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M1N16032   (Pages : 2)   Reg. No:...........................

                                                      Name: ....

FAROOK COLLEGE (AUTONOMOUS), KOZHIKODE
First Semester M.Sc Degree Examination, November 2016
CSSIC01 – Discrete Mathematical Structures
(2016 Admission onwards)

Max. Time: 3 hours   Max. Weightage: 36

Part A
Answer all questions.
Each question carries 1 weightage

1. Define

   a) Power Set   b) Symmetric differences of two sets

2. What is meant by universal quantifiers. Give examples.

3. Explain free and bound occurrences.

4. Define

   a) Surjective function   b) Symmetric relation

5. Define POSET with example.

6. Define Lattice.

7. Explain 'minterm' related with Boolean form.

8. a) State Lagrange's theorem   b) Define abelian group

9. Define Ring.

10. Discuss planar graphs.

11. Explain the term connectedness related with directed graph and undirected graph.

12. Explain Hamiltonian Circuit.

                                              (12 x 1 = 12 weightage)

Part B
Answer any six questions.
Each question carries 2 weightage

13. Explain different logical connectives used in propositional logic.

14. Explain Inverse function. Show that the functions $f(x) = x^3$ and $g(x) = x^{1/3}$ for $x \in R$ are inverses of one another.

15. a) State Pigeonhole principle

    b) Discuss Hasse Diagrams

16. Let $\langle L, \leq \rangle$ be a lattice in which $*$ and $\oplus$ denote the operations of meet and join respect

    For any $a, b \in L$, Show that $a \leq b \Leftrightarrow a * b = a \Leftrightarrow a \oplus b = b$

17. Define a) sublattice.   b) complemented lattice

18. Discuss on Permutation groups.

19. In a simple digraph, $G = \langle V, E \rangle$ prove that, every node of the digraph lies on exactly on strong component.

20. Prove that tree with n vertices has n-1 edges.

21. Discuss Subgroups and Homomorphisms.

(6 x 2 = 12 wei

Part C
Answer any three questions.
Each question carries 4weightage

22. Show that $1 (P \wedge Q) \to (1P \vee (1P \vee Q)) \Leftrightarrow (1P \vee Q)$

23. a)Discuss on composition of functions.

    b)Let $f: R \to R$ be given by $f(x) = -x^2$ and $g: R_+ \to R_+$ be given by $g(x) = \sqrt{x}$

    R_+ is the set of nonnegative real numbers and R is the set of real numbers. Find $f \circ g$

    Is $g \circ f$ defined?

24. Let $X = \{ 1, 2, 3, 4, 5, 6, 7\}$ and $R = \{ \langle x, y \rangle \mid x\text{-}y \text{ is divisible by } 3\}$. Show that R is a equivalence relation. Draw the graph of R

25. Show that subgroup of a cyclic group is itself a cyclic group

26. Derive the principal disjunctive normal form of

    $P \to ((P \to Q) \wedge 1 (1Q \vee 1P))$

27. Explain Dijkstra's shortcut path algorithm, with a suitable example

(3 x 4 = 12 wei

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FAROOK COLLEGE (AUTONOMOUS), KOZHIKODE
First Semester M.Sc Degree Examination, November 2016
CSSIC02 – Advanced Data Structures
(2016 Admission onwards)

Time: 3 hours   Max. Weightage: 36

Part A
Answer **all** questions
Each question carries 1 weightage

What is a linear data structure? Give two examples of linear data structures

Define efficiency of an algorithm.

Define time complexity of an algorithm.

What are the operations that can be performed with records?

Differentiate between a complete binary tree and a perfect binary tree.

What is a Dequeue?

Differentiate recursive and iterative algorithms.

What are the properties of a B+ tree.

What is a trie?

What is rehashing ?

What is amortized analysis?

What is a binomial heap?

                                       (12 x 1 = 12 weightage)

Part B
Answer any six questions
Each question carries 2 weightage

13. Explain the implementation of multiple stack.

14. Analyze the time complexity of quick sort algorithm.

15. List the advantages and disadvantages of a circular linked list.

16. Write a recursive and non recursive algorithm to traverse a binary tree in inroder.

17. Write an algorithm which deletes the given data in a binary search tree.

18. What are the different methods of representing graphs?

19. Create a Huffman tree with the numbers 23, 54, 12, 66, 87, 35, 16, 60, 23, 75.

20. Write the steps for insertion and deletion in max heaps.

21. Discuss the linear probing method.

(6 x 2 = 12 weightage)

Part C
Answer any three questions
Each question carries 4 weightage

22. Convert a + b * c + (d * e + f) * g the infix expression into postfix form.

23. With a simple graph, state and explain the algorithm to perform Breadth first traversal the g

24. Explain binary search algorithm with an example.

25. Define a B-tree. Illustrate insertion and deletion routines for a B-tree.

26. Design an algorithm to delete all nodes in a circular linked list.

27. Explain the implementation of hash table.

(3 x 4 = 12 weightage)

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FAROOK COLLEGE (AUTONOMOUS), KOZHIKODE
First Semester M.Sc Degree Examination, November 2016
CSSIC03 – Theory of Computation
(2016 Admission onwards)

Time: 3 hours

Max. Weightage: 36

Part A

Answer all questions.

Each question carries 1 weightage.

1. Explain different strategies employed in proving a mathematical problem?

2. Define Deterministic Finite Automata.

3. Whether 'cfl' is closed under intersection?

4. Define regular expression.

5. Define context free grammar.

6. Define PDA.

7. Whether the languages accepted by a DPDA and NPDA are same? Justify your answer.

8. Define undecidable problem.

9. Define Type 3 grammar.

10. State Cook's theorem.

11. Give DFA for the language

$$L = \{a^n b^m : n \geq 2 , m \geq 1 \}.$$

12. Give NFA for the language

$$L = \{b^4 w a^2 : w \in \{a,b\}^* \}.$$

(12 x 1 = 12 weightage)

Part B
Answer any six questions.
Each question carries 2 weightage.

13. Construct an NFA for the regular expression $a*b(a+b)*$

14. Define Regular expression. Give one example.

15. What is a parse tree? Give one example.

16. Differentiate between recursive and recursively enumerable languages.

17. Give DFA for the language.

    L = {all strings with not more than three '0' s; $\Sigma = \{0, 1\}$ }.

18. Construct a PDA for the language

    $L = \{ a^n b^n c^m | n \geq 1, m \geq 1 \}$.

19. Convert the grammar in to CNF.

    $S \rightarrow AB$

    $A \rightarrow aAb \mid ab$

    $B \rightarrow cBd \mid cd$

20. Distinguish between P an NP class of problems.

21. Briefly explain the concept of polynomial time Reduction.

(6 x 2 = 12 weightage)

Part C
Answer any three questions.
Each question carries 4 weightage.

22. Construct DFA equivalent to the given NFA

    $M = (\{q0,q1\},\{0,1\},\delta, q0, \{q,\})$

    Where δ is : $\delta(q0, 1) = \{ q1 \}$; $\delta(q0, 0) = \{ q0, q1 \}$;

    $\delta(q1, 1) = \{ q0 \}$; $\delta(q1, 1) = \Phi$;

23. Explain the pumping lemma for regular sets.

24. Define PDA and its working in details. What is meant by a PDA accepting a language by

    a. empty stack.

    b. final state.

25. Explain different types of Turing Machine.

26. Design a TM to accept the language

    $L = \{ a^n b^n a^n b^n | n \geq 1 \}$.

27. Explain the Halting problem. Show that it is undecidable.

(3 x 4 = 12 weightage)

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FAROOK COLLEGE (AUTONOMOUS), KOZHIKODE

First Semester M.Sc Degree Examination, November 2016

CSSIC04 – The Art of Programming Methodology

(2016 Admission onwards)

Max. Time: 3 hours   Max. Weightage: 36

Part A

Answer **all** questions.

Each question carries **1** weightage

1. What is an algorithm? Explain with an example.

2. Explain about program maintenance.

3. Describe the structure of C program.

4. What is a keyword? Give examples.

5. How to declare and initialize different types of memory variable.

6. Differentiate between while and do while statement.

7. Explain the use of goto statement.

8. What is a string? How to initialize a String?

9. What is a recursion? Explain with an example.

10. How to initialize a structure?

11. What is a pointer? How to declare and initialize a pointer?

12. Explain any two file handling functions.

                                       (12 x 1 = 12 weightage)

Part B

Answer any **six** questions.

Each question carries **2** weightage

13. Write an algorithm to find the roots of quadratic equations.

14. Write a program to display first n natural numbers.

15. Differentiate between variables and constants.

16. Explain the use of switch statement with an example.

17. What is a loop? Explain the syntax of for loop.

18. Explain the array of strings with an example.

19. What is the difference between call by value and call by reference?

20. Distinguish between actual parameters and formal parameters.

21. What is pointer to pointer variable? Explain with example.

(6 x 2 = 12 weightage)

Part C

Answer any **three** questions.

Each question carries **4** weightage

22. List the arithmetic, logical and relational operators in C. What is the difference between the '&' and '&&' operators.

23. Explain the decision making statements with examples.

24. What is meant by dynamic memory allocation?.Explain the functions related to this.

25. Write a program to check the given number is prime or not.

26. Write a program to find the factorial of a number using recursion.

27. Write a program to concatenate two strings without using strcat function.

(3 x 4 = 12 weightage)

N16036 (Pages : 1) Reg. No:...........................

Name: ....

FAROOK COLLEGE (AUTONOMOUS), KOZHIKODE
First Semester M.Sc Degree Examination, November 2016
CSSIC05 – Computer Organization and Architecture
(2016 Admission onwards)

Time: 3 hours   Max. Weightage: 36

Part A
Answer all Questions.
Each Question carry one weightage

1. Differentiate combinational circuits with sequential circuits.
2. What are the DeMorgan's theorems and how is it useful in digital electronics?
3. What is SPEC rating and what is its significance?
4. What is a stack frame and where is it required?
5. Discuss with the help of diagram the input and output gating of one register bit.
6. Write down the IEEE 64 bit floating point representation.
7. What is Flash memory and how does it work?
8. How does cache memory improve the performance in pipeline architecture?
9. Compare teh programme controlled I/O and Interrupt I/O?
10. Discuss the ALU and its associated parts in 8085 processor.
11. Discuss the role of index registers in 8086 processsor.
12. Discuss the advantages and disadvantages of a microcontroller.   (*12 x 1=12 weightage*)

Part B
Answer any six questions.
Each question carry two weightages

13. Simplify the following function using K-Map to minimum literals:
    F(w,x,y,z) = Σ(1,3,5,7,0,15) and d(w,x,y,z)= Σ(4,6,12,13)
14. Discuss how a 4 bit shift register can be converted to shift counter and show waveforms.
15. What are the different methods used for handling multiple interrupts in a computer.
16. Compare Hardwired control and microprogrammed control.
17. Discuss the principle of interger division using a circuit.
18. Discuss the virtual memory organization in a system.
19. Explain the centralized Bus Arbitration scheme with aid of an example.
20. Discuss the implementation of pipeline architecture in 8086 processor.
21. Discuss the different features 8051 Microcontroller.

(*6 x 2=12 Weightage*)

Part C
Answer any three questions.
Each question carries 4 wightages

22. Discuss with the help of neat diagram the design of a 4 bit synchronous up-down counter.
23. With the help of block diagram explain the three bus organization in a processor.
24. With the help of an example, explain the Bit-Pair Recoding of Multipliers.
25. Explain with the help of diagrams, the SDRAM circuit and its different modes.
26. Discuss the synchronous and asynchronous buses with the help of timing diagrams.
27. With the help of block diagram explain the internal architecture of 8085 processor.

(*3 x 4= 12 Weightage*)