3E1136

Roll No. _____ Total No of Pages: 4

3E1136

B. Tech. III - Sem. (Main / Back) Exam., Dec. 2019
BSC Computer Science & Engineering
3CS2-01 Advanced Engineering Mathematics
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 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 the coefficient of skewness, if the man and mode of the distribution are equal?

Q.2 What is the variance of the Poisson distribution with mean value 5?

Q.3 Define the exponential distribution.

Q.4 What is optimization?

Q.5 Match the following type of problems with their descriptions –

(a)	Geometric programming problem	(i)	Classical optimization problem
(b)	Quadratic programming problem	(ii)	Objective and constraints are posynomials with positive coefficients
(c)	Stochastic programming problem	(iii)	Objective is quadratic and constraints are linear
(d)	Calculus of variations problem	(iv)	Design variables are nondeterministic or probabilistic

Q.6 Write four engingeering applications of optimization.

Q.7 Consider the following problem –

Minimize $z = f(X)$,

Subject to $g_j(X) \leq 0; j = 1, 2, 3, \ldots, m.$

Then write the suitable Kuhn – Tucker conditions.

Q.8 What is difference between a slack and surplus variable?

Q.9 What happens when m = n in a Linear Programming Problem (LPP)? Where m and n denotes the numbers of equation and decision variables respectively.

Q.10 For non – degenerate feasible solution of m × n transportation problem, how many independent individual positive assignments will be required?

PART – B

(Analytical/Problem solving questions) **[5×8=40]**

Attempt any five questions

Q.1 A box contains 'a' white and 'b' black balls, 'c' balls are drawn. Find the expected value of the number of white balls drawn.

Q.2 The joint probability density function of a two – dimensional random variable (X, Y) is given by –

$$f(x,y) = \begin{cases} 2, & 0 < x < 1, 0 < y < x \\ 0, & \text{elsewhere} \end{cases}$$

Find the marginal density functions of X and Y. Also find the conditional density function of Y given X = x and conditional density function of X.

Q.3 Fit a straight line to the following data –

X	1	2	3	4	6	8
Y	2.4	3	3.6	4	5	6

Q.4 A company desires to devote the excess capacity of the three machines lathe, shaping and milling to make three products A, B and C. The available time per month in these machines are tabulated below –

Machine	Lathe	Shaping	Milling
Available time per month	200 hours	110 hours	180 hours

The time (in hours) taken to produce each unit of the products A, B and C on the machines is displayed in the table below –

Machine	Lathe	Shaping	Milling
Product A	5	2	4
Product B	2	2	Nil
Product C	3	Nil	3

The profit per unit of the products A, B and C are ₹ 20, ₹ 15 and ₹ 12 respectively. Formulate the mathematical model to maximize the profit.

Q.5 Find the maximum and minimum value of the function –

$u = x^3 + y^3 - 3x - 12y + 50$

Q.6 Find the optimum of the following constrained multivariable problem –

Minimize $Z = -x_1^2 + (x_2 + 1)^2 + (x_3 - 1)^2$

Subject to $x_1 + 5x_2 - 3x_3 = 6$

$x_1, x_2, x_3 \geq 0.$

Q.7 Using two phase simplex method, solve the following linear programming problem –

Max. $z = -x_1 - x_2$

Subject to $3x_1 + 2x_2 \geq 30$

$-2x_1 - 3x_2 \leq -30$

$x_1 + x_2 \leq 5$

and $x_1, x_2 \geq 0$

PART – C

(Descriptive/Analytical/Problem Solving/Design Questions) **[4×15=60]**

Attempt any four questions

Q.1 (a) Find mean and variance of Poison distribution.

(b) How optimization problem are classified based on the nature of expressions?

Q.2 (a) Using Simplex method, show that the following linear programming problem has an unbounded solution –

Maximize $z = x_1 + 2x_2$

Subject to $x_1 - x_2 \leq 10$

$3x_1 - 2x_2 \leq 40$

$x_1, x_2 \geq 0$

(b) Calculate the coefficient of correlation from the following data –

X	1	2	3	4	5	6	7	8	9
Y	9	8	10	12	11	13	14	16	15

Q.3 If the skulls are classified as A, B and C according as the length – breadth index is under 75, between 75 and 80, or over 80. Using normal distribution find approximately the mean and standard deviation of a series in which A are 58%, B are 38% and C are 4%, being given that –

$$f(t) = \frac{1}{\sqrt{2\pi}} \int_0^t \exp(-x^2/2)dx,$$

then $f(0.20) = 0.08$ and $f(1.75) = 0.46$.

Q.4 Solve the following problem using Kuhn – Tucker conditions –

Minimize $f(x_1, x_2, x_3) = x_1^2 + x_2^2 + x_3^2$

$g_1 = 2x_1 + x_2 - 5 \leq 0$

$g_2 = x_1 + x_3 - 2 \leq 0$

$g_3 = 1 - x_1 \leq 0$

$g_4 = 2 - x_2 \leq 0$

$g_5 = -x_3 \leq 0.$

Q.5 (a) Write the dual of the following problem –

Minimize $z = 2x_1 + x_2$

Subject to $3x_1 + x_2 \geq 3, 4x_1 + 3x_2 \geq 6, x_1 + 2x_2 \geq 2$

and $x_1, x_2, x_3 \geq 0$

(b) Using Vogel's Approximation method, find basic feasible solution for the following unbalanced transportation problem –

	Destination				Availability
	X	Y	Z	W	
I	14	19	11	20	10
II	19	12	14	17	15
III	14	16	11	18	12
Requirement	8	12	16	14	

---

183 CS/IT/EC

3E1102

Roll No. _____ Total No of Pages: 3

3E1102

B. Tech. III - Sem. (Main / Back) Exam., Dec. 2019

HSMC Civil Engineering

3CE1-02 Technical Communication

Common for All Branches

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 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 Technical Communication.

Q.2 Name any two technical texts.

Q.3 Mention the different types of letters.

Q.4 What is a technical report?

Q.5 What are nouns? Give examples.

PART – B

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

Attempt any four questions

Q.1 Correct the following sentences –

(i) Do you have sister? – Yes, I do.

(ii) When you come to Germany? – Last year.

(iii) When you return to Japan? – Next year.

(iv) You like German food? – Not very much.

(v) Do you like dogs? – Yes, I like.

(vi) He plays the piano very well, don't he?

(vii) Where she live? – Sorry, I don't know.

(viii) Will you help me today? – Yes, I'll.

(ix) I need any money to buy lunch today.

(x) My father work in a bank.

Q.2 Your college recently organized a science symposium on the topic : 'Effect of pollution on quality of life'. You are Amit/Amita Raazdan, editor of the college magazine. Write a report on the event for your magazine. (120 – 150 words)

Q.3 Describe Technical Articles, mentioning strategies and structure of Technical Articles.

Q.4 Describe the importance of Communication Skills for engineers.

Q.5 Describe the strategies of organization and information design for print and online media.

Q.6 You are Sandhya/Sohan an active member of the Animal Lovers Club which works for the welfare of animals by preventing cruelty to them. Recently you visited Mahatma Gandhi Animal Care Home. You were pleasantly surprised to see the good treatment given to the animals. Write an email to a friend in 150–200 words recounting your visit.

PART – C

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

Attempt any two questions

Q.1 Describe the various aspects of Technical Communication in detail.

Q.2 Read the passage and make notes, giving a suitable title:

User guide, also commonly known as a technical communication document, is intended to give assistance to people using a particular system. It is usually written by a technical writer, although user guides are written by programmers, product or project managers, or other technical staff, particularly in smaller companies.

User guides are most commonly associated with electronic goods, computer hardware and software, although they can be written for any product. Most user guides contain both a written guide and associated images. In the case of computer applications, it is usual to include screenshots of the human – machine interfaces, and hardware manuals often include clear, simplified diagrams. The language used is matched to the intended audience, with jargon kept to a minimum or explained thoroughly.

User guides have been found with ancient devices. One example is the Antikythera mechanism, a 2,000 year old Greek analogue computer that was found off the coast of the Greek island Antikythera in the year 1900. On the cover of this device are passages of text which describe the features and operation of the mechanism.

User manuals and user guides for most non –trivial software applications are book-like documents with contents similar to the above list. They may be distributed either in print or electronically. Some documents have a more fluid structure with many internal links. The Google Earth User Guide is an example of this format. The term guide is often applied to a document that addresses a specific aspect of a software product. Some usages are Installation Guide, Getting Started Guide, and various How to guides. An example is the Picasa Getting Started Guide.

Q.3 Write a letter of application that you would put with your CV, in reply to the advertisement which appeared in the Employment News on July 2nd for the post of junior manager, Infosys.

,84

3E1137

Roll No. _____ Total No of Pages: 4

3E1137

B. Tech. III - Sem. (Main / Back) Exam., Dec. 2019

ESC Computer Science & Engineering

3CS3-04 Digital Electronics

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 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 (i) In FF clocking –

(a) Hold time is greater than set-up time

(b) Set-up time is greater than hold time

(c) Hold time is before edge triggering

(d) Set-up time is after edge triggering

(ii) A 4-bit binary ripple counter uses flip-flops with propagation delay time of 25ns each. The maximum possible time required for change of state will be –

(a) 25ns

(b) 50ns

(c) 70ns

(d) 100ns

Q.2 (i) A 4-bit modulo- 16 ripple counter uses JK flip-flops. If the propagation delay of each FF is 50ns, the maximum clock frequency that can be used is equal to –

(a) 20 MHz

(b) 10 MHz

(c) 5 MHz

(d) 4 MHz

(ii) What J-K input condition will always set 'Q' upon the occurrence of the active clock transition?

(a) J = 0, K = 0

(b) J = 1, K = 1

(c) J = 1, K= 0

(d) J = 0, K = 1

Q.3 In standard TTL, the "totem pole" stage refers to –

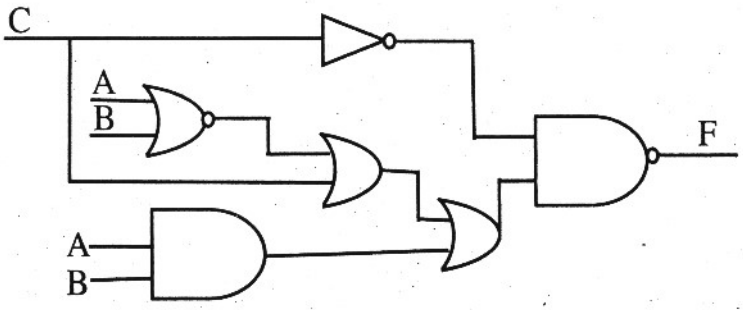
(a) the multi-emitter input stage

(b) the phase splitter

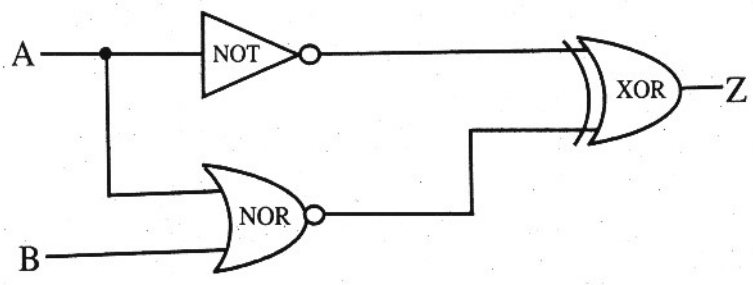
(c) the output buffer

(d) open collector output stage

Q.4 Find the output F in the following figure –



Q.5 Complete the truth table for the combinational circuit shown in the figure –



Q.6 Minimum number of 2-input NAND gates required to implement the function $F=(X'+Y')'(Z+W)$ is-

(a) 3 (b) 4

(c) 5 (d) 6

Q.7 CMOS logic has the property of –

(a) Increased capacitance and delay

(b) Decreased area

(c) High noise margin

(d) Low static power dissipation

Q.8 Which TTL logic gate is used for wired ANDing?

Q.9 Which one of the following can be used as parallel to serial converter?

(a) Decoder (b) Multiplexer

(c) Digital counter (d) Demutiplexer

Q.10 Perform the subtraction using 2's complementary arithmetic's –

(i) 11011 – 11001

(ii) 11001 - 11011

PART – B

(Analytical/Problem solving questions) **[5×8=40]**

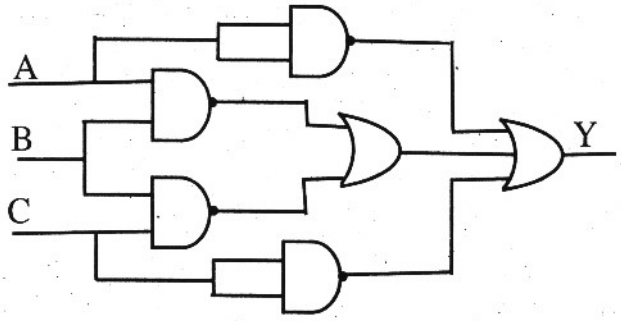
Attempt any five questions

Q.1 Show that: A XNOR B=AB+A'B'=$(AB'+A'B)'$. Write the equation for a 4-input XNOR gate in canonical Sum-of-Products and canonical Product-of-Sum forms. Also construct the corresponding logic diagrams.

Q.2 What is race around condition in JK flip flop? Discuss a method which is commonly used to eliminate the race around condition?

Q.3 (a) What are Universal gates? Why they are known so?

(b) For the logic shown in the figure, find the output 'Y'.



Q.4 Design a 4-bit, Mode-controlled bidirectional shift register using 'SR' flip-flops and explain its working in both directions.

Q.5 (a) Write short note on complementary MOS logic.

(b) (i) What is Fan-in and Fan-out?

(ii) Explain the terms noise margin and gate delays.

Q.6 (a) Represent the number $(-17)_{10}$ in (i) Sign magnitude form (ii) 1's complement representation.

(b) The Boolean expression F = z(w'+y) is a simplified version of the expression: F=(w'+y)(x'+z)(w'+z). Find the Don't care conditions, if any.

Q.7 Design 3-bit synchronous up counter using T flip flop.

PART – C

(Descriptive/Analytical/Problem Solving/Design Questions) **[4×15=60]**

Attempt any four questions

Q.1 (a) Draw a frequency divider using JK FFs to divide input clock frequency by a factor of 8.

(b) Reduce following Boolean function and then realized the reduced one using NOR gate only. X=A (B'+C') (A+D)

(c) Convert a T Flip-flop into a JK flip-flop.

Q.2 (a) Explain full adder and design a full adder circuit using 3 to 8 decoder and two OR gates.

(b) Design a 4 bit binary to gray code converter and realize it using logic gates.

Q.3 (a) Draw the voltage profile diagram of a TTL logic gate. Define High noise margin and Low noise margin. Calculate HNM and LNM for a typical TTL gate.

(b) Explain the interfacing concept of a TTL gate driving a CMOS gate with equal power supply voltage.

Q.4 (a) Show that a positive logic NAND gate is the same as a negative logic NOR gate.

(b) Show that the NAND connection is not associative.

(c) Reduce the following equation using Quine McClusky method of minimization F (A,B,C,D) =Σm(0,1,3,4,5,7,10,13,14,15).

Q.5 (a) Discuss a decade counter and its working principle.

(b) Draw an asynchronous 4 bit up-down counter and explain its working.

(c) Using JK flip flops, design a parallel counter which counts in the sequence 000,111,101,110,001,010,000……..

3E1138

Roll No. _____ Total No of Pages: 4

3E1138

B. Tech. III - Sem. (Main / Back) Exam., Dec. 2019
PCC Computer Science & Engineering
3CS4-05 Data Structures and 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 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 data structure. Mention any two applications of data structures.

Q.2 Mention the purpose of B^+ - Trees.

Q.3 What is the difference between internal sorting and external sorting?

Q.4 What is meant by abstract data type?

Q.5 What are the applications of stack?

Q.6 What do you mean by circular linked list?

Q.7 Compare graph and tree.

Q.8 Differentiate between linear and non-linear data structure.

Q.9 What is a dequeue?

Q.10 Define Hash function.

PART – B

(Analytical/Problem solving questions) **[5×8=40]**

Attempt any five questions

Q.1 Difference between linear queue and circular queue. Also write the advantage and disadvantage of circular queue. [8]

Q.2 What do you mean by tower of Hanoi problem? Explain with suitable example. [8]

Q.3 Convert following expressions in its equivalent post fix expressions – [8]

(i) A * (B + C * D) + E

(ii) A * B ^ C + D

Q.4 Define Binary Search Tree. Write algorithm to implement insertion operation on Binary search tree. [8]

Q.5 The in – order & pre – order traversal sequence of nodes in a binary tree are given below:

In-order: E A C K F H D B G

Pre-order: F A E K C D H G B

Draw the binary tree. [8]

Q.6 What is a priority queue? How can it be implemented? Explain an application of priority queue. [8]

Q.7 What is a Threaded Binary Tree? Explain the advantages of using a threaded binary tree. [8]

PART – C

(Descriptive/Analytical/Problem Solving/Design Questions) **[4×15=60]**

Attempt any four questions

Q.1 Create the linked list to represent the following polynomials – [15]

$5x^5 + 4x^4 + 6x^2 - 4$

$8x^6 + 4x^4 + 3x^3 + 2x^2 + x$

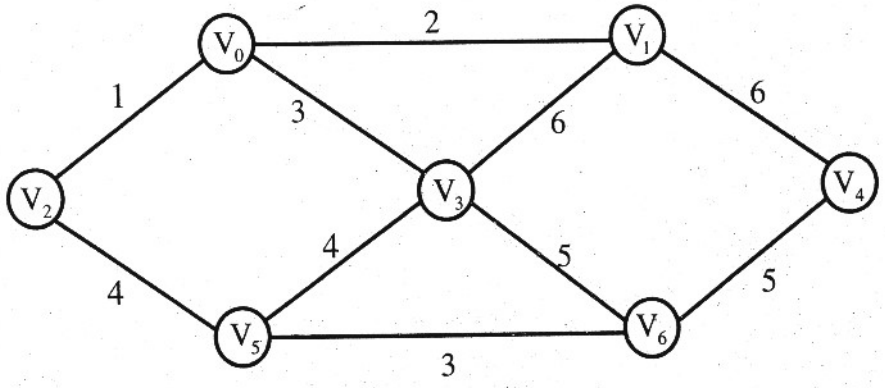
Write a function add () to add these polynomials and print the resultant linked list.

Q.2 Define a B–Tree. What are the application of B–Tree? Draw a B–Tree of order 4 (four) by insertion of the following keys in order :

Z, U, A, I, W, L, P, X, C, J, D, M, T, B, Q, E, H, S, K, N, R, G, Y, F, O, V. [15]

Q.3 What is sorting? Write an algorithm to sort the real number using insertion sort and selection sort. What is the time complexity for both selection and insertion sort? [15]

Q.4 (a) Define the spanning tree. Write the Prim's algorithm to find the minimum cost spanning tree of the following: [8]



(b) Describe the Dijkstra's algorithm for finding shortest path with help of suitable example. [7]

Q.5 (a) What is AVL tree? Explain the balancing methods of AVL tree with an example. [8]

(b) What do you mean by hashing and collision? Discuss the advantages and disadvantages of hashing over other searching techniques. [7]

3E1139

Roll No. _____ Total No of Pages: 3

3E1139

B. Tech. III - Sem. (Main / Back) Exam., Dec. 2019
PCC Computer Science & Engineering
3CS4-06 Object Oriented Programming
Common For 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 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 dynamic binding? How it is useful in OOP?

Q.2 List a few areas of application of OOP technology.

Q.3 What is dynamic initialization of a variable? Give example of C++.

Q.4 What is the difference between following two statements:

(a) Char * const i;

(b) Char const * i;

Q.5 List some properties of constructor.

Q.6 Explain Importance of destructors.

Q.7 What is operator overloading?

Q.8 What is abstract class?

Q.9 Explain generic programming and its implementation in C++.

Q.10 What is exception and how can we handle it.

PART – B

(Analytical/Problem solving questions) **[5×8=40]**

Attempt any five questions

Q.1 Write a function using reference variables to swap the values of two integers.

Q.2 Define a class in C++ to represent a Bank account. Take Assumptions for Data & Member functions.

Q.3 Explain constructor overloading with suitable example.

Q.4 Derive a class from a base class which is having a pure virtual function. Write C++ code.

Q.5 Write a Program to copy contents of one text file to other.

Q.6 Write a program to show the application of multiple catch statements.

Q.7 What is friend function? Write code to explain it.

PART – C

(Descriptive/Analytical/Problem Solving/Design Questions) **[4×15=60]**

Attempt any four questions

Q.1 What is Multiple Inheritance? How Ambiguities can be resolved in Multiple Inheritance. Show by suitable code.

Q.2 Define a class to create, update & manage online shopping list of a customer. Take your own Assumptions for Data & Member Functions.

Q.3 Write a C++ Program to overload '+' operator for string concatenation.

Q.4 With the help of suitable code explain Runtime Polymorphism.

Q.5 Prepare a Swap Function Containing template arguments to swap the content of two variables of type "int" , "char" & "float" .

197

3E1140

Roll No. _____ Total No of Pages: 3

3E1140

B. Tech. III - Sem. (Main / Back) Exam., Dec. 2019

PCC Computer Science & Engineering

3CS4-07 Software Engineering

Common For 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 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 system engineering?

Q.2 Mention the three key elements of software engineering.

Q.3 What is the objective of various model in software engineering?

Q.4 Define the merits of the various model in software engineering.

Q.5 Why accuracy is important in the data dictionary?

Q.6 What is behavior modeling?

Q.7 What is a finite state machine model?

Q.8 Why design documentation is important in software engineering?

Q.9 Write the objective of software project planning

Q.10 What is sequence diagram in the context of UML?

PART – B

(Analytical/Problem solving questions) **[5×8=40]**

Attempt any five questions

Q.1 Describe the Computer Based system as an organizational information system with an example.

Q.2 Explain the software development life cycle with a diagram.

Q.3 What do you understand by data dictionary where and how it is used?

Q.4 Explain the object modular radiation with example.

Q.5 What is SDLC? Explain the MIS oriented SDLC model?

Q.6 Explain COCOMO estimation model in software project management.

Q.7 What is UML? Explain how it is useful in object – oriented modeling.

PART – C

(Descriptive/Analytical/Problem Solving/Design Questions) **[4×15=60]**

Attempt any four questions

Q.1 Discuss merits and demerits of various models of software development.

Q.2 Write a short not on a Finite State Machine (FSM).

Q.3 Explain object – oriented analysis and its approach and explain classes and object relationship model.

Q.4 Explain major elements of DFD & CFD.

Q.5 Explain the use case diagram and state diagram in the context of UML.

2-08

3E1651

Roll No. _____ Total No of Pages: 3

3E1651

B. Tech. III - Sem. (Back) Exam., Dec. 2019

Information Technology

3IT1A Electronic Devices & Circuits

Time: 3 Hours **Maximum Marks: 80**

Min. Passing Marks: 26

Instructions to Candidates:

*Attempt any **five questions,** selecting **one question** from **each 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

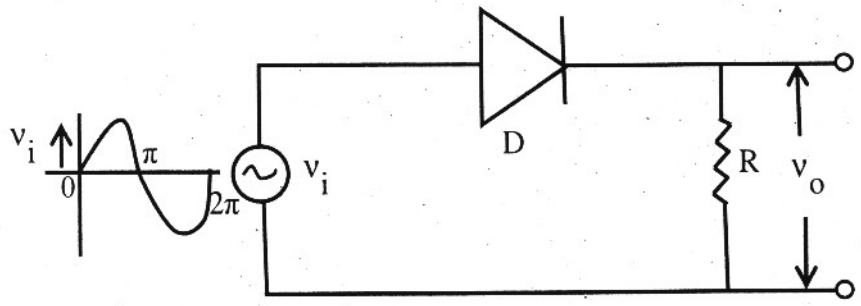
Q.1 (a) Explain and compare between, Conductor, Semiconductor and Insulator with example. [8]

(b) Explain the Generation and recombination of charge carriers in semiconductors. [8]

OR

Q.1 (a) Explain the working of voltage multiplier using suitable example. [8]

(b) Draw the output waveform of following clipper circuits. [8]



UNIT- II

Q.2 (a) Explain and draw the Input and Output characteristics of CE Amplifier. [8]

(b) Explain the thermal runway in transistor Amplifier. [8]

OR

Q.2 (a) Define the α_1 & β_1 and also find the relationship between α and β. [8]

(b) Explain the various methods of stabilization techniques in brief. [8]

UNIT- III

Q.3 (a) Explain the working of R-C coupled amplifier. And also explain the role of coupling capacitor. [10]

(b) Explain the Miller's theorem. [6]

OR

Q.3 Write short note on any two - [2×8=16]

(a) Cascade Amplifier

(b) Emitter follower

(c) Construction and operation of MOSFET

UNIT- IV

Q.4 (a) Explain various types of amplifiers with suitable diagrams. [8]

(b) What parameters are improved in feedback amplifiers compare to without feedback Amplifiers? [8]

OR

Q.4 Draw the diagram of following -

(a) Voltage series feedback Amplifier [4]

(b) Current series feedback Amplifier [4]

(c) Voltage shunt feedback Amplifier [4]

(d) Current shunt feedback Amplifier [4]

UNIT- V

Q.5 (a) Explain the working of R-C phase shift oscillator with suitable diagram. [8]

(b) Calculate the frequency of Wein bridge oscillator if [8]

$R_1 = R_2 = R = 200\ k\Omega$, $C_1 = C_2 = C = 200PF$.

OR

Q.5 (a) Explain the working of Astable multivibrator with suitable diagram. [8]

(b) Explain the working of Schmitt trigger with suitable diagram and also explain the term UTP and LTP. [8]

3E1655

Roll No. _____ Total No of Pages: 3

3E1655

B. Tech. III Sem. (Back) Exam., Dec. 2019

Computer Science & Engineering

3CS4A Linux and Shell Programming

Time: 3 Hours **Maximum Marks: 80**

Min. Passing Marks: 26

Instructions to Candidates:

*Attempt any **five questions,** selecting **one question** from **each 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 hard and soft symbolic links. What is environment and path setting? [8]

(b) How the read, write and execute permissions attached with a file are different from that attached to a directory? Explain. [8]

OR

Q.1 (a) Differentiate between following Linux commands in detail. [8]

(i) cp and mv

(ii) w and who

(iii) man and info

(b) What is shell and explain LINUX system architecture? [8]

UNIT- II

Q.2 Discuss mode of operation in vi editor. Also discuss commands available in vi editor for string searching and substitution. [16]

OR

Q.2 (a) Explain compiling and linking of C, C++ programs. [8]

(b) Write short note on System calls. [8]

UNIT- III

Q.3 (a) What do you understand by the term X in X – windows? Explain X – windows client server architecture with the help of suitable diagram. [10]

(b) What is window manager? Explain in detail. [6]

OR

Q.3 (a) Explain how can customize X – work environment and applications. [10]

(b) What is the role of following files in setting up the x – windows for a user : [6]

.xinitrc, .xsession

UNIT- IV

Q.4 What is the meaning and purpose of shell? Explain its types. [16]

OR

Q.4 (a) Find the output of following command and explain: [8]

(i) $ls – l\date\who

(ii) $cal&;date&;uname&

(iii) $ls/

(iv) $(cal;date);(uname;who)

(b) Write LINUX code to display file creating time of those files whose name starts with 'a' and is of 5 character long. [4]

(c) What is command separation and grouping in shell? [4]

UNIT- V

Q.5 (a) Explain control structures in shell programming in detail? [8]

(b) Write short note on any two – [2×4=8]

(i) awk utility

(ii) Job control in shell programming

(iii) NULL and USET variables

OR

Q.5 (a) Explain Built in functions and history in detail. [8]

(b) List the important characteristics of code management with rcs and cvs. Also list important difference between rcs and cvs. [8]

206

3E1656

Roll No. _____ Total No of Pages: 4

3E1656

B. Tech. III - Sem. (Back) Exam., Dec. 2019

Computer Science & Engineering

3CS6A Advanced Engineering Mathematics-I

CS, IT

Time: 3 Hours **Maximum Marks: 80**

Min. Passing Marks: 26

Instructions to Candidates:

*Attempt any **five questions,** selecting **one question** from **each 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 engineering applications of optimization techniques - [8]

(b) Find the extreme points of the function –

$f(x_1, x_2) = x_1^3 + x_2^3 + 2x_1^2 + 4x_2^2 + 6.$ [8]

OR

Q.1 (a) Minimize $f(X) = \frac{1}{2}(x_1^2 + x_2^2 + x_3^2)$ [8]

Sub to $g_1(X) = x_1 - x_2 = 0$

$g_2(X) = x_1 + x_2 + x_3 - 1 = 0$

by direct substitution method.

(b) Use Kuhn – Tucker conditions to maximize – [8]

$f(x_1, x_2) = -x_1 - x_2$

sub to $x_1^2 + x_2 \geq 2$

$4 \leq x_1 + 3x_2$

$x_1 + x_2^4 \leq 30$ at $x^* = \begin{pmatrix} 1 \\ 1 \end{pmatrix}$

UNIT- II

Q.2 (a) Use Big –M method the solve the following L.P.P. [8]

Max Z = $3x_1 + 2x_2$

sub. to $2x_1 + x_2 \leq 2$

$3x_1 + 4x_2 \geq 12 \quad ; x_1, x_2 \geq 0.$

(b) Write the dual of the following L.P.P. [8]

Max Z = $x_1 - 2x_2 + 3x_3$

sub. to $2x_1 + 5x_3 \leq 16$

$5x_2 + 4x_3 \geq 18$

$x_1 + x_2 + x_3 = 10$

$x_1 \geq 0, x_2 \geq 0, x_3$ unrestricted in sign.

OR

Q.2 (a) Solve the following transportation problem by Vogel's approximation method – [8]

	W_1	W_2	W_3	Supply
F_1	2	7	4	5
F_2	3	3	1	8
F_3	5	4	7	7
F_4	1	6	2	14
Demand	7	9	18	

(b) Maximum $z = 6x_1 + 15x_2$ [8]

sub to $5x_1 + 3x_2 \leq 15$; $2x_1 + 5x_2 \leq 10$;

$x_1, x_2 \geq 0$ using graphical method.

UNIT- III

Q.3 (a) If p is prime and a is an integer not divisible by p, then prove that $a^{p-1} \equiv$ (mod p). [8]

(b) State the Chinese Remainder theorem. Also solve the linear system $x \equiv 1(\text{mod } 3)$, $x \equiv 2(\text{mod } 5)$ and $x \equiv 3(\text{mod } 7)$. [8]

OR

Q.3 (a) Prove that (Z_7, X_7) is an abelian group for multiplication modulo 7, where [8]

$Z_7 = \{1, 2, 3, 4, 5, 6\}$.

(b) Let H and K be subgroups of a group G.

Show that $H \cap K$ is a subgroup of G. [8]

UNIT- IV

Q.4 (a) Find $L\left(\frac{1-\cos t}{t}\right)$. [8]

(b) Use Laplace transform to solve the differential equation $(D^2-3D+2)\, x(t)=1-e^{2t}$, $x(0)=1$, $x'(0) = 0$. [8]

OR

Q.4 (a) Use the convolution theorem to evaluate - [8]

$$L^{-1}\left(\frac{s^2}{(s^2+a^2)\,(s^2+b^2)}\right)$$

(b) Solve $\frac{\partial^2 u}{\partial t^2} = a^2 \frac{\partial^2 u}{\partial x^2}$ with the boundary conditions $u(0,t) = 0$, $u(c,t) = 0$, $u(x,0) = b \sin\frac{\pi x}{c}$ and $u_t(x,0) = 0$. [8]

UNIT- V

Q.5 (a) Find y(0.25) and y(0.43) using Newton's difference interpolation formula. [8]

x	0.0	0.2	0.4	0.6	0.8
y	0.3989	0.3910	0.3683	0.3332	0.2897

(b) Evaluate $\int_0^6 \frac{dx}{1+x^2}$ by using Simpson's one-third rule (Take h=1). [8]

OR

Q.5 (a) Solve the following difference equation -

$y_{n+2} - 4y_{n+1} + 3y_n = 4^n$. [8]

(b) Using Runge-Kutta method of order 4, find y at x = 1.1. Given that –

$\frac{dy}{dx} = x^2 + y^2$, $y(1) = 1.5$, $h = 0.1$ [8]

210

3E1654

Roll No. _____ Total No of Pages: 2

3E1654

B. Tech. III - Sem. (Back) Exam., Dec. 2019
Computer Science & Engineering
3CS5A Object Oriented Programming
EE, EX, CS, IT

Time: 3 Hours **Maximum Marks: 80**
Min. Passing Marks: 26

Instructions to Candidates:

*Attempt any **five questions,** selecting **one question** from **each 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 difference between Union and Structure in C. [8]

(b) Explain structures as user defined data types. [8]

OR

Q.1 (a) Explain pointers to Structure in C with the help of appropriate example. [8]

(b) Write short note on Passing Structures to functions with example. [8]

UNIT- II

Q.2 (a) Differentiate Structures and Class in terms of access to members in detail. [8]

(b) Give introduction of defining member functions within and outside a class and explain. [8]

OR

Q.2 (a) Explain Constructor and Destructor function in detail. [10]

(b) Write short note on friend functions and classes. [6]

UNIT- III

Q.3 (a) Explain fundamentals and Restrictions with operator Overloading. [8]

(b) Differentiate binary operator and unary operator with example. [8]

OR

Q.3 (a) Differentiate operator functions as class members and operator functions as friend function. [10]

(b) Write short note on conversion between types. [6]

UNIT- IV

Q.4 Explain various types of Inheritance with appropriate example. [16]

OR

Q.4 Explain following in detail with example.

(a) Virtual destructors [8]

(b) Virtual functions and Dynamic binding [8]

UNIT- V

Q.5 (a) Explain the concept of multiple class member in detail with the help of appropriate example. [10]

(b) Write short note on virtual base classes. [6]

OR

Q.5 Explain following with example-

(a) Exception handling [8]

(b) Templates [8]

3E1653

Roll No. _____ Total No of Pages: 4

3E1653

B. Tech. III - Sem. (Back) Exam., Dec. 2019
Applied Elect. & Inst. Engineering
3AI4 Digital Electronics
EE, EX, EC, EI, CS, IT, AI

Time: 3 Hours **Maximum Marks: 80**
Min. Passing Marks: 26

Instructions to Candidates:

*Attempt any **five questions,** selecting **one question** from **each 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) Using Boolean Algebra show that -

(i) $AB + AC + \overline{B}C = AB + \overline{B}C$ [4]

(ii) Simplify Expression and draw circuit [4]

$$\overline{\overline{(\overline{A} + B)} + (\overline{A + B})} + \overline{\overline{(\overline{A}B)} + (\overline{A\overline{B}})}$$

(b) Solve the given expression using Consensus theorem

(i) $\overline{AB} + AC + B\overline{C} + \overline{B}C + AB$ [4]

(ii) Implement the Ex-OR logic operation with only NAND gate. [4]

OR

Q.1 (a) Convert the following: [4×1=4]

(i) $(2F9A)_{16} = (\quad)_2$

(ii) $(1100100)_2 = (\quad)_8$

(iii) $(24T.05)_{10} = (\quad)_2$

(iv) $(1010.011)_2 = (\quad)_{10}$

(b) Perform the following operations: [2×3=6]

(i) $(2AC)_{16} + (10F)_{16}$

(ii) $(32)_8 + (67)_8$

(c) Define the following with example: [2×3=6]

(i) Gray Code

(ii) Hamming Distance

UNIT- II

Q.2 (a) Define the following of logic families: [4×2=8]

(i) Fan out

(ii) Figure of merit

(iii) Noise immunity

(iv) Wired-Logic

(b) Discuss CMOS NAND and NOR gate. [8]

OR

Q.2 (a) Draw a neat circuit of TTL NAND gate with totem pole output and explain? [8]

(b) Compare the characteristics of TTL, ECL, RTL and CMOS logic families. [8]

UNIT- III

Q.3 (a) Compare K-map technique and Quine – McClusky minimization. [8]

(b) Simplify the expression [8]

$F(A, B, C, D) = ACD + \overline{A}B + \overline{D}$

OR

Q.3 (a) Simplify the following using Tabulation method: [8]

$F = \sum(1,2,3,7,8,9,10,11,14,15)$

(b) Convert the following in to Canonical form: [8]

(i) $AB + B\overline{C}D + \overline{A}D$ into Canonical SOP

(ii) $(A + \overline{B})(\overline{C}+\overline{D})(\overline{B}+\overline{C})$ into Canonical POS

UNIT- IV

Q.4 (a) Design and explain the working of BCD to Seven Segment decoder. [8]

(b) What are the use of multiplexer and demultiplexer. Explain the construction and working of multiplexer circuit. [8]

OR

Q.4 Draw the logic diagram and show all implementations steps:

(i) BCD to excess -3 encoder [4]

(ii) 4-Bit binary serial address [4]

(iii) 2-Bit Multiplier [4]

(iv) Parity Generator 2 checkers [4]

215

UNIT- V

Q.5 (a) Write short notes on the following:

(i) Asynchronous and Synchronous counter [4]

(ii) Sequential and non sequential counter [4]

(b) With the help of excitation table. Show how D - flip flop can be converted into T-flip flop. [8]

OR

Q.5 (a) What do you mean by shift register? Classify the shift registers. And explain the working of serial in Parallel out shift register. [8]

(b) Draw a logic diagram of clocked S-R FF and obtain its characteristics equation also show its excitation table. [8]

3E1652/3E1612

Roll No. _____ Total No of Pages: 3

3E1652/3E1612

B. Tech. III - Sem. (Back) Exam., Dec. 2019

Computer Science & Engineering

3CS2A Data Structures and Algorithms

CS, IT, EX, EC, EI

Time: 3 Hours **Maximum Marks: 80**

Min. Passing Marks: 26

Instructions to Candidates:

*Attempt any **five questions,** selecting **one question** from **each 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) State that –

(i) Algorithm [2]

(ii) Time & Space complexity [2]

(iii) Big O & Omega Notation with graph. [2]

(iv) Difference b/w algorithm, pseudocode & program. [2]

(b) Define Array as a data structure and its properties. [8]

OR

Q.1 (a) What do you understand by descending order priority queue with the help of suitable example. [8]

(b) Complete the address of 3D array in a Row Major form. [8]

UNIT- II

Q.2 Convert the following expression in its equivalent port fix expression - [16]

(i) A * B + C

(ii) A * B ^ C + D

(iii) A* (B + C * D) + E

OR

Q.2 (a) What is Dequeue and write the insertion & deletion algorithm for Dequeue date structure? [8]

(b) How will you use away for multiplication of polynomial? Explain. [8]

UNIT- III

Q.3 (a) Explain the advantages of Binary search over sequential search. [8]

(b) Write an algorithm to insert an element into a single linked list. [8]

OR

Q.3 Write the algorithm for Insertion & Deletion in doubly & circular connected linear linked lists explain. [16]

UNIT- IV

Q.4 (a) Insert the following list of element in an AVL Tree - [8]

3, 5, 11, 8, 4, 1, 12, 7, 2, 6, 10

(b) Difference b/w threaded & unthreaded binary. [3]

(c) What is B-Tree? Explain. [5]

OR

Q.4 (a) Explain the various applications of trees for representation of sets. [8]

(b) Define the following - [8]

(i) Strictly Binary Tree

(ii) Completely Binary Tree

UNIT- V

Q.5 Write short notes -

(i) Selection Sort [4]

(ii) Quick Sort [4]

(iii) Merge Sort [4]

(iv) Bubble Sort [4]

OR

Q.5 (a) What do you mean by Graph Data Structure. [8]

(b) Sort the following data in ascending order using Quick sort – [8]

9, 4, 12, 6, 5, 10, 7
