Roll No. _____   [Total No. of Pages : 2]

5E1788

B.Tech. V-Sem. (Main &Back) Examination, January/February - 2024
Information 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)

PART - A
(Answer should be given up to 25 words only).
ALL questions are Compulsory.   (10×2=20)

1. Differentiate Microprocessor and Microcontroller.

2. Explain priority interrupts? Explain non maskable interrupts.

3. Define instruction cycle, machine cycle and T-State.

4. List out the five categories of 8085 instructions. Give examples of the instructions for each group.

5. Write a program to obtain 2's complement of the number.

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

7. What is Program Counter and Stack Pointer.

8. What are the various registers in 8085?

5E1788 /2024   (1)   [Contd....

9. Differentiate between memory mapped I/O and peripheral mapped I/O.

10. How many machine cycles does 8085 have, mention them all.

PART - B
(Analytical/Problem solving questions)
Attempt any FIVE questions. (5×4=20)

1. Write an assembly language program to transfer a block of ten data elements from memory location 5000H to 6000H.

2. What is the importance and use of Stack? Illustrate about PUSH and POP instructions.

3. Explain the control word format of 8255 in IO mode and BSR mode.

4. Write notes on status flag register. Also write down condition under which the flag bits affected.

5. Sketch and explain the timing waveform for fetch operation.

6. Draw the Pin Diagram of 8085 microprocessor. Explain important pins used for interfacing with the memory and peripherals.

7. State any three features of 8259 programmable interrupt controller in detail.

PART - C
(Descriptive/Analytical/Problem Solving/Design questions)
Attempt any THREE questions. (3×10=30)

1. Draw and explain interrupt structure of 8085.

2. Write the use of Stack and illustrate PUSH and Pop operations in detail with suitable examples. Also list stack related instructions.

3. Why are AD_7-AD_0 lines multiplexed with help of latching circuit? Explain how these lines are de-multiplexed.

4. Explain the term addressing modes and with suitable examples illustrate the addressing modes of 8085 microprocessor.

5. Write an assembly language program in 8085 microprocessor to generate Fibonacci series.

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5E1351

B.Tech. V- Sem. (Back) Examination January/February- 2024
ESC Computer Science and Engineering
5CS3-01 Information Theory and Coding

Time : 2 Hours

Maximum Marks : 80
Min. Passing Marks : 28

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 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).

PART - A

(Answer should be given up to 25 words only)

All questions are compulsory.   (5×2=10)

1. What is conditional entropy in information theory and coding?

2. What are the prefix codes in Huffman coding?

3. Define minimum distance consideration in linear block code?

4. Write the properties of Galois fields?

5. What are the applications of convolutional code?

PART - B

(Analytical/Problem solving questions)

Attempt any Four questions.   (4×10=40)

1. A Gaussian channel has 1 MHz Bandwidth. calculate the channel capacity if its signal power to noise density ratio is 5×10^4Hz.

2. Define mutual information? Explain the properties of mutual information.

3. What is the systematic cyclic code? Differentiate between systematic and non systematic codes

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4. Differentiate between cyclic code and linear block code.

5. Explain error detection and correction capabilities of hamming code.

6. Explain -
    a) Viterbi Algorithm
    b) Code tree

PART - C

(Descriptive/Analytical/Problem Solving/Design questions)

Attempt any Two questions.   (2×15=30)

1. State Shannon's Hartley theorem and its implications? How does channel capacity change if

    bandwidth is increased to infinity? Explain in detail

2. For a systematic (7, 4) linear block code, the parity matrix P is given by

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

    i)   Find all possible code vectors.
    ii) Draw the corresponding encoding circuit
    iii) Detect and correct the following error R=[1 0 1 1 1 0 0]

3. Define the following:
    a) Channel Coding
    b) Source Coding
    c) Variable length Code

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5E1751

5E1751

B.Tech. V-Sem. (Main) Examination, January/February - 2024
Computer Sc. and Engg. (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)

PART-A
(Answer should be given up to 25 words only).
All questions are compulsory.

(10×2=20)

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

2. Show that if there are 'n' number of equally likely message then entropy of the source is $\log_2 n$.

3. Define Kraft inequality.

4. Explain prefix code with example.

5. Differentiate between random ever and burst ever.

6. Classify the types of linear block code.

7. Explain 2 properties of Galois field.

8. Discuss cyclic codes and its generation.

9. Compare convolution code over other coding methods.

10. Describe the differences between state diagram and trellis diagram of convolution code.

PART - B

(Analytical/Problem solving questions)

Attempt any Five questions.   (5×4=20)

1. The probabilities of five possible outcomes of an experiment are given as
    $P(x_1)=1/2$, $P(x_2)=1/4$, $P(x_3)=1/8$, $P(x_4)=P(x_5)=1/16$ Determine the entropy and
    information rate if there are 16 outcomes per second.

2. Show that for a discrete binding channel
    $H(X, Y) = H(X/Y)+H(Y)$
    $H(X, Y) = H(X) + H(Y)$

3. A discrete memoryless source emits four messages with probability set
    [1/2, 1/4, 1/8, 1/8].Constructs a Shannon-fano code for this message and also
    find the efficiency.

4. A voice grade channel of telephone network has a bandwidth of 3.4KHz. Calculate
    the information capacity of telephone channel for signal to noise ratio of 30 dB.

5. Illustrate the concept of systematic and non-systematic code.

6. The following polynomials $f(x)$ and $g(x)$ are defined over GF(3).

    $$f(x) = 2 + x + x^2 + 2x^4$$
    $$g(x) = 1 + 2x^2 + 2x^4 + x^5$$

    Calculate addition and multiplication of above 2 polynomials.

7. Describe viterbi algorithm in detail.

PART - C

(Descriptive/Analytical/Problem Solving/Design question)

Attempt any Three questions.   (3×10=30)

1. a) Discuss the concept of joint entropy and mutual information.   (5)
    b) Explain different types of channels with their channel matrix   (5)

2. Construct Huffman's code for following set of messages. Also find the efficiency
    $P(x_1) = 0.49$, $P(x_2) = 0.14$, $P(x_3) = 0.14$, $P(x_4) = 0.07$, $P(x_5)=0.07$,
    $P(x_6) = 0.04$, $P(x_7) = 0.02$, $P(x_8) = 0.02$, $P(x_9) = 0.01$ (10)

3. Consider a (7,4) linear blockcode with the parity-check matrix H given by

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

a) Construct code words for this (7, 4) code (5)

b) Show that this code is a Hamming code (5)

4. 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)

5. Write a short note on
   a) Sequential decoding (5)
   b) Transfer function of convolutional code (5)

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Roll No. _____ [Total No. of Pages : 2

5E1821

5E1821

B.Tech. V Sem. (Main & Back) Examination, January/February - 2024

Artificial Intelligence and Data Science

5AID3-01 Data Mining -Concepts and Techniques

AID, CAI, CDS

Time : 3 Hours

Maximum Marks : 70

Instructions to Candidates:

Attempt all Ten questions from Part A, five question out of Seven 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)

PART - A

(Answer should be given up to 25 words only)

ALL questions are Compulsory. (10×2=20)

1. What is concept description?

2. Define Data characterization.

3. What is the need for preprocessing the data?

4. List the important issues that have to be addressed during data integration.

5. Define Data mining as KDD (knowledge Discovery in Databases).

6. Write the strategies for data reduction.

7. List some variants of Apriori Algorithm.

8. What is Clustering?

9. State two clustering methods that are used in "Grid and density based" method.

10. List some applications of Data Mining.

5E1821/2024 (1) [Contd....

PART - B

(Analytical/Problem Solving questions)

Attempt any FIVE questions. (5× 4 = 20)

1. Explain the differences between "explorative data mining" and "Predictive data mining" and give one example of each.

2. How concept Hierarchies are useful in data mining?

3. What do you mean by market basket analysis and how it can help in a supermarket?

4. Give brief description of the following:

   i) Binning

   ii) Regression.

5. What is the drawback of k-means algorithm? How can we modify the algorithm to diminish that problem?

6. Explain how data mining helps in detection of money Laundering and other financial crimes?

7. Compare SCAN with DBSCAN. What are their similarities and differences?

PART - C

(Descriptive/Analytical/Problem Solving/Design question)

Attempt any THREE questions. (3× 10 = 30)

1. Explain data mining as kDD process. Describe various functionalities of data mining.

2. Write and explain the algorithm for mining frequent item sets without candidate generation. Give relevant example.

3. What is Bayesian belief network? Explain in detail.

4. a) Classify various clustering methods.

   b) Explain any one partitioning based clustering methods.

5. What are various applications of data mining in Science and engineering? Describe various challenges of emerging scientific applications of data mining.

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Total No. of Questions: Total No.of Pages:

Roll No. _____

B.Tech.V-Sem.(Back)Exam 2024
Computer Sc. & Engg.
5CS4-02Compiler Design
5E1352
CS,IT

Time: 3 Hours   Maximum Marks: 120
                                       Min. Passing Marks: 42

Attempt all ten questions from Part A, five question out of seven from Part B and four questions out of five 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 up to 25 words only)
                      All questions are compulsory

Q1. Write the differences between compilers and interpreters?
Q2. What is a precedence of a parse tree?
Q3. What are the various phases of a compiler?
Q4. What is symbol table?
Q5. Define parser.
Q6. Why lexical and syntax analyzers are separated out?
Q7. Define ambiguous grammar.
Q8. List the characteristics of peephole optimization.
Q9. List the properties of LR parser?
Q10. What are the problems with top down parsing?   10 x 2 = 20

                 Part B(Analytical/Problem solving questions)
                         Attempt any Five questions

Q1. Explain DFA and NFA with an Example?
Q2. Construct the LL (1) Parsing table for the following grammar?
E→E+T|T
T→ T*F
F→ (E) | id
Q3. What is the Lexical analyzer? Discuss the Functions of Lexical Analyzer.
Q4. What is YACC? Explain how do you use it in constructing the parser using it.

Q5. What is a operator precedence parser?List the advantages and disadvantages of operatorprecedence parsing.
Q6. Explain Peephole Optimization in detail.
Q7. What are three address codes? Explain different types of representation of three address code?   5 x 8 =40

Part C(Descriptive/Analytical/Problem Solving/Design questions)
Attempt any four questions

Q1. Explain the procedure to remove the ambiguity from the given grammar with your own example?
Q2. What is DAG? Explain the applications of DAG. Construct the DAG for the following basic block:
D := B*C
E :=A+B
B := B+C
A := E-D
Q3. What are the storage allocation strategies? Explain different storage allocation strategies in detail.
Q4. Explain the following
a) Parameter passing
b) conical LR parsing
c) Loop optimization

Q5. What is LEX? Discuss the usage of LEX in lexical analyzer generation?4 x 15 = 60

Roll No. _____   [Total No. of Pages : 2

5E1752

5E1752

B.Tech. V-Sem. (Main & Back) Examination, January/February - 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).

PART - A

(Answer should be given up to 25 words only)

All questions are compulsory.   **(10×2=20)**

1. What is Translator.

2. Define Bootstrapping.

3. What is token.

4. Explain error handling.

5. Define paising.

6. What is syntax.

7. Define DAG.

8. What is ambiguity.

9. What is activation record.

10. Define optimization.

PART - B

(Analytical/Problem solving questions)

Attempt any Five questions. (5×4=20)

1. Classify the errors and discuss the errors in each phase of compiler.
2. What is symbol table? Write the procedure to store the names in symbol table.
3. Explain Bottom up paising in detail.
4. Explain Intermediate code forms using postfix notation.
5. Write short note on global data flow Analysis.
6. What is peehole optimization? Explain in detail.
7. Consider the grammer

    E → E+E
    E → E*E
    E → id

    Perform shift reduce paising of the input string "id1+id2+id3".

PART - C

(Descriptive/Analytical/Problem Solving/Design questions)

Attempt any Three questions. (3×10=30)

1. Explain the paising techniques with a hierarchical diagram.
2. Discuss the phases of compiler with the help of appropriate diagram.
3. Construct syntax tree and postfix notation for the following expression

    $(a+(b*c)^\wedge d - e / (f+g))$.

4. What is common subexpression and how to eliminate it? Explain with the help of appropriate example.
5. Write short notes on
    a. YACC error handling in paising.
    b. Finite Automata lexical analyzer.

Roll No. _____

5E1753

B.Tech. V-Sem (Main&Back) Examination, January/February - 2024
Artificial Intelligence and Data Science
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)

PART A
(Answer should be given up to 25 words only).

All questions are compulsory.   (10×2=20)

1. Define logical and physical Address.

2. Explain the features of operating system.

3. Define the term virtual Memory.

4. Explain the term file system in brief.

5. What is semaphore?

6. Draw the process state diagram.

7. Why page size is always power of 2?

8. What is starvation? How can me overcome it?

9. What is thrashing?

10. Differentiate between pager and swapper.

PART - B

(Analytical/Problem solving questions)

Attempt any Five questions. (5×4=20)

1. What is memory management unit (MMU)? Explain Best fit, worst fit and Quick fit algorithms in detail.

2. What are the necessary conditions of deadlock? Explain resource graph model and safe-unsafe states with a suitable example.

3. Explain in detail the following CPU scheduling Algorithm:

   i) Priority Scheduling

   ii) Round Robin.

4. What is the importance of paging and segmentation in memory management? Explain with diagram?

5. Differentiate between Windows and Linux based operating system?

6. Consider 3 pages frames and following refence string use FIFO page replacement algo to calculate the number of page faults in each reference string is -

   7 0 1 2 0 3 0 4 2 3 0 3 2 1 2 0 1 7 0 1

7. Write and explain the Banker's Algorithm for deadlock avoidance?

PART - C

(Descriptive/Analytical/Problem Solving/Design question)

Attempt any Three questions. (3×10=30)

1. What is Dining philosophers problem? Explain the solution of this problem by using a suitable example.

2. Consider the following page reference string 1,2,3,4, 1,2,5,1,2,3,4,5 compare the number of page faults with frame size 3,4 with LRU page replacement algorithm. Also explain Belady's anomely in detail.

3. Suppose a disk drive has 200 cyclinders the drive is initially at cylinder position 9B. The queue with request from I/O to blocks on cylinders. 86, 147, 91,177 94, 150, 102, 175 130 what is the total head movement needed to satisfy the request for SCAN and C-SCAN scheduling algorithm.

4. Consider the following four processes, with the length of the CPU burst time given in milliseconds.

Process	Burst time (Ms)	Arrival Time (Ms)
P0	15	0.0
P1	20	1.0
P2	3	2.0
P3	7	2.0

Consider the shortest Remaining time first (SRTF) Round Robin (RR) (Quantum = 5ms) Scheduling algorithms. Illustrate the scheduling crantt chart. Which algorithm will give the minimum average waiting time.

5. Consider a paging system with the page table stored in memory.
   a) If a memory reference takes 200 nanoseconds, how long does a paged memory reference take?
   b) If we add TLBs and 75 percent of all page-table references are found in the TLBs, what is the effective memory reference time? Assume that finding a page-table entry in the TLBs takes zero time, if the entry is There.

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5E1354

5E1354

B.Tech. V-Sem. (Back) Examination, January./February. - 2024

Computer Sc. & Engg.

5CS4-04 Computer Graphics & Multimedia

CS, IT

Time : 3 Hours   Maximum Marks : 120

Min. Passing Marks: 42

Instructions to Candidates:

Attempt all ten questions from Part A, five question out of seven from Part B and four questions out of five 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)

PART - A

(Answer should be given up to 25 words only)

All questions are compulsory   (10×2=20)

1. What is resolution?

2. Explain Ambient reflection.

3. Describe properties of Koch curve.

4. Define Pirel.

5. Explain scan conversion.

6. What do you mean by clipping?

7. Discuss YIQ color model.

8. Define shearing.

9. What is parallel projection?

10. Define concave polygon.

5E1354/2024   (1)   [Contd....

PART - B

(Analytical/Problem solving questions)

Attempt any Five questions   (5×8=40)

1. Explain the application areas of computer graphics in detail.

2. Discuss the cohen-rutherland line clipping algorithm.

3. Explain flood fill algorithm. Differentiate it with boundary fill algorithm.

4. What are the various aspects of illumination of objects?

5. Discuss the Depth Buffer Algorithm to display visible surfaces of polygon.

6. Define Animation Explain principles of animation briefly.

7. Show that the composition of two rotations is additive by concatenating the matrix representation for $R(\theta_1)$ and $R(\theta_2)$ to obtain. $R(\theta_1).R(\theta_2) = R(\theta_1 + \theta_2)$.

PART - C

(Descriptive/Analytical/Problem Solving/Design question)

Attempt any Four questions.   (4×15=60)

1. Write a routine to convert RGB color model to HSV color model.   (15)

2. Explain the working of Ray tracing. Calculate rays for rectangular view port also.(15)

3. Explain B-Spline curve and Bazier curve in detail.   (15)

4. a) Discuss Random scan system in detail.   (8)

    b) Draw a line from (10,12) to (20,18) on a raster screen using Bresenham's line algorithm.   (7)

5. a) How is Liang-bersky algorithm more efficient than the Cohen Rutherland algorithm ? Explain.   (8)

    b) Perform 45^0 rotation of triangle A(0,0), B(1,1), C(5,2) about an arbitrary point (-1,-1)   (7)

5E1354   (2)

Roll No. _____ [Total No. of Pages : 2]

5E1754

5E1754

B.Tech. V-Sem (Main and Back) Examination, January/February - 2024
Artificial Intelligence and Data Science
5AID4-04 Computer Graphics and 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 form No.205

PART A
(Answer should be given up to 25 words only).
All questions are compulsory.   (10×2=20)

1. Define Pixels.

2. What is translations?

3. Define Gray scale.

4. Explain which clipping process handles the clipping of strings.

5. What is surface rendering?

6. What is Animation?

7. Define color Models.

8. Write the steps for 3-D transformations.

9. Define Aspect Ratio

10. What is polygon clipping.

5E1754/2024   (1)   [Contd....

PART - B
(Analytical/Problem solving questions)

Attempt any Five questions. (5×4=20)

1. Compare DDA and Bresanham's algorithm.

2. Explain scan conversion.

3. Write any four applications of Computer Graphics.

4. Explain transformation in homogenous co-ordinate system.

5. Explain B Spline curves and 3 D scaling system.

6. Explain HSV color model

7. Define Ray tracing algorithm with an example.

PART - C
(Descriptive/Analytical/Problem Solving/Design question)

Attempt any Three questions. (3×10=30)

1. Derive the various parameters to draw circle using mid-point circle algorithm and calculate intermediate pixel for circle having center point coordinates (0,0) and radius r = 10. **(10)**

2. Obtain the final coordinates after two rotations on point (6,9) with rotation angles are 30^0 and 60^0 respectively. **(10)**

3. Write short notes on
   a) Line Attributes **(5)**
   b) Flood Fill Technique **(5)**

4. Explain Physical and Synthetic graphics system ? Also explain the raster scan and vector scan display with example. **(4+6)**

5. What is Animation? Explain animation function in details. Also write the steps in generation of animation. **(10)**

5E1754 (2)

5E1355

5E1355

B.Tech. V-Sem. (Back) Examination, January/February - 2024

Computer Sc. & Engg

5CS4-05 Analysis of Algorithms

CS,IT

Time : 3 Hours

Maximum Marks : 120

Mm. Passing Marks: 42

Instructions to Candidates:

Attempt all ten questions from Part A, five question out of seven from Part B and four questions out of five 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)

Part - A

(Answer should be given up to 25 words only)

All questions are compulsory (10×2=20)

1. What are Asymptotic Notations? Define them.

2. Differentiate Kruskal's and Prim's Algorithm.

3. Define and explain the Cook's theorem.

4. Differentiate Branch & Bound and Backtracking problems with example.

5. Find out the time complexity of given algorithm.

   int x = 0;

   for (int i=1, i<n; +i++)

   {for (j=1;j<n;++j)

   {x++;

   n--;}}

6. What is 0/1 Knapsack Problem?

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7. Describe binary search algorithm with its complexity.

8. Explain Naive pattern matching algorithm.

9. Write the difference between feasible and optimal solution.

10. Discuss Quadratic Assignment problem with suitable example.

PART - B

(Analytical/Problem solving questions)

Attempt any Five questions $(5 \times 8 = 40)$

1. Solve the recurrence relation using Recurrence Tree for time complexity.

   $T(n)=1$ if $n=1$

   $T(n)=T(n/3)+T(2n/3)+cn$ if $n>1$

2. Define the vertex cover and set cover problems.

3. Show all the steps of Strassen's Matrix Multiplication Algorithm. Apply it on given 2x2 matrices.

   $\begin{vmatrix} 1 & 3 \\ 2 & 5 \end{vmatrix}$ $\begin{vmatrix} 3 & 9 \\ 4 & 7 \end{vmatrix}$

4. Define the term pattern-matching. Explain spurious hits in the Rabin- Karp string-matching algorithm with an example. How many spurious hits does the Rabin-Karp encounter in the text T=23590231415267399921 when looking for pattern P=31415 with q=13?

5. Explain Greedy approach with suitable example. Consider a Knapsack of capacity 60 and items with profits as (280, 110,120,120) and weight (40,10,20,24).What is the maximum Profit earned using greedy approach.

6. What is Dynamic programming? How it is used to find longest common subsequence?

7. Illustrate the randomized algorithm. Differentiate the Las Vegas and Monte-Carlo Algorithm with example.

PART - C

(Descriptive/Analytical/Problem Solving/Design question)

Attempt any Four questions $(4 \times 15 = 60)$

1. Write the algorithm of Merge Sort. Implement Merge Sort on the following data using divide and conquer technique. Also show tree of Recursive calls. Write the time and space complexity of merge sort.

   32,14, 15, 27,31,7,23,26

5E1355 (2)

2. What is the use of matrix chain multiplication method? Find the optimal parenthesizing for given matrices. A1 =2x3 A2=3x4 A3=4x2 A4=2x5

3. Solve the Travelling and Salesman problem using branch and bound method for the given graph.
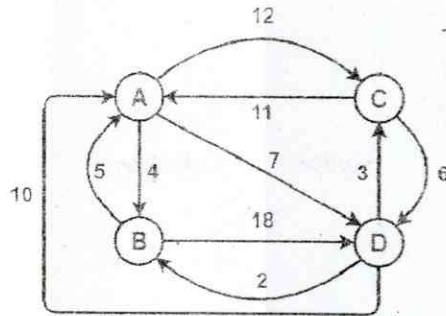
4. Discuss the terms Residual Network, residual capacity and Augmenting Path. Find the Maximum flow using Ford Fulkerson and the mm-cut for the given n/w.
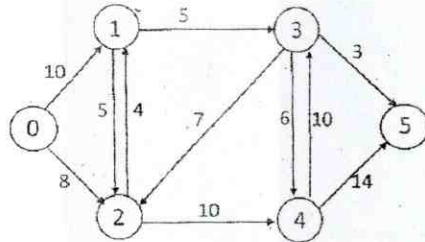
5. Define terms P. NP, NP-Complete and NP-Hard problem with suitable examples. Show the relation between them.

Roll No. _____

Total No. of Pages : 3

5E1755

B.Tech. V-Sem. (Main & Back) Examination, January/February - 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 form No.205)

PART - A
(Answer should be given up to 25 words only).
All questions are compulsory.   (10×2=20)

1. What is knapsack problem? Define two variants of Knapsack problem.

2. Difference between Dynamic Programming and Greedy Method.

3. What do you understand by Approximation Algorithm? Give two examples of Approximation Algorithm.

4. Give recurrence relation for Merge Sort and solve the reccurrence to find its time complexity.

5. What do you mean by Pattern Matching? Name any two pattern matching Algorithms.

6. State Cook's Theorem.

7. What is Minimum Spanning Tree? Name any two algorithm used to find Minimum Spanning Tree.

8. Define Time complexity with its Notation

9. Order the following time complexities in increasing order

    n, 2^n, $\log_2^n$, 1, 3^n, $n\log_2^n$, n^3

10. Define lower Bound Theory.

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PART - B
(Analytical/Problem solving questions)
Attempt any Five questions. $(5 \times 4 = 20)$

1. Solve the following recurrence relation and find complexity using Master's method.

   a) $T(n) = 4T(\sqrt{n}) + \lg^5 n$ {$\lg$ means $\log_2$}

   b) $T(n) = T\left(\dfrac{9n}{10}\right) + n$

2. $A = <a\,c\,b\,a\,e\,d>$, $B = <a\,b\,c\,a\,d\,f>$ If D is an LCS of A and B then find D using dynamic programming.

3. Explain Best case, Average case and worst case running time of Quick Sort.

4. Use Strassen's Matrix multiplication to compute matrix product.

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

5. What do you understand by Randomized Algorithm? explain Las Vegas and Monte Carlo Algorithm.

6. Why Huffman code is better than fixed length code? Find Huffman code corresponding to following character and its frequencies.

Character	a	b	c	d	e	f	g
Frequency	37	18	29	13	30	17	6

7. Explain use of prefix function in KMP string matching algorithm with an example

PART - C
### (Descriptive/Analytical/Problem Solving/Design question)

Attempt any Three questions. $(3 \times 10 = 30)$

1. Find the optimal paranthesization of matrix chain product whose sequence of dimension is (30, 1, 40, 10, 25).

2. What is backtracking? Write an algorithm for solving n-queen problem. trace it for N=6 using backtracking approach.

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3. Solve Travelling Salesman Problem(TSP) having following cost matrix using branch and bound method.
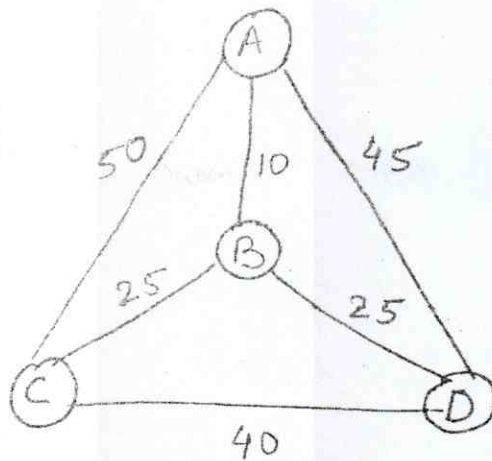
4. Explain multicommodity flow problem and solve the following flow network for finding maximum flow.
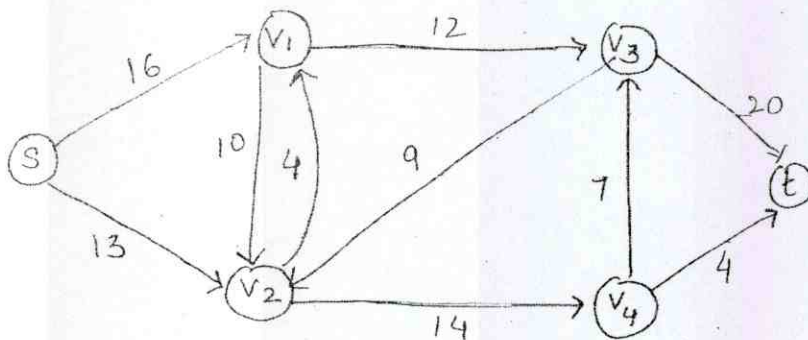
5. Define the terms P, NP, NP complete and NP-hard problems. Prove that 3-SAT is NP complete problem.

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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)

PART A

(Answer should be given up to 25 words only)

All questions are compulsory.   (10×2=20)

1.   Explain the role and importance of testing in Project Management?

2.   Explore estimation of effort and duration in Project Management?

3.   Describe boundary value testing?

4.   Define Data Flow Based testing?

5.   Discuss about Mutation testing?

6.   Explain error seeding in testing?

7.   What is UML and its example?

8.   What is test cases in UML?

9.   Explain class hierarchy in object oriented testing?

10. Differentiate between surface structure and deep structure.

PART - B

(Analytical/Problem solving questions)

Attempt any Five questions.   (5×4=20)

1. Explain the role and responsibilities of a Software Project Manager?

2. Describe all the important steps of Project planning?

3. Define McCabe's cyclomatic complexity in Black Block Testing?

4. Explain Decision table based testing.

5. Describe Regression testing?

6. Explain Scenario based test design?

7. Discuss about GUI Testing.

PART - C

(Descriptive/Analytical/Problem Solving/Design question)

Attempt any Three questions.   (3×10=30)

1. Write a short note on:
   a) Software Project Management competencies.
   b) Software size estimation.

2. Differentiate between white box and black box testing. Also explain various types of black box and White box testing.

3. Differentiate between

   i) Integration testing v/s Interaction testing

   ii) System testing v/s Performance testing

4. Explain the issues in object oriented testing? Explain various types of object oriented testing in details.

5. Write a short note on :

   i) Test case generation using UML Diagrams

   ii) Object oriented system testing

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B.Tech. V - Sem. (Back) Examination January/February - 2024
PCC/PEC Information Technology
5IT5-12 Software Testing and Project Management

Time : 2 Hours

Maximum Marks : 80
Min. Passing Marks : 28

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** 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).

PART - A

(Answer should be given up to 25 words only)

All questions are **compulsory**

(5×2=10)

1. What are the skills required for software project management? (2)

2. What are decision tables? (2)

3. What exactly do you mean when you say "Mutation Testing"? (2)

4. State the concept of scenario Testing? (2)

5. What is system Testing and why should you care? (2)

PART - B

(Analytical/Problem solving questions)

Attempt any **Four** questions

(4×10=40)

1. Describe the project team's organisation and explain the various stages of project planning. (10)

2. What is performance testing? Explain the tools and techniques for peformance testing with suitable examples. (10)

3. Explain the principle of polymorphim and inheritance in terms of object - oriented system Testing using appropriate examples. **(10)**

4. Explain the silent features of GUI testing. How is it different from class testing? **(10)**

5. Explain the concept of cyclomatic complexity. Explain basis path testing in detail with appropriate example? **(10)**

6. What is integration testing and how does it work? Explain decomposition based integration testing with example. **(10)**

PART - C

(Descriptive/Analytical/Problem Solving/Design Questions)

Attempt any **Two** questions **(2×15=30)**

1. Suppose that you are a manager of a software development project. Explain why the number of developers necessary for project should be not determined by dividing the effort estimate (in person month) by actual duration estimate (in months). **(15)**

2. Make a clear distinction between white box and black - box testing? Explain how the equivalence class partioning system works. **(15)**

3. Create an activity diagram for online bank management system project and design test cases based on the activity diagram. **(15)**

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B.Tech. V-Sem. (Back) Examination, January/February - 2024

PCC/PEC Computer Sc. & Engg.

5CS5-11 Wireless Communication

CS, IT

Time : 2 Hours

Maximum Marks : 80

Mm. Passing Marks: 28

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 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)

PART - A

(Answer should be given up to 25 words only)

ALL questions are Compulsory.   (5×2=10)

1. What is multipath and fading.

2. Explain multiple access techniques.

3. Write OFDM principle.

4. Write the different types of Diversity.

5. Write the difference between fading and nonfading channels.

PART - B

(Analytical/Problem solving questions)

Attempt any FOUR questions.   (4×10=40)

1. Explain the large scale path loss in wireless channels.

2. Explain the effect of fading and multipath propagation in mobile communication.

3. Differentiate between FDMA, TDMA, CDMA.

4. Explain cyclic prefix, windowing PAPR with respect to OFDM.

5. How to active Equalization in multipath mitigation techniques?

6. Explain MIMO System.

PART - C

(Descriptive/Analytical/Problem Solving/Design questions)

Attempt any TWO questions. (2×15=30)

1. Why do we need multiple access technique? With all relevant merits. Explain the working of CSMA/CD technique?

2. Explain the principle of offset QPSK, p/4- DQPSK, minimum shift keying, Gaussian minimum shift keying and also compare them.

3. Explain following in details.

   a) Adaptive equalization

   b) Zero forcing and LMS algorithms.

   c) Rake receiver.

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B. Tech. V-Sem. (Back) Examination, January/February - 2024

PCC/PEC Computer Sc. & Engg.

5CS5-12 Human -Computer Interaction

Time : 2 Hours

Maximum Marks : 80

Mm. Passing Marks: 28

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 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)

PART - A

(Answer should be given up to 25 words only)

All questions are compulsory.   (5×2=10)

1. List the fields invoived in HCI

2. Define Fitt's law.

3. List the seven stages of Donald Norman's model.

4. Define the significance of Empirical Research.

5. Define Class Model and State Model

PART - B

(Analytical/Problem solving questions)

Attempt any Four questions.   (4×10=40)

1. Discuss in detail the concept of usability elaborating its advantages.

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2. Create a GOMS description of the task of photocopying an article from a journal

3. Explain the use of Nielsen's ten heuristics with suitable example.

4. How are research questions formulated in Empirical research methods. What are the issues in Empirical Research.

5. Analyze the difference between dialog design using FSM, State Charts and Petri Nets.

6. Evaluate the relevance of CA in IS design Model.

PART - C

(Descriptive/Analytical/Problem Solving/Design question)

Attempt any Two questions.   (2×15=30)

1. Explain the GOMS family of models describing the design and evaluation of each.

2. Discuss the Experiment Design and Data Analysis using one-way ANOVA.

3. Write a note on:

   a) Model Human Processor

   b) Concur Task Tree

   c) Cognitive Walkthrough

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B.Tech. V-Sem. (Main & Back) Exam 2024
Artificial Intelligence and Data Science
5AID5-12 Probability & Statistics for Data Science (Elective-II)
5E1827
AID,CDS

Time: 3 Hours   Maximum Marks: 70

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 up to 25 words only)
All questions are compulsory   (5+5)

Q.1 Define Baye's Theorem.

Q.2 Write formula for regression coefficient.

Q.3 Define Null and Alternate Hypothesis.

Q.4 Find the mode of the given values. 9 8 5 9 12 8 7 6 5 9

Q.5 Perform one sample t-test for: n=5, sample mean=3.871 and s = 0.679.

Q.6 Find the mean values of X and Y for the two lines of regression as X+2Y = 5 and 2X+3Y =8.

Q.7 Find the value of third quartile, when first quartile is 104 and quartile deviation is 8.

Q.8 Write the fundamental axioms of probability.

Q.9 Define One Tail and Two Tail Test.

Q.10 Define kurtosis.   10 x 2 = 20

Part B (Analytical/Problem solving questions)
Attempt any Five questions

Q.1 In one sample of 8 observations, the sum of squares of deviations of the sample values from the sample mean was 84.4 and in the other sample of 10 observations it was 102.6. Test whether this difference is significant at 5% level of significance (given as 3.29).

Q.2 Explain that if one of the regression coefficient is greater than unity, the other must be less than unity.

Q.3 Calculate mode and median for a distribution Karl Pearson's coefficient of skewness is 0.64, standard deviation is 13 and mean is 59.2.

Q.4 Four cards are drawn from the pack of 52 cards. What is the chance that
    (i)   No two cards are of equal value.
    (ii)   Each card belongs to different suits.

Q.5 Define ANOVA. What is chi-square test? Explain the formula used for chi-square test.

Q.6 What are the different components of statistics? How is statistics used in everyday life? Explain with the suitable example.

Q.7 What is sampling distribution, and what are the uses of sampling distributions?

Part C (Descriptive/Analytical/Problem Solving/Design question)
Attempt any three questions   5 x 4 = 20

Q.1 a) "Correlation and Regression are two sides of the same coin". Justify?

    b) Differentiate between Binomial, Poisson and normal distribution.   (5+5)

Q.2 Three experiments determine the moisture content of sample of power, we are taking a sample from each of 4 consignments. The data is below:-

Experiment	Consignment			
	I	II	III	IV
A	9	10	9	10
B	12	11	9	11
C	11	12	10	12

Perform an analysis of variance on these data and discuss whether there is any significant difference between consignments of between experiments.

Test at 5% level which pairs of experiments differ significantly, if any given $F_{0.05}$=5.14 for degree of freedom(2,6), $F_{0.05}$=4.76 for degree of freedom(3,6), and $t_{0.025}$=2.45 for degree of freedom 6.

Q.3 a) Calculate the regression coefficients for the following data

X	1	2	3	4	5	6	7
Y	9	8	10	12	11	13	14

b) Find the means of X and Y variables and the coefficient of correlation between them from the following two regression equations: 2Y–X–50 = 0 &3Y–2X–10 = 0.   (5+5)

Q.4 a) In a bolt factory, three machines M□, M□, and M□ manufacture 2000, 2500, and 4000 bolts every day. Of their output 3%, 4%, and 2.5% are defective bolts. One of the bolts is drawn very randomly from a day's production and is found to be defective. What is the probability that it was produced by machine M□?

b) The mean of 25 observations is 36. If the mean of first 13 observations is 32 and that of last 13 observations is 39. Find thirteenth observation.   (6+4)

Q.5 a)What is hypothesis testing? Where we use t-test?

b) The water diet requires you to drink 2 cups of water every half an hour from when you get up until you go to bed but eat anything you want. Four adult volunteers agreed to test their diet. They are weighed prior to beginning the diet and 6 weeks after. Their weights in pounds are:

Persons	1	2	3	4
Weight Before	180	125	240	150
Weight after	170	130	215	152

Conduct a one sample t-test using the difference with the above hypothesis.(t tabulated = 1.026)   (4+6)

3 x 10= 30

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B.Tech. V-Sem. (Main) Examination, January/February - 2024
Computer Sc. and Engg. (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 form No.205

PART - A

(Answer should be given up to 25 words only).

All questions are compulsory.   (10×2=20)

1. What is Scope and objective of Wirelsss Communication.

2. Explain Doppler shift?

3. What are requirements of a MIMO system?

4. Explain Cyclic Prefix?

5. Explain Principles of offset QPSK?

6. Explain Link budget Design.

7. Define Cellular concept.

8. Explain linear Equalization?

9. Define Duplening

10. What is fading in Wireless channels?

PART - B
(Analytical/Problem solving questions)
Attempt any Five questions.   (5×4=20)

1. Describe zero forcing and LMS Algorithm?

2. Explain in detail hand off and situation for triggering hand off?

3. Explain Doppler spread and Coherence time in detail.

4. Explain Beam forming in multiple antenna technique?

5. Describe fast fading and slow fading?

6. Explain OFDM and its working.

7. Explain Spatial Multiplexing in detail?

PART - C
(Descriptive/Analytical/Problem Solving/Design question)
Attempt any Three questions.   (3×10=30)

1. Describe Gaussian Minimum shift Keying? Differentiate between QPSK and MSK?

2. Describe the following in detail
   a) Adaptive Equalization
   b) Micro-Macro Diversity
   c) Rake Receiver.

3. Differentiate between FDMA, CDMA and TDMA. Also Explain their working.

4. Describe Large Scale Path loss. Also define path loss models.

5. Explain Error Probability in fading channels with diversity reception.

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B.Tech. V-Sem. (Main) Examination, January/February - 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 form No.205)

PART A

(Answer should be given up to 25 words only)

All questions are compulsory.   (10×2=20)

1. What is user Interface?

2. What are the various difficulties with poor design?

3. What are the three components of HCI?

4. Name the different models of interaction?

5. How the Fitt's Law can be used to predict performance?

6. How to measure difficulty of a target acquisition task?

7. What are the two major steps in norman's model of interaction?

8. What is the goal of object modeling in development of any system?

9. What is ANOVA principle?

10. Define CTT?

PART - B
(Analytical/Problem solving questions)

Attempt any FIVE questions.

(5×4=20)

1. What do you mean by diagrammatic notation and dialog semantics? explain in brief.

2. Discuss the chronological history of graphical user interface.

3. Discuss in brief the importance of the user interface design.

4. What are the two major techniques that are applied for hierarchical task analysis? Explain.

5. Discuss in brief the utility of models in HCI.

6. Discuss the key differences between KLM and CMN GOMS.

7. Explain the Hick Hyman Law . Describe the predicitive formulation of the law.

PART - C
(Descriptive/Analytical/Problem Solving/Design question)

Attempt any Three questions.

(3×10=30)

1. What is OOM? Explain the types of model with their purpose in detail.

2. What principles can be used from Jakob Nielser's ten usability heuristics?

3. Explain GUI design and Aesthetics in detail.

4. What are the shneiderman's eight golden rules? Explain in detail

5. Explain

   1) Cognitive Walkthrough.
   2) Concur Task Tree.

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