5E1751

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5E1751

B.Tech. V-Sem. (Main/Back) Exam. - 2024

COMPUTER SCIENCE AND ENGINEERING (IOT)

5CIT3-01 / Information Theory and Coding

CS, CCS, CIT

Time : 3 Hours Maximum Marks : 70

Instructions to Candidates :

Attempt **all ten** questions from Part-A, **five** questions out of **seven** questions from Part-B and **three** questions out of **five** questions from Part-C.

Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly. Units of quantities used / calculated must be stated clearly.

Use of following supporting material is permitted during examination. (Mentioned in Form No. 205)

1. ..... 2. .....

PART-A

*(Answer should be given upto 25 words only. **All** questions are **compulsory**. Each question carries 2 marks.)* [10x2=20]

Q.1. Explain the property of Mutual information.

Q.2. Prove the following statement "The sun rises in the east" contains zero amount of information.

Q.3. Define Kraft Inequality.

Q.4. What is a Prefix code ?

Q.5. Compare Burst error and Random error.

Q.6. Explain two properties of Galois field.

Q.7. Classify the types of Linear block code.

Q.8. What is the value of Syndrome vector for Error free transmission ?

Q.9. Differentiate between State diagram and Trellis diagram.

Q.10. Define Standard Array.

PART-B

(Analytical / Problem solving questions. Attempt **any five** questions. Each question carries 4 marks.) [5x4=20]

Q.1. Show that for a discrete binding channel :

$$H(X,Y) = H(X/Y) + H(Y)$$
$$H(X,Y) = H(X) + H(Y)$$

Q.2. Illustrate the concept of Systematic and Non-systematic code.

Q.3. The probabilities of five possible out come of an experiment are given as :

$$P(x_1) = 0.2, P(x_2) = 0.2, P(x_3) = 0.18, P(x_4) = 0.15, P(x_5) = 0.05$$

Determine the entropy and information rate.

Q.4. Explain Viterbi algorithm in detail.

Q.5. A discrete memoryless source exists four messages with probability set $[1/2, 1/4, 1/8, 1/8]$. Construct a Shannon-Fano code for this message and determine its efficiency.

Q.6. A communication system employs a continuous source. The channel noise is White and Gaussian. The bandwidth of the source output is 10 MHz and signal to noise power ratio at the receiver is 100. What will be the channel capacity ?

Q.7. Derive the expression for channel capacity when bandwidth becomes infinite.

PART-C

(Descriptive / Analytical / Problem solving / Design questions. Attempt **any three** questions. Each question carries **10** marks.) [3x10=30]

Q.1. Construct Haffman's code for following set of messages and determine its efficiency :

$$P(x_1) = 0.49, P(x_2) = 0.14, P(x_3) = 0.14,$$
$$P(x_4) = 0.07, P(x_5) = 0.07, P(x_6) = 0.04,$$
$$P(x_7) = 0.02, P(x_8) = 0.02, P(x_9) = 0.01$$

Q.2. The generator polynomial of a (6, 3) cyclic code is $g(x) = 1 + x^2$:

(a) Find all the code words for this code. [6]

(b) How many errors can this code correct ? [4]

Q.3. Write short notes on the following :

(a) Sequential decoding [5]

(b) Transfer function of convolutional code [5]

Q.4. Consider a (7, 4) linear block code with the parity-check matrix H given by :

$$H = \begin{bmatrix} 1011100 \\ 1101010 \\ 0111001. \end{bmatrix}$$

(a) Construct code words for (7, 4) code. [5]

(b) Show that this code is a Hamming code. [5]

Q.5. Joint probability matrix of discrete channel is given by :

$$P(X,Y) = \begin{matrix} 0.05 & 0.05 & 0.02 & 0.05 \\ 0.15 & 0.16 & 0.01 & 0.09 \\ 0.12 & 0.03 & 0.02 & 0.05 \\ 0.01 & 0.12 & 0.01 & 0.06 \end{matrix}$$

Compute Conditional and Joint entropies.

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5E1752

B.Tech. V-Sem. (Main/Back) Exam. - 2024

ARTIFICIAL INTELLIGENCE AND DATA SCIENCE

5AID4-02 Compiler Design

CS, IT, AID, CAI, CDS, CIT, CCS

Time : 3 Hours Maximum Marks : 70

Instructions to Candidates :

Attempt all ten questions from Part-A, five questions out of seven questions from Part-B and three questions out of five questions from Part-C.

Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly. Units of quantities used / calculated must be stated clearly.

Use of following supporting material is permitted during examination. (Mentioned in Form No. 205)

1. .....NIL..... 2. .....NIL.....

PART-A [10×2=20]

(Answer should be given up to 25 words only)

All questions are compulsory

Q.1. What is a Cross Compiler? Give an example.

Q.2. Write four differences between Compiler and Interpreter.

Q.3. What are the disadvantages of operator precedence parsing?

Q.4. What are the data structures used in symbol table?

Q.5. What are the limitations of stack allocation?

Q.6. Write two important points about heap management.

Q.7. What is translator? Write down the steps to execute a program.

Q.8. What are the various attributes of a Symbol Table?

Q.9. What are the benefits of intermediate code generation?

Q.10. Define Pre-processor. What are the functions of Pre-processor?

PART-B [5x4=20]

(Analytical/Problem-solving questions)

Attempt any five questions

Q.1. What is Compiler? Explain the different phases of a compiler.

Q.2. What is meant by Peephole optimization? What are its characteristics?

Q.3. Define passes of a compiler. Which are the factors that decide number of passes for a compiler?

Q.4. What is the role of Parsing? Explain different types of parsing in compiler design.

Q.5. Write short notes on **any two** of the following :

(a) YACC (b) Bootstrapping (c) LEX Compiler

Q.6. Write short notes on **any four** of the following :

(a) Synthesized attributes

(b) Inherited attributes

(c) Dependency graph

(d) Evaluation order

(e) Directed Acyclic Graph (DAG)

Q.7. How storage organization works by compiler for executable program? Explain in detail.

PART-C

[3x10=30]

(Descriptive/Analytical/Problem-Solving/Design questions)

Attempt any three questions

Q.1. (a) What are the issues in the design of a Code Generator? Explain in detail using suitable example. [7]

(b) Show that the grammar $S \rightarrow 0S1 \mid SS \mid \in$ is ambiguous. [3]

Q.2. (a) Show the following grammar : [6]

$S \rightarrow Aa \mid bAc \mid Bc \mid bBa$

$A \rightarrow d$

$B \rightarrow d$

Is LR(1) but not LALR(1).

(b) Write the comparison among SLR Parser, LALR parser and Canonical LR Parser. [4]

Q.3. Write short notes on **any four** of the following :

(a) Ambiguity (with example)

(b) Recursive Descent Parser

(c) Predictive LL(1) parser (working)

(d) Handle pruning

(e) Operator Precedence Parser

Q.4. Explain the following with suitable example :

(a) Loop-invariant code motion

(b) Dead-code elimination

Q.5. Solve **any three** of the following :

(a) Eliminate Left recursion from following grammar.

$S \rightarrow (L) \mid x, L \rightarrow L, S \mid S$

(b) Describe the Syntax directed definition, and Syntax directed Translation, taking an example.

(c) Explain S-attributed definitions and L-attributed definitions.

(d) Choose the correct way to simplify the given grammar and simplify it :

$S \rightarrow AB,\ A \rightarrow a,\ B \rightarrow b,\ C \rightarrow d$

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5E1753

B.Tech. V-Sem. (Main/Back) Exam. - 2024

Operating System

5AID4-03 Operating System

CS,IT,AID,CAI,CDS,CIT,CCS

Time : 3 Hours Maximum Marks : 70

Instructions to Candidates :

Attempt all ten questions from Part-A, five questions out of seven questions from Part-B and three questions out of five questions from Part-C.

Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly. Units of quantities used / calculated must be stated clearly.

Use of following supporting material is permitted during examination. (Mentioned in Form No. 205)

1. ..... 2. .....

PART-A [10x2=20]

(Answer should be given up to 25 words only)

All questions are compulsory

Q.1. What is Kernel?

Q.2. What do you mean by system call?

Q.3. What is process control block?

Q.4. Define effective access time?

Q.5. Name any five page replacement algorithm used for page replacement.

Q.6. What are the various file operations?

Q.7. What are safe and unsafe state in a deadlock?

Q. 8 Define deadlock prevention.

Q. 9 What is the main function of Memory Management Unit (MMU)?

Q. 10. What is the importance of Disc scheduling in operating system?

PART-B [5x4=20]

(Analytical/Problem Solving Questions)

Attempt any five questions

Q.1. Differentiate among multi programming, multi-processing and multi-tasking.

Q.2 State the differences between logical and physical address space.

Q.3. What do you mean by a Deadlock? Explain Banker's algorithm with an example.

Q.4. What is Directory? What are UFD and MFD? Also state the operations that can be performed on a directory.

Q 5. What is a race condition? Illustrate with an example why presence of race condition is considered as bad design.

Q.6. Consider there are three page frames which are initially empty. If the page reference string is 1, 2, 3, 4, 2, 1, 5, 3, 2, 4, 6. Calculate the number of page faults using the optimal page replacement policy.

Q.7. Explain the performance of demand paging with necessary examples.

PART-C

[3x10=30]

(Descriptive/Analytical/Problem Solving/Design Question)

Attempt any three questions.

Q1. (a) Describe the actions taken by Kernel to context switch between processes.

(b) For a given set of processes calculate the average wait time and average turn around time by using FCFS, SJF and RR.

Process	Burst	Priority
P1	8	4
P2	6	1
P3	1	2
P4	9	2
P5	3	3

Q.2 What is Fork system call? What will be the output of the following code and justify the output?

```
#include<stdio.h>
#include<unistd.h>
 int main ()
        { if (fork () : : fork ())
              fork () ;
         Printf ("1") ;
          return 0 ;
         }
```

Q.3 Suppose that a disk has 500 cylinders, (0-4999). The drive is currently serving a request at 143, and the previous request was at cylinder 125. The queue of pending requests are 86, 1470, 913, 1774, 948, 1509, 1022, 1750, 130 starting from the current head position, what is the total distance that the disk arm move to satisfy all the pending requests for each of the following :

(i) FCFS

(ii) SSTF

(iii) SCAN

Q.4. (a) What is Virtual Memory? How it is different from Cache memory and secondary memory? Also discuss the benefits of virtual memory techniques. [6]

(b) Discuss the indexed file allocation method with proper example. [4]

Q. 5. Write short notes on the following : [2.5×4=10]

(a) Mobile OS

(b) Time OS

(c) Belady Anomaly

(d) Principle of locality of reference

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5E1754

B.Tech. V-Sem. (Main/Back) Exam. - 2024

Artificial Intelligence and Data Science

5AID4-04 / Computer Graphics & Multimedia

CS,IT,AID,CAI,CDS,CCS

Time : 3 Hours Maximum Marks : 70

Instructions to Candidates :

Attempt all ten questions from Part-A, five questions out of seven questions from Part-B and three questions out of five questions from Part-C.

Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly. Units of quantities used / calculated must be stated clearly.

Use of following supporting material is permitted during examination. (Mentioned in Form No. 205)

1. ..... 2. .....

PART-A **[10x2=20]**

(Answer should be given up to 25 words only)

All questions are compulsory

Q.1 What are the Basic Components of a Computer Graphics System?

Q.2 What are the different types of transformations in computer graphics?

Q.3 What is Aliasing?

Q.4 Describe the scan conversion algorithm for drawing lines.

Q.5 Define window-to-viewport transformation.

Q.6 Define Clipping.

Q.7 What is Ray Tracing?

Q.8 What is raster animation?

Q.9 Define Morphing.

Q.10 Compare and contrast the CMY, HSV, and HLS colour models.

PART-B **[5x4=20]**

(Analytical/Problem-Solving Questions)

Attempt any five questions.

Q.1 Explain scan-line-polygon filling algorithm in detail.

Q.2 Explain in brief Phong reflection model and how it is used to simulate the way light interacts with surfaces. How does the model take into account the ambient, diffuse, and specular components of light?

Q.3 Compare and contrast Bezier curves and B-spline curves.

Q.4 What is halftone patterns and dithering techniques used for?

Q.5 Discuss the importance of recursively defined curves in computer graphics, including the use of Koch curves, C curves, and dragon curves.

Q.6 Compare and contrast the Cohen-Sutherland line clipping algorithm with the Liang-Barsky algorithm.

Q.7 Discuss the importance of tweening in animation, including the use of linear and non-linear interpolation techniques.

PART-C **[3x10=30]**

(Descriptive/Analytical/Problem-Solving/Design Question)

Attempt any three questions

Q.1 Describe the different types of transformations used in computer graphics. Explain how each transformation is represented mathematically and how they can be combined to produce more complex transformations.

Q.2 Compare and contrast the different anti-aliasing techniques used in computer graphics. Explain the advantages and disadvantages of each technique and discuss their applications in computer graphics.

Q.3 Compare and contrast the different clipping techniques used in 2D graphics, including Cohen-Sutherland line clipping and Liang-Barsky line clipping. Explain how each technique works and its advantages and disadvantages.

Q.4 Describe the different types of transformations used in 3D graphics, including scaling, rotation, and translation in detail.

Q.5 Discuss the YIQ colour model and its applications in video and television systems. Explain how the YIQ model is used to separate luminance and chrominance information.

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5E1755

B.Tech. V-Sem. (Main/Back) Exam. Jan.- 2024

Artificial Intelligence and Data Science

5AID4-05 Analysis of Algorithm

CS,IT,AID,CAI,CIT,CDS,CSD,CCS

Time : 3 Hours Maximum Marks : 70

Instructions to Candidates :

Attempt all ten questions from Part-A, five questions out of seven questions from Part-B and three questions out of five questions from Part-C.

Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly. Units of quantities used / calculated must be stated clearly.

Use of following supporting material is permitted during examination.

(Mentioned in Form No. 205)

1. ..... 2. .....

PART-A [10x2=20]

(Answer should be given up to 25 words only)

All questions are compulsory

Q.1. Identify the time complexity at given algorithm :

```
A()
{ i = 1; S = 1
  While (S< = n)
  { i++
    S = S+1;
    Print ("RAVI")
}
```

Q.2. Eludidate Complexity with its Notations.

Q.3. Describe Randomized Algorithm.

Q.4. What is P, NP problem?

Q.5. Identify Pattern matching algorithm.

Q.6. Define Branch and Bound Problem.

Q.7. Explain Assignment Problem.

Q.8. Define Cook's theorem.

Q.9. Discuss space complexity.

Q.10. Discuss about Lower Band theory.

PART-B

[5x4=20]

(Analytical/Problem solving questions)

Attempt any five questions

Q.1. Contrast between 3 Asymptotic notations and define the use of objective of Asymptotic Notation.

Q.2 Explain Naive String Pattern Matching algorithm with the help of example.

Q.3. Solve the Travelling salesmen problem for the following cost matrix :

$$\begin{array}{c} \\ W \\ X \\ Y \\ Z \end{array} \begin{array}{c} \begin{array}{cccc} W & X & Y & Z \end{array} \\ \begin{bmatrix} \infty & 8 & 13 & 18 \\ 3 & \infty & 7 & 8 \\ 4 & 11 & \infty & 10 \\ 6 & 6 & 7 & \infty \end{bmatrix} \end{array}$$

Q.4. Differentiate between Las Vegas and Monte Carlo Algorithm with example.

Q 5. Discuss Quadratic assignment problem using a suitable example.

Q.6. Explain set cover problem with the help of example.

Q.7. Using Quick sort algorithm sort the following sequence :

A = {13, 19, 9, 5, 12, 8, 7, 4, 21, 2, 6, 11}

PART-C

[3x10=30]

(Descriptive/Analytical/Problem Solving/Design question)

Attempt any three questions

Q1. Solve the recurrence relation using master theorem. [5+5]

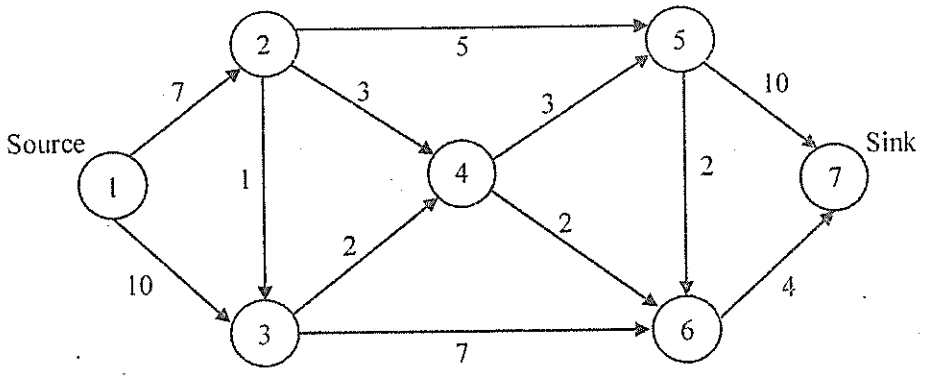
(a) $T(n)=T\left(\sqrt{n}\right)+C$

(b) $T(n)=8T\left(\frac{n}{2}\right)+n^2$

Q.2. (a) Find the pattern ABCBC in the test ACABABCABCBCA using KMP matcher. [5]

(b) Differentiate between Backtracking and Branch and Bound algorithm. [5]

Q.3. (a) Find out the Max flow path by Ford Fulkersen method for given network.[7]



(b) Explain all the properties of multi commodity flow. [3]

Q.4. (a) Describe the term P, NP, NP-Hard and NP complete with suitable examples. [7]

(b) Explain vertex cover problem. [3]

Q.5. Using Strassen's Matrix Multiplication algorithm, compute the Matrix product.[10]

$$A = \begin{bmatrix} 1 & 3 \\ 7 & 5 \end{bmatrix}, \qquad B = \begin{bmatrix} 6 & 8 \\ 4 & 2 \end{bmatrix}$$

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Total No. of Questions : 22 Total No. of Pages : 04

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5E1757

B.Tech. V-Sem. (Main/Back) Exam. - 2024

COMPUTER SCIENCE AND ENGINEERING (IOT)

5CIT4-12 / Human-Computer Interaction (Elective-II)

CS, CSD, CIT

Time : 3 Hours Maximum Marks : 70

Instructions to Candidates :

Attempt all ten questions from Part-A, five questions out of seven questions from Part-B and three questions out of five questions from Part-C.

Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly. Units of quantities used / calculated must be stated clearly.

Use of following supporting material is permitted during examination. (Mentioned in Form No. 205)

1. ..... 2. .....

PART-A [10×2=20]

(Answer should be given up to 25 words only)

All questions are compulsory

Q.1. Define usability.

Q.2. What is the role of user research in interactive system design?

Q.3. What is model-based design and evaluation?

Q.4. State Fitts' Law.

Q.5. What are the benefits and limitations of heuristic evaluation?

Q.6. Define Concur Task Tree.

Q.7. What are the benefits and limitations of using FSMs in dialog design?

Q.8. Describe the key components of an HTA model.

Q.9. What is a Cognitive Architecture?

Q.10. Define ANOVA.

PART-B [5x4=20]

(Analytical/Problem Solving questions)

Attempt any five questions

Q.1. What is CMN-GOMS, and how does it differ from KLM?

Q.2. What is a cognitive walkthrough, and explain how is it used to evaluate the usability of a product or system?

Q.3. Describe the Finite State Machine method and explain how it is used to design and evaluate user interfaces. Discuss the benefits and limitations also.

Q.4. Discuss the implications of HCI for software engineering methodologies.

Q.5. Describe the process of applying OOM to UI design, including the identification of objects, classes, and relationships.

Q.6. Compare OOM with other modeling approaches, including structured analysis and design, and human-computer interaction (HCI) design patterns.

Q.7. Describe the Statechart method and explain how it is used to design and evaluate user interfaces. Discuss the benefits and limitations of using Statecharts.

PART-C [3x10=30]

(Descriptive/Analytical/Problem Solving/Design questions)

Attempt any three questions

Q.1 Discuss the role of aesthetics in GUI design, including the use of color, typography, and imagery.

Q.2. State Fitts' Law and explain its significance in model-based design and evaluation. Describe Hick-Hyman's Law and its application in model-based design and evaluation.

Q.3. Explain Norman's model of interaction and discuss how it can be used to inform design decisions. Describe the different stages of the model and explain how designers can use the model to identify potential usability problems.

Q.4. Describe the Petri Net method and explain how it is used to design and evaluate user interfaces. Discuss the benefits and limitations of using Petri Nets in dialog design.

Q.5. Describe the MHP model and its components. Explain how MHP is used to model human cognition and behavior.

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5E1756

B.Tech. V-Sem. (Main/Back) Exam. - 2024

COMPUTER SCIENCE AND ENGINEERING (IOT)

5CIT4-11 / Wireless Communication (Elective-I)

CS, IT, CIT, CSD

Time : 3 Hours Maximum Marks : 70

Instructions to Candidates :

Attempt all ten questions from Part-A, five questions out of seven questions from Part-B and three questions out of five questions from Part-C.

Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly. Units of quantities used / calculated must be stated clearly.

Use of following supporting material is permitted during examination. (Mentioned in Form No. 205)

1. ..... 2. .....

PART-A [10×2=20]

(Answer should be given up to 25 words only)

All questions are compulsory

Q.1. Compare Fast fading and slow fading.

Q.2. Define coherence bandwidth.

Q.3. What is CDMA principle?

Q.4. What is frequency reuse?

Q.5. What is OFDM principle?

Q.6. Compare wireless and wired communication link.

Q.7. What is equalisation?

Q.8. Define Microdiversity.

Q.9. Explain MIMO principle.

Q.10. What is Beam forming?

PART-B [5x4=20]

(Analytical/Problem solving questions)

Attempt any five questions

Q.1. A mobile is moving at 50 m/sec in a cellular system with 930 MHz. Find the Dopplar spread, coherence time and appropriate sampling time and distance to predict small scale fading.

Q.2. Explain spatial multiplexing system model.

Q.3. Explain zero forcing and LMS Algorithm.

Q.4. Using suitable schematic, explain minimum shift keying.

Q.5. What is trunking? Explain system capacity trunking and grade of service.

Q.6. Compare FDMA, TDMA, CDMA.

Q.7. What is time dispersion? Discuss multipath time delay spread.

PART-C [3x10=30]

(Descriptive/Analytical/Problem Solving/Design questions)

Attempt any three questions

Q.1 Discuss different diversity combining techniques. Using suitable schematic, explain Rake receiver.

Q.2. What is the need of equalization in multipath mitigation? Explain linear and non-linear equalization.

Q.3. What is multiple access technique? Derive mathematical expression for TDMA, CDMA capacity.

Q.4. What is communication link? Explain structure of a wireless communication link. Discuss PAPR.

Q.5. What is Pathloss ? Discuss different pathloss model. Derive expression for error probability in fading channels with diversity reception.

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5E1351

B.Tech.V-Sem. (Re Back) Exam 2024

ESC Computer Sc. & Engg.

5CS3-01 Information Theory & Coding

Time : 2 Hours Maximum Marks : 80

Attempt all five questions from Part A, four questions out of six questions from Part B and two questions out of three from Part C.

Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly. Units of quantities used/ calculated must be stated clearly.

Use of following supporting material is permitted during examination. (Mentioned in form No.205)

1. ..... 2. .....

PART-A **[5x2=10]**

(Answer should be given up to 25 words only)

All questions are compulsory

Q.1. Define uncertainty and entropy in the context of information theory.

Q.2. What is a prefix code, and why is it importance for data compression?

Q.3. What is the Shannon limit, and why is it important?

Q.4. What are the key differences between systematic and non-systematic block codes?

Q.5. Define a cyclic code and also state its important property.

PART-B

[4x10=40]

(Analytical/Problem solving questions)

Attempt any four questions

Q.1. Compare linear block codes, cyclic codes, and convolutional codes in terms of structure, application, and efficiency.

Q.2. State and explain the source coding theorem with a suitable example.

Q.3. Discuss the importance of Galois field arithmetic in error correction.

Q.4. Construct the Huffman code with minimum code variance for the following probabilities and also determine the code variance and code efficiency :

$$\{0.25, 0.25, 0.125, 0.125, 0.125, 0.0625, 0.0625\}$$

Q.5. Explain the decoding process for linear block codes with an example.

Q.6. Explain the relationship between code trees, trellises, and state diagrams in convolutional codes.

PART-C

[2x15=30]

(Descriptive/Analytical/Problem Solving/Design Question)

Attempt any two questions

Q.1. Explain the coding and decoding process of a (7,4) linear block code. Provide a detailed example, including the computation of parity bits and error detection.

Q.2. Explain the Viterbi algorithm for decoding convolutional codes. Illustrate its working with an example of a convolutional code with a rate ½ and constraint length K=3.

Q.3. Consider (3,1,2) convolutional code with g(1) = (110), g(2) = (101) and g(3) = (111):

(i) Draw the encoder block diagram.

(ii) Find the generator matrix.

(iii) Find the code word corresponding to the information sequence (11101) using time domain approach.

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5E1352

Total No. of Questions : 22 Total No. of Pages : 04

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5E1352

B.Tech. V-Sem. (Re-Back) Exam. - 2024

COMPUTER SC. AND ENGG.

5CS4-02 / Compiler Design

CS,IT

Time : 3 Hours Maximum Marks : 120

Instructions to Candidates :

Attempt all ten questions from Part-A, five questions out of seven questions from Part-B and four questions out of five questions from Part-C.

Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly. Units of quantities used / calculated must be stated clearly.

Use of following supporting material is permitted during examination.

(Mentioned in Form No. 205)

1. ..... 2. .....

PART-A **[10x2=20]**

(Answer should be given up to 25 words only)

All questions are compulsory

Q.1. Define Symbol Iable.

Q.2. Define data flow equation.

Q.3. Define handle pruning.

Q.4. Define Ambiguous Grammar.

Q.5. What is Linear analysis?

Q.6. Differentiate tokens, patterns, lexame.

Q.7. Differentiate sentence and sentential form.

Q.8. Define left factoring.

Q.9. What is the order of calling sequence?

Q.10. What are the basic goals of code movement?

PART-B **[5x8=40]**

(Analytical/Problem-Solving Questions)

Attempt any five questions

Q.1. Find whether the following grammar is LL(1) or not, and construct a predictive parsing table for the following grammar:

$$S \rightarrow iEtSS' \mid a \qquad S' \rightarrow eS \mid \varepsilon \qquad E \rightarrow b$$

Q.2. What is the role of Parsing? Explain different types of parsing in compiler design.

Q.3. Which are the types of data flow analysis performed by compilers? Describe in brief.

Q.4. What are the issues in the design of a code generator? Explain in detail.

Q.5. What is Compiler? Explain the different phases of a compiler.

Q.6. Explain three techniques for loop optimization with examples.

Q.7. Explain synthesized attribute and inherited attribute with suitable examples.

PART-C [15x4=60]

(Descriptive/Analytical/Problem-Solving/Design questions)

Attempt any four questions

Q.1. (a) For the statement given, write three address statements and construct DAG.

$$a + a * (b - c) + (b - c) * d$$

(b) Explain LR parsing algorithm with an example.

Q.2. Define Unambiguous Grammar. Show that the given grammar is ambiguous. Also, find an equivalent unambiguous grammar. $E \rightarrow E + E,\ E \rightarrow *E \text{ and } E \rightarrow id$

Q.3. Solve any tree of the following:

(a) Eliminate Left recursion from the grammar. $S \rightarrow (L) \mid x, L \rightarrow L, S \mid S$

(b) Describe the Syntax directed definition, and Syntax directed Translation, taking an example.

(c) Explain S-attributed definitions and L-attributed definitions.

(d) Choose the correct way to simplify the given grammar and simplify it.

$$S \rightarrow AB, A \rightarrow a, B \rightarrow b, C \rightarrow d$$

Q.4. Write short notes on the following:

(a) Augmented grammar

(b) YACC

(c) Rules to construct the LR (0) itmes

(d) Rules of closure operation and goto operation

(e) Bootstrapping

Q.5. Write short notes on the following:

(a) Synthesized attributes

(b) Inherited attributes

(c) Dependency graph

(d) Evaluation order

(e) Backpatching

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Total No. of Questions : 22 Total No. of Pages : 04

Roll No. : .....

5E1353

B.Tech. V-Sem. (Re-Back) Exam. - 2024

COMPUTER SC. & ENGG.

5CS4-03/ Operating System

CS, IT

Time : 3 Hours Maximum Marks : 120

Instructions to Candidates :

Attempt all ten questions from Part-A, five questions out of seven questions from Part-B and four questions out of five questions from Part-C.

Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly. Units of quantities used / calculated must be stated clearly.

Use of following supporting material is permitted during examination.

(Mentioned in Form No. 205)

1. ..... 2. .....

PART-A [10×2=20]

(Answer should be given up to 25 words only)

All questions are compulsory

Q.1. Define buffering.

Q.2 What is a resource-allocation graph?

Q.3. What is a socket?

Q.4. What are conditions under which a deadlock situations may arise?

Q.5. What are the different states of a process?

Q.6. What is the use of paging in OS?

Q.7. What is FCFS?

Q.8. Define fragmentation.

Q.9. What is starvation in operating system?

Q.10. What are the advantages of multithreaded programming?

PART-B [5x8=40]

(Analytical/Problem Solving questions)

Attempt any five questions

Q.1. Explain the features of the UNIX in detail.

Q.2 What is Process? Give the difference between process and program.

Q.3. Explain various page replacement algorithms used for page replacement.

Q.4. Explain with suitable example :

(a) SJF

(b) Priority Sheduling

Q.5. What are the major problems to implement demand paging? Explain.

Q.6. Define :

(a) Throughput

(b) Turn around time

(c) Waiting time

(d) Response time

Q.7. Explain the role of the Kernel.

PART-C

[4x15=60]

(Descriptive/Analytical/Problem Solving/Design questions)

Attempt any four questions

Q.1. What are the various disk-scheduling algorithms? Consider the following disk request sequence for a disk with 100 tracks 98, 137, 122, 183, 14, 133, 65, 78 head pointer starting at 54 and moving in left direction. Find the number of head movements in cylinders using C-SCAN scheduling.

Q.2 Define Deadlock. What are a safe state and an unsafe state in deadlock? Also explain banker's algorithm.

Q.3. Differentiate between Linux, UNIX and Windows operating system.

Q.4. Define Thrashing. What is the cause of thrashing? How does the system detect thrashing? Once it detects thrashing, what can the system do to eliminate this problem?

Q.5. Compute average turnaround time and average waiting time for the following scheduling methods :

(i) FIFO

(ii) Round Robin

Process	Arrival time	Burst time
P_0	0	10
P_1	1	6
P_2	3	2
P_3	5	4

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Total No. of Questions : 22 Total No. of Pages : 04

Roll No. : .....

5E1354

B.Tech. V-Sem. (Re-Back) Exam. - 2024

COMPUTER SC. & ENGG.

5CS4-04 / Computer Graphics & Multimedia

CS, IT

Time : 3 Hours Maximum Marks : 120

Instructions to Candidates :

Attempt all ten questions from Part-A, five questions out of seven questions from Part-B and four questions out of five questions from Part-C.

Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly. Units of quantities used / calculated must be stated clearly.

Use of following supporting material is permitted during examination. (Mentioned in Form No. 205)

1. ..... 2. .....

PART-A **[10×2=20]**

(Answer should be given up to 25 words only)

All questions are compulsory

Q.1. What is Cathod Ray tube?

Q.2 What is Resolution?

Q.3. Define Projection Transformation.

Q.4. Explain character attributes.

Q.5. What is Anti-aliasing?

Q.6. Discuss translation.

Q.7. What is Character Generation?

Q.8. Define Surface Rendering.

Q.9. Discuss properties of light.

Q.10. What are the principles of Animation?

PART-B [5x8=40]

(Analytical/Problem Solving questions)

Attempt any five questions

Q.1. Using mid-point circle generation algorithm, draw a circle having radius r=8.

Q.2 Discuss Raster scan system with the help of block diagram.

Q.3. Write a polygon clipping algorithm to clip a polygon against rectangular clipping area.

Q.4. Explain RGB, CMY and HSV color models.

Q.5. Discuss space filling curves in detail.

Q.6. Describe the properties of Bazier curves.

Q.7. Explain cohen Sutherland line clipping in detail.

PART-C [4x15=60]

(Descriptive/Analytical/Problem Solving/Design questions)

Attempt any four questions

Q.1. Discuss the general application of computer graphics. Explain random scan system also.

Q.2 Explain reflection and shearing with suitable example.

Q.3. Write a procedure to display 2D cubic Bazier curves given a set of 4 control points in XY plane.

Q.4. Explain half tone patterns and dithering techniques in detail.

Q.5. Write short notes on the following :

(a) Koch curves and C curves

(b) Animation techniques

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Total No. of Questions : 22 Total No. of Pages : 04

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5E1355

B.Tech. V-Sem. (Re-Back) Exam. - 2024

COMPUTER SC. AND ENGG.

5CS4-05 / Analysis of Algorithms

CS, IT

Time : 3 Hours Maximum Marks : 120

Instructions to Candidates :

Attempt all ten questions from Part-A, five questions out of seven questions from Part-B and four questions out of five questions from Part-C.

Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly. Units of quantities used / calculated must be stated clearly.

Use of following supporting material is permitted during examination. (Mentioned in Form No. 205)

1. ..... 2. .....

PART-A [10x2=20]

(Answer should be given up to 25 words only)

All questions are compulsory

Q.1. What is an Algorithm?

Q.2. What is Dynamic Programming?

Q.3. What is the difference between Backtracking and Branch and Bound?

Q.4. What is the Matrix Chain Multiplication Problem?

Q.5. Describe the difference between Las Vegas Algorithms and Monte Carlo Algorithms.

Q.6. What is the Flow-shop Scheduling Problem?

Q.7. What is a Randomized Algorithm?

Q.8. What is the definition of NP-Hard?

Q.9. What is Pattern Matching?

Q.10. Define Cook's Theorem.

PART-B

[5x8=40]

(Analytical/Problem-Solving Questions)

Attempt any five questions

Q.1. What is the Boyer-Moore Algorithm, and how does it differ from other pattern matching algorithms?

Q.2. Explain the Binary Search Algorithm and its complexity with the suitable example.

Q.3. What is the Network Capacity Assignment Problem, and how is it defined? What are the applications of the Network Capacity Assignment Problem?

Q.4. Describe the 0/1 Knapsack Problem and how it can be solved using Dynamic Programming?

Q.5. Prove that if a problem is NP-Complete, then it is also NP-Hard.

Q.6. Describe the difference between Las Vegas Algorithms and Monte Carlo Algorithms.

Q.7. State Cook's Theorem and explain its significance.

PART-C

[4x15=60]

(Descriptive/Analytical/Problem-Solving/Design Questions)

Attempt any four questions

Q.1. (a) A sorting algorithm has a time complexity of O (n log n). If the input size is increased from 1000 to 2000, what is the approximate increase in the running time of the algorithm? [7]

(b) Explain the Minimal Spanning Tree Problem with example. How it can be solved using the Greedy Method? [8]

Q.2. (a) Explain the N-Queens Problem and how it can be solved using Backtracking? Describe the steps involved in solving the problem and provide an example. [10]

(b) How does the KMP Matcher Algorithm handle mismatches between the pattern and the text? [5]

Q.3. (a) Prove that the Vertex Cover Problem is NP-Complete. [8]

(b) Explain the concept of decision problems and how they relate to NP, NP-Hard, and NP-Complete problem classes? [7]

Q.4. (a) What is the relationship between approximation algorithms and the concept of NP-Completeness? [8]

(b) What is a randomized algorithm, and how does if differ from a deterministic algorithm? [7]

Q.5. Describe the Branch and Bound technique and its application in solving optimization problems. Explain the concept of Lower Bound Theory and its role in Branch and Bound. Provide an example of a problem that can be solved using Branch and Bound. [15]

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Total No. of Questions : 22 Total No. of Pages : 04

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5E1355

B.Tech. V-Sem. (Re-Back) Exam. - 2024

COMPUTER SC. AND ENGG.

5CS4-05 / Analysis of Algorithms

CS, IT

Time : 3 Hours Maximum Marks : 120

Instructions to Candidates :

Attempt all ten questions from Part-A, five questions out of seven questions from Part-B and four questions out of five questions from Part-C.

Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly. Units of quantities used / calculated must be stated clearly.

Use of following supporting material is permitted during examination. (Mentioned in Form No. 205)

1. ..... 2. .....

PART-A [10x2=20]

(Answer should be given up to 25 words only)

All questions are compulsory

Q.1. What is an Algorithm?

Q.2. What is Dynamic Programming?

Q.3. What is the difference between Backtracking and Branch and Bound?

Q.4. What is the Matrix Chain Multiplication Problem?

Q.5. Describe the difference between Las Vegas Algorithms and Monte Carlo Algorithms.

Q.6. What is the Flow-shop Scheduling Problem?

Q.7. What is a Randomized Algorithm?

Q.8. What is the definition of NP-Hard?

Q.9. What is Pattern Matching?

Q.10. Define Cook's Theorem.

PART-B

[5x8=40]

(Analytical/Problem-Solving Questions)

Attempt any five questions

Q.1. What is the Boyer-Moore Algorithm, and how does it differ from other pattern matching algorithms?

Q.2. Explain the Binary Search Algorithm and its complexity with the suitable example.

Q.3. What is the Network Capacity Assignment Problem, and how is it defined? What are the applications of the Network Capacity Assignment Problem?

Q.4. Describe the 0/1 Knapsack Problem and how it can be solved using Dynamic Programming?

Q.5. Prove that if a problem is NP-Complete, then it is also NP-Hard.

Q.6. Describe the difference between Las Vegas Algorithms and Monte Carlo Algorithms.

Q.7. State Cook's Theorem and explain its significance.

PART-C

[4x15=60]

(Descriptive/Analytical/Problem-Solving/Design Questions)

Attempt any four questions

Q.1. (a) A sorting algorithm has a time complexity of O (n log n). If the input size is increased from 1000 to 2000, what is the approximate increase in the running time of the algorithm? [7]

(b) Explain the Minimal Spanning Tree Problem with example. How it can be solved using the Greedy Method? [8]

Q.2. (a) Explain the N-Queens Problem and how it can be solved using Backtracking? Describe the steps involved in solving the problem and provide an example. [10]

(b) How does the KMP Matcher Algorithm handle mismatches between the pattern and the text? [5]

Q.3. (a) Prove that the Vertex Cover Problem is NP-Complete. [8]

(b) Explain the concept of decision problems and how they relate to NP, NP-Hard, and NP-Complete problem classes? [7]

Q.4. (a) What is the relationship between approximation algorithms and the concept of NP-Completeness? [8]

(b) What is a randomized algorithm, and how does if differ from a deterministic algorithm? [7]

Q.5. Describe the Branch and Bound technique and its application in solving optimization problems. Explain the concept of Lower Bound Theory and its role in Branch and Bound. Provide an example of a problem that can be solved using Branch and Bound. [15]

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Total No. of Questions : 14 Total No. of Pages : 04

Roll No. : .....

5E1356

B.Tech. V-Sem. (Re-Back) Exam. - 2024

PCC/PEC COMPUTER SCIENCE AND ENGG.

5CS5-11 / Wireless Communication

CS, IT

Time : 2 Hours Maximum Marks : 80

Instructions to Candidates :

Attempt all ten questions from Part-A, Four questions out of Six questions from Part-B and two questions out of three questions from Part-C.

Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly. Units of quantities used / calculated must be stated clearly.

Use of the following supporting material is permitted during examination. (Mentioned in Form No. 205)

1. ..... 2. .....

PART-A [5x2=10]

(Answer should be given up to 25 words only)

(All questions are compulsory)

Q.1. What is small-scale fading in wireless channels?

Q.2. Define FDMA.

Q.3. Describe the role of windowing in OFDM.

Q.4. Describe the difference between linear and non-linear equalization techniques.

Q.5. Describe the difference between microdiversity and macrodiversity.

PART-B [4x10=40]

(Analytical/Problem Solving Questions)

(Attempt any four questions)

Q.1. Describe the principles of OFDM. Explain how OFDM is used to transmit information over the wireless channel and discuss its advantages and disadvantages.

Q.2. Describe the system model for MIMO systems, including the transmitter, receiver, and channel. Explain the different components of the system model and how they interact to enable MIMO communication.

Q.3. Explain the principles of Code Division Multiple Access (CDMA) and describe how it is used in celluar networks. Compare CDMA with FDMA and TDMA.

Q.4. Explain the concept of adaptive equalization and its importance in wireless communication systems. Describe the different types of adaptive equalization algorithms.

Q.5. Describe the concept of channel modeling in MIMO systems. Explain the different channel models, including the Rayleigh fading model and the Rician fading model, and describe their application in MIMO systems.

Q.6. Explain the concept of fast fading and slow fading in wireless channels. Discuss the causes of fast fading and slow fading and explain their effects on wireless communication.

PART-C [2x15=30]

(Descriptive/Analytical/Problem Solving/Design Questions)

(Attempt any two questions)

Q.1. (a) Discuss the techniques used to assign channels to users in cellular networks. Explain the importance of channel allocation and describe the algorithms used to allocate channel. [7]

(b) Describe the techniques used to improve coverage in cellular networks. Explain the importance of improving coverage and also discuss the limitations of these techniques. [8]

Q.2. (a) Explain the principles of Minimum Shift Keying modulation. Discuss how MSK is used to transmit information over the wireless channel and explain its advantages and disadvantages. [7]

(b) Discuss the principles of p/4-DQPSK modulation. Explain how p/4-DQPSK is used to transmit information over the wireless channel and discuss its advantages and disadvantages. [8]

Q.3. (a) Discuss the techniques used to mitigate the effects of multipath fading in wireless communication system. Explain the importance of equalization and diversity techniques in mitigating the effects of multipath fading. [8]

(b) Describe the Zero Forcing (ZF) algorithm and its application in equalization. Explain the advantages and disadvantages of the ZF algorithm and provide examples of its application in wireless communication system. [7]

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