5E5106

Roll No. _____ Total No of Pages: 2

5E5106

B. Tech. V - Sem. (Back) Exam., Feb.-March - 2021

Computer Science & Engineering

5CS6.1A Advanced Data Structure

CS, IT

Time: 2 Hours **Maximum Marks: 48**

Min. Passing Marks: 15

Instructions to Candidates:

*Attempt **three questions,** selecting **one question each** from any three **unit.** All questions carry **equal** marks. 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

UNIT- I

Q.1 Describe 2-3 trees with the help of an appropriate example. Explain various operations performed on the 2-3 tree. [16]

OR

Q.1 (a) Explain interval tree with the help of suitable example. [8]

(b) Explain dynamic order statistics with the help of suitable example. [8]

UNIT- II

Q.2 (a) Write an algorithm to explain insertion and union operation binomial heap with the help of suitable example. [8]

(b) Define Amortization Analysis with the help of suitable example. [8]

OR

Q.2 (a) Explain 2-3-4 trees with the help of an example. Explain the function of insertion and deletion with an example. [12]

(b) Write a short note on Fibonacci heap. [4]

UNIT- III

Q.3 (a) Write and explain Ford – Fulkerson max-flow Algorithm. [8]

(b) Explain Algorithm for connectedness with the help of suitable example. [8]

OR

Q.3 Define the following (Any two)- [2×8=16]

(a) Isomorphic components

(b) Connected components & Articulation point

(c) Cut vertices

(d) Planar & Dual graph

UNIT- IV

Q.4 Write short notes on - [16]

(a) Bitonic sorter with example

(b) Zero – one principle

OR

Q.4 (a) Explain Priority Queue and Concatenable Queue in 2-3 tree in detail. [8]

(b) Explain operation on disjoint sets and its union, find problem. [8]

UNIT- V

Q.5 (a) Explain Modular Arithmetic with the help of suitable example. [8]

(b) State and Prove Chinese Remainder Theorem. [8]

OR

Q.5 (a) Explain the use of number theoretic notions in data structures. [8]

(b) What is Division theorem? Explain. [8]

5E1399

Roll No. _____ Total No of Pages: 2

5E1399

B. Tech. V - Sem. (Main / Back) Exam., Feb.-March - 2021

Information Technology

5IT3 –01 Microprocessor and Interfaces

Time: 2 Hours **Maximum Marks: 65**

Min. Passing Marks: 23

Instructions to Candidates:

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

Schematic diagrams must be shown wherever necessary. Any data you feel missing may 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

(Answer should be given up to 25 words only) **[5×2=10]**

All questions are compulsory

Q.1 Define microcontroller.

Q.2 What is the function of S_0 & S_1 pins?

Q.3 What is meant by assembly language?

Q.4 Write 2 branch instructions.

Q.5 What are Vectored interrupts?

PART – B

(Analytical/Problem solving questions) **[4×10=40]**

Attempt any four questions

Q.1 Explain system bus. Give individual description of component buses.

Q.2 Explain the relationship in T – state, Machine cycle and Instruction cycle with a suitable example.

Q.3 Write a code to collect even readings at C200 memory location onwards. The input data is stored at memory location C300 onwards. It is 10 readings of 1 byte each in input data.

Q.4 Write a code to add 2 sixteen bit data.

Q.5 Describe the Non-vectored interrupts in 8085. How are they different from vectored interrupts?

Q.6 What are the different modes in 8259A? Explain each one.

PART – C

(Descriptive/Analytical/Problem Solving/Design Questions) **[1×15=15]**

Attempt any one questions

Q.1 What do you understand by addressing mode? Explain all addressing modes available in microprocessor 8085.

Q.2 Write a program in assembly language to sort a list 20 data stored at location C300 onwards.

Q.3 Explain 8255A characteristic with a neat sketch of 8255A formats.

5E1351

Roll No. _____ Total No of Pages: 2

5E1351

B. Tech. V - Sem. (Main / Back) Exam., Feb.-March - 2021

Computer Science & Engineering

5CS3 – 01 Information Theory & Coding

Time: 2 Hours **Maximum Marks: 65**

Min. Passing Marks: 23

Instructions to Candidates:

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

Schematic diagrams must be shown wherever necessary. Any data you feel missing may 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

(Answer should be given up to 25 words only) **[5×2=10]**

All questions are compulsory

Q.1 State the channel coding theorem for a discrete memoryless channel.

Q.2 What is prefix coding?

Q.3 Explain channel capacity theorem.

Q.4 Define efficiency of the source encoder.

Q.5 Define mutual information.

PART – B

(Analytical/Problem solving questions) **[4×10=40]**

Attempt any four questions

Q.1 An alphabet set contains 3 letters A, B, C transmitted with probabilities of 1/3, 1/4, 1/4. Find entropy.

Q.2 What is the difference between block codes and convolutional codes?

Q.3 Show that for a discrete binding channel –

$H(x, y) = H(x/y) + H(y)$

$H(x, y) = H(x) + H(y)$

Q.4 Write short note on Noise free channel and Shannon's theorem.

Q.5 Consider a source $S = [S_1, S_2]$ with probabilities 3/4 and 1/4 respectively. Obtain Shannon – Fane code for source S its 2^{nd} and 3^{rd} extensions. Calculate efficiency for each case.

Q.6 What is coding efficiency? Show that coding efficiency is maximum when P(0) = P(1).

PART – C

(Descriptive/Analytical/Problem Solving/Design Questions) **[1×15=15]**

Attempt any one questions

Q.1 The intersection of cyclic codes is cyclic. Find the generator polynomial of $C_1 \cap C_2$.

Q.2 Explain the need of error correcting codes. How its Encoding/Decoding take place? Explain with help of parity example.

Q.3 Write short notes (any two) –

(a) Hamming code and their applications

(b) Fading channel

(c) Huffman coding

(d) Advantages and disadvantages of convolutional codes

5E5101

Roll No. _____ Total No of Pages: 2

5E5101

B. Tech. V - Sem. (Back) Exam., Feb.-March - 2021
Computer Science & Engineering
5CS1A Computer Architecture
CS, IT

Time: 2 Hours **Maximum Marks: 48**
Min. Passing Marks: 15

Instructions to Candidates:

*Attempt **three questions,** selecting **one question each** from any three **unit.** All questions carry **equal** marks. 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

UNIT- I

Q.1 (a) What is a Von-Neumann Architecture? Explain how a program is executed in this architecture. [8]

(b) Explain Flynn's classification in brief. [8]

OR

Q.1 (a) Describe Register Transfer Language Operation. Illustrate with example. [8]

(b) Explain various types of addressing modes with examples of each. [8]

UNIT- II

Q.2 (a) What is Stack Organization? Describe all functionality regarding to stack. [8]

(b) Discuss the basic difference between a branch instruction, a call subroutine instruction and a program interrupt. [8]

OR

Q.2 (a) Explain the arithmetic and instruction pipeline with suitable example. How can these be differentiated? [8]

(b) Write short notes on CISC and RISC. [8]

UNIT- III

Q.3 (a) What do you understand by array multiplier? Explain with a suitable example. [8]

(b) Discuss Carry Look Ahead Adder in brief. [8]

OR

Q.3 (a) Explain Booth's algorithm for multiplication of signed-2's complement numbers. [8]

(b) Describe the fixed and floating point number system. [8]

UNIT- IV

Q.4 (a) Explain memory hierarchy in computer system. [8]

(b) What is content addressable memory? Explain associative memory in detail. [8]

OR

Q.4 (a) Explain difference between Paging and Segmentation. [8]

(b) What is the concept of Cache memory? Explain the working of DMA. [8]

UNIT- V

Q.5 (a) What is Priority Interrupt? Explain Daisy Chain interrupt. [8]

(b) Explain DMA controller with its block diagram. [8]

OR

Q.5 (a) Explain CPU-IOP communication with a diagram. [8]

(b) Describe Input-Output Interface in detail. [8]

5E1352

Roll No. _____ Total No of Pages: 2

5E1352

B. Tech. V - Sem. (Main / Back) Exam., Feb.-March - 2021

Computer Science & Engineering

5CS4 – 02 Compiler Design

Common for CS, IT

Time: 2 Hours **Maximum Marks: 82**

Min. Passing Marks: 29

Instructions to Candidates:

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

Schematic diagrams must be shown wherever necessary. Any data you feel missing may 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

(Answer should be given up to 25 words only) **[10×2=20]**

All questions are compulsory

Q.1 Define parser.

Q.2 Mention the basic issues in parsing.

Q.3 Why lexical & syntax analyzers are separated out?

Q.4 Define contex free grammar.

Q.5 Define the terms language translator & compiler.

Q.6 What is a flow graph? Explain with an example.

Q.7 List out different object code forms.

Q.8 Differentiate Abstract Syntax Tree & DAG representation of intermediate code.

Q.9 Define left recursion. Is the following grammar left recursive? $E \rightarrow E + E / E * E / a/b$

Q.10 What is hashing? Explain it.

PART – B

(Analytical/Problem solving questions) **[4×8=32]**

Attempt any four questions

Q.1 Define an LL (1) grammar. Is the following grammar LL (1)

G : S → i E t S /i E t Ses/ a ; E → b.

Also write the rules for computing FIRST() & FOLLOW().

Q.2 What is an LALR (1) grammar? Construct LALR parsing table for the following grammar.

S → cC, C → cC, C → c/d.

Q.3 Explain the usage of YACC parser generator in construction of a parser.

Q.4 Why do we need syntax trees when constructing compliers?

Q.5 Explain the various complier phases in brief with suitable example.

Q.6 What is the process & importance of intermediate code generation?

Q.7 Explain the various strategies of symbol table creation & organization?

PART – C

(Descriptive/Analytical/Problem Solving/Design Questions) **[2×15=30]**

Attempt any two questions

Q.1 Write short notes on -

(a) Nesting dept & access links

(b) Data structures used is symbolic table

(c) Static versus dynamic storage allocation

Q.2 What is LEX? Discuss the usage of LEX in Lexical Analyzer generation?

Q.3 Generate the three address code for the following code fragment -

```
while (a > b)
{
  if (c > d)
  x = y + z ;
  else
  x = y – z ;
}
```

Q.4 Explain the different storage allocation strategies.

Q.5 Explain the following terms –

(i) Register descriptor

(ii) Address descriptor

(iii) Instruction costs

5E1353

Roll No. _____ Total No of Pages: 3

5E1353

B. Tech. V - Sem. (Main / Back) Exam., Feb.-March - 2021
Computer Science & Engineering
5CS4 – 03 Operating System
Common for CS, IT

Time: 2 Hours **Maximum Marks: 82**

Min. Passing Marks: 29

Instructions to Candidates:

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

Schematic diagrams must be shown wherever necessary. Any data you feel missing may 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

(Answer should be given up to 25 words only) **[10×2=20]**

All questions are compulsory

Q.1 What is an operating system?

Q.2 What is the kernel?

Q.3 What are batch system?

Q.4 What is a process?

Q.5 What are schedulers?

Q.6 Define the term virtual memory.

Q.7 Explain various goals of protection.

Q.8 Explain the term file system in brief.

Q.9 What is thrashing?

Q.10 What is multi user operating system?

PART – B

(Analytical/Problem solving questions) **[4×8=32]**

Attempt any four questions

Q.1 Differentiate between UNIX and Windows based operating systems.

Q.2 What is thread management in operating system? Explain the applications of thread.

Q.3 What is the importance of paying and segmentation in memory management? Explain with diagram.

Q.4 Define concept of file operations. Give the process of directory structures and file management.

Q.5 Explain in detail the following CPU scheduling algorithms-

(a) Priority Scheduling

(b) Round Robin

Q.6 What is process control block? Explain with diagram and its contents.

Q.7 Explain four conditions which are necessary for a deadlock to occur.

PART – C

(Descriptive/Analytical/Problem Solving/Design Questions) **[2×15=30]**

Attempt any two questions

Q.1 Compute average turnaround time and average waiting time for the following scheduling methods –

(a) FIFO

(b) SJF

(c) Round Robin

Process	Burst time	Arrival time
P_1	4	2
P_2	2	1
P_3	5	1
P_4	3	3

Q.2 Suppose a disk drive has 200 cylinders, numbers numbered from 0 to 199. The drive is initially at cylinder 53. The queue with requests from I/O to blocks on cylinders-

98, 183, 37, 122, 14, 124, 65, 67

(a) FCFS SCAN scheduling

(b) C-SCAN scheduling

Q.3 Explain the following –

(a) Demand paging

(b) Segmentation with paging scheme

(c) Thrashing

(d) Global versus local allocation

Q.4 Under what circumstances do page fault occurs? Describe the actions taken by the operating system when a page fault occurs.

Q.5 What is Dining Philosophers Problem? Explain the solution of this problem by using a suitable example.

5E5102

Roll No. _____ Total No. of Pages: 2

5E5102

B. Tech. V - Sem. (Back) Exam., Feb.-March - 2021
Computer Science & Engineering
5CS2A Digital Logic Design

Time: 2 Hours **Maximum Marks: 48**
Min. Passing Marks: 15

Instructions to Candidates:

*Attempt **three questions,** selecting **one question each** from any three **unit.** All questions carry **equal** marks. 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

UNIT- I

Q.1 (a) What is modelling concept of VHDL? Explain. [8]

(b) Describe the various types of operators used in VHDL modelling. [8]

OR

Q.1 Describe Look Ahead Carry Adder with its VHDL code. Also draw its simulation waveform. [16]

UNIT- II

Q.2 (a) Describe the resolved signals with suitable examples. [8]

(b) Compare the component declaration and component instantiation. [8]

OR

Q.2 (a) Explain the concurrent statements with the suitable examples. [8]

(b) Write the VHDL code for a four-bit comparator. [8]

UNIT- III

Q.3 (a) What is the difference between Moore and Mealy state machines? [8]

(b) Explain design of a sequence detector with timing diagram. [8]

OR

Q.3 Write short notes on -

(a) FPGA [4]

(b) PLD [4]

(c) PGA [4]

(d) PAL [4]

UNIT- IV

Q.4 (a) Explain the hazards in combination circuit. [10]

(b) Find a circuit that has no static hazards and implement the following Boolean Expression -

$F(W, X, Y, Z) = \Sigma (0, 2, 6, 7, 8, 10, 12)$ [6]

OR

Q.4 (a) Explain the stable and unstable states and explain the reduction of the basic state table. [8]

(b) Define event driven circuits and write steps for designing these circuits. [8]

UNIT- V

Q.5 (a) Explain the FPGA Architecture and also write its advantages. [8]

(b) What do you mean by logic synthesis? [8]

OR

Q.5 Write short notes on -

(a) The array and interconnect [4]

(b) SRAM –based devices [4]

(c) Flash RAM [4]

(d) Hybrid FLASH – SRAM devices [4]

5E1354

Roll No. _____ Total No of Pages: 2

5E1354

B. Tech. V - Sem. (Main / Back) Exam., Feb.-March - 2021
Computer Science & Engineering
5CS4 – 04 Computer Graphics & Multimedia
Common for CS, IT

Time: 2 Hours **Maximum Marks: 82**
Min. Passing Marks: 29

Instructions to Candidates:

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

Schematic diagrams must be shown wherever necessary. Any data you feel missing may 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

(Answer should be given up to 25 words only) **[10×2=20]**

All questions are compulsory

Q.1 What is specular reflection?

Q.2 Define Gray Scale.

Q.3 What is Transformations Routine?

Q.4 Define Resolution.

Q.5 What does text clipping mean? Explain.

Q.6 What is morphing?

Q.7 What is Defuse reflection?

Q.8 Define surface rendering.

Q.9 Define Interlacing.

Q.10 What is Animation?

PART – B

(Analytical/Problem solving questions) **[4×8=32]**

Attempt any four questions

Q.1 Write short note on: Anti-Aliasing technique?

Q.2 Explain Cohen – Sutherland line clipping Algorithm with region code in detail.

Q.3 Differentiate between boundary fill and flood fill techniques.

Q.4 Write a routine to convert RGB color model to HSV color model.

Q.5 Discuss properties of Bezier curves.

Q.6 Describe Phong Shading in detail.

Q.7 What is Ray Tracing? Explain basic ray tracing algorithm.

PART – C

(Descriptive/Analytical/Problem Solving/Design Questions) **[2×15=30]**

Attempt any two questions

Q.1 In a Raster System with resolution 2560 × 2048. How many pixels could be accessed per second by a display controller that refresh that Screen at a rate of 60 frames per second. Also calculate access time per pixel in the system.

Q.2 During area filling one start with a point inside the program region and point it outward towards boundary. Which fill algorithm is this? Explain it showing how 8 - connected approach fills complex figures.

Q.3 What is homogeneous coordinate? Discuss the composite transformation matrices for two successive translation and scaling.

Q.4 What is the use of compression technique in computer graphics? Explain JPEG and MPEG in detail.

Q.5 Explain Halftone patterns and Dithering techniques in detail.

5E5103

Roll No. _____ Total No of Pages: 2

5E5103

B. Tech. V - Sem. (Back) Exam., Feb.-March - 2021
Computer Science & Engineering
5CS3A Telecommunication Fundamentals
CS, IT

Time: 2 Hours **Maximum Marks: 48**
Min. Passing Marks: 15

Instructions to Candidates:

*Attempt **three questions,** selecting **one question each** from any three **unit**. All questions carry **equal** marks. 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

UNIT- I

Q.1 (a) Explain the stop and wait ARQ protocol and also discuss the Piggy backing Method. [8]

(b) Explain the layered architecture of OSI Model. What is the significance of OSI model? What is the significance of XDR (External Data Representation) at presentation layer? [8]

OR

Q.1 (a) What do you understand by Synchronization Problem? How to solve it? Explain with suitable example. [8]

(b) Draw the following reference Models used in computer communication – [8]

(i) OSI / ISO Model

(ii) TCP / IP Model

UNIT- II

Q.2 (a) Show that slotted ALOHA has a Maximum throughput of twice the pure ALOHA maximum throughput. [8]

(b) What is sliding window protocol? What should be the size of window? Explain. [8]

OR

Q.2 (a) Explain the frame structure of point to point protocol. What is the difference between HDLC and PPP? [8]

(b) A pure ALOHA network transmits 200 bit frames on a shared channel of 200 kbps. What is the throughput if the system (all stations together) produces 1000 frames per second? [8]

UNIT- III

Q.3 (a) What is Hidden node and Exposed node problem? Explain with example. [8]

(b) Explain virtual LANs. How can we configure VLAN in switch? [8]

OR

Q.3 (a) How does 802.11 Architecture work? [8]

(b) What is looping problem in switching? Explain Spanning and Spanning tree protocol in detail. [8]

UNIT- IV

Q.4 (a) Explain ADSL, DS1, DS3 Carriers. [10]

(b) Explain TDMA frame structure. [6]

OR

Q.4 (a) Explain time division and space division multiplexing. [8]

(b) Compare TDM and FDM. [8]

UNIT- V

Q.5 (a) What is the difference between Multiplexing and Spread Spectrum? Explain FHSS. [8]

(b) Explain CDMA with the help of an example. [8]

OR

Q.5 Write short notes on the following –

(a) Walsh codes [4]

(b) Hand off [4]

(c) M – sequence [4]

(d) IMT – 2000 [4]

5E1355

Roll No. _____ Total No of Pages: 3

5E1355

B. Tech. V - Sem. (Main / Back) Exam., Feb.-March - 2021
Computer Science & Engineering
5CS4 – 05 Analysis of Algorithms
Common for CS, IT

Time: 2 Hours **Maximum Marks: 82**

Min. Passing Marks: 29

Instructions to Candidates:

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

Schematic diagrams must be shown wherever necessary. Any data you feel missing may 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

(Answer should be given up to 25 words only) **[10×2=20]**

All questions are compulsory

Q.1 What is Master Method?

Q.2 What is the difference between Dynamic Programming and Divide and Conquer Mechanism?

Q.3 What do you mean by Approximation Algorithms? Give two examples.

Q.4 What do you mean by Lower Bounds?

Q.5 What is Greedy Method?

Q.6 State Cook's theorem.

Q.7 Write down the algorithm of Binary Search.

Q.8 Give a recurrence for merger sort algorithm and solve it.

Q.9 What are the constraints required for a Backtracking method?

Q.10 Order the following time complexities in increasing order.

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

PART – B

(Analytical/Problem solving questions) **[4×8=32]**

Attempt any four questions

Q.1 X = < a, a, b, a, b >, Y = < b, a, b, b >. If Z is an LCS of X and Y, then find Z using dynamic programming.

Q.2 What is the use of prefix function in KMP string matching algorithm? Explain with example.

Q.3 Explain vertex and set cover problem.

Q.4 Write short notes on the following:-

(a) Quadratic assignment problem

(b) Boyer-Moore Algorithm

Q.5 Explain the Las Vegas and Monte Carlo Algorithm with example.

Q.6 Solve the following recurrence relations and find their complexities using master method-

(a) $T(n) = 2T(\sqrt{n}) + \log_2 n$

(b) $T(n) = 4T\left(\frac{n}{2}\right) + n^2$

Q.7 Define the terms P, NP, NP complete and NP-Hard problems.

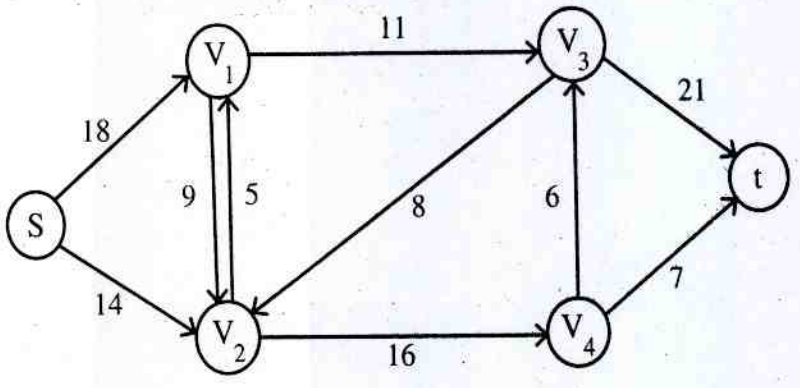
PART – C

(Descriptive/Analytical/Problem Solving/Design Questions) **[2×15=30]**

Attempt any two questions

Q.1 Find the optimal parenthesization of matrix-chain product whose sequence of dimensions is (4, 10, 6, 40, 5).

Q.2 What do you mean by Multi-commodity flow in the network? Find the max flow path by Ford-Fulkerson method for given network.



Q.3 Given the text -

T = < 2, 3, 5, 9, 0, 2, 3, 1, 4, 1, 5, 2, 6, 7, 3, 9, 9, 2, 1 >

P = < 3, 1, 4, 1, 5 >

And modulo q = 13, m = 5

Choose the pattern matching with average case complexity and explain the search process. Justify the answer for choosing such algorithm.

Q.4 Solve the TSP problem having the following cost matrix using branch and bound.

	A	B	C	D
A	X	15	11	7
B	14	X	13	20
C	6	9	X	4
D	8	12	22	X

Q.5 Show all the steps of Strassen's Matrix Multiplication algorithm to multiply the following matrices -

$$X = \begin{bmatrix} 3 & 2 \\ 4 & 8 \end{bmatrix} \text{ and } Y = \begin{bmatrix} 4 & 5 \\ 9 & 6 \end{bmatrix}$$

5E5104

Roll No. _____ Total No of Pages: 3

5E5104

B. Tech. V - Sem. (Back) Exam., Feb.-March - 2021

Computer Science & Engineering

5CS4A Database Management Systems

Common for CS, IT

Time: 2 Hours **Maximum Marks: 48**

Min. Passing Marks: 15

Instructions to Candidates:

*Attempt **three questions,** selecting **one question each** from any three **unit.** All questions carry **equal** marks. 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

UNIT- I

Q.1 (a) Discuss DDL and DML with example. [6]

(b) What are the advantages of DBMS over file system? Explain in detail. [10]

OR

Q.1 (a) Explain the structure of DBMS with a neat and labelled diagram. [10]

(b) What is data abstraction? Explain different levels of data abstraction with diagram. [6]

UNIT- II

Q.2 (a) Explain E-R model and different notations used in E-R diagram. [10]

(b) What is aggregation? Explain with a suitable example. [6]

OR

Q.2 (a) Construct E-R diagram for library. [10]

(b) What is cardinality ratio? Discuss cardinality ratio for binary relationship. [6]

UNIT- III

Q.3 (a) Explain relational algebra operations: selection, projection and rename operation with example. [8]

(b) Why are outer join operations required? Explain different types of outer join operations with example. [8]

OR

Q.3 (a) Explain relational algebra division operations with example. [6]

(b) Consider the following schema - [2×5=10]

Sailor (sid, sname, rating, age)

Reserve (sid, bid, day)

Boat (bid, bname, color)

(i) Write relational algebra query to find the names of sailors who have reserved both red and green color boats.

(ii) Write relational algebra query to find the color of boats reserved by lubber.

UNIT- IV

Q.4 Consider the following schema :

Sailor (sid, sname, rating, age)

Reserve (sid, bid, day)

Boat (bid, bname, color)

(a) Write SQL query to find all sid's of Sailors who have a rating of 10 or have reserved boat 104. [5]

(b) Write SQL query to find the names of Sailors who have reserved both red and green color boats. [5]

(c) Write SQL syntax for creating a table, displaying its structure and inserting values in table. [6]

OR

Q.4 Consider the above schema -

(a) Write SQL query to find the details of Sailors whose name.second.character is '0' and has at least five characters. [5]

(b) Write SQL query to find the names of Sailors who have reserved red or green color boats. [5]

(c) What is active data base? Discuss triggers with their advantages. [6]

UNIT- V

Q.5 (a) What is functional dependency? Explain types of functional dependencies with suitable examples. [8]

(b) Let $F = \{A \rightarrow B, BC \rightarrow D\}$ for a given relation R. Prove or disprove the following FD's using Armstrong axioms. [8]

(i) $AC \rightarrow D$

(ii) $B \rightarrow D$

(iii) $AD \rightarrow B$

OR

Q.5 (a) What is Normalization? Explain 3 NF and BCNF with suitable example. [8]

(b) Let us suppose R = (A, B, C, G, H, I) and set of FD's, $F = \{A \rightarrow B, A \rightarrow C, CG \rightarrow H, CG \rightarrow I, B \rightarrow H\}$, find closure of F. [8]

5E1356

Roll No. _____ Total No of Pages: 2

5E1356

B. Tech. V - Sem. (Main / Back) Exam., Feb.-March - 2021
Computer Science & Engineering
5CS5 – 11 Wireless Communication
Common for CS, IT

Time: 2 Hours **Maximum Marks: 65**

Min. Passing Marks: 23

Instructions to Candidates:

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

Schematic diagrams must be shown wherever necessary. Any data you feel missing may 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

(Answer should be given up to 25 words only) **[5×2=10]**

All questions are compulsory

Q.1 What is wireless communication concept?

Q.2 What is the significance of propagation model?

Q.3 What are the different types of transmission impairment?

Q.4 What is TDMA?

Q.5 Why need MIMO system?

PART – B

(Analytical/Problem solving questions) **[4×10=40]**

Attempt any four questions

Q.1 Explain in detail a handoff scenario at cell boundary.

Q.2 With a diagram explain the performance of RAKE receiver.

Q.3 With the help of a neat diagram explain about frequency reuse and the advantages of it.

Q.4 Briefly explain the structure of wireless communication Link.

Q.5 Discuss about the operation of spatial multiplexing systems.

Q.6 Explain in detail how inherent delay in a multiuser system is overcome by beam forming.

PART – C

(Descriptive/Analytical/Problem Solving/Design Questions) **[1×15=15]**

Attempt any one questions

Q.1 Why is beam forming important for wireless systems? With illustration explain transmit beam forming, receive beam forming and opportunistic beam forming.

Q.2 What is the nonlinear equalization? Explain the three nonlinear methods of Equalization with suitable diagrams.

Q.3 Explain free space propagation model and explain the parameters of mobile multipath channel.

5E1357

Roll No. _____ Total No of Pages: 2

5E1357

B. Tech. V - Sem. (Main / Back) Exam., Feb.-March - 2021

Computer Science & Engineering

5CS5 – 12 Human-Computer Interaction

Time: 2 Hours **Maximum Marks: 65**

Min. Passing Marks: 23

Instructions to Candidates:

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

Schematic diagrams must be shown wherever necessary. Any data you feel missing may 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

(Answer should be given up to 25 words only) **[5×2=10]**

All questions are compulsory

Q.1 What is scope & outcome of Human Computer Interaction?

Q.2 Explain research question formulation Techniques.

Q.3 Explain Hick – Hyman's law with example.

Q.4 How you can collect requirements from contextual inquiry?

Q.5 What is HTA? Draw different notations is HTA.

PART – B

(Analytical/Problem solving questions) **[4×10=40]**

Attempt any four questions

Q.1 What is usability? What do you mean by 5 E's in usability? Explain Eight Golden Rules.

Q.2 Explain Gulf of Model. What do you mean by Gulf of Evaluation and Gulf of Execution?

Q.3 How can you state HCI is important for designing a software? Explain Prototyping Techniques.

Q.4 What do you mean by Concur Task Tree (CTT)?

Q.5 Explain OOP and OOM of user Interface design?

Q.6 What do you mean by GOMS? Which models one present in GOMS family? Explain them.

PART – C

(Descriptive/Analytical/Problem Solving/Design Questions) **[1×15=15]**

Attempt any one questions

Q.1 How could you conduct a Heuristics Analysis for GOOGLE MAPS in Google Earth? You should consider evaluator as Expert user. Assume parameters if any required.

Q.2 What are different methods for analysis of Empirical data?

Suppose you have designed a new text entry technique for phones. Multi – Tap & T9 techniques are already present but you think your new method is better than other techniques. You decide to under-take some empirical research to evaluate your invention and to compare it with the current techniques? [Assume F(2, 9) = 4.26]

Participants	New Method	Multi – tap	T9
1	3	5	7
2	2	2	4
3	1	4	5
4	1	2	3

Q.3 How GUI is used to design system interactive? What are requirements for GUI? Explain Aesthetics for Graphics.

5E1400

Roll No. _____ Total No of Pages: 2

5E1400

B. Tech. V - Sem. (Main / Back) Exam., Feb.-March - 2021

Information Technology

5IT5 –12 Software Testing and Project Management

Time: 2 Hours **Maximum Marks: 65**

Min. Passing Marks: 23

Instructions to Candidates:

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

Schematic diagrams must be shown wherever necessary. Any data you feel missing may 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

(Answer should be given up to 25 words only) **[5×2=10]**

All questions are compulsory

Q.1 What do you mean by Software Testing? [2]

Q.2 What is Software Project Management? [2]

Q.3 Define Boundary Value Testing. [2]

Q.4 State the concept of System Testing. [2]

Q.5 What do you mean by Class Hierarchy? [2]

PART – B

(Analytical/Problem solving questions) **[4×10=40]**

Attempt any four questions

Q.1 Explain the Software Process Models. Describe project planning & organization of project team. [10]

Q.2 Explain Decision Table Based Testing & Data-Flow Based Testing with suitable example. [10]

Q.3 Describe the Integration Testing & Regression Testing. [10]

Q.4 Explain the Scenario Based Test Design with suitable example. [10]

Q.5 Explain Test Case Generation using UML diagrams. [10]

Q.6 What is UML? How it is useful in Object Oriented Modelling? [10]

PART – C

(Descriptive/Analytical/Problem Solving/Design Questions) **[1×15=15]**

Attempt any one questions

Q.1 Explain the terms project, program, portfolio and management related to the project management. [15]

Q.2 Explain the testing surface structure and deep structure in Object Oriented Testing. [15]

Q.3 Explain the following in context of UML – [15]

(a) Use Case Diagram

(b) Sequence Diagram

(c) GUI Testing-

5E5105

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5E5105

B. Tech. V - Sem. (Back) Exam., Feb.-March - 2021

Computer Science & Engineering

5CS5A Operating Systems

CS, IT

Time: 2 Hours **Maximum Marks: 48**

Min. Passing Marks: 15

Instructions to Candidates:

*Attempt **three questions,** selecting **one question each** from any three **unit.** All questions carry **equal** marks. 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

UNIT- I

Q.1 (a) What are the different services provided by the operating system? [8]

(b) Is there any difference between kernel level and user level threads? [8]

OR

Q.1 (a) What are the two models of inter-process communication? What are the strengths & weaknesses of the two approaches? [8]

(b) What are the advantages of peer to peer system over client server system? [8]

UNIT- II

Q.2 (a) In connection with inter process communication, explain the following - [8]

(i) Race condition

(ii) Critical condition

(iii) Sleep & wakeup

(iv) Sleeping Barber's problem

(b) What are the different algorithm solutions of critical section problem? Explain. [8]

OR

Q.2 Consider the following set of processes, with the length of the CPU burst given in milliseconds - [16]

Process	Priority	Burst time
P_1	2	2
P_2	1	1
P_3	4	8
P_4	2	4
P_5	3	5

The processes are assumed to have arrived in the order P_1, P_2, P_3, P_4, P_5 at all time 0.

Find –

(a) Draw four Gantt charts that illustrates the execution of these processes using the following scheduling algorithms-

(i) FCFS

(ii) SJF

(b) What is the turnaround time of each of the scheduling algorithm?

(i) FCFS

(ii) SJF

(c) What is the waiting time of each process for FCFS and SJF scheduling algorithms?

UNIT- III

Q.3 (a) Explain memory hierarchy in detail with the help of diagram. [8]

(b) Explain the difference between paging and segmentation. [8]

OR

Q.3 (a) Explain Banker's Algorithm for deadlock avoidance with an example. [8]

(b) What are the differences between internal and external fragmentation? [8]

UNIT- IV

Q.4 (a) What is Belady's Anomaly? In which algorithm does it occur? [8]

(b) Is there any difference between Pure Paging and Demand Paging? Explain. [8]

OR

Q.4 (a) Write a short note on page Replacement Algorithm. [8]

(b) Let 620 frames be split between two processes, one of 100 pages & one of 1270 pages. Find the number of frames allocated for each process if proportional allocation method is used. [8]

UNIT- V

Q.5 (a) Define file system. Explain file operation in detail. [8]

(b) Explain the concept of spooling with all the types and its advantages & disadvantages. [8]

OR

Q.5 (a) Explain the purpose and use of the following open () and close () operation with example. [8]

(b) Explain the classification of Allocation Methods. [8]

5E5107

Roll No. _____ Total No of Pages: 2

5E5107

B. Tech. V - Sem. (Main / Back) Exam., Feb.-March - 2021
Computer Science & Engineering
5CS6.2A Digital Signal Processing

Time: 2 Hours **Maximum Marks: 48**
Min. Passing Marks: 16

Instructions to Candidates:

*Attempt **three questions,** selecting **one question each** from any three **unit.** All questions carry **equal** marks. 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

UNIT- I

Q.1 (a) Explain sampling and different types of sampling techniques. [8]

(b) Explain the properties & application of discrete time systems. [8]

OR

Q.1 (a) Find the magnitude & phase response for the system characterized by difference equation $y(n) = \frac{1}{6} x(n) + \frac{1}{3} x(n-1) + \frac{1}{6} x(n-2)$ [8]

(b) Explain in detail the concept of continuous time processing of discrete time signals. [8]

UNIT- II

Q.2 (a) What are the different properties of z-transforms? [8]

(b) For the transform analysis of LTI system, explain the phenomena of all pass system. [8]

OR

Q.2 (a) What are the different properties of the DTFT? [8]

(b) What is inverse z – transform? Explain with a suitable diagram. [8]

UNIT- III

Q.3 (a) Determine the Nyquist rate and Nyquist interval of the following signal –

$$x(t) = \frac{1}{\pi t} \sin(600\pi t)$$ [8]

(b) What is Aliasing? [8]

OR

Q.3 (a) What is sampling in frequency domain? [8]

(b) Describe interpolation technique for the reconstruction of a signal from its sample. [8]

UNIT- IV

Q.4 (a) Explain in detail the different properties of DFT. [8]

(b) Decimation in Time FFT algorithm. [8]

OR

Q.4 Determine the four point DFT of the sequence x(n) = (1, 0, 2, 1) using DIT Algorithm. [16]

UNIT- V

Q.5 Design an FIR linear phase filter using Kaiser Window to meet the following specifications - [16]

$0.99 \leq |H(e^{j\omega})| \leq 1.01$, for $0 \leq |\omega| \leq 0.19\,\pi$

$|H(e^{j\omega})| \leq 0.01$, for $0.2/\pi \leq |\omega| \leq \pi$

OR

Q.5 Write short notes on (Any two) – [8+8=16]

(a) Hamming & Kaiser Windowing

(b) IIR filter

(c) Impulse Invariance Transformation
