collection of weather information system. (05 Marks)
- b. What is design pattern? Explain four elements of design pattern. (05 Marks)
- c. Discuss the implementation issues important in software engineering. (06 Marks)

Module-3

- 5 a. Explain development testing. Explain the three levels of granularity carried out in testing. (04 Marks)
- b. Discuss test driven development and state the benefits of test driven developments. (04 Marks)
- c. What is user testing? Explain six stages of acceptance testing process. (08 Marks)

OR

- 6 a. List and explain the 'Lehman's Law' concern to system change. (06 Marks)
- b. Explain software reengineering process with suitable diagram. State the activities of reengineering process. (06 Marks)
- c. Explain the four strategic options of legacy system management. (04 Marks)

Module-4

- 7 a. List and explain the factors affecting software pricing. (05 Marks)
- b. Explain in detail plan driven development approach to software engineering. (05 Marks)
- c. Explain the COCOMO – II estimation model. (06 Marks)

1 of 2

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
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OR

- 8 a. Explain different types of software standards and mention their importance. (05 Marks)
b. Explain how reviews and inspections are used to check the quality of project delivery. (06 Marks)
c. List and explain the key stages in software component analysis. (05 Marks)

Module-5

- 9 a. Explain the ways of coping with change and reduction of rework cost. (06 Marks)
b. Explain the practices involved in the extreme programming. (10 Marks)

OR

- 10 a. State the principle of agile methods. (05 Marks)
b. Explain plan drive and agile development approach for software development. (05 Marks)
c. Write a note on pair programming. (06 Marks)

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15CS43

Fourth Semester B.E. Degree Examination, Dec.2018/Jan.2019 Design and Analysis of Algorithms

Time: 3 hrs.

Max. Marks: 80

Note: Answer any FIVE full questions, choosing
ONE full question from each module.

Module-1

- What is an algorithm? What are the properties of an algorithm? Explain with an example. (04 Marks)
 - Explain the general plan for analyzing the efficiency of a recursive algorithm. Suggest a recursive algorithm to find factorial of a number. Derive its efficiency. (08 Marks)
 - If $t_1(n) \in O(g_1(n))$ and $t_2(n) \in O(g_2(n))$ prove that $t_1(n) + t_2(n) \in O(\max\{g_1(n), g_2(n)\})$. (04 Marks)

OR

- Explain the asymptotic notations with examples. (06 Marks)
 - Distinguish between the two common ways to represent a graph. (04 Marks)
 - Discuss about the important problem types and fundamental data structures. (06 Marks)

Module-2

- Discuss how quick-sort works to sort an array and trace for the following data set. Draw the tree of recursive calls made.

65	70	75	80	85	60	55	50	45
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- Derive the best case complexity of quick sort algorithm. (10 Marks)
 - Briefly explain the Strassen's matrix multiplication. Obtain its time complexity. (06 Marks)

OR

- Explain the concept of divide and conquer. Design an algorithm for merge sort and derive its time complexity. (10 Marks)
 - What are the three major variations of decrease and conquer technique? Explain with an example for each. (06 Marks)

1 of 3

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
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Module-3

- 5 a. Explain the concept of greedy technique for Prim's algorithm. Obtain a minimum cost spanning tree for the graph shown in Fig.Q5(a). (08 Marks)

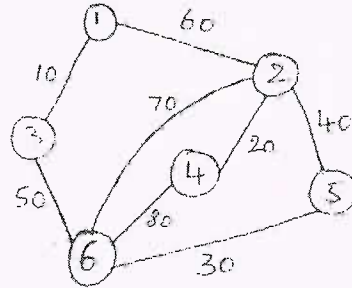


Fig.Q5(a)

- b. Solve the below instance of the single source shortest path problem with vertex 6 as the source. With the help of a suitable algorithm. (08 Marks)

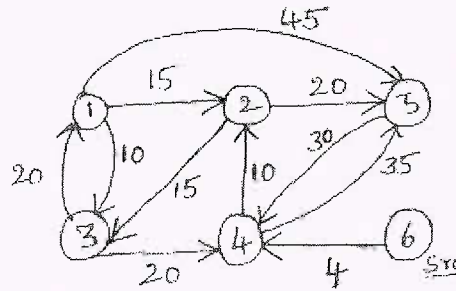


Fig.Q5(b)

OR

- 6 a. What are Huffman trees? Explain. Construct a Huffman code for the following data :

Character	A	B	C	D	E	-
Probability	0.5	0.35	0.5	0.1	0.4	0.2

- Encode DAD_CBE using Huffman encoding. (08 Marks)
 b. Explain transform and conquer technique. Sort the below list using Heap sort :
 3, 2, 4, 1, 6, 5. (08 Marks)

Module-4

- 7 a. Define transitive closure of a graph. Write Warshall's algorithm to compute transitive closure of a directed graph. Apply the same on the graph defined by the following adjacency matrix :

$$R = \begin{bmatrix} 0 & 1 & 0 & 0 \\ 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 1 \\ 0 & 0 & 0 & 0 \end{bmatrix}$$

(08 Marks)

- b. Using Dynamic programming, solve the below instance of knapsack problem. (08 Marks)

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

Capacity $w = 5$

OR

- 8 a. Obtain an optimal binary search tree for the following four-key set. (08 Marks)

Key	A	B	C	D
Probability	0.1	0.2	0.4	0.3

- b. Solve the following travelling sales person problem represented as a graph shown in Fig.Q8(b), using dynamic programming. (08 Marks)

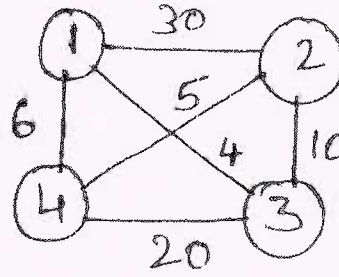


Fig.Q8(b)

Module-5

- 9 a. What is the central principle of backtracking? Apply backtracking to solve the below instance of sum of subset problem
 $S = \{5, 10, 12, 13, 15, 18\}$ $d = 30$. (08 Marks)
- b. Solve the below instance of assignment problem using branch and bound algorithm.

$$C = \begin{matrix} & \begin{matrix} \text{Job}_1 & \text{Job}_2 & \text{Job}_3 & \text{Job}_4 \end{matrix} \\ \begin{matrix} \text{Person a} \\ \text{Person b} \\ \text{Person c} \\ \text{Person d} \end{matrix} & \begin{pmatrix} 9 & 2 & 7 & 8 \\ 6 & 4 & 3 & 7 \\ 5 & 8 & 1 & 8 \\ 7 & 6 & 9 & 4 \end{pmatrix} \end{matrix}$$

(08 Marks)

OR

- 10 a. Draw the state-space tree to generate solutions to 4-Queen's problem. (04 Marks)
- b. Apply backtracking to the problem of finding a Hamiltonian circuit in the graph shown below : (04 Marks)

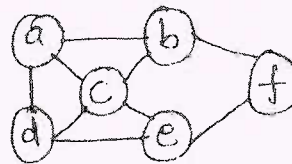


Fig.Q10(a)

- c. Define the following :
- i) Class P
 - ii) Class NP
 - iii) NP complete problem
 - iv) NP hard problem.

(08 Marks)

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Fourth Semester B.E. Degree Examination, Dec.2018/Jan.2019 Microprocessors and Microcontrollers

Time: 3 hrs.

Max. Marks: 80

Note: Answer any FIVE full questions, choosing
ONE full question from each module.

Module-1

- 1 a. Explain with neat block diagram, the architecture of 8086 microprocessor. (08 Marks)
b. What are Addressing Modes? Discuss its types with suitable examples. (08 Marks)

OR

- 2 a. Develop an assembly language program to calculate the sum of 5 bytes of data. (05 Marks)
b. With a neat block diagram, explain the three steps to create executable assembly language program. (06 Marks)
c. What are assembler directives? Discuss any three directives with examples. (05 Marks)

Module-2

- 3 a. Discuss shift and rotate instruction of 8086 microprocessor with examples. (08 Marks)
b. Explain with suitable examples the logical instructions of 8086 microprocessor. (04 Marks)
c. Discuss multiplication (MUL) and division (DIV) instructions of 8086 microprocessor. (04 Marks)

OR

- 4 a. What are interrupts? Discuss interrupt vector table with diagram for 8086 microprocessor. (06 Marks)
b. Write an assembly language program for 8086 that :
i) Clears the screen
ii) Sets the cursor at the centre of screen. (05 Marks)
c. Develop an assembly language program for 8086 to convert Binary Coded Decimal (BCD) to ASCII. (05 Marks)

Module-3

- 5 a. Explain the string instructions (MOVS, LODS, STOS, CMPS and SCAS) with suitable examples. (08 Marks)
b. Discuss the sign extension of 8 bit and 16 bit operands [CBW and CWD] in 8086 with suitable examples. (08 Marks)

OR

- 6 a. Discuss 8086 input/output (IN and OUT) instructions with examples. (04 Marks)
b. Explain 8255 and its control word format with diagrams. (08 Marks)
c. Explain the features of 8255 PPI. (04 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
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Module-4

- 7 a. Discuss the processor modes of CPSR with respect to ARM processor. (06 Marks)
b. Write the comparison between microprocessor and microcontrollers. (04 Marks)
c. Explain with neat block diagram the ARM based embedded device microcontroller. (06 Marks)

OR

- 8 a. Discuss the following with diagrams :
i) Von Neumann architecture with cache
ii) Harvard architecture with TCM. (08 Marks)
b. Explain the pipeline mechanism in (Advanced RISC Machine)ARM processor. (08 Marks)

Module-5

- 9 a. Discuss the comparison instructions with examples with respect to ARM processor. (05 Marks)
b. Explain the Barrel shifter operation in ARM processor with diagram. (06 Marks)
c. Explain the arithmetic instructions with examples with respect to ARM process. (05 Marks)

OR

- 10 a. Explain briefly co-processor instructions of ARM processor. (04 Marks)
b. Discuss the load store instructions with respect to :
i) Single Register Transfer
ii) Multiple Register Transfer. (07 Marks)
c. Write a short note on Swap instructions with examples with respect to ARM processor. (05 Marks)

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Fourth Semester B.E. Degree Examination, Dec.2018/Jan.2019

Object Oriented Concepts

Time: 3 hrs.

Max. Marks: 80

Note: Answer any FIVE full questions, choosing one full question from each module.

Module-1

- 1 a. Write the differences between procedure oriented program and object oriented program. (04 Marks)
- b. List and explain any four features of object oriented program. (05 Marks)
- c. What is function overloading? Write a C++ program to define three overloaded functions to find the sum of two integers, sum of two floating point numbers and sum of three integers. (07 Marks)

OR

- 2 a. Define a Student class with following measures:
Data members: RollNo., Name, averagemarks
Member function: to read the data, to print the data, write a C++ program to read the data of 10 students and print the 10 students information. (05 Marks)
- b. Define a friend function. Illustrate with an example. (05 Marks)
- c. What is constructor? Mention its types. Explain parameterized constructor with an example. (06 Marks)

Module-2

- 3 a. List and explain the java buzzwords. (08 Marks)
- b. class Example {
public static void main (String args[]) {
int a;
for (a = 0; a < 3; a++)
{ int b = -1;
System.out.println (" " + b);
b = 50;
System.out.println (" " + b);
}
}
}
What is the output of the above code? If you insert another 'int b' outside the for loop, what is the output. (04 Marks)
- c. With an example, explain in working of >> and >>> (unsigned right shift). (04 Marks)

OR

- 4 a. Define bytecode. How does it help java program(s) achieve portability? (05 Marks)
- b. Write a java program to sum only the first five elements of the array {1, 2, 3, 4, 5, 6, 7, 8, 9, 10} using "for each" version of the for loop. (06 Marks)
- c. Define type casting. Explain with an example. (05 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
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Module-3

- 5 a. Define inheritance. Explain multilevel hierarchy with an example program. (05 Marks)
 b. Describe the various levels of access protections available for packages and their implications. (07 Marks)
 c. Distinguish between method overloading and overriding in Java, with suitable example. (04 Marks)

OR

- 6 a. Define exception. Explain exception handling mechanism with an example. (08 Marks)
 b. Discuss the following terms with example: i) super ii) final (08 Marks)

Module-4

- 7 a. What is thread? Explain two ways of creating a thread in JAVA with example. (08 Marks)
 b. What is the need of synchronization? Explain with an example how synchronization is implemented in JAVA. (08 Marks)

OR

- 8 a. Explain the delegation event model used to handle events in JAVA. What are events, event listener and event sources? (06 Marks)
 b. With the syntax, explain the use of isAlive() and join() methods. (04 Marks)
 c. Explain Adapter class and Inner classes with example. (06 Marks)

Module-5

- 9 a. What is an Applet? Explain the skeleton of an Applet. Enlist applet tags. (08 Marks)
 b. Write a program using an Applet which will Print "key pressed" on the status window when you press the key, "key released" on the status window when you release the key and when you type the characters it should print "Hello" at coordinates (50, 50) on Applet. (08 Marks)

OR

- 10 a. Describe the two key features of swings. (04 Marks)
 b. Explain the following with an example for each and syntax:
 i) JLabel
 ii) Jtextfield
 iii) JButton
 iv) JComboBox (12 Marks)

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15CS46

Fourth Semester B.E. Degree Examination, Dec.2018/Jan.2019
Data Communication

Time: 3 hrs.

Max. Marks: 80

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

- 1 a. Define Data Communication. Explain the Fundamental components of a data communication system. With the neat diagram, explain components of data communication. (06 Marks)
- b. List out the functionalities of physical layer, data link layer, network layer, explain in brief. (04 Marks)
- c. Define Transmission impairment. Explain different causes of transmission impairment during signal transmission. (06 Marks)

OR

- 2 a. Explain digital signal transmission methods. Explain line coding. (06 Marks)
- b. Draw the line code for the sequence 01001110 using NRZ, NRZ-L, NRZ-I, RZ, AMI. (07 Marks)
- c. Define Through put. A network with a bandwidth of 10mbps can pass only an average of 12,000 frames per minute. With each frame carrying an average of 10,000 bits. What is the throughput of this network? (03 Marks)

Module-2

- 3 a. Explain PCM and quantization process with steps. (08 Marks)
- b. What is Spread Spectrum? Explain FHSS with suitable diagram. (08 Marks)

OR

- 4 a. What is Multiplexing? Define Synchronous TDM, with data rate management – strategies. (07 Marks)
- b. Compute the following, if the data rate for each input connection is 1Kbps. If 1 bit at a time is multiplexed, what is the duration of i) Each input slot ii) Each output slot iii) Each frame. (03 Marks)
- c. Explain how message can be sent from one system to another using datagram approach and calculate the total delay with appropriate diagram. (06 Marks)

Module-3

- 5 a. Explain Error detection using block coding. (06 Marks)
- b. Identify the code word using CRC given data word 1001 and generator is 1011. (04 Marks)
- c. Explain different frame types in HDLC. (06 Marks)

OR

- 6 a. What is Internet checksum? If a sender needs to send four data items 7, 11, 12, 0, 6 answer the following : (06 Marks)
- i) Find the checksum at the sender site.
- ii) Find the checksum at the receiver site if there is no error.
- b. Explain stop and wait protocol with appropriate diagram. (04 Marks)
- c. Explain the frame format and transition phases of point to point protocol. (06 Marks)

Module-4

- 7 a. What is Channelization? List and explain the channelization protocols. (06 Marks)
b. A slotted ALOHA network transmit 200 bit frames using a shared channel with 200 K bits/sec bandwidth. Find the throughput if the system produces. (06 Marks)
i) 1000 Frames per second ii) 500 Frames per second iii) 250 Frames per second.
c. Describe Gigabit Ethernet. (04 Marks)

OR

- 8 a. Describe Pure ALOHA and Slotted ALOHA. (04 Marks)
b. Explain briefly controlled access method. (06 Marks)
c. Define Bluetooth and its architecture. (06 Marks)

Module-5

- 9 a. Write a short note on Satellite networks. (04 Marks)
b. Explain the Operation of cellular telephony. (06 Marks)
c. Explain Transition from IPV4 to IPV6. (06 Marks)

OR

- 10 a. Explain the working of mobile Ip with phases. (08 Marks)
b. Explain IP datagram header format, with neat diagram and give the description of each field. (08 Marks)

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