Roll No. ..... [Total No. of Pages : 4

CS–2404

B. Tech. (CS) (Third Semester)

EXAMINATION, 2020

COMPUTER ORGANIZATION

Time : Three Hours

Maximum Marks : 100

Note : Attempt questions from both Sections as directed.

Section—A

(Short Answer Type Questions)

Note : Attempt any *ten* questions. Each question carries 4 marks. 10×4=40

1. Define Bus System. Explain the architecture of bus system.
2. What are the different auxiliary memories ? Explain.

P. T. O.

3. Represent $(-307.1875)_{10}$ in single precision and double precision format.
4. What is General Register Organization ?
5. What are the difference between Horizontal and Vertical Micro codes ?
6. What do you understand by Locality of Reference ?
7. What is the difference between RAM and DRAM ?
8. Write a short note on Pipelining Process.
9. Write the difference between Serial and Parallel Communication.
10. Evaluate the arithmetic statement :

    $X = (A/B * C \wedge D) * (E \wedge F \wedge G)$

    using a general register computer with three address and zero address instruction format.

11. Perform the following operation on signed numbers using 2's complement method :

    $(56)_{10} + (-27)_{10}$

12. Explain the Feng's classification of parallel processing.
13. Why can I/O devices not be directly be connected to the system bus ? Explain.
14. What is asynchronous data transfer ? Explain.

Section—B

(Long Answer Type Questions)

Note : Attempt any *three* questions. Each question carries 20 marks. 3×20=60

1. What is Microprogrammed Control Unit ? Give the basic structure of microprogrammed control unit. Also discuss the microinstruction format and the control unit organization for a typical microprogrammed controllers using suitable diagram.
2. Discuss the Booth's algorithm for 2's complement number. Also illustrate it with perform (–20) * (+4) operation.

3. A block-set associative cache memory consists of 128 blocks divided into four block sets. The main memory consists of 16384 blocks and each block contains 256 eight bit words.

   (a) How many bits are required for addressing the main memory ?

   (b) How many bits are needed to represent the Tag, Set and word fields ?

4. How a processor executed instructions ? Define the internal functional units of a processor. How are they interconnected ?

5. Give the block diagram of DMA controller. Why are the read and write control lines in a DMA controller bidirectional ?

6. Explain the difference between vectored and non-vectored interrupt. Explain stating examples of each.

160

Roll No. ..18130303047. [Total No. of Pages : 4

CS–2401(N)

B. Tech. (CS) (Third Semester)

EXAMINATION, 2019

COMPUTER ORGANIZATION

Time : Three Hours

Maximum Marks : 100

Note : Attempt questions from both Sections as directed.

Section—A

(Short Answer Type Questions)

Note : Attempt any *ten* questions. Each question carries 4 marks. 10×4=40

1. What is Peripheral Device ? Give the example of peripheral devices.

2. Describe the basic format used to represent the floating point numbers.

3. A block-set associative cache memory consists of 128 blocks divided into four block sets. The main memory consists of 16384 blocks and each block contains 256 eight bit words.
   (a) How many bits are required for addressing the main memory ?
   (b) How many bits are needed to represent the Tag, Set and word fields ?
4. How a processor executed instructions ? Define the internal functional units of a processor. How are they interconnected ?
5. Give the block diagram of DMA controller. Why are the read and write control lines in a DMA controller bidirectional ?
6. Explain the difference between vectored and non-vectored interrupt. Explain stating examples of each.

Roll No. 1813103094 [Total No. of Pages : 4

CS–2401(N)

B. Tech. (CS) (Third Semester)

EXAMINATION, 2019

COMPUTER ORGANIZATION

Time : Three Hours

Maximum Marks : 100

Note : Attempt questions from both Sections as directed.

Section—A

(Short Answer Type Questions)

Note : Attempt any *ten* questions. Each question carries 4 marks. 10×4=40

1. What is Peripheral Device ? Give the example of peripheral devices.
2. Describe the basic format used to represent the floating point numbers.

3. What are the differences between Hardwired and Microprogrammed control unit ?
4. What are An Instruction ? Explain the sub-cycles of instruction cycle with example.
5. Compare between RISC and CISC.
6. Explain the basic functional units of a computer.
7. Explain the Flynn's classification of Parallel Processing.
8. Write a short note on Types of Interrupts.
9. Describe in detail about programmed I/O with neat diagram.
10. List and explain different types of shift micro-operation.
11. What are Speedup Performance Laws ?
12. What do you mean by Locality of Reference ? Explain with suitable example.
13. Evaluate the arithmetic statement

$$X = (A + B) * (C + D)$$

using a general register computer with three address and zero address instruction format.

14. Briefly define the following terms :
    (i) Micro-operation
    (ii) Magnetic disk

Section—B

(Long Answer Type Questions)

Note : Attempt any *three* questions. Each question carries 20 marks. 3×20=60

1. Discuss the Booth's algorithm for two's complement number. Also illustrate it with perform (–19) × (–13) operation.
2. What is an Effective Address ? How is it calculated in different types of addressing modes ? Explain.
3. What is Stack ? Give the organization of register stack with all necessary elements and explain the working of Push and Pop operations.
4. Draw and explain the block diagram of typical DMA controller.

5. A 4-way set associative cache memory unit with a capacity of 16 kB is built using a block size of 8 words. The word length is 32 bits. The size of the physical address space is 4 GB :

   (i) How many bits are needed to represent the Tag, Set and word fields ?

   (ii) How many bits are required for addressing the main memory ?

6. What is programmable logic device ? List various techniques to program PLD. 20

Roll No. 1813010043 [Total No. of Pages : 4

CS–2401(N)

B. Tech. (CS) (Third Semester)

EXAMINATION, 2019

COMPUTER ORGANIZATION

Time : Three Hours

Maximum Marks : 100

Note : Attempt questions from both Sections as directed.

Section—A

(Short Answer Type Questions)

Note : Attempt any *ten* questions. Each question carries 4 marks. 10×4=40

1. What is Peripheral Device ? Give the example of peripheral devices.

2. Describe the basic format used to represent the floating point numbers.

3. What are the differences between Hardwired and Microprogrammed control unit ?
4. What are An Instruction ? Explain the sub-cycles of instruction cycle with example.
5. Compare between RISC and CISC.
6. Explain the basic functional units of a computer.
7. Explain the Flynn's classification of Parallel Processing.
8. Write a short note on Types of Interrupts.
9. Describe in detail about programmed I/O with neat diagram.
10. List and explain different types of shift micro-operation.
11. What are Speedup Performance Laws ?
12. What do you mean by Locality of Reference ? Explain with suitable example.
13. Evaluate the arithmetic statement

$$X = (A + B) * (C + D)$$

using a general register computer with three address and zero address instruction format.

14. Briefly define the following terms :
    (i) Micro-operation
    (ii) Magnetic disk

Section—B

(Long Answer Type Questions)

Note : Attempt any *three* questions. Each question carries 20 marks. 3×20=60

1. Discuss the Booth's algorithm for two's complement number. Also illustrate it with perform (–19) × (–13) operation.
2. What is an Effective Address ? How is it calculated in different types of addressing modes ? Explain.
3. What is Stack ? Give the organization of register stack with all necessary elements and explain the working of Push and Pop operations.
4. Draw and explain the block diagram of typical DMA controller.

5. A 4-way set associative cache memory unit with a capacity of 16 kB is built using a block size of 8 words. The word length is 32 bits. The size of the physical address space is 4 GB :

   (i) How many bits are needed to represent the Tag, Set and word fields ?

   (ii) How many bits are required for addressing the main memory ?

6. What is programmable logic device ? List various techniques to program PLD. 20

CS-2406

B.Tech. (Semester-IV) Exam.–2017

COMPUTER ORGANIZATION

Time : Three Hours
Maximum Marks : **100**

Note : Attempt questions from all sections.

SECTION - A

(Short-answer Type Questions)

Note : Attempt **any Ten** questions. Each question carries 4 marks. 4×10=40

1. Give IEEE standards for floating point numbers.
2. Differentiate between a Micro-Process and a Micro Program.
3. What is Hamming code and how is it used?
4. What is mean by adder expansion?
5. Describe Handshaking.
6. What is virtual memory and why is it important to implement it?

7. Explain Accumulator with its circuit.

8. Explain various types of RAM memory.

9. Write down assembly code to multiply two numbers stored in processor registers.

10. Describe instruction life cycle with diagram.

11. Explain the role of program counter.

12. Describe instruction set.

13. Define Microoperation with example.

14. Differentiate between Synchronous and Asynchronous Communication.

15. Define Control Function.

SECTION - B

(Long Answer type questions)

Note : Attempt **any Three** questions. Each question carries 20 marks. 20x3=60

1. Define DMA, DMA controller and transfer modes in detail.

2. Perform the following Operation :
   (i) (245.2525-240.1010) Using Binary Operation
   (ii) $(1212.22)_8 = (?)_{10}$
   (iii) $(AAB.B)_{16} = (?)_{10}$
   (iv) $(7632)_8 = (?)_{16}$

3. Write a note on Memory Organization Band on Hierarchy.

4. Write a note on :
   (i) Hardwired and Microprogrammed implementation.
   (ii) RISC and CISC Computer

5. Explain :
   (i) Flynn's classification for Architecture
   (ii) General purpose register organization.

6. Explain Interrupt, types of Interrupt and Interrupt handling.

Roll No. ..... [Total No. of Pages : 4

CS–2404

B. Tech. (CS) (Third Semester)

EXAMINATION, 2020

COMPUTER ORGANIZATION

Time : Three Hours

Maximum Marks : 100

Note : Attempt questions from both Sections as directed.

Section—A

(Short Answer Type Questions)

Note : Attempt any *ten* questions. Each question carries 4 marks. 10×4=40

1. Define Bus System. Explain the architecture of bus system.
2. What are the different auxiliary memories ? Explain.

P. T. O.

3. Represent $(-307.1875)_{10}$ in single precision and double precision format.
4. What is General Register Organization ?
5. What are the difference between Horizontal and Vertical Micro codes ?
6. What do you understand by Locality of Reference ?
7. What is the difference between RAM and DRAM ?
8. Write a short note on Pipelining Process.
9. Write the difference between Serial and Parallel Communication.
10. Evaluate the arithmetic statement :

$$X = (A/B * C \wedge D) * (E \wedge F \wedge G)$$

using a general register computer with three address and zero address instruction format.

11. Perform the following operation on signed numbers using 2's complement method :

$$(56)_{10} + (-27)_{10}$$

12. Explain the Feng's classification of parallel processing.
13. Why can I/O devices not be directly be connected to the system bus ? Explain.
14. What is asynchronous data transfer ? Explain.

Section—B

(Long Answer Type Questions)

Note : Attempt any *three* questions. Each question carries 20 marks. $3 \times 20 = 60$

1. What is Microprogrammed Control Unit ? Give the basic structure of microprogrammed control unit. Also discuss the microinstruction format and the control unit organization for a typical microprogrammed controllers using suitable diagram.
2. Discuss the Booth's algorithm for 2's complement number. Also illustrate it with perform (–20) * (+4) operation.

3. A block-set associative cache memory consists of 128 blocks divided into four block sets. The main memory consists of 16384 blocks and each block contains 256 eight bit words.

   (a) How many bits are required for addressing the main memory ?

   (b) How many bits are needed to represent the Tag, Set and word fields ?

4. How a processor executed instructions ? Define the internal functional units of a processor. How are they interconnected ?

5. Give the block diagram of DMA controller. Why are the read and write control lines in a DMA controller bidirectional ?

6. Explain the difference between vectored and non-vectored interrupt. Explain stating examples of each.

160

Roll No. ..... [Total No. of Pages : 8

CS–2403

B. Tech. (CS) (Third Semester)

EXAMINATION, 2020

COMPUTER BASED NUMERICAL STATISTICAL TECHNIQUE

Time : Three Hours

Maximum Marks : 100

Note : Attempt questions from both Sections as directed.

Section—A
(Short Answer Type Questions)

Note : Attempt any *ten* questions. Each question carries 4 marks. 10×4=40

1. Three approximate values of number $\frac{1}{3}$ are given as 0.30, 0.33 and 0.34. Which of these three is the best approximation ?

2. If :

$$r = 3h(h^6 - 2)$$

find the percentage error in r at $h = 1$, if the percentage error in h is 5.

3. Find a positive real root of $x - \cos x = 0$ by bisection method correct upto 4 decimal places between 0 and 1.

4. Find the real root of :

$$2x - \log_{10} x - 7$$

correct to four decimal places using iteration method.

5. Using the method of false position, find the root of equation :

$$x^6 - x^4 - x^3 - 1 = 0$$

upto four decimal places.

6. Find the real root of the equation $x = e^{-x}$ using the Newton-Raphson method.

7. Show relation between operators (proof) :

(i) $\Delta = E\nabla = \nabla E = \delta E^{\frac{1}{2}}$

(ii) $E = e^{hD}$

8. Find the missing value of the following data :

$f(x)$	x
7	1
X	2
13	3
21	4
37	5

9. Find the cubic polynomial which takes the following values :

x	$f(x)$
0	1
1	2
2	1
3	10

10. From the following table of half-yearly premium for policies maturing at different ages, estimate the premium for policy maturing at the age of 63 :

Age	Premium (in ₹)
45	114.84
50	96.16
55	83.32
60	74.48
65	68.48

11. Use Gauss' forward formula to find a polynomial of degree four which takes the following values of function $f(x)$:

x	$f(x)$
1	1
2	−1
3	1
4	−1
5	1

12. $f(x)$ is the polynomial of degree four and given :
$f(4) = 270$, $f(5) = 648$, $\Delta f(5) = 682$, $\Delta^3 f(u) = 132$
find the value of $f(5.8)$ using Gauss's backward formula.

13. Use Stirling's formula to find y_{35}, given $y_{20} = 512$, $y_{30} = 439$, $y_{40} = 346$ and $y_{50} = 243$.

14. Given $y_0, y_1, y_2, y_3, y_4, y_5$ (fifth differences constant), prove that :

$$y_{2\frac{1}{2}} = \frac{1}{2}c + \frac{25(c-b)+3(a-c)}{256}$$

where $a = y_0 + y_5$,
$b = y_1 + y_4$,
$c = y_2 + y_3$.

15. Using Newton's divide and difference formula. calculate the value of $f(6)$ from the following table :

x	$f(x)$
1	1
2	5
7	5
8	4

Section—B

(Long Answer Type Questions)

Note : Attempt any *three* questions. Each question carries 20 marks. 3×20=60

1. A rod is rotating in a plane. The following table gives the angle θ (in radians) through which the rod has turned for various values of times t (in sec) :

t	θ
0	0
0.2	0.12
0.4	0.49
0.6	1.12
0.8	2.02
1.0	3.20
1.2	4.67

Calculate the angular velocity and angular acceleration of the rod at $t = 0.6$ sec.

2. Evaluate :

$$\int_0^6 \frac{dx}{1+x^2}$$

by using :

(i) Simpson's $\frac{3}{8}$ rule

(ii) Trapezoidal rule

(iii) Weddle's rule

3. Given :

$$\frac{dy}{dx} = \frac{(y-x)}{(y+x)}$$

with $y = 1$ for $x = 0$. Find y approximately for $x = 0.1$ by Euler's method.

4. Fit a straight line to the following data :

x	y
0	1
1	1.8
2	3.3
3	4.5
4	6.3

5. The pressure of the gas corresponding to various volume V is measured, given by the following data :

V (cm^3)	P (kg cm^2)
50	64.7
60	51.3
70	40.5
90	25.9
100	78

Fit the data to the equation :

$$PV^{\gamma} = C$$

6. (a) Write algorithm of Stirling's formula.

(b) Write a program in 'C' for Lagrange's method of interpolation.

Roll No. ..... [Total No. of Pages : 8

CS–2403

B. Tech. (CS) (Third Semester) EXAMINATION, 2019

COMPUTER BASED NUMERICAL STATISTICAL TECHNIQUE

Time : Three Hours

Maximum Marks : 100

Note : Attempt questions from both Sections as directed.

Section—A

(Short Answer Type Questions)

Note : Attempt any *ten* questions. Each question carries 4 marks. 10×4=40

1. Evaluate the sum

$$s = \sqrt{3} + \sqrt{5} + \sqrt{7}$$

to four significant digits and find its absolute and relative errors.

2. Compute the percentage error in the time period

$$T = 2\pi\sqrt{\frac{l}{g}} \text{ for } l = 1 \text{ m}$$

if the error in the measurement of l is 0.01.

3. Find a real root of $x^3 - x = 1$ between 1 and 2 by Bisection method, compute five iterations.

4. Find the real root of equation :

$$\cos x = 3x - 1$$

correct to three decimal places using iteration method.

5. Find a real root of the equation

$$x \log_{10} x = 1.2$$

by Regula-Falsi method correct to four decimal places.

6. Using Newton-Raphson method, find the real root of the equation :

$$3x = \cos x + 1$$

correct to four decimal places.

7. Prove relation between operations :

(i) $E = e^{hD}$

(ii) $\Delta = E\nabla = \nabla E = \delta E^{1/2}$

8. To show that :

(i) $\Delta^n [x]^n = n!$

(ii) $\Delta^{n+1} [x]^n = 0$

9. From the table, estimate the number of students who obtained marks between 40 and 45 :

Marks	No. of Students
30—40	31
40—50	42
50—60	51
60—70	35
70—80	31

10. From the following table of half yearly premium policies maturing at different ages,

estimate the premium for policy maturing at the age of 63 :

Age	Premium (in ₹)
45	114.84
50	96.16
55	83.32
60	74.48
65	68.48

11. Apply Gauss' forward formula to find the values of u_9 if $u_0 = 14, u_4 = 24$, $u_8 = 32, u_{12} = 35$ and $u_{16} = 40$.

12. Using Gauss backward interpolation formula, find the population for the year 1936 given that :

Year	Population (in thousand)
1901	12
1911	15
1921	20
1931	27
1941	39
1951	52

13. Use Stirling's formula to find y_{28}, given :

$$y_{20} = 49225$$
$$y_{25} = 48316$$
$$y_{30} = 47236$$
$$y_{35} = 45926$$
$$y_{40} = 44306$$

14. Given $y_0, y_1, y_2, y_3, y_4, y_5$ (fifth differences constant). Prove that :

$$y_{2\frac{1}{2}} = \frac{1}{2}c + \frac{25(c-b)+3(a-c)}{256}$$

where

$$a = y_0 + y_5$$
$$b = y_1 + y_4$$
$$c = y_2 + y_3.$$

15. Using Lagrange's interpolation formula, find $y(10)$ from the following table :

x	y
5	12
6	13
9	14
11	16

$\frac{dy}{dx} = x - y$ with initial condistion $y = 1$ when $x = 0$

Section—B

(Long Answer Type Questions)

Note : Attempt any *three* questions. Each question carries 20 marks. 3×20=60

1. The table given below reveals the velocity 'v' of a body during the time 't' specified. Find the acceleration at $t = 1.1$:

t	v
1.0	43.1
1.1	47.7
1.2	52.1
1.3	56.4
1.4	60.8

2. Evaluate :

$$\int_0^1 \frac{dx}{1+x^2}$$

using :

(i) Simpson's $\frac{1}{3}$ rule taking $h = 1/4$.

(ii) Weddle's rule taking $h = 1/6$

3. Solve the equation

$$\frac{dy}{dx} = x + y$$

with initial condition $y(0) = 1$ by Runge-Kutta rule, from $x = 0$ to $x = 0.4$ with $h = 0.1$.

4. Fit a straight line to the following data :

x	y
71	69
68	72
73	70
69	70
67	68
65	67
66	68
67	64

8. Evaluate $\int_0^1 \frac{dx}{1+x^2}$ by using Simpson's Three eighth rule taking h= 1/6.

9. Use Picard's method to obtain y for x = 0.2 Given: $\frac{dy}{dx} = x - y$ *with initial condistion* $y = 1$ *when* $x = 0$

5. By the method of least squares, find the curve :

$$y = ax + bx^2$$

that best fits the following data :

x	y
1	1.8
2	5.1
3	8.9
4	14.1
5	19.8

6. Write a program in 'C' for finding out a real root of equation $f(x) = 0$ by Newton-Raphson method.

Roll No..................................

2403

CS-303 Computer Based Numerical &Statistical Techniques

B.Tech. III Semester

Maximum Marks : 15 **Time : 45 min**

Note: i) Questions Paper is divided in two parts. In Part A **Each Question is compulsory** and part B has internal choice

ii) Part A have MCQ and Part B have descriptive questions and have internal choice.

PART - A **5*1=5**

Multiple Choice Question-

1. In an ordinary differential equation the first category method is________.
   A. Taylor method B. Euler method C. Modified Euler Method D. Runge Kutta Mehtod
2. The degree of y(x) in Trapezoidal Rule is ________.
   A. 1 B. 2 C. 3 D. 6

3.Newton-Raphson method has a________ convergence.
   A. linear B. quadratic C. cubic D. bi quadratic

4. Newton's divided difference formula is used only for ________ intervals.
   A. equal B. unequal C. open D. closed

5 In Newton-cotes formula, if f(x) is interpolated at equally spaced nodes by a polynomial of degree two then it represents______.
   A. Trapezoidal rule B. Simpson's one-third rule C. Simpson's three-eigth rule D. Euler's rule

PART – B **2*5=10**

Attampt any Two of the following

6. What is the difference between correlation and regression? Explain Lines of Regression with its type.
7. Fit a straight line to the following-

x	0	1	2	3	4
y	1	1.8	3.3	4.5	6.3

8. Evaluate $\int_0^1 \frac{dx}{1+x^2}$ by using Simpson's Three eighth rule taking h=1/6.
9. Use Picard's method to obtain y for x = 0.2 Given:

$$\frac{dy}{dx} = x - y \text{ with initial condistion } y = 1 \text{ when } x = 0$$

Roll No. ..... [Total No. of Pages : 8

CS–2403

B. Tech. (CS) (Third Semester)

EXAMINATION, 2020

COMPUTER BASED NUMERICAL STATISTICAL TECHNIQUE

Time : Three Hours

Maximum Marks : 100

Note : Attempt questions from both Sections as directed.

Section—A

(Short Answer Type Questions)

Note : Attempt any *ten* questions. Each question carries 4 marks. 10×4=40

1. Three approximate values of number $\frac{1}{3}$ are given as 0.30, 0.33 and 0.34. Which of these three is the best approximation ?

P. T. O.

2. If :

$$r = 3h(h^6 - 2)$$

find the percentage error in r at $h = 1$, if the percentage error in h is 5.

3. Find a positive real root of $x - \cos x = 0$ by bisection method correct upto 4 decimal places between 0 and 1.

4. Find the real root of :

$$2x - \log_{10} x - 7$$

correct to four decimal places using iteration method.

5. Using the method of false position, find the root of equation :

$$x^6 - x^4 - x^3 - 1 = 0$$

upto four decimal places.

6. Find the real root of the equation $x = e^{-x}$ using the Newton-Raphson method.

7. Show relation between operators (proof) :

(i) $\Delta = E\nabla = \nabla E = \delta E^{\frac{1}{2}}$

(ii) $E = e^{hD}$

8. Find the missing value of the following data :

$f(x)$	x
7	1
X	2
13	3
21	4
37	5

9. Find the cubic polynomial which takes the following values :

x	$f(x)$
0	1
1	2
2	1
3	10

2. If :

$$r = 3h(h^6 - 2)$$

find the percentage error in r at $h = 1$, if the percentage error in h is 5.

3. Find a positive real root of $x - \cos x = 0$ by bisection method correct upto 4 decimal places between 0 and 1.

4. Find the real root of :

$$2x - \log_{10} x - 7$$

correct to four decimal places using iteration method.

5. Using the method of false position, find the root of equation :

$$x^6 - x^4 - x^3 - 1 = 0$$

upto four decimal places.

6. Find the real root of the equation $x = e^{-x}$ using the Newton-Raphson method.

7. Show relation between operators (proof) :

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8. Find the missing value of the following data :

$f(x)$	x
7	1
X	2
13	3
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37	5

9. Find the cubic polynomial which takes the following values :

x	$f(x)$
0	1
1	2
2	1
3	10

10. From the following table of half-yearly premium for policies maturing at different ages, estimate the premium for policy maturing at the age of 63 :

Age	Premium (in ₹)
45	114.84
50	96.16
55	83.32
60	74.48
65	68.48

11. Use Gauss' forward formula to find a polynomial of degree four which takes the following values of function $f(x)$:

x	$f(x)$
1	1
2	–1
3	1
4	–1
5	1

12. $f(u)$ is the polynomial of degree four and given :

$f(4) = 270$, $f(5) = 648$, $\Delta f(5) = 682$, $\Delta^3 f(u) = 132$

find the value of $f(5.8)$ using Gauss's backward formula.

13. Use Stirling's formula to find y_{35}, given $y_{20} = 512$, $y_{30} = 439$, $y_{40} = 346$ and $y_{50} = 243$.

14. Given $y_0, y_1, y_2, y_3, y_4, y_5$ (fifth differences constant), prove that :

$$y_{2\frac{1}{2}} = \frac{1}{2}c + \frac{25(c-b)+3(a-c)}{256}$$

where $a = y_0 + y_5$,

$b = y_1 + y_4$,

$c = y_2 + y_3$.

15. Using Newton's divide and difference formula, calculate the value of $f(6)$ from the following table :

x	$f(x)$
1	1
2	5
7	5
8	4

Section—B

(Long Answer Type Questions)

Note : Attempt any *three* questions. Each question carries 20 marks. 3×20=60

1. A rod is rotating in a plane. The following table gives the angle θ (in radians) through which the rod has turned for various values of times t (in sec) :

t	θ
0	0
0.2	0.12
0.4	0.49
0.6	1.12
0.8	2.02
1.0	3.20
1.2	4.67

Calculate the angular velocity and angular acceleration of the rod at $t = 0.6$ sec.

2. Evaluate :

$$\int_0^6 \frac{dx}{1+x^2}$$

by using :

(i) Simpson's $\frac{3}{8}$ rule

(ii) Trapezoidal rule

(iii) Weddle's rule

3. Given :

$$\frac{dy}{dx} = \frac{(y-x)}{(y+x)}$$

with $y = 1$ for $x = 0$. Find y approximately for $x = 0.1$ by Euler's method.

4. Fit a straight line to the following data :

x	y
0	1
1	1.8
2	3.3
3	4.5
4	6.3

5. The pressure of the gas corresponding to various volume V is measured, given by the following data :

V (cm^3)	P (kg cm^2)
50	64.7
60	51.3
70	40.5
90	25.9
100	78

Fit the data to the equation :

$$PV^{\gamma} = C$$

6. (a) Write algorithm of Stirling's formula.

(b) Write a program in 'C' for Lagrange's method of interpolation.

CS-301/2401

B.Tech. (Semester-III) Exam.–2016

Discrete Structures

Time : Three Hours
Maximum Marks : 100

Note : Attempt questions from all sections.

SECTION - A

(Short-answer Type Questions)

Note : Attempt **any ten** questions. Each question carries 4 marks. 10×4=40

1. Prove that (A-B)UB = AUB.
2. If R is an equivalance rotation in a int A, then prove that R^{-1} is also an equivalance relation in A.
3. If f : A →B be one-one and onto, then prove that the inverse mapping of f is unique.
4. Define Algebraic structure and group.

5. Prove the theorem -
"In a group G, the identity element and the inverse of an element are unique".

6. Define Homomorphism and Isomorphism of Group.

7. Prove that the Ring of Integer I is an integral domain.

8. Differetiate Ring, Skew field and field.

9. Let [B, +, .;] be a Boolean Algebra and a, b∈B, then show that a+b = b ⇒a.b=a.

10. Convert the function $f(x, y, z) = (x.y^{-1} + x.z^{1})^{1} + x^{1}$ into disjunctive normal form.

11. Define the partial order relation and partially ordered set (Po-set).

12. Differentiate Tree and Binary search Tree.

13. Prepare truth table for following statement -
$(PVq) \wedge \sim r \Rightarrow q$

14. Simplify the following
(i) $\sim(PVQ)\ V\ (\sim P \wedge Q)$
(ii) $PV\ (P \wedge Q)$

15. Define with example in a graph
(i) PATH
(ii) CIRCUIT

SECTION - B

(Long Answer type questions)

Note : Attempt **any three** questions. Each question carries 20 marks. 20x3=60

1. Define Generating Functions. Find the generating function of following series.
(i) 1, -1, 1, -1, 1, -1, ...
(ii) 1, 0, 0, 1, 0, 0, 1, 0, 0, ...

2. Prove that Boolean Algebra is a complemented Distributive Lattice.

3. (i) Write down the principle of Pigeonhole and mathematical induction.
(ii) Prove the following by using mathematical induction
$1 + 3 + 5 + ...+ (2n-1) = n^2$

4. (i) If A, B, C, be three non-empty sets, then prove that -
A x (BUC) = (AXB) U (AXC)

(ii) "The set IxI is a commutative ring with unity element with respect to addition and multiplication, defined as under :

$$(a,b) + (c,d) = (a+c, b+d)$$

$$(a,b).(c.d) = (ac, bd)$$

Where $a,b,c,d \in I$"

Prove whether it is correct or not.

5. Write a note on -

(i) Euler Graph

(ii) Hamiltonian Path and Circuit

(iii) Binary Search Tree

(iv) Universal and existential quantifiers.

6. In Boolean Algebra [B, + ., '] Prove that -

(i) $a+b = 0 \Leftrightarrow a=0, b=0$

(ii) $a.b' = 0 \Leftrightarrow a'+b=1$

(iii) $a+b=a+c$ and $a.b=a.c \Rightarrow b=c$

(iv) $[a+a'.b]\,[a'+ab]=b$

5. Give the definition of a Group.

6. Prove that in a group G, the identity element and the inverse of an element are unique.

7. Define the property of Isomorphism and Automorphism.

8. Write down the properties of a Ring.

9. Let $a, b \in I$, define $a \oplus b = a + b - 1$ and $a \odot b = a + b - ab$. Verify that $I \times I$ is a ring or not.

10. Write down the definition of Boolean algebra.

11. What do you mean by the Principle of duality?

12. $\forall a \in B$, prove that –

(i) $a + a = a$

(ii) $a.a = a$

13. Let $[B, +, \cdot, ']$ be a Boolean algebra and a, b be any two elements of B. Then prove that –

$$(a + b)' = a'.b'$$

14. Prove that in a Boolean algebra,

$$[a + a'b][a' + ab] = b$$

15. Define the LUB (Least Upper Bound) and GLB (Greater Lower Bound).

Section-B

(Long Answer Type Questions)

Note: Attempt any three questions. Each question carries 20 marks. **(20x3=60)**

1. In a Boolean Algebra $[B, +, \cdot, ']$ the relation " $\leq$ " is a partial ordered relation.

2. Prove that a Boolean Algebra is a complemented distributive Lattice.

3. If p, q and r are three statements then prove that –

(a) $p \wedge (q \vee r) \equiv (p \wedge q) \vee (p \wedge r)$

(b) $p \vee (q \wedge r) \equiv (p \vee q) \wedge (p \vee r)$

4. Solve the following recurrence relation for given boundary.

$$a_n = a_{n-1} + 2a_{n-2}, \qquad n \geq 2$$

$$a_0 = 2, \qquad a_1 = 7$$

5. Find the generating function of following series:

(i) $1, -1, 1, -1, 1, -1, \ldots\ldots$

(ii) $1, 0, 0, 1, 0, 0, 1, 0, 0, \ldots\ldots$

6. Define the following:

(i) Pigeonhole Principle

(ii) Principle of Induction

(iii) Spanning Tree

(iv) Open and Closed Walk

(v) Path & Circuit

Roll No. 1813810300145 | Total No. of Pages : 6

CS–301/2401

B. Tech. (Third Semester)

EXAMINATION, 2019

DISCRETE STRUCTURE

Time : Three Hours

Maximum Marks : 100

Note : Attempt questions from both Sections as directed.

Section—A

(Short Answer Type Questions)

Note : Attempt any *ten* questions. Each question carries 4 marks. 10×4=40

1. Two finite sets have m and n elements. The total number of subsets of the 1st set is 56 more than the total number of subsets of the second set. Find the values of m and n.

2. A survey shows that 73% of the Indian like apples, whereas 65% like oranges. What percentage of Indians like both apples and oranges.

3. Define binary search tree and, Hamiltonian path.

4. Define the following :

   (i) Bipartite graph

   (ii) Regular graph

5. Let :

$$A = \{1, 2, 3\}, B = \{p, q, r\}$$

and

$$C = \{x, y, z\}$$

and let

$$R = \{(1, p), (1, r), (2, q), (3, q)\}$$

and

$$S = \{(p, y), (q, x), (r, z)\}$$

Compute RoS.

6. Let A = {1, 2, 3} and R be a relation on A, given as R = {(1, 1), (1, 3), (2, 2), (3, 1), (3, 2)}. Find the transitive closure of R.

7. Consider the set N of natural numbers. Then, (N, +) and (N, ×) are monoid or not ?

8. Define POSETS.

9. Define Lattices.

10. Define minimal element and maximal element in Posets.

11. Define 'Ring'.

12. Define the following :

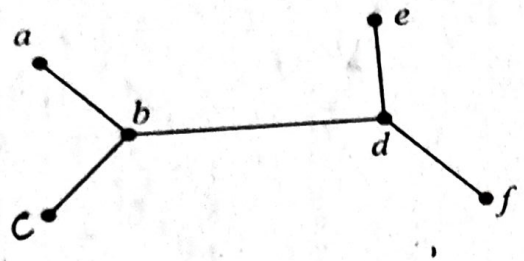
   (i) Group

   (ii) Abelian Group

13. Determine whether a semigroup with more than one idempotent elements can be a group.

14. Define spanning tree with example.

15. Find the eccentricity of all vertices of the tree shown in Figure :



Section—B

(Long Answer Type Questions)

Note : Attempt any *three* questions. Each question carries 20 marks. 3×20=60

1. (i) Prove that $n < 2^n$ for all positive integer n, usng Mathematical Induction.

   (ii) Define isomorphic posets and Euler graph.

2. Consider the following truth table :

P	Q	R	S (P, Q, R)
1	1	1	0
1	1	0	0

1	0	1	1
1	0	0	1
0	1	1	0
0	1	0	1
0	0	1	0
0	0	0	0

   (i) Construct Boolean expression having this table as its truth table.

   (ii) Construct a circuit having the given table as its Input/output table.

3. (i) Is the statement tautology ?

$$((p \to q) \wedge (q \to r)) \to (p \to r)$$

   (ii) Express the statement :

$$(\neg(p \vee q)) \vee ((\neg p) \wedge q)$$

   in the simplest possible form.

4. Let A be the set of factors of a particular positive integer m and let $\leq$ be the relation "divides" i. e. :

$$\leq = \{(x, y) : x \in A, y \in A \text{ and } x' \mid 'y\}$$

Draw Hash diagram for :

(i) $m = 12$

(ii) $m = 30$

(iii) $m = 45$

5. Define the following :

(i) Universal and Existential quantifier

(ii) Bounded Lattice and Complemented lattice

6. (a) (i) Find generating function of the discrete numeric function :

2, 3, 5, 9, 17, 33.....

(ii) Solve the recurrence relation :

$$a_r - 6a_{r-1} + 9a_{r-2} = 0$$

160

CS-301/2401

B.Tech. (Semester-III) Exam.–2016

Discrete Structures

Time : Three Hours
Maximum Marks : **100**

Note : Attempt questions from all sections.

SECTION - A

(Short-answer Type Questions)

Note : Attempt **any ten** questions. Each question carries 4 marks. 10×4=40

1. Prove that (A-B)UB = AUB.

2. If R is an equivalance rotation in a int A, then prove that R^{-1} is also an equivalance relation in A.

3. If f : A→B be one-one and onto, then prove that the inverse mapping of f is unique.

4. Define Algebraic structure and group.

5. Prove the theorem -
"In a group G, the identity element and the inverse of an element are unique".

6. Define Homomorphism and Isomorphism of Group.

7. Prove that the Ring of Integer I is an integral domain.

8. Differetiate Ring, Skew field and field.

9. Let [B, +, .;] be a Boolean Algebra and a, b∈B, then show that a+b = b ⇒a.b=a.

10. Convert the function $f(x, y, z) = (x.y^1 + x.z^1)^1 + x^1$ into disjunctive normal form.

11. Define the partial order relation and partially ordered set (Po-set).

12. Differentiate Tree and Binary search Tree.

13. Prepare truth table for following statement -

$$(P \vee q) \wedge \sim r \Rightarrow q$$

14. Simplify the following
(i) $\sim(P \vee Q) \vee (\sim P \wedge Q)$
(ii) $P \vee (P \wedge Q) = P$

15. Define with example in a graph
(i) PATH
(ii) CIRCUIT

SECTION - B

(Long Answer type questions)

Note : Attempt **any three** questions. Each question carries 20 marks. 20x3=60

1. Define Generating Functions. Find the generating function of following series.
(i) 1, -1, 1, -1, 1, -1, ...
(ii) 1, 0, 0, 1, 0, 0, 1, 0, 0, ...

2. Prove that Boolean Algebra is a complemented Distributive Lattice.

3. (i) Write down the principle of Pigeonhole and mathematical induction.
(ii) Prove the following by using mathematical induction
$1 + 3 + 5 + \ldots\ldots + (2n-1) = n^2$

4. (i) If A, B, C, be three non-empty sets, then prove that -
$A \times (B \cup C) = (A \times B) \cup (A \times C)$

(ii) "The set Ixl is a commutative ring with unity element with respect to addition and multiplication, defined as under :

$$(a,b) + (c,d) = (a+c, b+d)$$

$$(a,b).\ (c.d) = (ac, bd)$$

Where $a,b,c,d \in I$"

Prove whether it is correct or not.

5 Write a note on -

(i) Euler Graph

(ii) Hamiltonian Path and Circuit

(iii) Binary Search Tree

(iv) Universal and existential quantifiers.

In Boolean Algebra [B, + ., '] Prove that -

(i) $a+b = 0 \Leftrightarrow a=0, b=0$

(ii) $a.b' = 0 \Leftrightarrow a'+b=1$

(iii) $a+b=a+c$ and $a.b=a.c \Rightarrow b=c$

(iv) $[a+a'.b]\ [a'+ab]=b$

Roll No. ..... [Total No. of Pages : 7

CS–2401

B. Tech. (CS) (Third Semester)

EXAMINATION, 2020

DISCRETE STRUCTURE

Time : Three Hours

Maximum Marks : 100

Note : Attempt questions from both Sections as directed.

Section—A

(Short Answer Type Questions)

Note : Attempt any *ten* questions. Each question carries 4 marks. 10×4=40

1. Write down all possible subsets of A = {2, 3}.

2. In a survey it is found that 21 people like product A, 26 people like product B and 29 people like product C. If 14 people like products A and B; 15 like product B and C; 12 like product C and A; and 8 people like all the three products, find how many like product C only.

3. Let :

$$A = \{2, 4, 6\}$$

and $$B = \{1, 4, 5, 6\}$$

then find out the relation from A to B defined by 'is less than or equal to'. Find out the domain and range of the relation.

4. Let :

$$R = \{(1, 2), (1, 1), (1, 4), (3, 4), (2, 2)\}$$

be a relation on a set $A = \{1, 2, 3, 4\}$, find the symmetric closure of R.

5. Define injective function and surjective function.

6. Define principles of mathematical induction.

7. Define following :

   (i) Semigroup

   (ii) Monoids

8. Let :

$$G = \{1, \omega, \omega^2\}$$

where 1, ω, ω^2 are cube roots of unity. Show that (G, X) is an abelian group where 'X' is the ordinary multiplication.

9. Define greatest lower bound (glb) and least upper bound (lub) in POSETS.

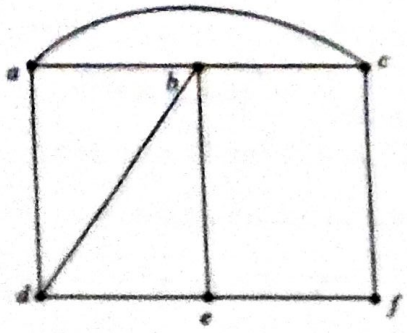
10. Prove that the number of vertices of odd degree in a graph is always even.

11. Define following :

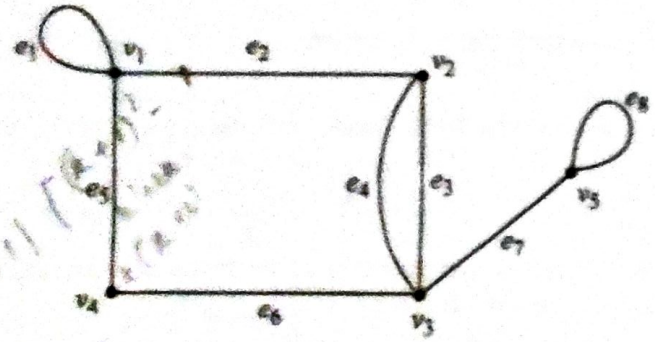
   (i) Degree of Vertex

   (ii) Pendent Vertex

12. Find the diameter of the connected graph shown in figure :



13. Represent the graph G shown in figure using an incidence matrix :



14. Define traversal algorithm (traversing the tree).

15. What is the value of the following prefix expression :

$$\uparrow - * 3\,3 * 4\,2\,5$$

Section—B

(Long Answer Type Questions)

Note : Attempt any *three* questions. Each question carries 20 marks. $3 \times 20 = 60$

1. (a) Prove that $n^3 - n$ is divisible by 3 whenever n is a positive integer. Using mathematical induction.

   (b) Define group homomorphism and isomorphism.

2. Let :

$$R = \{a, b, c, d\}$$

and define the operation + and . and R, as shown in table below :

+	a	b	c	d
a	a	b	c	d
b	b	a	d	c
c	c	d	b	a
d	d	c	a	b

.	a	b	c	d
a	a	a	a	a
b	a	a	b	a
c	a	b	c	d
d	a	a	d	a

Show that (R, +, .) is a ring.

3. Consider the Boolean function :

$$f(x_1, x_2, x_3, x_4) = x_1 + [x_2.(\bar{x}_1 + x_4) + x_3(\bar{x}_2 + \bar{x}_4)]$$

(i) Simplify f algebraically.

(ii) Draw the logic circuit of f and reduction of f.

(iii) Find the minterm normal form of f.

4. Obtain the equivalent conjunctive normal form or product of sum canonical form of Boolean expression in three variables x_1, x_2, x_3 :

(i) $x_1.x_2$

(ii) $x_1 + x_2$

5. (i) Show that :

$$\{[(p \vee q) \rightarrow r] \wedge (\neg p)\} \rightarrow (q \rightarrow r)$$

is a tautology without using truth tables.

(ii) Define the following :

(a) Bounded Lattice

(b) Distributive Lattice

6. (i) Solve the recurrence relation :

$$a_r - 5a_{r-1} + 6a_{r-2} = 0$$

where $a_0 = 2$ and $a_1 = 5$.

(ii) Find the generating function for the finite sequence :

3, 3, 3, 3, 3, 3, 3

80

CS-301/2401

B. Tech. (Semester-III) Examination–2013

Discrete Structures

Time: Three Hours

Maximum Marks: **100**

Note: Attempt questions from all the sections.

Section –A

(Short Answer Type Questions)

Note: Attempt any ten questions. Each question carries 4 marks. **(4x10=40)**

1. Prove that-
$(A - B) \cup B = A \cup B$.

2. Prove that-
$Ax(B - C) = (AxB) - (AxC)$.

3. If R is an equivalence relation in a set A, then prove that R^{-1} is also an equivalence relation in A.

4. Explain injective, subjective and bijective mapping.

5. If X and Y be two non-empty sets and f be a mapping of X into Y, then for any subsets A and B of Y, prove that- $f^{-1}(A \cap B) = f^{-1}(A) \cap f^{-1}(B)$.

6. Prove that n^{th} root of unity form a commutative group with respect to ordinary multiplication.

7. Define an abelian group with it's all properties.

8. Prove that the residue classes of integrn modulo m form an abelian group with respect to addition of classes modulo m.

9. Define Ring and Field.

10. Define Integral domain and Sub-Ring.

11. In a Boolean alzebra $(B, t; ;)$.
Prove that $(a + b).(a' + c) = a'.b + a.c.$

12. Show that for the Boolean alzebra [B, +; ;].
p.q.r+p.q.r'+p.q'.r+p'.g.r=p.g+g.r+r.p, ∀ p,q,r FB.

13. In a Boolean alzebra $(B, +; ;)$.
Prove that $[a + a; b].[a' + a.b] = b.$

14. Define Partial order relation.

15. Let A = {2,3,6,12,24,36} and the relation ≤ be such that $a \leq b$ if a divides b. Draw the Hasse diagram of $(A, \leq)$.

Section –B

(Long Answer Type Questions)

Note: Attempt any three questions. Each question carries 20 marks. **(20x3=60)**

1. Define Lattice. Prove that Boolean alzebra is a complemented, distributive lattice.

2. In a Boolean Alzebra, prove that:
   (i) $a + b = lub\ \{a, b\}$
   (ii) $a.b = glb\ \{a, b\}$

3. Prove that the set I X I is a commutative ring with unity element with respect to addition and multiplication defined as under-
$(a, b) + (c, d) = (a + c, b + d).$
$(a, b).(c, d) = (a.c, b.d).$

4. Define recurrence relation. Solve the following recurrence relation for given boundary conditions-

$a_n = a_{n-1} + 2_{an-2}, n \geq 2$

$a_o = 2, a_1 = 7.$

5. Define Generating Function. Find the generating function which generates 1,0,0, 1,0,0, 1,0,0, ...

6. Explain following terms with suitable examples-

(i) Tautology

(ii) Contradiction

(iii) Binary Tree

(iv) Complete Graph

(v) Directed Graph

Roll No. ..... [Total No. of Pages : 7

CS–2401

B. Tech. (CS) (Third Semester)

EXAMINATION, 2020

DISCRETE STRUCTURE

Time : Three Hours

Maximum Marks : 100

Note : Attempt questions from both Sections as directed.

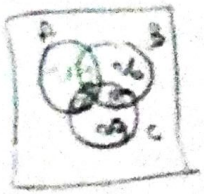
Section—A

(Short Answer Type Questions)

Note : Attempt any *ten* questions. Each question carries 4 marks. 10×4=40

1. Write down all possible subsets of A = {2, 3}.

2. In a survey it is found that 21 people like product A, 26 people like product B and 29 people like product C. If 14 people like products A and B; 15 like product B and C; 12 like product C and A; and 8 people like all the three products, find how many like product C only.



3. Let :

$$A = \{2, 4, 6\}$$

and

$$B = \{1, 4, 5, 6\}$$

then find out the relation from A to B defined by 'is less than or equal to'. Find out the domain and range of the relation.

4. Let :

$$R = \{(1, 2), (1, 1), (1, 4), (3, 4), (2, 2)\}$$

be a relation on a set $A = \{1, 2, 3, 4\}$, find the symmetric closure of R.

5. Define injective function and surjective function.

6. Define principles of mathematical induction.

7. Define following :

   (i) Semigroup

   (ii) Monoids

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9. Define greatest lower bound (glb) and least upper bound (lub) in POSETS.

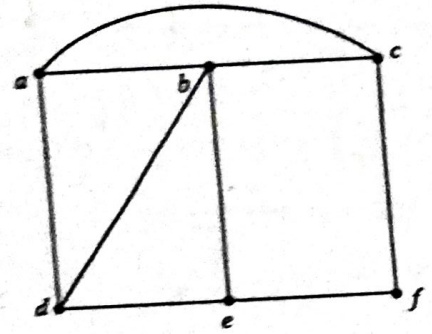
10. Prove that the number of vertices of odd degree in a graph is always even.

11. Define following :

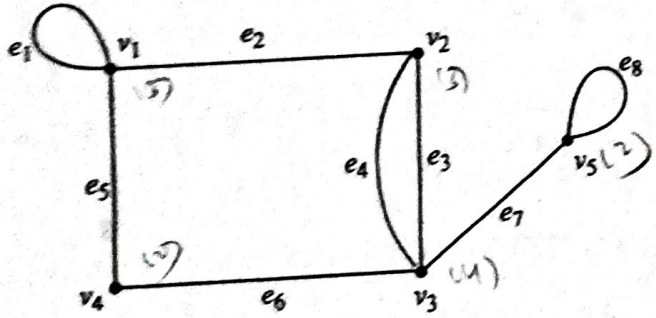
   (i) Degree of Vertex

   (ii) Pendent Vertex

12. Find the diameter of the connected graph shown in figure :



13. Represent the graph G shown in figure using an incidence matrix :



14. Define traversal algorithm (traversing the tree).

15. What is the value of the following prefix expression :

$$\uparrow - * 3\,3 * 4\,2\,5$$

Section—B

(Long Answer Type Questions)

Note : Attempt any *three* questions. Each question carries 20 marks. 3×20=60

1. (a) Prove that $n^3 - n$ is divisible by 3 whenever n is a positive integer. Using mathematical induction.

(b) Define group homomorphism and isomorphism.

2. Let :

$$R = \{a, b, c, d\}$$

and define the operation + and . and R, as shown in table below :

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a	a	b	c	d
b	b	a	d	c
c	c	d	b	a
d	d	c	a	b

.	a	b	c	d
a	a	a	a	a
b	a	a	b	a
c	a	b	c	d
d	a	a	d	a

Show that (R, +, .) is a ring.

3. Consider the Boolean function :

$$f(x_1, x_2, x_3, x_4) = x_1 + [x_2.(\bar{x}_1 + x_4) + x_3(\bar{x}_2 + \bar{x}_4)]$$

(i) Simplify f algebraically.

(ii) Draw the logic circuit of f and reduction of f.

(iii) Find the minterm normal form of f.

4. Obtain the equivalent conjunctive normal form or product of sum canonical form of Boolean expression in three variables x_1, x_2, x_3 :

(i) $x_1.x_2$

(ii) $x_1 + x_2$

5. (i) Show that :

$$\{[(p \vee q) \rightarrow r] \wedge (\neg p)\} \rightarrow (q \rightarrow r)$$

is a tautology without using truth tables.

(ii) Define the following :

(a) Bounded Lattice

(b) Distributive Lattice

(i) Solve the recurrence relation :

$$a_r - 5a_{r-1} + 6a_{r-2} = 0$$

where $a_0 = 2$ and $a_1 = 5$.

(ii) Find the generating function for the finite sequence :

3, 3, 3, 3, 3, 3, 3

80

CS-301/2401

B.Tech. (Semester-III) Exam.–2016

Discrete Structures

Time : Three Hours
Maximum Marks : **100**

Note : Attempt questions from all sections.

SECTION - A

(Short-answer Type Questions)

Note : Attempt **any ten** questions. Each question carries 4 marks. 10×4=40

1. Prove that (A-B)UB = AUB.

2. If R is an equivalance rotation in a int A, then prove that R^{-1} is also an equivalance relation in A.

3. If f : A→B be one-one and onto, then prove that the inverse mapping of f is unique.

4. Define Algebraic structure and group.

[P. T. O.

5. Prove the theorem -
"In a group G, the identity element and the inverse of an element are unique".

6. Define Homomorphism and Isomorphism of Group.

7. Prove that the Ring of Integer I is an integral domain.

8. Differetiate Ring, Skew field and field.

9. Let [B, +, .;] be a Boolean Algebra and a, b∈B, then show that a+b = b ⇒a.b=a.

10. Convert the function $f(x, y, z) = (x.y^{-1} + x.z^{1})^{1} + x^{1}$ into disjunctive normal form.

11. Define the partial order relation and partially ordered set (Po-set).

12. Differentiate Tree and Binary search Tree.

13. Prepare truth table for following statement -

$$(PVq)\wedge\sim r \Rightarrow q$$

14. Simplify the following
(i) ~(PVQ) V (~P∧Q)
(ii) PV (P∧Q)

15. Define with example in a graph
(i) PATH
(ii) CIRCUIT

SECTION - B

(Long Answer type questions)

Note : Attempt **any three** questions. Each question carries 20 marks. 20x3=60

1. Define Generating Functions. Find the generating function of following series.
(i) 1, -1, 1, -1, 1, -1, ...
(ii) 1, 0, 0, 1, 0, 0, 1, 0, 0, ...

2. Prove that Boolean Algebra is a complemented Distributive Lattice.

3. (i) Write down the principle of Pigeonhole and mathematical induction.
(ii) Prove the following by using mathematical induction

$$1 + 3 + 5 + \ldots\ldots + (2n-1) = n^2$$

4. (i) If A, B, C, be three non-empty sets, then prove that -

$$A \times (B \cup C) = (A \times B) \cup (A \times C)$$

(ii) "The set IxI is a commutative ring with unity element with respect to addition and multiplication, defined as under :

(a,b) + (c,d) = (a+c, b+d)

(a,b). (c.d) = (ac, bd)

Where a,b,c,d ∈ I"

Prove whether it is correct or not.

5. Write a note on -

(i) Euler Graph

(ii) Hamiltonian Path and Circuit

(iii) Binary Search Tree

(iv) Universal and existential quantifiers.

6. In Boolean Algebra [B, +, ., '] Prove that -

(i) $a+b = 0 \Leftrightarrow a=0, b=0$

(ii) $a.b' = 0 \Leftrightarrow a'+b=1$

(iii) $a+b=a+c$ and $a.b=a.c \Rightarrow b=c$

(iv) $[a+a'.b]\,[a'+ab]=b$

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Institute of Engineering & Technology, Bundelkhand University Jhansi

Roll No.--------------------------- **Sessional IIInd 2019-2**

B. Tech Computer Science & Engineering

Data Structure Using C (Semester III)

Time: 45 Minutes **Maximum Marks:**

Q1. What can be said about the array representation of a circular Queue when it contains only one elemen
(a) front=rear=Null (b) front= rear+1 (c) front= rear-1 (d) front= rear

Q2. The five items A, B, C, D and E pushed in stack, one after the other starting from A. The stack is popped four times and each element is inserted in a queue. Then two elements are deleted from the queue and pushed back on the stack. Now one item is popped from the stack the popped item is ___

Q3. Time required to search an element in a binary search tree having n elements is ____________.

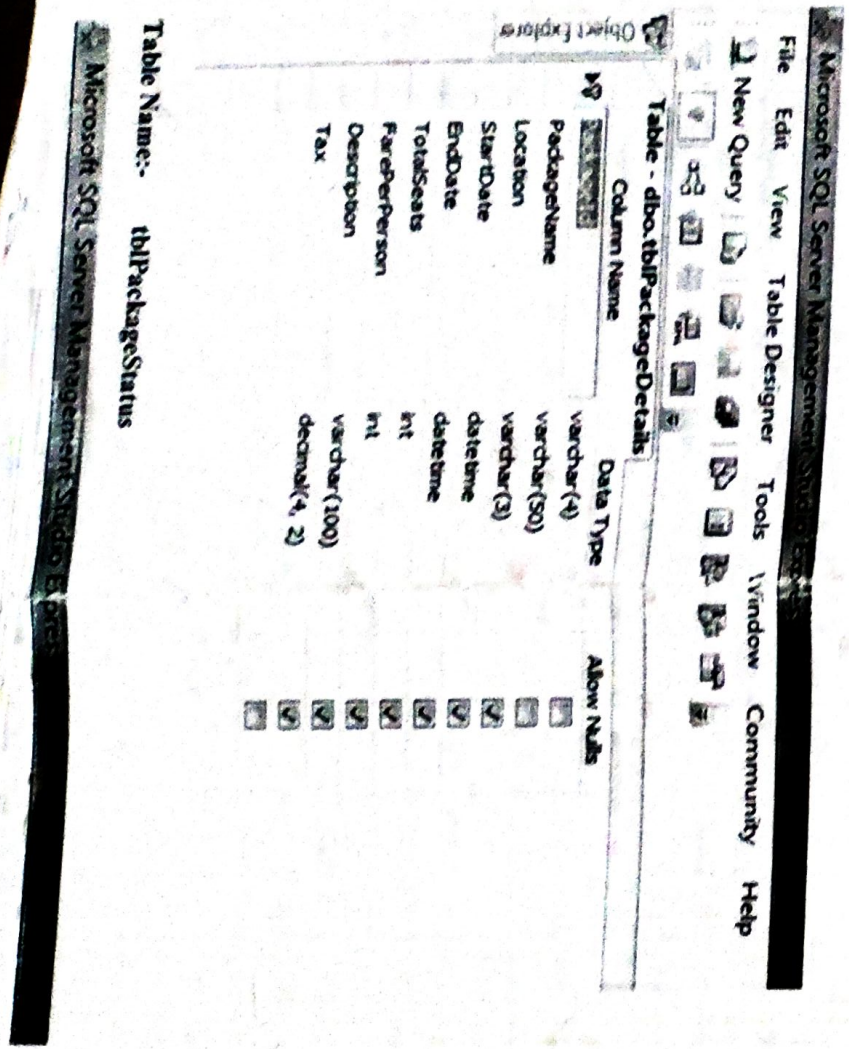
Q4. How many value can be held by an array A(-1…m, 1…m)?
(a) m (b) m^2 (c) m(m+1) (d) m(m+2)

Q5. Write a program segment to count non-zero elements of a Matrix.

Q6. Differentiate overflow and underflow condition in linked list.

Q7. Construct the expression tree. Find the equivalent postfix notation. For the following expression
$((((a * x + b) * x + c) * x + d) * x + c) * x + f$

Q8. Running Time of Quick sort. Best-case Analysis **OR**
Insert the following sequence of keys into an AVL tree. Find out the type of rotation required in eac
MAR, MAY, NOV, AUG APR, JAN, DEC, JUL, FEB, JUN.



CS-302/2402

B. Tech. (Semester-III) Exam.–2018

Data Structure Using 'C'

(Computer Engg.)

Time: Three Hours

Maximum Marks: **100**

Note: Attempt questions from all the sections.

Section-A

(Short Answer Type Questions)

Note: Attempt any ten questions. Each question carries 4 marks. **(4x10=40)**

1. What is data structure? Discuss the various implementation of data structure.

2. Determine the worst case time complexity following program.

```
for (i = 1; i <= n; i++)
for (j = i; j <= n; j++)
for (k = 1; k <= j; k++)
  a = 1;
```

3. What are the factors "measuring the Running Time of a Program (Time Complexity)"?

4. Calculate the address of $x[4,3]$ in a two dimensional array $x[1-5, 1-4]$ stored in row major order. Assume the base address to be 1000 and that each element required four words of storage.

5. Write algorithm for deleting the node pointed by pointer from a linear linked list implemented dynamically.

6. Write advantages and disadvantages of static stack.

7. Write the prefix form of the following expression:

(i) $a \&\& b \| c \| !(e > f)$

(ii) $[a + (b - c)] * [(d - e)/(f - g + h)]$

8. What is recursion? Illustrate how recursion can be replaced by iteration?

9. What is priority queue? How can you represent a priority queue in memory? Explain.

10. Write different traversal algorithm for (traversing) a binary tree.

11. Consider the algebraic expression

$$E = (3a + b)(5x - y)^2$$

Draw the tree T which corresponds to the expression E.

12. Draw a graph with five vertices each of degree four.

13. Implement Transposition of a sparse matrix in C language.

14. Write C function for Insertion sort.

15. Write note on B+ tree.

16. Write various applications of queue.

Section-B

(Long Answer Type Questions)

Note: Attempt any three questions. Each question carries 20 marks. **(20x3=60)**

1. (a) Suppose a singly linked list L is in memory write an algorithm which deletes the last node from L.

   (b) Write C program to create a singly linked list and split it at the middle and make second half as the first and vice-versa display the final list.

2. (a) Write a program in C to merge two one dimensional arrays.

Table Name:- tblPackageStatus

(b) Consider the following dequeue to character where DEQUE is a circular array which is allocated six memory cells.

LEFT = 2, RIGHT = 4, DEQUE: –, A, C, D, –, –.

Describe the deque while the following operations take place.

(a) F is added to right of the deque.

(b) Two letters on the right are deleted.

(c) K, L and M are added to the left of the deque.

(d) One letter on the left is deleted.

(e) R is added to the left of the deque.

(f) S is added to the right of the deque.

(g) T is added to the right of the deque.

3. (a) Write C Program for Binary search.

(b) Write C Program for bubble sort.

4. (a) What is AVL tree? Explain all the rotation in AVL tree.

(b) Insert the following sequence of keys into an AVL tree. Find out the type of rotation required in each case:

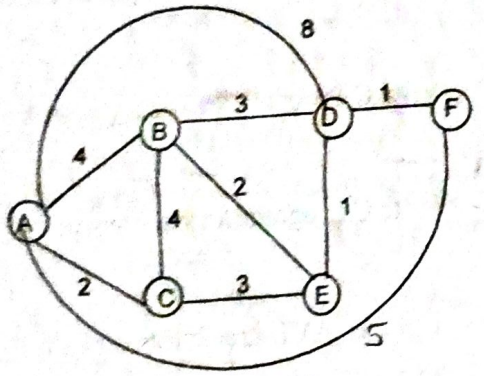
Mar, May, Nov, Aug, Apr, Jan, Dec, Jul, Feb, Jun

Table Name:- tblPackageStatus

Microsoft SQL Server Management Studio

(a) What do you understand by hashing? Explain the collision resolution strategies used in hashing.

(b) Draw the minimum cost spanning tree for the graph given below. Use Kruskal's algorithm.



6. Write short notes on the following –

(a) Hulfmann Algorithm

(b) Threaded binary tree

(c) B+ tree

(d) Insertion and deletion algorithm on B- Tree

Roll No. .....

...e Tower of Hanoi problem
...of disks are 4 and number of

CS-
...gorithm for a stack. What is

B. Tech. (CS)

EXAMIN...verse a string using stack ?

DATA STRUC...e and show how you can

Time : ...ng using stack.

Maximu...

...postfix expression. Assume

Note : Attempt questic... 2 :

directed.

Sec D* CAB – + *

(Short Answe...e notation ? Explain the bog

Note : Attempt any *ter*...

carries 4 marks.

...binary tree ? Explain the

1. Write and explain ... threaded binary tree.
largest element in a...

P. T. O.

gorithm to find the *k*th

8 of *n* elements.

5 (a) What do you understand la to find the address collision resolution strat ent in three-dimensional

(b) Draw the minimum cos ent takes four bytes of graph given below. Use K are stored in row major

al equation be represented

the method to add

ations using link list.

d a C function to reverse

in

linked list. Write an

an element from the

to evaluate the given

8. What is the Tower of Hanoi problem ? Explain the solutions of the Tower of Hanoi problem where the number of disks are 4 and number of pegs are 3.

9. Write deletion algorithm for a stack. What is its complexity ?

10. How can you reverse a string using stack ? Give *one* example and show how you can reverse a given string using stack.

11. Evaluate the given postfix expression. Assume A = 1, B = 3, C = 2 :

ABC + D* CAB – + *

12. What is asymptotic notation ? Explain the bog 'O' notation.

13. What is threaded binary tree ? Explain the important types of threaded binary tree.

14. Write an algorithm to count the leaf nodes of a binary tree.

15. Explain various hashing techniques.

Section—B

(Long Answer Type Questions)

Note : Attempt any *three* questions. Each question carries 20 marks. 3×20=60

1. Define the binary and the complete binary tree with example. Consider the following in-order and pre-order traversal of binary tree :

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

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

2. Define the B-tree. Explain the steps to build a B-tree of order 5 on the following sequence of input :

   65, 21, 13, 10, 96, 84, 73, 62, 41, 41, 56, 19, 15, 18, 31, 28, 30

CS-302/2402

B.Tech (Semester-III) Exam.–2016

Data Structure Using 'C'

(Computer Engg.)

Time : Three Hours
Maximum Marks : **100**

Note : Attempt questions from all sections.

SECTION - A

(Short-answer Type Questions)

Note : Attempt **any ten** questions. Each question carries 4 marks. 4×10=40

1. Write Kruskal's algorithm for finding minimal spanning trees.

2. What are the different Asymptotic notations used?

3. Describe the methods of analyzing an algorithm.

4. Give an algorithm to count the number of leaf nodes in a binary tree t.

[P. T. O.

5. What is B-Tree? Explain its properties.

6. Explain with example the Bubble sort using algorithms.

7. Explain with example pre-order, post-order and In-order traversal.

8. Explain how analysis of linear search is done with a suitable illustration.

9. What is divide and conquer strategy and give the quick sort algorithm.

10. Apply the quick sort technique on the following list.

L = {4, 5, 1, 7, 8, 9, 2, 88}

11. Define recurrence equation and explain how solving recurrence equation is done.

12. Write an algorithm to insert an item x just before the i^{th} element in a queue.

13. Write an algorithm for insertion sort.

14. Write an algorithm for selection sort.

15. Explain with example the depletion operation in Array using algorithm

SECTION - B

(Long Answer type questions)

Note Attempt **any three** questions. Each question carries 20 marks. 3x20=60

1 Write Floyd-Warsball algorithm to solve all pair shortest path problem. Also write its complexity

2 Show the result of inserting the following items in an initially empty B-tree of order 5

25, 31, 38, 76, 05, 60, 38, 08, 30, 15, 35, 17, 23, 53, 27, 43, 65, 48

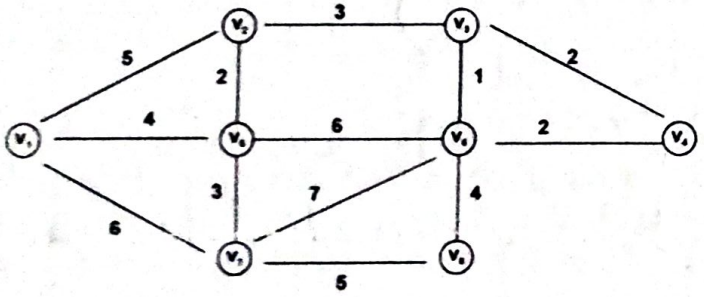
3 (i) Discuss Depth First Search Traversal algorithm and its significance with an example

(ii) Explain with example the B+ Tree

4 Explain with the example and algorithm the insertion and deletion operation in circular linked list.

5. Show the searching and Traversing operation in D-queues with algorithm and example.

6. For the graph shown below obtain the following
   (a) MST by Kruskal's Method
   (b) MST by Prim's Method



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A

EC - 302

Examination December - 2009

III[rd] Semester

B.Tech (Computer Engineering)

Switching Theory

Time: Three Hours

Maximum Marks :100

Note: Attempt all Sections.

Section - A

Note:- Attempet All Questions (10×2=20)

1. Verify that AND operation are both commutative and associative.
2. Prove that a positive logic NAND operation is equivalent to a negative logic NOR operation and vice-versa
3. Find 2's complement of $(111011011)_2$
4. Subtract $(0101)_2$ from $(0011)_2$
5. Convert $(11011011)_2$ → Gray code
6. Convert $(468)_{10}$ → Excess 3 code

PTO

Convert the following

7. $(63FE)_{16}$ → ( )$_2$ & ( )$_{10}$

8. $(68.49)_{10}$ → ( )$_2$ & ( )$_8$

9. $(3628)_{10}$ → ( )$_{BCD}$ & ( )$_2$

10. $(1101.001)_2$ → ( )$_{10}$ & ( )$_8$

Section - B

Note : Attempt any 8 questions. (8x5=40)

1. Prove $B \oplus (B \ominus A C) = AC$

2. Explain the operation of a positive edge triggered JK Flip-flop with truth – table.

3. Implement the given function by using NAND gate. Also verify the truth – table.

$$F = (AB + C\overline{D})(A\overline{C} + BD)$$

4. Implement the given function using 8:1 MUX.

$$F = (A\overline{B}CD + AB\overline{C}D + AB\overline{D} + \overline{A}BC\overline{D} + \overline{B}\overline{C}D.$$

5. Reduce the given expression to its simplest terms

$$F = (A + \overline{B} + \overline{C})(\overline{A} + B + C)(BC)$$

6. Explain decode counter with block diagram

7. Differentiate between static and dynamic hazards

8. Explain the operation of a Static RAM cell with suitable block diagram.

9. Compare the following technologies. nMOS, CMOS, TTL & ECL for delay power dissipation and area requirement.

10. Differentiate between BJT & MOS devices. Write at least 4 advantages & disadvantages.

11. The min terms of the function are given deduce it and express the function in both SOP & POS forms.

$$F(w, x, y, z) = \sum(0, 1, 6, 8, 9, 11, 14, 15)$$

12. Explain cyclic codes by taking a suitable example.

Section - C

Note : Attempt any **two** questions. (2x20=40)

1. (a) Describe the operation of a Master – Slave flip-flop. The J-K master-slave flip-flop has its J-K input tied to Vcc and a series of square pulses are applied to the clock input. Describe the wave form at Q. (15)

(b) What are the differences between an edge- triggered and the pulse-triggered J-K flip-flop? (5)

2. (a) Design a 4 bit comparator and write its expression for A<B, A=B and A>B (12)

(b) Design a 4 bit binary adder using Half Adders. (8)

3. Design a 4 bit bidirectional shift register with proper block schematic and explain the operation with function table. (20)

4. Deduce the given function using k-Maps. Realize the reduced function using combination of universal gates.

$$F(A,B,C,D,E) = \bar{A}BC\bar{D}E + \bar{A}\bar{B}C\bar{D}E + ABC\bar{D}\bar{E}$$
$$+A\bar{B}C\bar{D}E + \bar{A}BC\bar{D}E + ABC\bar{D}\bar{E} + A\bar{B}C\bar{D}E$$
$$+\bar{A}BC\bar{D}\bar{E} + \bar{A}BC\bar{D}E + \bar{A}BC\bar{D}E$$

4. Give the classification of digital logic families and describe various characteristics of digital ICs.

5. Minimize the following expression using K-map and realize using basic gates :

$$Y = \Sigma m (1, 2, 9, 10, 11, 14, 15)$$

6. Explain the following :

(i) ECL

(ii) Cache Memory

(iii) Decade Counter

(iv) Priority Encoder

(6) Design a 4 bit binary adder using Half Adders. (8)

3. Design a 4 bit bidirectional shift register with proper block schematic and explain the operation with function table. (20)

4. Deduce the given function using k-Maps. Realize the reduced function using combination of universal gates.

$$F(A,B,C,D,E) = \bar{A}BC\bar{D}E + \bar{A}\bar{B}\bar{C}\bar{D}E + ABC\bar{D}\bar{E}$$
$$+A\bar{B}\bar{C}\bar{D}E + \bar{A}\bar{B}C\bar{D}E + ABC\bar{D}\bar{E} + A\bar{B}C\bar{D}E$$
$$+\bar{A}\bar{B}C\bar{D}\bar{E} + \bar{A}\bar{B}\bar{C}\bar{D}\bar{E} + \bar{A}\bar{B}C\bar{D}E.$$

Roll No. ..... [Total No. of Pages : 4

CS–2405

B. Tech. (CS) (Third Semester)

EXAMINATION, 2020

DIGITAL LOGIC DESIGN

Time : Three Hours

Maximum Marks : 100

Note : Attempt questions from both Sections as directed.

Section—A

(Short Answer Type Questions)

Note : Attempt any *ten* questions. Each question carries 4 marks. 10×4=40

1. Convert the following :
   (i) $(63.725)_8$ to binary
   (ii) $(412.412)_{10}$ to octal
2. Describe universal logic gates.

3. State DeMorgan's theorem and prove using an example.
4. Explain half adder.
5. What is multiplexer ? Explain.
6. Give the classification of memories.
7. Explain T-flip flop.
8. Explain ASM chart.
9. Differentiate synchronous and asynchronous sequential circuits.
10. Simplify the following Boolean expression :

$$Y = \overline{(\overline{AB} + \overline{A} + AB)}$$

11. Construct EX-OR gate using NAND and NOR gates.
12. Draw the logic circuit for the following Boolean expression using basic logic gates :

(i) $Y = \overline{AB} + C$

(ii) $Y = AC + B\overline{C} + \overline{A}BC$

13. Subtract the following binary numbers using 2's complement :

(i) $(11101)_2 - (1100)_2$

(ii) $(1100)_2 - (11101)_2$

14. What is Race Condition ?
15. Define static and dynamic hazard.

Section—B

(Long Answer Type Questions)

Note : Attempt any *three* questions. Each question carries 20 marks. 3×20=60

1. (a) Describe master slave JK flip-flop.

   (b) Explain shift left register.

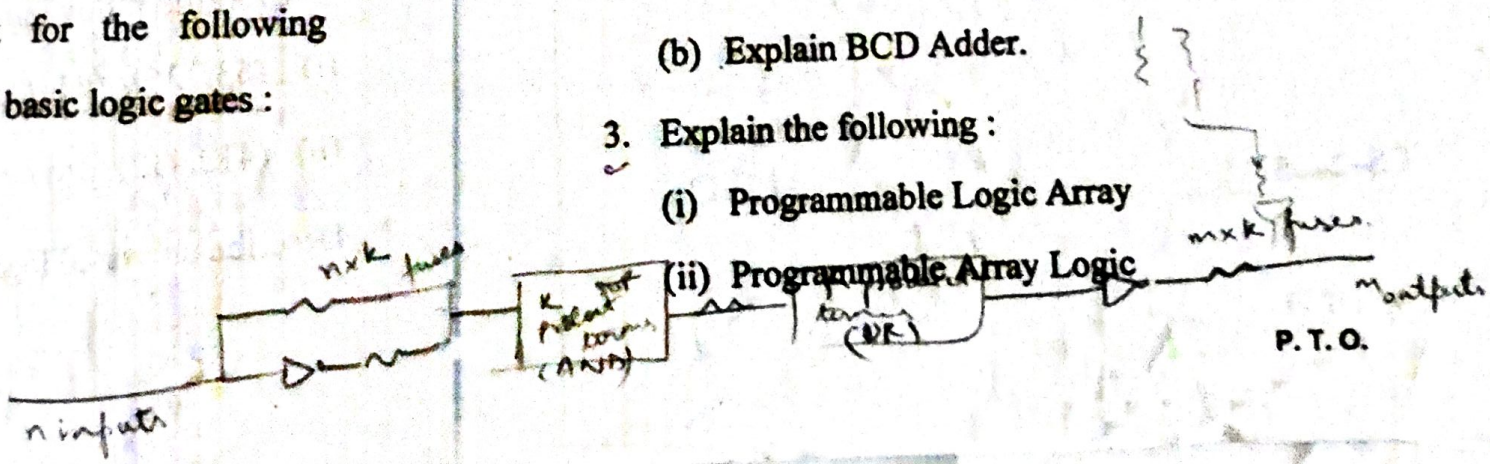
2. (a) With the help of suitable diagram explain 3 to 8 decoder.

   (b) Explain BCD Adder.

3. Explain the following :

   (i) Programmable Logic Array

   (ii) Programmable Array Logic



4. Give the classification of digital logic families and describe various characteristics of digital ICs.

5. Minimize the following expression using K-map and realize using basic gates :

$$Y = \Sigma m (1, 2, 9, 10, 11, 14, 15)$$

6. Explain the following :

(i) ECL

(ii) Cache Memory

(iii) Decade Counter

(iv) Priority Encoder

4. Explain the following :

(i) Octal to binary encoder

(ii) 3 to 8 line decoder

5. (a) Draw the circuit diagram of :

(i) CMOS AND gate

(ii) CMOS OR gate

(b) Explain MOS state RAM cell.

6. (a) Draw the block diagram of a PLA device and explain.

(b) Explain magnitude comparator.

4. Give the classification of digital logic families and describe various characteristics of digital ICs.

5. Minimize the following expression using K-map and realize using basic gates :

$$Y = \Sigma m (1, 2, 9, 10, 11, 14, 15)$$

6. Explain the following :

(i) ECL

(ii) Cache Memory

(iii) Decade Counter

(iv) Priority Encoder

Roll No. [illegible] [Total No. of Pages : 4

CS–2404(N)

B. Tech. (CS) (Third Semester)

EXAMINATION, 2019

DIGITAL LOGIC DESIGN

Time : Three Hours

Maximum Marks : 100

Note : Attempt questions from both Sections as directed.

Section—A

(Short Answer Type Questions)

Note : Attempt any *ten* questions. Each question carries 4 marks. 10×4=40

1. Convert the following :

(i) $(13.25)_{10}$ to binary

(ii) $(1CD.2A)_{16}$ to binary

(iii) $(11011.1011)_2$ to decimal

(iv) $(570)_{10}$ to octal

2. Describe the basic logic gates with their logic circuit and truth table.

3. Prove the following Boolean expression using Boolean algebra :

$$(A + B)(\overline{A}\,\overline{C} + C)(\overline{\overline{B} + AC}) = \overline{A}\,B$$

4. Subtract using 2's complement :

(i) $(1)_2$ from $(100)_2$

(ii) $(0101)_2$ from $(1110)_2$

5. Simplify :

$F(A, B, C, D,) = \Sigma M(0, 1, 4, 5, 8, 10)$

using K-map.

6. Differentiate asynchronous and synchronous sequential circuits.

7. Discuss CE transistor as a switch.

8. Give the classification of bipolar logic families.

9. Describe fan in and fan out characteristic.

10. Classify the memories.

11. Describe full adder with truth table.

12. Construct AND gate using NOR gates and OR gate using NAND gates.

13. Describe ripple counter.

14. Explain D-flip flop.

15. Discuss half subtractor circuit.

Section—B

(Long Answer Type Questions)

Note : Attempt any *three* questions. Each question carries 20 marks. 3×20=60

1. (a) Describe the working of positive edge triggered SR flip flop.

   (b) Describe 8 : 1 multiplexer.

2. (a) Explain the working of shift right register.

   (b) Explain decade counter.

3. (a) Explain BCD adder.

   (b) Draw the block diagram of BCD to binary convertor IC 74184 and explain.

4. Explain the following :

(i) Octal to binary encoder

(ii) 3 to 8 line decoder

5. (a) Draw the circuit diagram of :

(i) CMOS AND gate

(ii) CMOS OR gate

(b) Explain MOS state RAM cell.

6. (a) Draw the block diagram of a PLA device and explain.

(b) Explain magnitude comparator.

160

8. Find r's complement of $(r^n - 1)$.

(a) $(75256)_{10}$

(b) $(101101)_2$

9. Write difference between PLA and PAL.

10. Explain the working of master slave flip flop.

11. Convert the following octal number to decimal number

(a) (763.45)

(b) 467.32

12. Design a full adder using ROM.

13. Design Decimal to BCD encoder.

14. Define Multiplexer and Demultiplexer. Write its application.

15. Implement the following function using 8:1 MUX

$F(ABCD) = \pi M(0,3,5,6,8,9,10,12,14)$

Section – B

Note : Attempt any three questions. **(20x3=60)**

1. Design a BCD to excess 3 code converter. Write its truth table and logic diagram.

2. Write short notes on following:

(i) EEPROM

(ii) PROM

(iii) Parity Bit

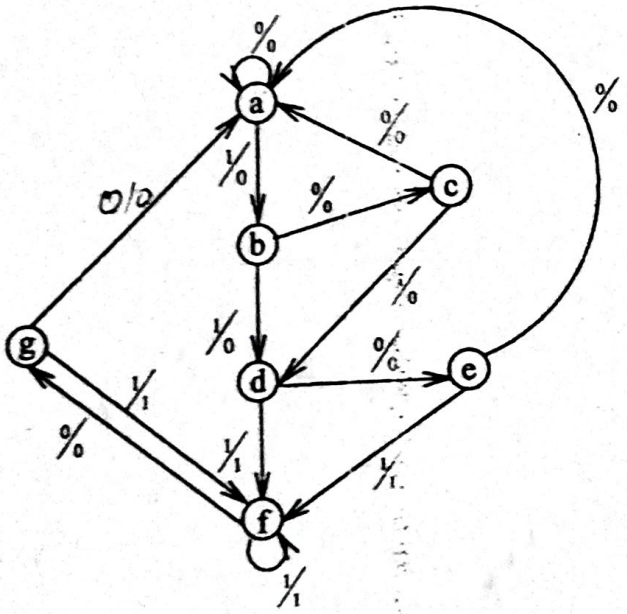
(iv) Flash Memory

(v) Edge Triggering flip-flop

3. (a) Draw a 4 bit down counter. Explain its working with diagram and truth table.

(b) Explain in brief JK Flip Flop.

4. Obtained the reduced state table and state diagram for a sequential circuit whose state diagram is



5. (a) Implement the following Boolean function with NOR-NOR logic

$F(ABC) = \pi(0,2,4,5,6)$,

EC-302/2315/2405

B.Tech. [EC] (Semester-III) Exam.–2015

Switching Theory

Time : Three Hours
Maximum Marks : **100**

Note : Attempt questions from all sections.

SECTION - A

(Short-answer Type Questions)

Note : Attempt **any ten** questions. Each question carries 04 marks. 10x4=40

1. What are Nibble?
2. Convert $(3000.45)_{10}$ into its equivalent octal number.
3. Write the advantages of Binary codes?
4. Prove the following boolean function
   (a) $A + AB = A$ (b) $A + \bar{A}B = A + B$
5. Explain Product of Sum (POS).

[P

6. For the logical expression given below, draw the K_{map} and obtain the simplified expression.

4. $Y = \bar{A}\bar{B}\bar{C}D + \bar{A}B\bar{C}D + A\bar{B}\bar{C}D + \bar{A}BCD$

7. Explain Universal Gate?

8. Explain Half adder?

9. Explain encoders? Also write its type?

10. Explain State Diagram?

11. Write the classification of registers?

12. Explain classification of memories based on the principle of operation?

13. Write the advantages of ROM?

14. Write the comparision among TTL, CMOS and ECL?

5.

15. Explain Fan-IN and Fan-Out?

SECTION - B

(Long-answer Type Questions)

Note : Attempt **any three** questions. Each question carries 20 marks. 20x3=60

1. Find the minimal expression for the following function using N Quine Mc-Cluskey method?

$f(A,B,C,D) = \Sigma m\,(0,1,4,6,8,9,10,12 + d\,(5,7,14)$

2. (a) $Y = A\bar{B}C + B\bar{C}D + \bar{A}BC$

(i) Simplify this equation and realize using basic gates.

(ii) Realize the simplified equation using only NOR gates.

(b) Implement the following function using an 8:1 MUX.

$f(A,B,C,D) = \pi M\,(0,2,4,6,8,10,12,14)$

3. Convert the following :

(a) JK to SR flip flop.

(b) D to SR flip flop.

4. Design a MOD-9 counter using T flip flop.

5. (a) Comparison between CMOS and TTL.

   (b) Explain CMOS as a NAND gate.

6. (a) Explain classification of Hazards.

   (b) Explain PAL.

EC-302/2405

B. Tech. (EC) (Semester-III) Examination-2012

Switching Theory

Time: Three Hours

Maximum Marks: 100

Note: Attempt questions from all the Sections.

Section-A

(Short Answer Type Questions)

Note: Attempt any ten questions from this section. Each question carries 4 marks. (4x10=40)

1. Design a Half Adder using two Half Adder

2. Design Excess 3 code to BCD code converter.

3. Explain Race Around Condition.

4. Simplify using K Map
   $F(A, B, C, D) = \pi m(1, 3, 7, 11, 15) + d(0, 2, 5)$

5. What are the different types of logic hazards?

6. Design a Full Adder using 8: 1 MUX ICs.

7. Differentiate between combinational & sequential logic circuits.

8. Convert the following:

(i) $(CF.5)_{16} \rightarrow (\quad)_{10}$

(ii) $(\quad)_{7} \rightarrow (152)_{8}$

(iii) (100 100 111000. 0111) BCD → ( ) 10

(iv) $(F4\ D2)_{16} \rightarrow (\quad)_{10}$

9. Write the characteristics equation of all Flip Flops.

10. Implement the Boolean Expression using only NAND gates.

$$Y = \overline{(A + B)C}D$$

11. A staircase light is controlled by two switches one at the top of stair and another at the bottom of stair case.

(i) Make a Truth for this system

(ii) Write the logic equation

(iii) Realize the circuit using AND- OR gates.

12. Simplify the Boolean Expression.

(i) $(\bar{A} + B)(A+B+D)\bar{D}$

(ii) $B(A + \bar{B})(B + C)$

13. Design Octal to Binary Encoder.

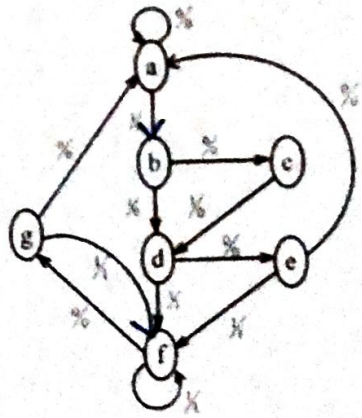
14. Explain D & T Flip Flop.

Section-B

(Long Answer Type Questions)

Note: Attempt any three questions from this section. Each question carries 20 marks. (20x3=60)

1. Obtain the reduced state table and reduced state diagram for a sequential circuit whose state diagram is shown below:



2. A sequential circuit with two D Flip Flops A and B input X and output Y is specified by the following next state and output equations.

$A(t+1) = A X + B X$

$B(t+1) = A' X$

$Y = (A+B) X'$

(a) Draw the logic diagram of ckt.

(b) Derive the state table.

(c) Derive the sate diagram.

3. Write short notes on following:

(i) HAZARDS (ii) LATCHES & FLIP FLOP

(iii) PLA & PAL (iv) RAM

4. (a) Explain JK Flip Flop.

(b) Design a synchronous Binary MOD & Counter.

5. Simplify the following Boolean function using Quine-Mc- clunkey method.

$Y(A, B, C, D) \sum_m(1, 2, 3, 5, 9, 12, 14, 15) + d(4, 8, 11)$

6. (a) Convert R_s to JK Flip Flop.

(b) Construct an ASM chart for a digital system that counts the number of people in a room. People enter the room from one door with a photo cell that changes a signal A from 1 to 0. When the light is interrupted. They leave the room from a second door with a similar photo cell with a signal B. Both A & B are synchronized with the clock, but they may stay on or off for more than one clock period.

EC-2315/2405(O)

B.Tech. [EC] (Semester-III) Exam.-2016

Switching Theory

Time : Three Hours

Maximum Marks : 100

Note : Attempt questions from all sections.

SECTION - A

(Short-answer Type Questions)

Note : Attempt any ten questions. Each question carries 4 marks. 10×4=40

1. Convert $(25)_8$ in to hexadecimal.

2. Explain gray codes.

3. Prove the following Boolean function.

(a) A + AB + AB = A

(b) $A + \bar{A}B = A + B$

2. A sequential circuit with two D Flip Flops A and B input X and output Y is specified by the following next state and output equations.

$A(t+1) = A X + B X$

$B(t+1) = A' X$

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EC-2315/2405(O)

B.Tech. [EC] (Semester-III) Exam.–2016

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Time : Three Hours

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SECTION - A

(Short-answer Type Questions)

Note : Attempt **any ten** questions. Each question carries 4 marks. 10×4=40

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3. Prove the following Boolean function.

(a) $A + AB + AB = A$

(b) $A + \bar{A}B = A + B$

[P. T. O.

4. Explain the SOP form.

5. Explain half subtractor.

6. Explain two bit magnitude comparator.

7. Explain the working of CMOS.

8. Explain 2 : 4 encoder?

9. Explain 2's complement.

10. Explain AND and OR Law to bolean function.

11. What is the difference between combinational & sequential circuit.

12. What is the difference between RAM & ROM?

13. Perform $(1011)_{82}$ - $(0100)_2$ using 1's complement method.

14. Determine the value of base x if $(211)_x = (152)_8$.

15. Convert $(1011011.011)_2$ into octal number.

SECTION - B

(Long Answer type questions)

Note : Attempt **any three** questions. Each question carries 20 marks. 3x20=60

1. Simplify the following Boolean expression using K-map & verify it using Quine-Mccluskey Method $f(A,B,C,D) = \Sigma M(0,1,3,7,8,9,11,15)$

2. Minimize the following expression using K-map
$f = \Sigma m\ (0,1,2,5,13,15)$

3. Implement the following logic function using 4 : 1 multiplexer $f(A, B, C) = \pi M(0,1,3,5,7)$ and implement a full adder circuit using two 4 : 1 multiplexers.

4. Explain the working of J-K flip-flop and what is race around condition.

5. Using any type of flip-flop, design an 4-bit synchronous counter that up count in gray code.

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EC-302/2405

B. Tech. (EC) (Semester-III) Examination-2012

Switching Theory

Time: Three Hours

Maximum Marks: **100**

Note: Attempt questions from all the Sections.

Section-A

(Short Answer Type Questions)

Note: Attempt any ten questions from this section. Each question carries 4 marks. **(4x10=40)**

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2. Design Excess 3 code to BCD code converter.

3. Explain Race Around Condition.

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   $F(A, B, C, D) = \pi m (1, 3, 7, 11, 15) + d (0, 2, 5)$

5. What are the different types of logic hazards?

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$$Y = \overline{(A + B)C}D$$

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(i) Make a Truth for this system

(ii) Write the logic equation

(iii) Realize the circuit using AND- OR gates.

12. Simplify the Boolean Expression.

(i) $(\bar{A} + B)(A+B+D)\,\bar{D}$

(ii) $B(A + \bar{B})\,(B + C)$

13. Design Octal to Binary Encoder.

14. Explain D & T Flip Flop.

Section-B

(Long Answer Type Questions)

Note: Attempt any three questions from this section. Each question carries 20 marks. (20x3=60)

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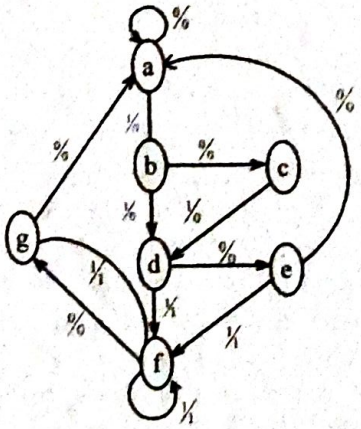

2. A sequential circuit with two D Flip Flops A and B input X and output Y is specified by the following next state and output equations.

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(b) Design a synchronous Binary MOD & Counter.

5. Simplify the following Boolean function using Quine-Mc- cluskey method.

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Roll No. ..... **[Total No. of Pages : 4**

CS–2405

B. Tech. (CS) (Third Semester)

EXAMINATION, 2020

DIGITAL LOGIC DESIGN

Time : Three Hours

Maximum Marks : 100

Note : Attempt questions from both Sections as directed.

Section—A

(Short Answer Type Questions)

Note : Attempt any *ten* questions. Each question carries 4 marks. 10×4=40

1. **Convert the following :**

(i) $(63.725)_8$ to binary

(ii) $(412.412)_{10}$ to octal

2. **Describe universal logic gates.**

3. State DeMorgan's theorem and prove using an example.

4. Explain half adder.

5. What is multiplexer ? Explain.

6. Give the classification of memories.

7. Explain T-flip flop.

8. Explain ASM chart.

9. Differentiate synchronous and asynchronous sequential circuits.

10. Simplify the following Boolean expression :

$$Y = \overline{(\overline{AB} + \overline{A} + AB)}$$

11. Construct EX-OR gate using NAND and NOR gates.

12. Draw the logic circuit for the following Boolean expression using basic logic gates :

(i) $Y = \overline{AB} + C$

(ii) $Y = AC + B\overline{C} + \overline{A}BC$

13. Subtract the following binary numbers using 2's complement :

(i) $(11101)_2 - (1100)_2$

(ii) $(1100)_2 - (11101)_2$

14. What is Race Condition ?

15. Define static and dynamic hazard.

Section—B

(Long Answer Type Questions)

Note : Attempt any *three* questions. Each question carries 20 marks. 3×20=60

1. (a) Describe master slave JK flip-flop.

   (b) Explain shift left register.

2. (a) With the help of suitable diagram explain 3 to 8 decoder.

   (b) Explain BCD Adder.

3. Explain the following :

   (i) Programmable Logic Array

   (ii) Programmable Array Logic

4. Give the classification of digital logic families and describe various characteristics of digital ICs.

5. Minimize the following expression using K-map and realize using basic gates :

$$Y = \Sigma m (1, 2, 9, 10, 11, 14, 15)$$

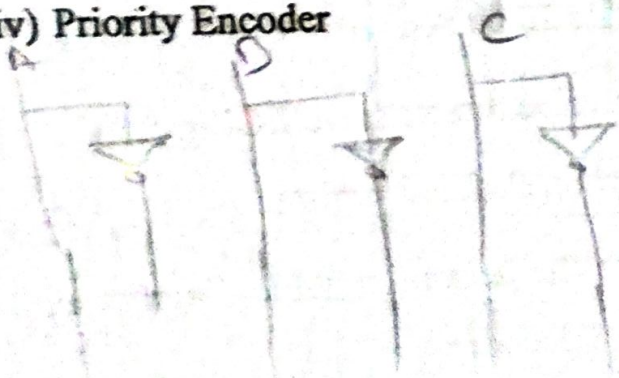
6. Explain the following :

   (i) ECL

   (ii) Cache Memory

   (iii) Decade Counter

   (iv) Priority Encoder



$\bar{A}B + AC$

$A\bar{B} + \bar{B}C$

$\bar{A}B + \bar{A}C + AB\,C$