304

5E1751

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

Roll No. : .....

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.

308

5E1752

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

Roll No. : .....

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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312

5E1753

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

Roll No. : .....

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

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

Roll No. : .....

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

Total No. of Questions : 22

Total No. of Pages : 04

Roll No. : .....

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.

322

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]

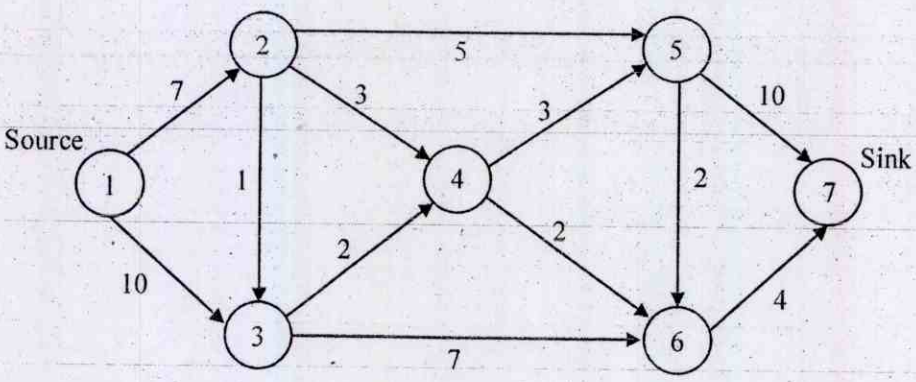
(a) $T(n)=T\left(\sqrt{n}\right)+C$

(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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324

5E1756

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

Roll No. : .....

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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5E1757

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

Roll No. : .....

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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5E1788

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

Roll No. : .....

5E1788

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

Inforamation Technology

5IT3-01 / Microprocessor and Interfaces

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. Define bit, byte and word.

Q.2. Difference between microprocessor and microcontroller.

Q.3. What is a flag? State the various flags used in 8085.

Q.4. What is instruction cycle?

Q.5. Define opcode and operand.

Q.6. Difference between PUSH and POP instructions.

Q.7. How the 8085 processor differentiates a memory access (read/write) and 1/0 access (read/write)?

Q.8. What is Software interrupts?

Q.9. What operation is performed during first T-state of every machine cycle in 8085?

Q.10. Write a program to add two bit number.

PART-B [5x4=20]

(Analytical/Problem solving questions)

Attempt any five questions

Q.1. Write an assembly language program to transfer a block of ten data elements from memory location 4000H to 5000H.

Q.2. Explain with a neat block diagram the architecture of 8085 microprocessor.

Q.3. Sketch and explain the timing waveform for fetch operation.

Q.4. Explain addressing modes in 8085.

Q.5. State any three features of 8259 Programmable interrupt controller in detail.

Q.6. Describe with suitable example the operation of stack.

Q.7. Explain the operating modes of 8255 programmable peripheral interface.

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

(Descriptive/Analytical/Problem Solving/Design question)

Attempt any three questions

Q.1. Draw Timing diagram of MVI A, 45 instruction.

Q.2. Write an assembly language program in 8085 to find the largest number from an array.

Q.3. Draw and explain interrupt structure of 8085.

Q.4. Explain instruction set in 8085 with suitable example.

Q.5. Write short notes on address bus, data bus, control bus in 8085.

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33

5E1789

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

Roll No. : .....

5E1789

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

INFORMATION TECHNOLOGY

5IT 5-12 Software Testing and Project Management (Elective-I)

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. Define Software Project Manatement.

Q.2. Explain the role of software process in project management.

Q.3. List three software process moDel.

Q.4. What is requirements analysis?

Q.5. What is Project?

Q.6. What is feasibility study?

Q.7. What is Design?

Q.8. What is risk analysis?

Q.9. What are the advantages of SPM?

Q.10. List some of the key characteristics of project.

PART-B [5x4=20]

(Analytical/Problem solving questions)

Attempt any five questions

Q.1. What is McCabe's cyclomatic complexity and is it important?

Q.2 How are UML diagrams used in test case generation? Explain with suitable example.

Q.3. Discuss the primary responsibilities and challenges faced by a software project manager in ensuring a project success.

Q.4. What are boundary value testing and equivalence class testing?

Q 5. What is Regression Testing? Explain with a suitable example.

Q.6. What is software size extimation? Why it is important in poroject management?

Q.7. How does mutation testing contributes to strength of a test suite? What challenges are associated with this type of testing?

PART-C [3x10=30]

(Descriptive/Analytical/Problem Solving/Design question)

Attempt any three questions

Q1. What is GUI testing? What specific challenges does it present? Describe techniques and tool commonly use GUI testing.

Q.2 Describe the different stages of software development life cycle (SDLC). How project management techniques are applied at each stage.

Q.3 How decision tables are created in table-based testing? Explain with a suitable example.

Q.4 What is Error Seeding? Discuss the benefits and potential drawbacks of error seeding in different project.

Q. 5. Write short notes on the following :

(a) Testing surface structure and deep structure

(b) Explain any two software process models.

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336

5E1821

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

Roll No. : .....

5E1821

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

Artificial Intelligence and Data Science

(AID, CAI, CDS)

5AID3-01 / Data Mining-Concepts and Techniques

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. What is the significance of pattern evaluation in data mining?

Q.2. List two methods of handling missing data during preprocessing.

Q.3. Mention any one advantage and one limitation of classification using back-propagation.

Q.4. How do lazy learners differ from eager learners?

Q.5. Tabulate two types of data used in cluster analysis with one example for each.

Q.6. What is outlier analysis?

Q.7. How does support threshold vary in multilevel pattern mining?

Q.8. Provide an example of a maximal pattern in data mining.

Q.9. Define invisible data mining.

Q.10. Name two sectors where data mining is widely applied.

PART-B [5×4=20]

(Analytical/Problem solving questions)

Attempt any five questions

Q.1. Compare data normalization and data discretization in preprocessing.

Q.2. Differentiate between descriptive and predictive data mining with examples.

Q.3. What are the strengths and weaknesses of decision tree induction compared to other classification methods?

Q.4. Write a brief note on probabilistic model-based clustering and its applications.

Q.5. Illustrate the concept of a frequent pattern with a sample transaction database and the calculation of frequent item sets.

Q.6. Compare the Apriori algorithm and the FP-Growth algorithm.

Q.7. Explain the social and ethical concerns associated with data mining, focusing on privacy and security issues.

PART-C [3×10=30]

(Descriptive/Analytical/Problem Solving/Design questions)

Attempt any three questions

Q.1. Discuss the challenges of handling raw data and how preprocessing techniques address these issues with examples.

Q.2. Explain Bayesian belief networks with structure, working mechanism, and advantages in advanced classification methods.

Q.3. Compare and contrast partitioning and hierarchical clustering methods. Highlight their advantages, limitations, and suitability for different types of data.

Q.4 Explain the process of mining frequent item sets using a vertical data format. Describe how tid-lists are utilized and demonstrate the method with an example.

Q.5. Explain the web mining techniques including their types and applications in detail with suitable examples.

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359

5E1826

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

Roll No. : .....

5E1826

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

Artificial Intelligence and Data Science

5AID 5-11 Fundamentals of Block Chain (Elective-I)

AID, CAI, CDS

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 challenge double-spend problem poses in digital transactions?

Q.2. "Distributed systems are crucial for modern computing infrastructure". How?

Q.3. Describe role of delegates in Delegated Proof of Stake.

Q.4. Identify mechanism for fairness in Proof of Elapsed Time.

Q.5. What are key components of Bitcoin block chain's structure?

Q.6. Ethereum processes transactions and executes smart contracts. How?

Q.7. What role does Ethereum Virtual Machine (EVM) play in block chain ecosystem?

Q.8. Explain significance of Proof of Work in securing block chain transactions.

Q.9. How Bitcoin's Proof of Work ensure consensus and security?

Q.10. List features that make Bitcoin first among cryptocurrencies.

PART-B

[5x4=20]

(Analytical/Problem-Solving questions)

Attempt any five questions

Q.1. A malicious actor tries to double-spend in block chain. Explain mechanism to identify and reject fraudulent transactions.

Q.2. Consider a new cryptocurrency adoption faces resistance due to volatility. Design incentive mechanism to encourage adoption.

Q.3. How to re-secure a system in a scenario where private key is compromised? Minimal disruption should occur.

Q.4. Suggest steps to resolve inconsistency, if hash mismatch is detected in a chain.

Q.5. How to address scalability challenges in a block chain?

Q.6. Suggest mechanism to optimize gas fee calculations focusing on smaller transactions.

Q.7. Consider that transaction time increases on Bitcoin block chain due to congestion. Suggest strategies to reduce delays.

341

PART-C [3x10=30]

(Descriptive/Analytical/Problem Solving/Design questions)

Attempt any three questions

Q.1. Describe how Ethereum's smart contract differs from traditional software programs focusing on execution and trust.

Q.2. Discuss reward mechanisms in Ethereum 2.0. How they ensure validator participation?

Q.3. Propose mechanism to synchronize data between sidechain and its parent block chain.

Q.4. Explain importance of deposit-based incentives in honest participation in network.

Q.5. Describe properties of hash functions which make them suitable for block chain technology.

342

5E1827

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

Roll No. : .....

5E1827

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

Artificial Intelligence and Data Science

5AID5-12 Probability & Statistics for Data Science (Elective -II)

AID, CDS

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. Define the mode of a dataset.

Q.2. What does kurtosis indicate about a distribution?

Q.3. When A and B are two mutually exclusive events of a random experiment such that P(not A)=0.65 and P(A or B)=0.65, find P(B).

Q.4. Check whether is a probability density function or not?

Q.5. Define Critical Region and Level of significance.

Q.6. What is the formula for the chi-square statistic?

Q.7. How many number of normal equations required for fitting a polynomial of degree by least square method?

Q. 8 If correlation coefficient and then what will be the value of?

Q. 9 What is the primary purpose of logistic regression?

Q. 10. How does MANOVA differ from ANOVA?

PART-B [5x4=20]

(Analytical/Problem solving questions)

Attempt any five questions

Q.1. The standard deviation of a symmetrical distribution is 5 What must be the value of the fourth moment about the mean in order that the distribution be (i) Leptokurtic, (ii) mesokurtic and (iii) platikurtic?

Q.2 A manufacturing firm produces steel pipes in three plants with daily production volume of 500, 1000 and 2000 units respectively. According to past experience it is known that the fractions of defective output produced by the three plants are respectively 0.005, 0.008 and 0.010. If a pipe is selected from a day's total production and found to be defective. Find out what is the probability that it came from the first plant?

Q.3. A continuous random variable that can assume any value between and has a density function, then computer.

Q.4. Random samples of 400 men and 600 women were asked whether they would like to have a flyover near their residence. 200 men and 325 women were in favor of the

proposal. Test the hypothesis that proportions of men and women in favor of the proposal are same against that they are not, at 5% level.

Q 5. The I.Q.'s of a group of 6 persons were measured, and they then sat for a certain examination. Their I.Q.'s and examination marks were as follows :

Person:	1	2	3	4	5	6
I.Q.:	110	100	140	120	80	90
Exam Marks :	70	60	80	60	10	20

Compute the coefficient of rank correlation :

Q.6. Two random variables have the following regression lines.

$3x + 2y - 26 = 0$ and $6x + y - 31 = 0$.

Find the mean values and coefficient of correlation between x and y.

Q.7. Write difference between Binary outcomes and Count outcomes.

PART-C [10x3=30]

(Descriptive/Analytical/Problem Solving/Design questions)

Attempt any three questions

Q.1. Compute a suitable measure of dispersion for the following grouped frequency distribution giving reasons :

Classes	Frequency
Less than 20	30
20-30	20
30-40	15
40-50	10
50-60	5

Q.2 If the random variable takes the values 1,2,3 and 4 such that $2P(X=1)=3P(X=2)=P(X=3)=5P(X=4)$.

Then find (a) probability distribution and (b) cumulative distribution of X.

Q.3. Find the Student's t for following variable values in a sample of eight :

Taking the mean of the univers to be zero.

Q.4. Applying the theory of least square method, fit a second degree parabola to the following data :

	0	1	2	3	4
	1	5	10	22	28

Q. 5. Five dice were thrown 192 times and the number of times 4, 5 or 6 were as follows:

No. of dice throwing 4, 5 or 6	5	4	3	2	1	0
f	6	46	70	48	20	2

Calculate :

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346

5E1352

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

Roll No. : .....

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. $E \to E+E,\ E \to *E$ *and* $E \to id$

Q.3. Solve any tree of the following:

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

(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.

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

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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5E1354

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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5E1355

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

Roll No. : .....

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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5E1357

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

Roll No. : .....

5E1357

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

PCC/PEC COMPUTER SC. AND ENGG.

5CS5-12 / Human- Computer Interaction

Time : 2 Hours **Maximum Marks : 80**

Instructions to Candidates :

Attempt all five 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 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 Fitts' law.

Q.2. What are Shneiderman's eight golden rules of interface design?

Q.3. What is the difference between qualitative and quantitative research methods in HCI?

Q.4. How did the development of the graphical user interface (GUI) impact HCI?

Q.5. What is a Finite State Machine and how is it used in dialog design?

PART-B

[4x10=40]

(Analytical/Problem Solving Questions)

(Attempt any four questions)

Q.1. Discuss Norman's seven principles of user-centered design and explain how they can be used to design user interfaces that are intuitive and easy to use. Provide examples of each principle and discuss their application in real-world.

Q.2. Define CMN GOMS. How do the KLM and CMN-GOMS models differ from each other? What are the advantages and limitations of using the GOMS family of models in HCI?

Q.3. Describe the concept of Cognitive Architectures and its relevance in Human-Computer Interaction. Explain how CA can be used to model human cognition and behavior.

Q.4. Discuss the key principles of GUI design. Explain how these principles can be applied to design usable and aesthetically pleasing GUIs.

Q.5. Explain the Petri Net method and its application in dialog design. Discuss the benefits and limitations of Petri Nets and provide an example of its application.

Q.6. Explain the concept of statistical significance and its importance in HCI research. Describe how to interpret the results of a statistical test and discuss the implications of the results for design decisions.

PART-C

[2x15=30]

(Descriptive/Analytical/Problem Solving/Design Questions)

(Attempt any two questions)

Q.1. (a) Define usability and explain its importance in HCI. Discuss the key factors that influence usability and explain how usability can be measured and evaluated. [8]

(b) Discuss the difference between usability and accessibility. Explain how interactive systems can be designed to be both usable and accessible. [7]

Q.2. (a) Discuss Hick-Hyman's law and its application in HCI. Explain how Hick-Hyman's law can be used to predict the time it takes to make a decision and provide examples of its application in real-world scenarios. [8]

(b) Explain the concept of one-way ANOVA and its application in HCI. Describe how to perform a one-way ANOVA and interpret the results. [7]

Q.3. (a) Describe the CTT notation and its application in task modeling. Explain the banefits and limitations of CTT and also give example of its application. [7]

(b) Describe the process of object-oriented modeling of user interface design. Explain how to identify and define objects, attributes, and methods in user interface design. [8]

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