C24_CURRICULUM

DIPLOMA IN COMPUTER SCIENCE & ENGINEERING

Offered By

STATE BOARD OF

TECHNICAL EDUCATION AND TRAINING TELANGANA HYDERABAD

III SEMESTER

S. NO	Course		Teaching Scheme					Examination Scheme						
			Instruction Periods per week			Total Periods per semester	Credits	Continuous Internal Evaluation (CIE)			Semester End Examination (SEE)			
	Code	Course Name	L	T	P			Mid Sem 1	Mid Sem 2	Internal Evaluation	Max marks	Min marks	Total Marks	Min marks for passing including internal
1	SC-301	Applied Engineering Mathematics	4	1	0	75	2.5	20	20	20	40	14	100	End Marks shall be ≥35% of Topper Marks and Subject Total Shall be ≥ D-Hybrid Grade Minimum
2	EC-302	Digital Electronics	4	1	0	75	2.5	20	20	20	40	14	100	
3	CS-303	Data Structures Through C	4	1	0	75	2.5	20	20	20	40	14	100	
4	CS-304	OOPS Through C++	4	1	0	75	2.5	20	20	20	40	14	100	
5	CS-305	Computer Organisation and Architecture	4	1	0	75	2.5	20	20	20	40	14	100	
6	CS-306	Computer Networks	4	1	0	75	2.5	20	20	20	40	14	100	
7	EC-307	Digital Electronics Lab	1	0	2	45	1.25	20	20	20	40	20	100	End Marks shall be ≥50% of Topper Marks and Subject Total Shall be ≥ D-Hybrid Grade Minimum
8	CS-308	Data Structures Through C Lab	1	0	2	45	1.25	20	20	20	40	20	100	
9	CS-309	OOPS Through C++ Lab	1	0	2	45	1.25	20	20	20	40	20	100	
10	HU-310	Communication Skills and Life skills Lab	1	0	2	45	1.25	20	20	20	40	20	100	
			28	6	8	630	20	200	200	200	400	164	1000	

SC-301-APPLIED ENGINEERING MATHEMATICS

Course Title	Applied Engineering Mathematics	Course Code	SC-301
Semester	III	Course Group	Foundation
Teaching Scheme in Periods (L : T : P)	4:1:0	Credits	2.5
Methodology	Lecture + Tutorial	Total Contact Periods	75
CIE	60 Marks	SEE	40 Marks

Pre requisites:

This course requires the knowledge of Basic Engineering Mathematics and Engineering Mathematics at Diploma 1st and 2nd Semester level.

Course Outcomes (COs):

At the end of the course, the student will have the ability to:

CO 1	Evaluate the Indefinite Integrals of various functions.by Using substitution method
CO 2	Integrate various continuous functions using different methods of integration
CO 3	Integrate various functions by using Partial fractions and Integration by parts method.
CO 4	Evaluate the Definite Integrals using Fundamental Theorem of Integral Calculus and its properties.
CO 5	Compute the Areas of irregular shapes and Volumes of solids of revolution using the concept of Definite Integrals.
CO 6	Find the Mean and RMS values of various functions in engineering problems and evaluate Numerical problems in engineering by using Trapezoidal and Simpson's 1/3rd rule.

Course Content:

Unit-I Indefinite Integration – I: **Duration: 13Periods (L: 10– T:3)**

Integration as an inverse process of Differentiation- Indefinite integral of standard functions- Properties of Indefinite Integral- Integration by Substitution - Integrals using Trigonometric identities of the form: $\int \sin^2 x\, dx, \int \cos^2 x\, dx, \int \sin^3 x\, dx, \int \cos^3 x\, dx, \int \sin Ax \cos Bx\, dx, \int \cos Ax \cos Bx\, dx$ and $\int \sin Ax \sin Bx\, dx$, where A and B are constants- Integrals of tan x, cot x, sec x and cosec x-Integrals of the form $\int \sin^m x . \cos^n dx$ and $\int \tan^m x . \sec^n dx$, where m and n are positive integers.

Unit – II Indefinite Integration – II: **Duration: 12Periods (L: 10– T:2)**

Integrals of some particular functions (Nine standard integrals) of the type:$\int \frac{1}{a^2+x^2}\,dx$, $\int \frac{1}{a^2-x^2}\,dx$, $\int \frac{1}{x^2-a^2}\,dx$, $\int \frac{1}{\sqrt{a^2+x^2}}\,dx$, $\int \frac{1}{\sqrt{a^2-x^2}}\,dx$, $\int \frac{1}{\sqrt{x^2-a^2}}\,dx$, $\int \sqrt{a^2+x^2}\,dx$, $\int \sqrt{a^2-x^2}\,dx$and$\int \sqrt{x^2-a^2}\,dx$ - Integrals of the type: $\int \frac{1}{ax^2+bx+c}\,dx$,$\int \frac{1}{\sqrt{ax^2+bx+c}}\,dx$,$\int \sqrt{ax^2+bx+c}\,dx$, $\int \frac{px+q}{ax^2+bx+c}\,dx$, $\int \frac{px+q}{\sqrt{ax^2+bx+c}}\,dx$,$\int (px+q\sqrt{ax2+bx+c+}$, $\int \frac{1}{a\pm bsinx}\,dx$,$\int \frac{1}{a\pm bcosx}\,dxand\int \frac{1}{asinx\pm bcosx\pm c}\,dx$,where *a, b, c, p* and *q* are constants.

Unit-III Indefinite Integration–III: **Duration: 12 Periods (L: 10 – T:2)**

Integration by using Partial fractions-Integration by parts - Bernoulli's rule for integration by parts - Integrals of the type: $\int e^{ax}\sin bx\,dx$, $\int e^{ax}\cos bx\,dx$ and$\int e^x[f(x)+f'(x)]dx$,where a and b are constants.

Unit – IV Definite Integral and its Properties: **Duration:13Periods(L: 10 – T:3)**

Definite integral - Fundamental Theorem of Integral Calculus –Evaluation of definite integrals by Substitution Method- Properties of Definite Integrals -Evaluation of Definite integrals by applying their properties.

Unit – V Applications of Definite Integrals: **Duration: 13Periods (L: 10 – T:3)**

Areas under simple curves -Sign of the Area -The area of the region bounded by a curve and a line - Area between two curves -Volumes of solids of revolution about axes - Volumes of solids of revolution of the area of the region bounded by the curve and a line about axes - Volumes of solids formed by rotating a region bounded by the curves about axes.

Unit – VI Mean, RMS values and Numerical Integration: **Duration: 12Periods (L: 10 – T:2)**

Mean Values and Root Mean Square (R.M.S) values of a function in a given interval-Numerical Integration: Trapezoidal rule and Simpson's $\frac{1}{3}$-rule to evaluate an approximate value of a definite integral in a given interval- Problems leading to engineering applications.

Reference Books:

1. Higher Engineering Mathematics, by B.S.Grewal - Khanna publishers.
2. Thomas' Calculus, Pearson Publishers.
3. NCERT Mathematics Text Book for class XII, Part II.
4. Integral Calculus by Shanti Narayan and P. K. Mittal, S. Chand Publishers.

Suggested E-Learning references:

1. https://www.khanacademy.org/
2. https://www.wolframalpha.com/
3. https://onlinecourses.nptel.ac.in/
4. http://tutorial.math.lamar.edu/

Suggested Learning Outcomes:

At the end of the course, the student will have the ability to:

CO1 : Evaluate the Indefinite Integrals of various functions by Using substitution method

1.1 Explain the concept of Integration as an inverse process of Differentiation with standard notations.

1.2 Classify the Definite and Indefinite Integrals.

1.3. Formulate the standard Integrals using the definition of Integration.

1.4. State the properties of Definite Integrals.
(i.e., $\int (u \pm v)dx$, and $\int ku\ dx$,where *u, v* are functions in *x* and *k* is a scalar).

1.5 Use the Indefinite integrals of standard functions and properties of Integrals in solving engineering problems.

1.6 Evaluate Integrals involving simple functions of the following types by the method of Substitution:

i) $\int f(ax+b)dx$,where *f*(*x*)is in standard form,

ii) $\int f\big(g(x)\big)g'(x)dx$,

iii) $\int f(x^n)x^{n-1}dx$,

iv) $\int [f(x)]^n f'(x)dx$,

v) $\int \frac{f'(x)}{\sqrt{f(x)}}dx$

vi) $\int \frac{f'(x)}{f(x)}dx$

1.7 Find the integrals of tan *x*, cot *x*, sec *x* and cosec *x*.

1.8 Use some trigonometric identities to find the integrals of the type: $\int \sin^2 x\ dx$, $\int \cos^2 x\ dx$, $\int \sin^3 x\ dx$, $\int \cos^3 x\ dx$, $\int \sin Ax \cos Bx\ dx$, $\int \cos Ax \cos Bx\ dx$ and $\int \sin Ax \sin Bx\ dx$, where *A* and *B* are constants.

1.9 Evaluate the integrals of the type: $\int \sin^m x.\cos^n dx$,where *m* and *n* are positive integers.

1.10 Evaluate the integrals of type: $\int \tan^m x.\sec^n dx$, where *m* and *n* are positive integers.

CO2: Integrate various continuous functions using different methods of integration

2.1 Evaluate theintegrals of some particular functions (Nine standard integrals) of the type:

$\int \frac{1}{a^2+x^2}\,dx$, $\int \frac{1}{a^2-x^2}\,dx$, $\int \frac{1}{x^2-a^2}\,dx$, $\int \frac{1}{\sqrt{a^2+x^2}}\,dx$, $\int \frac{1}{\sqrt{a^2-x^2}}\,dx$, $\int \frac{1}{\sqrt{x^2-a^2}}\,dx$, $\int \sqrt{a^2+x^2}\,dx$, $\int \sqrt{a^2-x^2}\,dx$ and $\int \sqrt{x^2-a^2}\,dx$,where a is a constant.

2.2 Evaluate the integrals of the type:$\int \frac{1}{ax^2+bx+c}\,dx$,$\int \frac{1}{\sqrt{ax^2+bx+c}}\,dx$ and $\int \sqrt{ax^2+bx+c}\,dx$, where a, b and c are constants.

2.3 Evaluate the integrals of the type:$\int \frac{px+q}{ax^2+bx+c}\,dx$, $\int \frac{px+q}{\sqrt{ax^2+bx+c}}\,dx$ and $\int (px+q)\sqrt{ax^2+bx+c}\,dx$,Where a, b, c, p and q are constants.

2.4 Evaluate the integrals of the type:$\int \frac{1}{a\pm b\sin x}\,dx$, $\int \frac{1}{a\pm b\cos x}\,dx$ and $\int \frac{1}{a\sin x \pm b\cos x \pm c}\,dx$, where a, b and c are constants.

CO3: Integrate various functions by using Partial fractions and Integration by parts method.

3.1 Evaluate Indefinite Integrals using Partial fractions.

3.2 Evaluate Indefinite Integrals using Integration by parts.

3.3 Apply the Bernoulli's rule for evaluating the Integrals of the form $\int u.v\,dx$, where u and v are functions in x.

3.4 Evaluate the Integrals of the form $\int e^{ax}\sin bx\,dx$ and $\int e^{ax}\cos bx\,dx$,where a and b are constants.

3.5 Evaluate the Integrals of the form $\int e^x[f(x)+f'(x)]\,dx$.

CO4: Evaluate the Definite Integrals using Fundamental Theorem of Integral Calculus and its properties.

4.1 State the Fundamental Theorem of Integral Calculus.

4.2 Calculate the Definite Integrals over an interval by using the Fundamental Theorem of Integral Calculus.

4.3 Evaluate the Definite Integrals by using Substitution Method.

4.4 Explain various properties of Definite Integration.

4.5 Evaluate the Definite Integrals by using its properties.

CO5: Compute the Areas of irregular shapes and Volumes of solids of revolution using the concept of Definite Integrals.

5.1 Define Area under simple curves.

5.2 Describe the sign of the Areas of simple curves.

5.3 Calculate the Areas under simple curves.

5.4 Determine the area of the region bounded by a curve and a line.

5.5 Find the area enclosed between two curves using methods of Definite Integration.

5.6 Define the volume of a solid generated by revolving a region bounded by the curves about axes.

5.7 Explain Volumes of solids of revolution.

5.8 Calculate the Volumes of a solid that is obtained by revolving a plane region about axes.

5.9 Compute the Volumes of solids of revolution of the area of the region bounded by the curve and

5.10 Evaluate the Volumes of solids formed by rotating a region bounded by the curves about axes. a line about axes.

6.0 Find the Mean and RMS values of various functions in engineering problems and evaluate Numerical problems in engineering by using Trapezoidal and Simpson's 1/3rd rule.

6.1 Explain Mean Value, Mean Square Value and Root Mean Square (RMS) value of the functions in any given interval.

6.2 Obtain the Mean Value, Mean Square Value and Root Mean Square (RMS) values of the functions in any given interval.

6.3 Explain Trapezoidal rule and Simpson's $\frac{1}{3}$rules.

6.4 Apply the Trapezoidal rule, Simpson's $\frac{1}{3}$ rules for for approximation of definite integrals

6.5 Solve the problems leading to engineering applications by using above methods.

Suggested Student Activities:

1. Student visits Library to refer Standard Books on Mathematics and collect related material.
2. Quiz.
3. Group discussion.
4. Surprise tests.
5. Seminars.
6. Home Assignments.
7. Mathematics for preparing competitive exams and solving old question papers on arithmetical ability.

CO / PO - MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	Mapped POs
CO1	3	2					3	1, 2 ,7
CO2	3	2					3	1, 2 ,7
CO3	3	2					3	1, 2 ,7
CO4	3	2					3	1, 2 ,7
CO5	3	2	2				3	1, 2 ,3,7
CO6	3	2	2				3	1, 2, 3, 7

STATE BOARD OF TECHNICAL EDUCATION & TRAINING, TELANGANA
DIPLOMA EXAMINATIONS (C - 24)
SC-301
SEMESTER - III, MID –I EXAM, MODEL PAPER
APPLIED ENGINEERING MATHEMATICS
(Open Book System)

Duration: 1: 00 Hour **Max. Marks: 20**

PART-A

Instructions: 1. Answer **ALL** questions. 04 × 01 = 04
2 Each question carries **ONE** mark.

1. Find: $\int \left(2x - \sqrt{x} + x^3\right) dx$.
2. Find: $\int \frac{dx}{3x+7}$.
3. Find: $\int \frac{dx}{\sqrt{25-x^2}}$.
4. Find: $\int \sqrt{7+x^2}$ dx.

PART-B

Instructions: 1. Answer **ALL** questions. 02 × 03 = 06
2. Each question carries **THREE** marks.

5(a) Evaluate: $\int sin^3 x\, dx$.

OR

5(b) Evaluate: $\int \frac{cos\sqrt{2x}}{\sqrt{2x}} dx$.

6(a)Evaluate: $\int \frac{3x^2}{4+x^6} dx$.

OR

6(b)Evaluate: $\int \sqrt{x^2+2x+5}\, dx$.

PART- C

Instructions: 1. Answer **ALL** questions. 02 × 05 = 10
2. Each question carries **FIVE** marks.

7(a) Evaluate: $\int \frac{dx}{4sin^2 x+9cos^2 x}$.

OR

7(b) Evaluate: $\int sin^7 x.cos^3 d$

8(a)Evaluate: $\int \frac{2x+5}{\sqrt{x^2-2x+2}} dx$.

OR

8(b)Evaluate: $\int \frac{1}{4sinx+3cosx+6} dx$.

STATE BOARD OF TECHNICAL EDUCATION & TRAINING, TELANGANA
DIPLOMA EXAMINATIONS (C - 24)
SC-301
SEMESTER - III, MID –II EXAM, MODEL PAPER
APPLIED ENGINEERING MATHEMATICS
(Open Book System)

Duration: 1: 00 Hour **Max. Marks: 20**

PART-A

Instructions: 1. Answer **ALL** questions. 04 × 01 = 04
2 Each question carries **ONE** mark.

1. Find: $\int e^{2x} sin3x\, dx$.
2. Find: $\int e^{x}(\cot x + \log \sin x)\, dx$.
3. Find: $\int_0^1 (x^4 + 1)\, dx$
4. Find: $\int_{-\frac{\pi}{2}}^{\frac{\pi}{2}} x\, cos\, x^2\, dx$.

PART-B

Instructions: 1. Answer **ALL** questions. 02 × 03 = 06
2. Each question carries **THREE** marks.

5(a) Evaluate: $\int \sinh 2x\, .\, sin2x\, dx$.

OR

5(b) Evaluate: $\int x^3 sin2x\, dx$ by using Bernoulli's rule.

6(a) Evaluate: $\int_0^{\frac{\pi}{2}} \frac{sin^{2025} x}{sin^{2025} x + cos^{2025} x}\, dx$.

OR

6(b) Evaluate: $\int_0^{2\pi} cos^2\, 7x\, dx$.

PART C

Instructions: 1. Answer **ALL** questions. 02 × 05 = 10
2. Each question carries **FIVE** marks.

7(a) Evaluate: $\int \frac{x^2}{x^2+7x+10}\, dx$.

OR

7(b)Evaluate: $\int \frac{x cos^{-1} x}{\sqrt{1-x^2}}\, dx$.

8(a) Evaluate: $\int_0^{\pi} \frac{x}{25cos^2 x + 16sin^2 x}\, dx$.

OR

8(b) Evaluate: $\int_0^1 \frac{cos^{-1} x}{x}\, dx$.

STATE BOARD OF TECHNICAL EDUCATION & TRAINING, TELANGANA
DIPLOMA EXAMINATIONS (C - 24)
SC-301
SEMESTER - III, SEMESTER END EXAM, MODEL PAPER
APPLIED ENGINEERING MATHEMATICS
(Open Book System)

Duration: 2 hours **[Total Marks: 40]**

PART-A

Instructions: 1. Answer **ALL** questions. 08 ×01 = 08
2 Each question carries **ONE** mark.

1. Find $\int(a_0 + a_1x + a_2x^2 + \cdots + a_nx^n))dx$.

2. Find $\int_{-1}^{1} x^2 \sin x^3 \, dx$.

3. Find the area bounded by the curve y = x^2, the *x* – axis and the ordinates *x* = 1and *x* = 3.

4. Find $\int \frac{1}{x\cos^2(\log x)} dx$.

5. Find the mean value of sin *x* over (0, 2π).

6. Find the volume of the solid generated when the area bounded by the curve y = x^3, the *x* – axis and the lines *x* = 0 to *x* = 1.

7. Find the R.M.S value of $\sqrt{x}$over the range (2, 3).

8. Find the approximate value of $\int_0^6 f(x)\, dx$ from the following table:

x	0	2	4	6
f(*x*)	3	7	11	9

by Trapezoidal Rule.

PART-B

Instructions: 1. Answer **ALL** questions. 04 × 03 = 12
2. Each question carries **THREE** marks.

9(a) Evaluate: $\int \frac{1}{\sqrt{\sin^{-1}x}\sqrt{1-x^2}} dx$.

OR

9(b) Find the area bounded by the curve y = cos *x* in (0, π).

10(a) Evaluate: $\int_0^5 \frac{\sqrt{x}}{\sqrt{x}+\sqrt{5-x}} dx$.

OR

10(b) A swimming pool is 100 feet wide and the depth *d* in meters at a distance *x* meters from bank is given by the following table:

x	0	20	40	60	80	100
d	0	7	9	15	8	2

Find the cross-section area of the swimming pool using Simson's $\frac{1}{3}$ -rule.

11(a) Find the area included between the parabola $x^2 = 16y$ and its latus rectum.

OR

11(b) Find the volume of the solid by rotating one arc of the curve $y = \sin 3x$ about x – axis.

12(a) Find the RMS value of $i = 3 \sin x$ over the half wave.

OR

12(b) Find the Mean value of $x^2 - 5x + 4$ between the values of *x*,where the expression vanishes.

PART C

Instructions: 1. Answer **ALL** questions 04 × 05 = 20

2. Each question carries **FIVE** marks

13(a) Evaluate: $\int \frac{5x+3}{\sqrt{x^2+4x+10}} dx$.

OR

13(b) Find the area enclosed between the curve $y^2 = 8x$ and the line $2y = x$.

14(a) Evaluate: $\int \frac{1}{x^4-1} dx$.

OR

14(b)The velocity of a train which starts from rest is given by the following table. The time is recorded in minutes from the start and speed in miles per hour.

Minutes	0	2	4	6	8	10	12	14	16	18	20
Miles/hour	0	10	18	25	29	32	20	11	5	2	0

Estimate approximately the total distance run in 20 meters using Simson's $\frac{1}{3}$ - rule.

15(a) Find the area between the two parabolas $y^2 = 4x$ and $x^2 = 12y$.

OR

15(b) Find the volume of the right circular cone of height h and semi vertical angle α.

16(a) Determine the Root Mean Square value of the function $y = x^2 e^{3x}$ in the range between $x = 0$ and $x = 2$.

OR

16(b)Find the Mean value of $sin^2 \omega t$ in the interval $\left[0, \frac{2\pi}{\omega}\right]$.

EC-302 : DIGITAL ELECTRONICS

Course Title	**Digital Electronics**	Course Code	**EC-302**
Semester	**III**	Course Group	**Core**
Teaching Scheme in Hrs(L: T:P)	**4:1:0**	Credits	**2.5**
Methodology	**Lecture+ Assignments**	Total Contact Periods	**75**
CIE	**60 Marks**	SEE	**40 Marks**

Pre-requisites

This course requires the basic knowledge of Semiconductor Devices.

COURSE OUTCOMES

CO1	Comprehend Number Systems and Binary Codes
CO2	Analyze logic gates and simplify Boolean functions using Boolean laws and Karnaugh map
CO3	Design combinational circuits – I
CO4	Design combinational circuits – II
CO5	Analyse and compare flip flops and registers
CO6	Design counters and comprehend memories

COURSE CONTENT AND BLU PRNT OF MARKS FOR SEE

<table>
<tr><th rowspan="2">Unit No</th><th rowspan="2">Unit Name</th><th rowspan="2">Periods</th><th colspan="4">Questions to be set for SEE</th></tr>
<tr><th colspan="2">R</th><th>U</th><th>A</th></tr>
<tr><td>I</td><td>Number systems and Binary codes</td><td>10</td><td rowspan="6">Q4</td><td rowspan="2">Q1</td><td rowspan="2">Q9(a)</td><td rowspan="2">Q13(a)</td></tr>
<tr><td>II</td><td>Boolean algebra, Logic gates and Karnaugh map</td><td>15</td></tr>
<tr><td>III</td><td>Combinational circuits – I</td><td>15</td><td rowspan="2">Q2</td><td rowspan="2">Q10(a)</td><td rowspan="2">Q14(a)</td></tr>
<tr><td>IV</td><td>Combinational circuits – II</td><td>10</td></tr>
<tr><td>V</td><td>Flip Flops and registers</td><td>15</td><td rowspan="2">Q3</td><td>Q5,Q6</td><td>Q9(b),Q11(a), Q11(b)</td><td>Q13(b),Q15(a), Q15(b)</td></tr>
<tr><td>VI</td><td>Counters and Memories</td><td>10</td><td>Q7,Q8</td><td>Q10(b),Q12(a), Q12(b)</td><td>Q14(b),Q16(a), Q16(b)</td></tr>
<tr><td></td><td>Total</td><td>75</td><td colspan="2">8</td><td>8</td><td>8</td></tr>
</table>

COURSE CONTENTS

After completion of the course, the student should be able to know

UNIT1 – NUMBER SYSTEMS AND BINARY CODES

Duration: 10 Periods (L: 8– T: 2)

Binary, Octal, Hexadecimal Number systems –comparison with Decimal system-Conversion from one number system into another – performing arithmetic operations in binary- Binary Codes -Use of weighted and Un-weighted codes- importance of parity Bit.

UNIT2 – BOOLEAN ALGEBRA, LOGIC GATES & KARNAUGH MAP

Duration:15 Periods (L: 9 – T:6)

Different postulates in Boolean algebra- Basic logic gates with truth table- universal logic gates - exclusive – OR gate with truth table- De-Morgan's theorems- AND, OR, NOT operations using NAND, NOR gates- De-Morgan's theorems - Simplify Boolean expressions (up to three variables)- standard representations for logical functions (SOP and POS form)- Boolean expressions from the given truth table- Karnaugh map to simplify Boolean Expression (up to 4 variables only).

UNIT3 – COMBINATIONAL CIRCUITS- I

Duration :15 Periods (L: 11– T: 4)

Concept of combinational logic circuits- Half adder circuit - Half-adder using NAND gates only &NOR gates only- Full adder circuit - Full-adder using two Half-adders and an OR – gate – half subtractor and full subtractor - 4 Bit parallel adder using full – adders- 2's compliment parallel adder/ subtractor circuit -Serial adder -Performance of serial and parallel adder.

UNIT4 –COMBINATIONAL CIRCUITS - II

Duration: 10 Periods (L: 8– T: 2)

Operation of 4 X 1 Multiplexers- Operation of 1 to 4 demultiplexer-applications- 8 X 3 encoder -Decimal to BCD encoder -3 X 8 decoder- BCD to decimal decoder- Applications - Tri-state buffer - Types of tri-state buffers-Applications - Digital comparator.

UNIT5 – FLIP FLOPS AND REGISTERS **Duration: 15 Periods (L: 10– T: 5)**

Concept of Sequential logic circuits- NAND and NOR latches with truth tables-Necessity of clock - Clocked RS flip flop circuit using NAND gates- Need for preset and clear inputs – Edge triggered D flip flop - Circuit of Clocked JK flip flop -Race around condition- Master slave JK flip flop circuit - clocked T flip flops - Symbols of above Flip Flops-Applications for each type of flip flop- Need for a Register - Types of registers- 4 bit shift left and shift right registers - 4-bit bi-directional shift Register –SISO, SIPO, PISO, PIPO Shift Registers - Applications of shift registers.

UNIT6–COUNTERS AND MEMORIES **Duration: 10 Periods (L: 8– T: 2)**

Synchronous and asynchronous counters - 4-bit asynchronous counter - Asynchronous decade counter with a circuit - 4-bit synchronous counter– asynchronous 4 bit up-down counter -Ring counter- applications - Types of memories - Memory read operation, write operation, access time, memory capacity, word length- ROM and RAM- Diode ROM - EEPROM and UVPROM- Dynamic MOS RAM cell- static RAM and dynamic RAM- Applications of Flash ROM.

Reference Books

1. Digital Design by Morris mano

2. Digital Computer Electronics by Malvino and leach. 3rdedition Tata McGraw-Hill Education

3. Modern Digital Electronics By RP JAIN TMH

4. Digital Electronics: Principles & Applications by Roger L. Tokheim -McGraw-Hill Education,

2008

5. Digital Electronics by GK Kharate, Oxford University Press.

Suggested E-learning references

1. www.nptel.com

2. www.electronics4u.com

Suggested Learning Outcomes

Upon completing this course, the student will be able to

CO1: Comprehend Number Systems and Binary Codes

1.1 Explain Binary, Octal, Hexadecimal number systems.

1.2 Compare the above with Decimal system.

1.3 Convert a given decimal number into Binary, Octal, and Hexadecimal numbers and vice versa.

1.4 Convert a given binary number into octal and hexadecimal number system and vice versa.

1.5 Perform binary addition, subtraction, Multiplication and Division.

1.6 Write 1's complement and 2's complement numbers for a given binary number.

1.7 Perform subtraction of binary numbers in 1's complement method.

1.8 Perform subtraction of binary numbers in 2's complement method.

1.9 State the use of weighted and Un-weighted codes and list the types.

1.10 Write BCD code for the given Decimal number.

1.11 Write Excess – 3 codes for given Decimal number.

1.12 Convert a given binary number into Gray code and vice-versa.

1.13 Explain the use of alphanumeric codes (ASCII & EBCDIC)

1.14 State the importance of parity Bit.

CO2: Analyze logic gates and simplify Boolean functions using Boolean laws and Karnaugh map

2.1 State different postulates in Boolean algebra.

2.2 Explain the basic logic gates AND, OR, NOT gates with truth table.

2.3 Explain the working of universal logic gates (NAND, NOR gates) using truth tables.

2.4 Explain the working of an exclusive – OR gate with truth table.

2.5 Realize AND, OR, NOT operations using NAND, NOR gates.

2.6 Realize exclusive – OR gate using basic gates.

2.7 Realize exclusive – OR gate using NAND, NOR gates.

2.8 Realize exclusive – NOR gate using NAND, NOR gates.

2.9 State and prove De-Morgan's theorems.

2.10 Apply De-Morgan's theorems related postulates to simplify Boolean expressions (up to four variables).

2.11 Explain Standard forms of Boolean function (SOP, POS)

2.12 Write Boolean expressions for given truth table and draw the circuit.

2.13 Use Karnaugh map to simplify Boolean Expression (up to 4 variables only) in SOP form.

2.14 Use Karnaugh map to simplify Boolean Expression (up to 4 variables only) in POS form.

CO3: Design combinational circuits - I

3.1 Define combinational logic circuit.

3.2 Define half adder circuit and write its truth table.

3.3 Write the output expression and draw half adder circuit using basic gates.

3.4 Realize a Half-adder using i) NAND gates only and ii) NOR gates only.

3.5 Explain the operation of full adder circuit with truth table.

3.6 Realize full-adder using two Half-adders and an OR – gate.

3.7 Explain the operation of Half subtractor with truth table

3.8 Explain the operation of Full subtractor with truth table.

3.9 Explain the working of 4 Bit parallel adder circuit using full adders.

3.10 Explain 2's compliment parallel adder/ subtractor circuit.

3.11 Explain the working of a serial adder circuit.

3.12 Compare the performance of serial and parallel adder.

CO4: Design combinational circuits - II

4.1 Define multiplexer and de-multiplexer.

4.2 Draw the circuit of 4 X 1 Multiplexer and explain its operation.

4.3 Mention applications of multiplexer.

4.4 Draw the circuit of 1 X 4 de- Multiplexer and explain its operation.

4.5 Mention applications of De-multiplexer.

4.6 Draw the circuit of 8 X 3 encoder and explain its operation.

4.7 Mention applications of Encoder.

4.8 Draw the circuit of 3 X 8 decoder and explain its operation.

4.9 Draw the circuit of BCD to decimal decoder explain its operation.

4.10 Mention applications of decoder.

4.11 State the need for a tri-state buffer.

4.12 List the two types of tri-state buffers with IC numbers.

4.13 Draw the circuit of 1-bit digital comparator (Magnitude comparator) andexplain its operation.

4.14 Write the IC numbers of4 X 1 Multiplexer, 1 X 4 De-multiplexer,3 X 8 Decoder,8 X 3 Encoder.

CO5: Analyse flip flops and registers.

5.1 Define a Sequential logic circuit.

5.2 State the necessity of clock.

5.3 Distinguish between combinational and sequential circuits

5.4 Explain RS Latch using NAND gates only and NOR gates only with Truth Tables.

5.5 Explain different types of Triggering in Flip Flops

5.6 Explain clocked RS flip flop using NAND gates.

5.7 Explain the level clocked D flip flop using NAND gates

5.8 State the need for preset and clear inputs.

5.9 Explain the circuit of JK flip flop using NAND gates with truth table.

5.10 What is race around condition in JK flip-flop and give methods to avoid it.

5.11 Explain the working of master slave JK flip flop circuit with necessary diagrams.

5.12 Explain the operation of T flip flop using JK flip flop and give truth tables.

5.13 List commonly used IC numbers of flip flops of each type.

5.14 List applications for each type of flip flop.

5.15 State the need for a Register

5.16 Explain the working of 4-bit shift left and shift right registers with a circuit and timing diagram.

5.17 Explain the working of 4-bit bi-directional shift register with a circuit and timing diagram.

5.18 Explain the working of SISO, SIPO, PISO, PIPO shift registers.

5.19 List applications of shift registers.

5.20 List commonly used IC numbers of registers.

CO6: Design counters and comprehend memories.

6.1 Define a counter and modulus of a counter.

6.2 Distinguish between synchronous and asynchronous counters.

6.3 Explain the working of 4-bit asynchronous up counter with a circuit and Timing diagram.

6.4 Explain the working of asynchronous 4 bit up-down counter with a circuit and Timing diagram

6.5 Explain the working of 4-bit synchronous counter with a circuit and Timing diagram.

6.6 Explain the working of decade counter with a circuit and Timing diagram.

6.7 List applications of counters.

6.8 List commonly used IC numbers of counters.

6.9 Explain the working of ring counter.

6.10 List applications of ring counter.

6.11 State the need for memory in digital circuits.

6.12 Define the terms memory read operation, write operation, access time, memory capacity and word length.

6.13 Classify various types of memories based on principle of operation, physical characteristics, accessing modes and fabrication technology.

6.14 Differentiate between ROM and RAM.

6.15 Explain the working of diode ROM.

6.16 Distinguish between EEPROM and UVPROM.

6.17 Explain the working of basic dynamic MOS RAM cell.

6.18 Compare static RAM and dynamic RAM.

6.19 State the need for Flash ROM.

6.20 List the applications of Flash ROM.

Suggested Student Activities

1. Learn how to Test the digital IC's and submit a report.

2. Propose how to manage the e-waste.

3. Perform trouble shooting of the not working equipment in the lab.

4. Learn the latest CMOS IC equivalents of the TTL ICs.

5. Prepare a simple PCB to perform verification of truth table for basic gates.

6. Prepare a PPT on the day-to-day application of the gates you have studied.

CO-PO, PSO Matrix:

	Basic and Discipline Specific Knowledge	Problem Analysis	Design/Development of Solutions	Engineering Tools, Experimentation and Testing	Engineering Practices for Society, Sustainability and Environment	Project Management	Lifelong Learning	Linked PO
CO	PO1	PO2	PO3	PO4	PO5	PO6	PO 7	
CO1	2	2	-	-	-	-	-	1,2
CO2	2	2	2	-	-	-	1	1,2,3,7
CO3	1	2	2	-	-	1	-	1,2,3,6
CO4	1	3	2	-	-	1	1	1,2,3,6,7
CO5	2	1	2	-	-	1	1	1,2,3,6,7
CO6	1	3	2	-	-	1	2	1,2,3,6,7

C-24 III SEMESTER

EC-302 DIGITAL ELECTRONICS MODEL PAPER MID-I

TIME: 1HOUR **MAX.MARKS:20**

PART-A

Answer ALL questions. 4 x1=4M

1. Convert the binary number 1101101 into its decimal equivalent.
2. Define 1's complement of a binary number.
3. Draw the logic symbol of AND and OR gates.
4. Define minterm.

PART-B

Answer ALL questions. 4 x1=4M

5(b) State the importance of parity bit.

6(a) State different postulates of Boolean algebra.

OR

6(b) Realize EX-OR gate using NAND gates only.

PART–C

Answer ALL questions 2 x5 =10 M

7(a)Explaintheworkingofuniversallogic gates NANDand NOR withtruthtables.

OR

7(b)SimplifytheBooleanexpressionusingDe-Morgan'stheoremsanddrawitssimplified logic circuit.

□□□□+□□□□+□□□□+ABCD+□□□□

C-24 IIISEMESTER

EC-302: DIGITALELECTRONICS MODEL PAPER MID- II

TIME: 1HOUR **MAX.MARKS:20**

PART-A

AnswerALLquestions. 4 x1=4M

1. Definecombinationallogic circuit.
2. Drawthe circuitoffulladderusinghalf adders.
3. Definea multiplexer.
4. WriteICnumbers ofmultiplexers.

PART–B

AnswerALLquestions . 2 x3 =6 M

5(a)Explainthe operationoffulladderwithatruth table.

OR

5(b)Compareserialadderandparalleladder.

6(a) Write the truth table of1 x 4 de-multiplexer.

OR

6(b)Write any3 applications foreachofMUXand decoders.

PART–C

AnswerALLquestions. 2 x5 =10 M

7(a)Explain theworking of 4-bitparalleladder usinghalfadders.

OR

7(b)Explain2’scomplementparalleladder/subtract circuit.

8(a)Writethetruthtableof4 X1 multiplexeranddrawits circuit.

OR

8(b)Explainthe workingofBCD todecimaldecoder circuit.

C-24 IIISEMESTER

EC-302: DIGITAL ELECTRONICS

MODELPAPER-SEMESTERENDEXAMINATION

TIME: 2HOURS MAX.MARKS :40

PART-A

AnswerALLquestions . 8 x1=8M

1. Stateany2 postulatesof Booleanalgebra.
2. Defineade-multiplexer.
3. Whatisedge-triggeringwithreferenceto clock.
4. DrawthesymbolofDandT flip-flop
5. Listany2ICnumbersofJKflip-flop.
6. Definemodulus ofa counter.
7. Definememoryaccesstime.
8. Define 2's complement of binary number

PART–B

Answer ALL questions. 4x3=12M

9(a) State and prove DE Morgan'sTheorems.

OR

9(b)Explain clockedSR flip flopusingNANDgates

10(a)RealizeahalfadderusingNAND gates only.

OR

10(b)Distinguishbetween synchronousandasynchronous counters.

11(a)Write thelogicsymbol and negativeedgetriggered truthtable of D flip-flop.

OR

11(b)Statetheneedofaregisterandlistitstypes.

12(a) Draw the circuit of a decade counter.

OR

12(b)DifferentiatebetweenROMand RAM.

PART–C

AnswerALLquestions. 2 x5 =10

13(a) Simplify the Boolean expression ∑M(1,3,6,8,14,15) using K- map and draw its simplified logic circuit.

OR

13(b)Explaintheworkingof4-bit left shift registerwithacircuitandtiming diagram.

14(a)Explain theworkingof 4-bitbit parallel adderusingfull adders.

OR

14(b)Explain the workingof diodeROM.

15(a)Explaintheworkingof parallel-inandparallel-out register with timing diagram.

OR

15(b)Explain theworkingofmaster slaveJKflip-flop circuitwith necessarydiagrams.

16(a)Explain Dynamic RAM

OR

16(b)Explain Ring Counter with timing diagrams.

CS-303 : DATA STRUCTURES THROUGH 'C'

Course Title:	Data structures through 'C'	Course Code	CS-303
Semester	III Semester	Course Group	Core
Teaching Scheme in Periods (L:T:P)	4:1:0	Credits	2.5
Methodology	Lecture+Tutorials	Total Contact Periods	75
CIE	60 Marks	SEE	40 Marks

Pre requisites

Basic knowledge of C programming language.

Course Outcomes

Upon completion of the course, the student shall be able to

CO1	Should be able to understand the concept of pointers, different types of pointers, use of pointers in arrays, functions, structures,
CO2	Should be able to analyze and understand the need of different dynamic memory allocation functions, should know how to analyze the efficiency of programs.
CO3	Should be able to compare and contrast different sorting and searching algorithms, and should interpret the analysis of different algorithms
CO4	Should understand the importance of stacks and queues, and its applications.
CO5	Understanding of linked list – types –representation and applications.
CO6	Importance of tree and graph concepts – applications

Course Content and Blue Print of Marks for SEE

Unit No	Unit Name	Periods	Questions to be set for SEE			
			R		U	A
I	Pointers	10	Q4	Q1	Q9(a)	Q13(a)
II	Dynamic memory allocation functions and introduction to data structures	12				
III	Sorting and Searching	11		Q2	Q10(a)	Q14(a)
IV	Stacks and Queues	12				

V	Linked Lists	15		Q3	Q5,Q6	Q9(b),Q11(a), Q11(b)	Q13(b),Q15(a), Q15(b)
VI	Non-Linear Data structure	15			Q7,Q8	Q10(b),Q12(a), Q12(b)	Q14(b),Q16(a), Q16(b)
	Total	75	8			8	8

Course Contents

UNIT - 1: Pointers **Duration: 10 Periods(L: 08 – T: 2)**

Pointer- Declaration and Initialization of Pointers -Accessing the address of a variableusing & operator- Accessing a value of a variable using de-referencing(*) pointer - Differentiate address andde-referencing operators - Pointer Arithmetic-precedence of address and de-referencingoperators-RelationshipbetweenArraysandPointers-Accessingarrayelementsusingpointers-Pointers as Function Arguments-Discuss Array of Pointers with examples-pointersand structures. Types of pointers –generic pointer,NULL pointer,dangling pointer,pointer to pointer

UNIT - 2: Dynamic Memory allocation functions and introduction to Data structure

Duration: 12 Periods(L: 10 – T: 2)

Dynamic Memory allocation – Introduction to Dynamic memory allocation, Allocating a block of memory using malloc(), Allocating multiple blocks of memory using calloc(), Releasing the used space using free(), Altering the size of memory using realloc().Compare and contrast different dynamic memory allocation functions.

Data structures – Abstract data type(ADT), Classification of data structures -Linear &nonlinear Data structures, Algorithm analysis- space and time complexity ,Asymptotic Notations(big-oh, Omega, Theta Notation).

UNIT - 3: Sorting and Searching **Duration: 11 Periods (L: 9 – T: 2)**

Sorting Algorithms– Bubble sort – algorithm –program- analysis for time complexity, selection sort – algorithm- program- Analysis for its time complexity, Insertion sort – Algorithm- Program and Algorithm Analysis of time complexity, Divide and conquer strategy-Quick sort –Algorithm-Program and analysis for time complexity& Merge sort – Algorithm- Algorithm analysis for time complexity, Application of sorting techniques. Searching Techniques – Linear Search – algorithm- program – algorithm analysis ,Binary Search – algorithm – Program –algorithm analysis, Applications of searching techniques.

UNIT - 4: Stacks and Queues **Duration: 12 Periods(L: 10 – T: 2)**

Stacks – Definition - Array Implementation of stacks, Application of stacks, converting infix to postfix expression – Algorithm,Evaluation of postfix expression – Algorithm – Program.

Queues – Definition- Array implementation of Queue, disadvantage of Ordinary queue, Circular queue- Array implementation of Circular queue– Sparse matrix.

UNIT - 5: Linked Lists **Duration: 15 Periods(L: 11 – T: 4)**

Linked Lists – Single linked list – routines on - Inserting the node at the beginning, Inserting the node at the end, Inserting the node at any random position, Deleting the node at the beginning, Deleting the node at the end, Deleting the node at any random position – Display- Program comprising all the functions, Advantages and disadvantages of single linked list- Routine on search and replace a data item, and count number of nodes in singly linked list– Doubly linked list- Inserting the node at the beginning, Inserting the node at the end, Inserting the node at any random position, Deleting the node at the beginning , deleting the node at the end, Deleting the node at any random position- Display- program comprising all the functions, Advantages and disadvantages of double linked list ,Create and display circular singly linked list

UNIT - 6: Non-Linear Data structures **Duration: 15Periods (L: 12 – T: 3)**

Trees – Definition of tree –Terminology-Types of Binary trees- (complete binary tree, full binary tree, skewed binary tree ,strictly binary tree,)– Linear representation of tree – Linked list representation of a tree , Operations on binary search tree(insertion, deletion), tree traversals(Inorder, Preorder, Postorder), Tree construction given Inorder and preorder traversal, Binary tree construction given Inorder and Postorder traversal, Algorithm for Tree Conversion (General tree to Binary tree) , Applications of trees

Graphs–Definition of graph, Graph terminology, Graph representation using arrays, Graph traversals (Breadth first searchexample, Depth first search example), compare and contrast BFS and DFS,Trees Vs. Graphs,Applications of graphs.

Text Books

1. Understandingpointers inC-YashwanthKanetkar.
2. DataStructuresusingC– EBalaguruSwamy
3. DataStructures:A PseudocodeApproach withC++-Gilberg/ Forouzan
4. DataStructuresusingC–AaronM.Tanenbaum.
5. Datastructuresthrough C-YashwanthKanetkar.

Reference Books

1. Data structures with C – Seymourlipschutz –schaums outlines
2. DataStructures:A PseudocodeApproach withC++-Gilberg/ Forouzan
3. Design analysis and algorithm – SartazSahani
4. Handbook on Datastructure and applications –Dinesh p. Mehta, sartajsahani

Suggested e-Learning Links

1. https://www.geeksforgeeks.org/data-structures/
2. https://www.javatpoint.com/data-structure-in-c
3. https://www.programiz.com/dsa
4. https://archive.nptel.ac.in/courses/106/102/106102064/
5. https://www.w3schools.com/dsa/dsa_intro.php

Suggested Learning Outcomes

For achieving the Course outcomes, the following learning outcomes must be achieved

CO1: Should be able to understand the concept of pointers, different types of pointers, use of pointers in arrays, functions, structures.

1.1 Define Pointer.

1.2 Illustrate declaration and initialization of Pointers.

1.3 Illustrate accessing the address of a variable using & operator.

1.4 Illustrate accessing a value of a variable using dereferencing (*)pointer.

1.5 Differentiate between address of operator (&) and de-referencing operators(*).

1.6 Discuss about pointer arithmetic.

1.7 Illustrate precedence of address of operator(&) and de-referencing operators(*).

1.8 Illustrate relationship between arrays and pointers.

1.9 Illustrate accessing array elements using pointers.

1.10 Discuss Array of Pointers with examples.

1.11 Illustrate use of pointer to structure.

1.12 Illustrate concept of structures containing pointers.

1.13 Explain Self-referential structures with examples.

1.14 List out different types of pointers.

CO2: Should be able to analyze and understand the need of different dynamic memory allocation functions, should know how to analyze the efficiency of programs.

2.1 Explain dynamic memory management function smalloc(),calloc(),free()andrealloc() and illustrate with examples to use these functions.

2.2 Compare different dynamic memory allocation functions.
2.3 Define data structure and classify them.
2.4 Define space and time complexity.
2.5 Different Asymptotic notations used to analyze the algorithms.
2.6 Explain about abstract data types
2.7 State algorithm analysis for time requirements.

CO3: Should be able to compare and contrast different sorting and searching algorithms, and should interpret the analysis of different algorithms.

3.1 Define sorting.

3.2 State the need of sorting.

3.3 List the four methods of sorting.

3.4 Explain the method of bubblesort.

3.5Writet healgorithm for bubble sort and define its complexity.

3.6 Discuss the program for bubblesort.

3.7 Explain the method of selection sort.

3.8 Write the algorithm for selection sort and define its complexity.

3.9 Discuss the program for selection sort.

3.10 Explain the method of insertion sort.

3.11Write the algorithm for insertion sort and define its complexity.

3.12 Discuss the program for insertion sort.

3.13 Explain the method and program on quick sort

3.14Explain the method of merge sort.

3.15Listapplications of sorting.

3.16 Define searching

3.17 Explain the method of Linear Search.

3.18 Illustrate the algorithm for Linear Search and its complexity

3.19 Discuss the program for Linear Search
3.20 Explain the method of Binary Search
3.21 Write the algorithm for Binary Search and its complexity
3.22 Discuss the program for
Binary
3.23Applicationsof searching and sorting.

CO4 :Should understand the importance of stacks and queues, and its applications.
4.1Definestack.
4.2List out the operations of a stack.
4.3 Implementation of stacks using arrays.
4.4 List the applications of stacks.
4.5 Algorithm to Convert in fix expression to postfix expression.
4.6 Evaluate postfix expression and program to evaluate postfix expression.
4.7 Define queue.
4.8 List out the operations on queues.
4.9 Implement array implementation of queue.
4.10 Disadvantage of Ordinary queue.
4.11 Implement ofcircular queues using arrays.
4.12 List out the applications of queues.
4.13 Definition of sparse matrix – converting ordinary matrix to sparse matrix.

CO5: Understanding of linked list – types –representation and applications.

5.1 Types of Linked list.
5.2 Inserting the node at the beginning, endand at any random position of a singly linked list.
5.3 Deleting the node from the beginning, end and at any random position of a singly linked list.
5.4 summarize the different routines of singly linked list along with display operation in the program.
5.5 Inserting the node at the beginning, end and at any random position of a doubly linked list.
5.6 Deleting the node from the beginning, end and at any random position of a doubly linked list.
5.7 summarize the different routines of doubly linked list in the program along with display operation in doubly linked list.
5.8 summarize the different routines of singly circular list in the program along with display operation in circular linked list.
5.9 Advantages and disadvantage of single, double, circular linked lists.

CO6:Importance of tree and graph concepts – applications

6.1 Define a tree.
6.2 Explain the terminology related to tree.
6.3 Define a binary tree.
6.4 List out different binary trees (complete binary tree, full binary tree, skewed binary tree, strictly binary tree).
6.5 Discuss different operations on binary search tree.
6.6 Explainthelinearrepresentationandlinkedlistrepresentationofa Binarytree.
6.7 List and explain different tree traversals
6.8 construct a binary tree given Inorder and preorder traversal.
6.9 construct a binary tree given Inorder and Postorder traversal.
6.10 Convert general trees to binary trees
6.11 List Applications of trees
6.12 Define Graph.
6.13 Explain the terminology related to Graph.
6.14 Infer and analyze different graph traversals algorithms (DFS,BFS).
6.15 Differences between trees and graphs.
6.16 Discuss the applications of graphs.

Suggested Student Activities

Student activity like mini-project, quizzes, etc. should be done in group of5-10 students.

1. Each group should do any one of the following type of activity or any other similar activity related to the course with prior approval from the course coordinator and program coordinator concerned.
2. Each group should conduct different activity and no repetition should occur.
3. Explore and analyze topics to improve the level of creativity and analytical skill by taking Quiz/ tests/ assignments. Documents have to be maintained as a record.
4. Visit different sites relevant to Data structure topics. Listen to the lectures and submit a hand written report
5. Coding competitions

CO-PO Mapping Matrix

	Basic and Discipline Specific Knowledge	Problem Analysis	Design/Development of Solutions	Engineering Tools, Experimentation and Testing	Engineering Practices for Society, Sustainability and Environment	Project Management	Lifelong Learning	Linked PO
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	
CO1	2	2		2			1	1,2,4,7
CO2	2	1	1				1	1,2,3,7
CO3	2	2	2			1	1	1,2,3,6,7
CO4	2	2	2	3	2	1	2	1,2,3,4,5,6,7
CO5	2	2	2	3	2	1	2	1,2,3,4,5,6,7
CO6	2	1	1	2		1	1	1,2,3,4,6,7

State Board of Technical Education and Training, Telangana
Model Question paper
DATA STRUCTURES THROUGH CIII-SEMESTER
Mid Semester-I Examination

Course Code: CS-303 **Duration:1 hour**
Course Name: DATA STRUCTURES THROUGH C **Max.Marks: 20 Marks**

PART-A

Answer **all** questions- Each Question carries **ONE** mark **4x1 = 4 Marks**

1. List out two operators used in pointer?
2. Definepointer.
3. Definelineardatastructure.
4. Define space complexity?

PART-B

Answer **two** questions- Each Question carries **THREE** marks **2x3 = 6 Marks**

5(a).Write aprogram toaccess arrayelementsusingpointers

OR

5(b).Explainself-referentialstructure

6(a).state the syntax of malloc() and calloc() dynamic memory allocation functions.

OR

6(b).Differentiate between linear and non-linear data structure.

PART-C

Answer **two** questions- Each Question carries **FIVE** marks **2x5 = 10 Marks**

7(a).Writeaprogramtoaccessvalueofvariableusingpointer

OR

7(b).With the help of a program, explain the concept of array of pointers.

8(a).Explain different asymptotic notations used in analyzing algorithm

OR

8(b).Define Datastucture? Explain the classification of Data structure.

State Board of Technical Education and Training, Telangana
Model Question paper
DATA STRUCTURES THROUGH C III-SEMESTER
Mid Semester-II Examination

Course Code: CS-303 **Duration:1 hour**
Course Name: DATA STRUCTURES THROUGH C **Max.Marks: 20 Marks**

PART-A

Answer **all** questions- Each Question carries **ONE** mark **4x1 = 4 Marks**

1. Write theneed of sorting
2. Listsortingmethods
3. Definestack.
4. List out any one disadvantage of ordinary queue.

PART-B

Answer **two** questions- Each Question carries **THREE** marks **2x3 = 6 Marks**

5(a).Explain theprocedureofselectionsort withexample.

OR

5(b).Explain the procedure of bubble sort with example.

6(a).List out any three applications of stacks.

OR

6(b).write a snippet of code for queueinsert() operation for queue.

PART-C

Answer **two** questions- Each Question carries **FIVE** marks **2x5 = 10 Marks**

7(a).Write aCprograminsertionsort

OR

7(b) . Explain the procedure for quick sort with example

8(a).Write aC programto implement stack using arrays.

OR

8(b).Write the algorithm to convert infix expression into postfix.

State Board of Technical Education and Training, Telangana
Model Question paper
Data Structures through C III-SEMESTER
Semester End Examination

Course Code: CS-303 **Duration:2 hour**
Course Name: Data structures through C **Max.Marks:40 Marks**

PART-A

Answer **all** questions- Each Question carries **ONE** mark **8x1 = 8 Marks**

1. List out two operators used in pointers.
2. Define space and time complexity.
3. List out any two advantages of linked list.
4. Write the syntax of malloc() function.
5. List out any two advantages of double linked list over single linked list.
6. List out two differences between single and doubly linked list.
7. Define a binary tree?
8. List out any two applications of graphs.

PART-B

Answer **Four** questions- Each Question carries **THREE** marks **4x3 = 12 Marks**

9. a) Classify the Data structures?

(OR)

b)Write the algorithm

i. To insert the data at the beginning in a single linked list.
ii. To delete the data from the end in a single linked list.

10. a) Write an algorithm to convert infix expression to postfix.

(OR)

b) Explain the procedure to implement BFS algorithm

11. a) Write a snippet to search and replace an element in double linked list.

(OR)

b) Differentiate between single and double linked list

12. a) Write an algorithm to construct a binary tree given preorder and inorder traversal

(OR)

b) Define the following terms

i. root
ii. path
iii. degree of a tree

PART-C

Answer **Four** questions- Each Question carries **FIVE** marks **4x5 = 20 Marks**

13. a) Write a C program to access array elements using pointers

(OR)

b) Explain the procedure to implement binary search.

14. a) Write a c program to implement stack using arrays.

(OR)

b) Explain the steps to convert a general tree into a binary tree.

15. a)Write a C program to insert an element at any random position in doubly linked list and display it.

(OR)

b) Analyze how the insertion and deletion operations are performed in circular queue.

16. a) Explain about array representation in trees.

(OR)

b)How to represent a graph using arrays in the memory.

CS-304 : OOPS THROUGH C++

Course Title:	**OOPS THROUGH C++**	Course Code	**CS-304**
Semester	**III Semester**	Course Group	**Core**
Teaching Scheme in Periods (L:T:P)	**4:1:0**	Credits	**2.5**
Methodology	**Lecture+Tutorials**	Total Contact Periods	**75**
CIE	**60 Marks**	SEE	**40 Marks**

Pre requisites

Knowledge of C Programming

Course Outcomes

Upon completion of the course, the student shall be able to

CO1	Learn the Principles of object oriented programming.
CO2	Develop programs using classes, objects and functions.
CO3	Understand C++ I/O operations.
CO4	Develop programs for constructors, destructors and operator overloading.
CO5	Learn types of inheritance and develop programs for different types of inheritances.
CO6	Develop programs for different types of templates.

Course Content and Blue Print of Marks for SEE

Unit No	Unit Name	Periods	Questions to be set for SEE			
			R		U	A
I	Principles of object oriented programming	11	Q4	Q1	Q9(a)	Q13(a)
II	Introduction to C++	14				
III	C++ I/O operators	10		Q2	Q10(a)	Q14(a)
IV	Constructors, Destructors and Operator	15				

	Overloading						
V	Derived classes and inheritance	15		Q3	Q5,Q6	Q9(b),Q11(a), Q11(b)	Q13(b),Q15(a), Q15(b)
VI	Templates	10			Q7,Q8	Q10(b),Q12(a), Q12(b)	Q14(b),Q16(a), Q16(b)
	Total	75	8			8	8

Course Contents

UNIT - 1: Principles of object oriented programming

Duration: 11 Periods (L: 9 – T:2)

Procedure oriented programming - Object oriented paradigm - basic concepts of object oriented programming - benefits of OOPs.-Applications of OOPs-

Structure of C++ program- I/O Operations – statements – keywords - operators in C++ - dynamic memory allocation.

UNIT - 2: Introduction to C++

Duration: 14Periods (L: 11 – T: 3)

Class – object- array of objects- passing objects to functions – pass by value and pass by reference - returning objects from functions - friend function - inline functions -function overloading.- functions with default arguments.

UNIT - 3: C++ I/O operators **Duration: 10Periods (L:9 – T:1)**

C++ I/O operators - formatted I/O - I/O manipulators - file I/O - binary I/O functions - file I/O functions–File handling.

UNIT – 4: Constructors, Destructors and Operator Overloading

Duration: 15 Periods (L: 11–T:4)

Constructor and Default constructor - Parameterized constructors - Multiple Constructors - Constructors with default arguments - Copy Constructor – dynamic constructor - Destructors - Operator Overloading - Overloading of Binary Operators - Overloading of Unary Operators - Rules for overloading of operators - Example Programs ofOperator overloading

UNIT - 5: Inheritance **Duration: 15Periods (L:12– T:3)**

Base Class and derived class - access control – Inheritance - types of inheritance – Single, Multi level, Multiple, Hybrid, Hierarchical - virtual base class –function overriding- virtual functions.

UNIT - 6: Templates **Duration: 11 Periods (L:8 – T:2)**

Need for Templates – classification of templates, function templates with single argument and multiple arguments - class templates with single argument and multiple arguments.

Reference Books

1. Teach yourself C++- Helbertschildt Osborne McG
2. Object-oriented Programming with C++- PoornachandraSarang PHI
3. Programming with C++- E. Balaguruswamy – TMH
4. Computer Science: A Structured Approach using C++- Forouzan/Gillberg - Thomson
5. C++ & OOPS Paradigm- DebasishJana PHI

Suggested E-learning references

1. **https://www.tutorialspoint.com/cplusplus/index.htm**
2. **https://www.programiz.com/cpp-programming**
3. **https://www.javatpoint.com/**
4. **https://www.techguruspeaks.com/c-plus-plus-programming/**
5. **https://www.guru99.com/cpp-tutorial.html**
6. **https://cplusplus.com/doc/tutorial/**
7. https://codescracker.com/cpp/
8. https://beginnersbook.com/2017/08/c-plus-plus-tutorial-for-beginners/
9. http://digimat.in/nptel/courses/video/106105151/

Suggested Learning Outcomes

Upon completion of the course, the student shall be able to

CO1: Learn the Principles of object oriented programming

1.1 Illustrate procedure oriented programming.

1.2 Define Object oriented paradigm.

1.3 Demonstrate Basic concepts of object oriented programming.

1.4 List differences between Procedure Oriented Programming and Object Oriented Programming.

1.5 List the Benefits of OOP's.

1.6 List Applications of OOPs.

1.7 Explain the structure of C++ program

1.8 Explain how to Create, compile, link and execute a C++ program.

1.9 List the differences between C and C++.

1.10 Explain C++ I/O operation with examples.

1.11 Illustrate how to use comment statements in C++.

1.12 List keywords of C++ other than C.

1.13 Explain the operation of dynamic memory allocation using new and delete operators.

CO2: Develop programs using classes, objects and functions.

2.1 Define a class & object in C++.

2.2 Illustrate class declaration.

2.3 Illustrate Creation of objects.

2.4 Explain accessing class members.

2.5 Illustrate how to declare and access array of objects.

2.6 Explain the concept of passing objects to functions.

2.7 Explain the concept of returning objects from functions.

2.8 Explain friend function and its use.

2.9 Illustrate how to declare, access pointers to objects.

2.10 Explain the use of 'this' operator.

2.11 Explain the concept of functions with default arguments

2.12 Explain the concept of function overloading.

2.13 Explain the concept of inline function.

2.14 Explain how to declare and use references.

CO3: Understand C++ I/O operations.

3.1 List C++ I/O operators with their meaning.

3.2 Explain the basics of formatted I/O.

3.3 Explain I/O manipulators and give examples.

3.4 Explain file I/O and classes of stream.h.

3.5 Explain the binary I/O functions like get( ) and put( ).

3.6 List different operations for File Handling.

3.7 Illustrate opening and closing file .

3.8 Illustrate writing to file.

3.9 Illustrate reading from file.

3.10 Explain random access on file.

CO4: Develop programs for constructors, destructors and operator overloading

4.1 Define constructor and its types.

4.2 Explain Default constructor.

4.3 Explain Parameterized constructor.

4.4 Explain Constructor overloading.

4.5 Explain Constructors with default arguments

4.6 Illustrate Copy Constructor.

4.7 Illustrate Dynamic constructor

4.8 Define Destructor.

4.9 Develop a program to demonstrate destructor.

4.10 Define Operator Overloading

4.11 Develop the programs for Overloading of Binary Operator with operator function as member function.

4.12 Develop the programs for Overloading of Binary Operator with operator function as friend function.

4.13 Develop the programs for Overloading of Unary Operator with operator function as member function.

4.14 Develop the programs for Overloading of Unary Operator with operator function as friend function.

4.15 List the rules for overloading of operators.

CO5: Learn types of inheritance and develop programs for differenttypes of Inheritances

5.1 What is the necessity of inheritance?
5.2 Explain the relation between base class and derived class.
5.3 What is the syntax for defining a derived class
5.4 Explain three types of access control – public, private & protected.
5.5 List Types of Inheritances and explain them with examples.
5.6 Develop a program using C++ for Single inheritance.
5.7 Develop a program using C++ for Multi level inheritance.
5.8 Develop a program using C++ for Multiple inheritance.
5.9 Develop a program using C++ for Hybrid inheritance.
5.10 Develop a program using C++ for Hierarchical inheritance.
5.11 Develop Virtual Base Class with an example program.
5.12 Explain function overriding.
5.13 Explain concept of virtual functions.
5.14 List applications of virtual functions.

CO6: Develop programs for different types of templates.

6.1 Explain the need for Templates.
6.2 List types of Templates.
6.3 Define Function Template
6.4 Demonstrate the Syntax of Function Template.
6.5 Develop C++ program for Function Template with Single Argument Types.
6.6 Develop C++ program to Create function Template.
6.7 Develop C++ program for Function Template with multiple argument types.
6.8 Illustrate use of Class Templates
6.9 Demonstrate the Syntax of Class Template with single parameter.
6.10 Demonstrate the Syntax of Class Template with multiple parameters.
6.11 Develop C++ program to Create Class Template with single parameter.

6.12 Develop C++ program to Create Class Template with multiple parameters.

6.13 Develop C++ program using Class Template for Stack Data Structure.

Suggested Student Activities

Student activity like mini-project, quizzes, etc. should be done in group of 5-10 students.

1. Coding competitions
2. Quiz Competitions
3. Advanced Topics Seminars

CO-PO Mapping Matrix

	Basic and Discipline Specific Knowledge	Problem Analysis	Design/Development of Solutions	Engineering Tools, Experimentation and Testing	Engineering Practices for Society, Sustainability and Environment	Project Management	Lifelong Learning	Linked PO
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO 7**	
CO1	2	1	1					1,2,3,7
CO2	2	2	2				1	1,2,3,7
CO3	2	1	1				1	1,2,3,7
CO4	2	2	2				1	1,2,3,7
CO5	2	2	2				1	1,2,3,7
CO6	3	2	2				1	1,2,3,7

MODEL QUESTION PAPERS
STATE BOARD OF TECHNICAL EDUCATION & TRAINING:TS:HYDERABD
CS-304- OOPS THROUGH C++
III SEMESTER MID-I SEMESTER – I MODEL PAPER

Time: 1 hour **Max. Marks:20**

PART-A

Answer <u>All</u> questions. Each carries 1 mark. **4X1=04 Marks**

1. Define class.
2. Define object.
3. What is function overloading?
4. List any two differences between C and C++.

PART-B

Answer any <u>TWO</u> questions. Each carries 3marks. **2X3=06Marks**

5a) List basic concepts of object oriented programming.

OR

5b) List any three benefits of OOPs.

6a) List the characteristics of friend function.

OR

6b) How to declare a class? Give its syntax.

. **PART-C**

Answer <u>TWO</u> questions. Each carries 5marks. **2X5=10Marks**

7a) Write any five differences between procedural oriented programming and object oriented programming.

OR

7b) Explain basic concepts of object oriented programming.

8a) Develop a C++ program to illustrate array of objects.

OR

8b) Develop a C++ program to illustrate the usage of this operator.

STATE BOARD OF TECHNICAL EDUCATION & TRAINING:TS:HYDERABD

CS-304- OOPS THROUGH C++

III SEMESTER MID SEMESTER – II MODEL PAPER

Time: 1 hour **Max. Marks:20**

PART-A

Answer <u>All</u> questions. Each carries 1 mark. **4X1=04 Marks**

1. Define input stream.

2.Define C++ streams.

3. List different types of constructors in C++.

4. Define constructor.

PART-B

Answer any <u>TWO</u> questions out of three questions. Each carries 5 marks.

2X5=10Marks

5a) Explain the purpose of get(),put() and getline().

OR

5 b) Explainabout C++ IO operators.

6a) Illustratesyntax to define parameterized constructor.

OR

6b) List any three rules to overload operators in C++.

PART-C

Answer any <u>TWO</u> questions. Each carries 5 marks. **2X5=10Marks**

7a) Explain I/O manipulators with examples.

OR

7b) Explain the hierarchy of stream classes.

8a) Develop a C++ program to illustrate copy constructor.

OR

8b) Develop a C++ program to perform binary operator overloading using friend function.

STATE BOARD OF TECHNICAL EDUCATION & TRAINING:TS:HYDERABD

SEMESTER END EXAMINATION MODEL QUESTION PAPER

CS-304- OOPS THROUGH C++

Time: 2 hours **Max. Marks:40**

PART-A

Answer All questions. Each carries 1 mark. **1X8=08 Marks**

1. Define class.
2. Define input stream.
3. What is inheritance?
4. What is function overloading
5. Define single inheritance.
6. Define multiple inheritance.
7. Define function template.
8. Define class template.

PART-B

Answer any all questions. All questions carry 3 marks **2X5=10Marks**

9. a) List any three benefits of OOPs.

OR

b) Illustrate syntax for defining a derived class.

10. a) List any three rules to overload operators in C++.

OR

b) Illustrate syntax for defining function template.

11 a) Illustrate syntax to define multilevel inheritance.

OR

b) Illustrate syntax to define hierarchical inheritance.

12 a) Illustrate syntax to define function template.

OR

b) Illustrate syntax to define class template.

PART-C

ANSWER ALL THE QUESTIONS. EACH QUESTION CARRIES 5 MARKS.

5x4= 20 Marks

13a. Develop a C++ program to illustrate array of objects.

OR

13b. Develop a C++ program using single inheritance..

14a. Develop a C++ program to illustrate copy constructor.

OR

14b.Develop a C++ program for class template with single argument type.

15a. Develop a C++ program using multiple inheritance.

OR

15b. Develop a C++ program using hierarchical inheritance.

16a. Develop a C++ program for function template with multiple argument types.

OR

16b. Develop a C++ program for class template with multiple argument types.

CS-305 : COMPUTER ORGANIZATION AND ARCHITECTURE

Course Title	Computer Organization And Architecture	Course Code	CS-305
Semester	III	Course Group	Core
Teaching Scheme in Hrs(L:T:P)	4:1:0	Credits	2.5
Methodology	Lecture + Tutorials	Total Contact Periods	75
CIE	60Marks	SEE	40Marks

Pre requisites

Fundamentals of Digital Electronics and Basics of Computers and its peripherals

Course Outcomes

Upon completion of the course the student shall be ableto

Course Outcome	
CO1	Understand the functional units of computer system
CO2	Understand Computer Arithmetic.
CO3	Analyze Central Processing Unit (CPU) Organization
CO4	Understand the computer memory system.
CO5	Explain modes of data transfer
CO6	Understand instruction pipeline processing and parallel processing

Course Content and Blue Print of Marks for SEE

Unit No	Unit Name	Periods	Questions to be set for SEE			
			R		U	A
I	Introduction to Computer Organization	10	Q4	Q1	Q9(a)	Q13(a)
II	Computer Arithmetic	15				
III	CPU Organization	10		Q2	Q10(a)	Q14(a)
IV	Computer Memory Organization	15				

V	Input and output organization	13		Q 3	Q5,Q6	Q9(b),Q11(a), Q11(b)	Q13(b),Q15(a), Q15(b)
VI	Pipe lining and Parallel Processing	12			Q7,Q8	Q10(b),Q12(a), Q12(b)	Q14(b),Q16(a), Q16(b)
	Total	75	8			8	8

Course Contents

UNIT - 1: Introduction to Computer Organization

Duration: 10 Periods(L: 8 – T:2)

Functional block diagram of Digital computer–Definition of Computer organization and computer architecture – Simple accumulator based CPU and function of each unit-Stored program concept – System bus - Interrupts.

UNIT - 2: Computer Arithmetic **Duration: 15 Periods (L: 9 – T:6)**

ALU-Basic types of information representation- Floating point representation and Fixed point representation of numbers -Complements- Fixed point addition and subtraction, multiplication and division operations with flowcharts-Floating point addition, subtraction operations with flowcharts

UNIT - 3: CPU Organization **Duration: 10 Periods(L: 8 – T:2)**

Operand- Op code and address –Internal Structure of the CPU –Instruction format - zero address, one address, two address and three address instructions– Addressing modes.

UNIT - 4: Computer Memory Organization **Duration:15 Periods(L: 13 – T:2)**

Main and auxiliary memory -Need for memory hierarchy in a computer –Significance of various memory devices characteristics: access time, access rate, cycle time - Associative Memory - Virtual memory organization in a computer system - Virtual address and physical address organization – Cache memory organization and advantages -Principle of memory interleaving in a computer – SSD vs HDD.

UNIT - 5: Input and output organization **Duration: 13 Periods(L: 11 – T:2)**

Peripheral devices - Need for an interface - Three modes of data transfer - Synchronous and a

synchronous data transfer -Hand shaking procedure of data transfer - Programmed I/Omethod of data transfer - Interrupted initiated I/O - DMA controlled transfer – Priority interrupt, polling, and daisy chaining priority.

UNIT - 6: Pipelining and Parallel Processing **Duration: 12 Periods(L: 11 – T:1)**

Pipelining – Pipelining hazards – Instruction pipeline - Principles of pipe line processing - Flynn's classification of Parallel processing – SMP – CPU Vs GPU - Comparison between CISC and RISC.

Text Books

1. ComputerOrganizationandArchitecture– WilliamStallingsTenthEdition,PHI/Pearson,2006.
2. Computer System Architecture–M.MorisMano,IIIrd Edition,PHI/Pearson,2006.

Reference Books

1. ComputerOrganization– CarHamacher,ZvonksVranesic,SafwatZaky,VEdition,McGrawHill, 2002.
2. ComputerArchitectureandOrganization– JohnP.Hayes,McGrawHillInternationaleditions,1998.
3. Computerarchitectureandorganization,4thedition,PChakraborty,JAICOpublishers.

Suggested Learning Outcomes

CO1:Understand the functional units of computer system

1.1.Explain the functional block diagram of Digital computer with diagram.

1.2.Define computer organization and computer architecture.

1.3.Drawtheblockdiagram of simple accumulator based CPU.

1.4. Explain the function of each unit of Simple accumulator based CPU.

1.5. Understand Interconnection structure of three basic modules (processor, memory, I/O).

1.6. Understand System bus, Address bus, Data bus, Control lines, Peripheral Component Interconnect (PCI).

1.7.Define the terms micro operation, macro operation, instruction cycle, fetch cycle and execution cycle.

1.8.Define stored program concept.

1.9.Describe the sequential execution of a program stored in memory by the CPU.

1.10.Define Interrupt.

1.12.Understand the importance of Interrupt.

1.13.List the types of Interrupts.

CO2: Understand Computer Arithmetic.

2.1.Explain the function of Arithmetic and Logic Unit (ALU) with a block diagram.

2.2. Explain the basic types of information representation in a computer.

2.3. Demonstrate the concept of Complement.

2.3.1. (r-1)'s Complement.

2.3.2.(r)'s Complement.

2.4. Illustrate fixed point representation of numbers with example.

2.5. Explain the fixed point addition and subtraction operations with flowchart.

2.6. Explain the Fixed point multiplication operation with flowchart.

2.7. Develop Booth's multiplication logarithm with flow chart.

2.8. Explain the Fixed point division operation with flowchart.

2.9. Illustrate floating point representation of numbers with example.

2.10. Describe floating point addition, subtraction operations with flowchart

2.11. Distinguish between Fixed point and Floating point representations.

CO3: Analyze Central Processing Unit (CPU) Organization

3.1 Define Opcode, Operand and address of machine instruction.

3.2 List types of operands.

3.3 List types of operations.

3.4. Illustrate the Internal Structure of the CPU.

3.5. Explain the registers essential to instruction execution.

3.6. Summarize the stages in instruction cycle.

3.7. Demonstrate Simple Instruction Format.

3.8. Explain zero address, one address, two address and three address instructions with simple examples.

3.9. Explain different addressing modes.

CO4: Understand the computer memory system.

4.1. Distinguish between main memory and auxiliary memory.

4.2. Explain the memory hierarchyin a computer.

4.3. List the four access methods of computer memory.

4.4. Define the three performance parameters

4.4.1 Access time (latency)

4.4.2 Cycle time

4.4.3 Transfer rate

4.5. Discuss Associative Memory.

4.6. Explain virtual memory organization in a computer system.

4.7. Explain virtual address and physical address organization.

4.8. State the principle of locality of reference (cache coherence).

4.9. Explain cache memory organization.

4.10. List the advantages of cache memory.

4.11.Analyzetheimportance of memory inter leaving.

4.12.Comparethe advantages of Solid State Drive (SSD) over Hard Disk Drive (HDD)

CO5: Explain modes of data transfer.

5.1. List various peripheral devices that can be connected to a computer.

5.2. Explain the need for an interface.

5.3. List out three modes of data transfer.

5.4. Compare synchronous and a synchronous data transfer.

5.5. Discuss strobe controlled procedure of data transfer

5.6.Discuss hand shaking procedure of data transfer.

5.7. Explain programmed I/O method of data transfer.

5.8. Explain interrupted initiated I/O.

5.9. Explain DMA controlled transfer.

5.10. Explain priority interrupt, polling, and daisy chaining priority.

5.11.Explain Input Output Processor with diagram.

CO6: Understand Instruction pipelining and parallel processing:

6.1. Define Pipelining.

6.2.List the stages of instruction pipeline.

6.3. Demonstrate the working of Instruction pipeline.

6.4. Define pipeline hazard (or pipeline bubble).

6.5.Summarize types of pipeline hazards.

6.6. Distinguish scalar processing and parallel processing.

6.7.Summarize the principle of Parallel processing.

6.8.Classify Parallel processing (Flynn's classification).

6.9. Define Symmetric Multi Processor (SMP).

6.10. List the advantages of Symmetric Multi Processors.

6.11. Illustrate the block diagram of Symmetric Multi Processor.

6.12. Interpret multi core processor.

6.13. Summarize Graphics Processing Unit (GPU).

6.14. Compare Central Processing Unit (CPU) and Graphics Processing Unit (GPU).

6.15. Summarize RISC and CISC processors.

Suggested Student Activities

1	Student activity like mini-project, surveys, quizzes, etc. should be done in group of 5-10 students.
2	Each group should do any one of the following type activity or any other similar activity related to the course and before conduction, get it approved from concerned Course co ordinator and Program Coordinator
3	Eachgroupshouldconductdifferentactivityandnorepeatingshouldoccur.
4	Visit different sites relevant to topics. Listen to the lectures and submit a hand written report.
5	Explore and analyze topics to improve the level of creativity and analytical skill by taking Quiz/ tests/ assignments. Documents have to be maintained as a record.
6	Create a power point presentation on the topic relevant to course or advanced topic as an extension to the course to improve the communication skills. Documents have to be maintained as are cord.
7	A Case study on Moore’s Law about the processors and submits a report.
8	Conduct a survey on types of memories and also about the cost and speed of various memories with comparison.

Suggested e-Learning Links

https://www.studytonight.com/computer-architecture
https://www.geeksforgeeks.org/computer-arithmetic-set-2/
https://archive.nptel.ac.in/courses/106/105/106105163/

Suggested e-Module Links

https://www.youtube.com/watch?v=oAneKttKjtA
https://youtu.be/NrUwqlQBvxc?si=u_H7kiXYQbuiwIOQ

CO-PO Mapping Matrix

	Basic and Discipline Specific Knowledge	Problem Analysis	Design/Development of Solutions	Engineering Tools, Experimentation and Testing	Engineering Practices for Society, Sustainability and Environment	Project Management	Lifelong Learning	Linked PO
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO 7**	**PO**
CO1	3	1	1	1			2	1,2,3,4,7
CO2	2	2	2	1		1	2	1,2,3,4,6,7
CO3	3	2	1				2	1,2,3,7
CO4	2	1	1				2	1,2,3,7
CO5	2	1	1				2	1,2,3,7
CO6	2	1	1				3	1,2,3,7

MODEL QUESTION PAPER
BOARD DIPLOMA MID-SEM-1 EXAMINATION (C-24)
CS-III-SEMESTER
CS-305– Computer Organization and Architecture

TIME: 1HOUR **MAXIMUM MARKS: 20**

PART-A **MARKS: 4 X 1 =4**

NOTE: 1. Answer all questions.
2. Each question carries one mark.

1. Definecomputer architecture.
2. Definemacrooperation.
3. List the basic types of information representation in a computer.
4. Represent (-9) in 2's complement form.

PART – B **MARKS : 2 X 3 = 6**

NOTE: 1. Answer any one question from 5 and 6.
2. Each question carries three marks.

5.a) Draw the functional block diagram of Digital computer

(OR)

5.b) Writeaboutinstructioncycle,fetchcycleandexecutioncycle.

6.a) Compare Fixed point and Floating point representations

(OR)

6.b) Draw the flowchart for fixed point addition and subtractio.

PART-C **MARKS:2 X5=10**

NOTE: 1.Answer one question each from 7 and 8.
2. Eachquestionisofinternalchoicetype
3. Eachquestioncarriesfivemarks.

7. a) Draw and explain the block diagram of simple accumulator based CPU. (OR)

7.b)Describethe sequential execution ofaprogram stored in memorybytheCPU.

8.a) Explain Booth's multiplication algorithm with flowchart.

(OR)

8.b)Explain floating point addition and subtraction with flowchart.

MODEL QUESTION PAPER
BOARD DIPLOMA MID-SEM-2 EXAMINATION (C-24)
CS-III-SEMESTER
CS-305– Computer Organization and Architecture

TIME: 1HOUR **MAXIMUM MARKS: 20**

PART-A MARKS: 4 X 1 =4

NOTE: 1. Answer all questions.
2. Each question carries one mark.

1. Define opcode and operand.
2. List any four addressing modes.
3. Defineaccesstime.
4. Whatisvirtual address?

PART – B **MARKS : 2 X 3 = 6**

NOTE: 1. Answer any one question from 5 and 6.
2. Each question carries three marks.

5. a)Drawthediagram of internal Structure of the CPU.

(OR)

5. b)List the types of operations.

6. a)Comparemain memoryandauxiliarymemory.

(OR)

6. b)Explain the need for memoryhierarchyin acomputer.

PART-C **MARKS : 2 X 5 = 10**

NOTE:1.Answer one question each from 7 and 8.
2. Each question is of internal choice type
3. Each question carries five marks.

7 a) Explain zero address, one address, two address and three address instructions withsimpleexamples.

(OR)

7.b)Explainvarious addressing modes.

8.a) Discuss in detail Associative Memory

(OR)

8.b)Explaincachememoryorganization.

MODEL QUESTION PAPER
BOARD DIPLOMA SEMESTER END EXAMINATION (C-24)
CS-III-SEMESTER
CS-305– Computer Organization and Architecture

TIME: 2 HOURS **MAXIMUM MARKS: 40**

PART-A MARKS:8 X1=8

NOTE:1.Answer allquestions.
2.Each questioncarriesonemark.

1. DefineStored Program Concept..
2. Define(r)'sComplement
3. Listtwo peripheraldevices
4. Whatis**priorityinterrupt**?
5. Listanytwo peripheraldevices.
6. Whatissynchronousdatatransfer?
7. Definepipelining.
8. DefineSymmetric MultiProcessors.

PART-B **MARKS:4 X3=12**

NOTE:1. Answeronequestioneach from9, 10,11and 12.
2. **Eachquestionisofinternalchoicetype**
3. **Eachquestioncarriesthreemarks.**

9.a)List the types of interrupts .

(OR)

9. b)**ExplaininterruptedinitiatedI/O.**.

10. a) Demonstrate Simple Instruction Format.
(OR)
10. b)Writethree types of pipeline hazards.

11. a)Explaintheneedforaninterface.
(OR)
11. b)What is **daisychainingpriority**.

12. a)What is Interpret multicore processor

(OR)

b)List the stages of instruction pipeline

PART-C 4 X 5 =20

NOTE:1.Answeronequestioneachfrom13,14, 15and16

2. Eachquestionisofinternalchoicetype

3. ***Eachquestioncarriesfivemarks.***

13. a) Describe the sequential execution of a program stored in memory by the CPU.

(OR)

b)ExplainprogrammedI/Omethodofdatatransfer.

13. a) Explainvirtualmemoryorganization inacomputersystem.

(or)

b)Compare RISC and CISC processors

15. a) ExplainInputOutputProcessor with diagram.

(OR)

b) Discusshand shakingprocedureof data transfer.

16. a) Demonstrate the working of Instruction pipeline.

(OR)

b) Write about Flynn's classification.

CS-306 : COMPUTER NETWORKS

Course Title:	**Computer Networks**	Course Code	**CS-306**
Semester	**III Semester**	Course Group	**Core**
Teaching Scheme in Periods (L:T:P)	**4:1:0**	Credits	**2.5**
Methodology	**Lecture+Tutorials**	Total Contact Periods	**75**
CIE	**60 Marks**	SEE	**40 Marks**

Pre requisites

Basic knowledge on Computer components and Networking devices

Course Outcomes

Upon completion of the course, the student shall be able to

CO1	Classify the Network Types and Topologies
CO2	Illustrate the different Transmission Media and Network components
CO3	Explain the working principle of Data Link layer and Medium Access layer protocols
CO4	Illustrate the Network Address classes and Internet protocols
CO5	Compare the header formats of TCP/UDP protocols
CO6	Explain the Domain Name System and Security

Course Content and Blue Print of Marks for SEE

Unit No	Unit Name	Periods	Questions to be set for SEE			
			R		U	A
I	**Introduction to Networks and Topologies**	13	Q4	Q1	Q9(a)	Q13(a)
II	**Network Transmission Media and Network Components**	12				
III	**Data Link Layer and Medium Access Control Protocols**	13		Q2	Q10(a)	Q14(a)
IV	**Network Addressing,**	12				

	Routing Algorithms and Internet Protocols						
V	**Internet Control and TCP/UDP Protocols**	12		Q3	Q5, Q6	Q9(b), Q11(a), Q11(b)	Q13(b), Q15(a), Q15(b)
VI	**Application Layer Services, Management and Security**	13			Q7, Q8	Q10(b), Q12(a), Q12(b)	Q14(b), Q16(a), Q16(b)
	Total	75	8			8	8

Course Contents

UNIT - 1: Introduction to Networks and Topologies

Duration: 13 Periods (L: 10 – T:3)

Computer Networks-Definition, Uses of networks-Business applications, Home applications, Networks Classification-Personal Area Networks, Local Area Networks, Metropolitan Area Networks, Wide Area Networks, Network Topologies- Bus, Star, Ring, Mesh, Hybrid, Network Reference Models-OSI, TCP/IP, Comparison of OSI and TCP/IP reference models, Design issues for the layers, Connection Oriented vs Connection Less services

UNIT - 2: Network Transmission Media and Network Components

Duration: 12 Periods (L:10 – T:2)

Wired Transmission Media- Twisted-Pair Cables, Coaxial Cables, Optical Fiber Cables, Wireless Transmission Media-Radio, Microwave, Infrared, Light, Network devices-Repeaters, Hubs, Switches, Bridges, Gateways, Network Interface Cards (NICs), Routers, Modem, Access Points, Define-Bandwidth, Propagation Time, Transmission time, Switching-Circuit switching, Packet switching, Comparison of Circuit switching and Packet switching

UNIT - 3: Data Link Layer and Medium Access Control Protocols

Duration: 13 Periods (L:10 – T:3)

Data Link Layer-Services provided to Network layer, Framing, Define (point-to point)-Error control, Flow control, Error Detection and Error Correction, Flow Control Protocols- Stop and Wait for Error Free channel and Noisy Channel, IEEE Standard Protocol-802.3 Ethernet Frame Format, Wireless LAN- 802.11 Frame Format, Bluetooth-Architecture, Applications, Protocol Stack, Frame Format

UNIT – 4: Network Addressing, Routing Algorithms and Internet Protocols

Duration: 12 Periods (L:10– T:2)

Network Layer- Services offered to Transport layer, Addressing Schemes-Physical address (MAC address), Logical address, IP Addresses- Components, Classes(classful), Routing Algorithms-Shortest path, Flooding, Distance Vector Routing, Internet Protocols-IP version4 protocol Header, IP version 6 protocol Header, Comparison of IPv4 and IPv6 protocols, IP Subnetting, Tunneling

UNIT - 5: Internet Control and TCP/UDP Protocols

Duration: 12 Periods (L:10– T:2)

Internet Control Protocols- Internet Control Message Protocol (ICMP)**,** Address Resolution Protocol, Transport layer- Services offered to Application layer, Addressing, Transport Service Primitives, Connection Establishment and Release services, Define(end-to-end)-Error Control and Flow Control, Transmission Control Protocols-TCP Header format, UDP Header format, Comparison of TCP and UDP.

UNIT - 6: Application Layer Services, Management and Security

Duration: 13 Periods (L:10 – T:3)

Application Layer **–** Services, Domain Name System (DNS)-Name space, Resource Records, Email-Architecture and Services, World Wide Web (Architectural overview), Hyper Text Transfer Protocol, Network Management - ISO Network Management Model, Simple Network Management Protocol (SNMP), Remote network monitoring (RMON), **ping** command, Network Security Basics-Attacks, Services, Network Security Model

Reference Books

1. Computer Networks, 5th Edition, by Tanenbaum
2. Data Communications and Networking, 4th Edition, by Behrous A. Forouzan
3. Cryptography and Network Security by William Stallings
4. Business Data Communications and Networking 7th Edition by Fitzgerald, Dennis
5. Computer Networking-A Top-Down Approach by KUROSE, ROSS

Suggested E-learning references

1. https://www.slideshare.net/burhanAhmed14/computer-network-130198698
2. https://archive.nptel.ac.in/courses/106/105/106105183/
3. https://www.redbooks.ibm.com/abstracts/gg243376.html
4. https://onlinecourses.nptel.ac.in/noc22_cs19/preview
5. https://www.geeksforgeeks.org/computer-network-tutorials/
6. https://www.javatpoint.com/computer-network-tutorial
7. https://www.slideshare.net/manjushreemm/network-attacks-108736212

Suggested Learning Outcomes

For achieving the Course outcomes, the following learning outcomes must be achieved

CO1: Classify the Network Types and Topologies

1.1 Define Computer Network

1.2 List two business applications

1.3 List two home applications

1.4 Classify the computer networks

1.4.1 Explain the PAN, LAN

1.4.2 Explain the MAN and WAN

1.4.3 Compare the LAN, MAN, WAN

1.5 Classify Network Topologies

1.5.1 Explain the Bus topology and Star topology

1.5.2 Explain the Ring topology and Mesh topology

1.5.3 Explain the Hybrid topology

1.5.4 Compare various topologies

1.6 List network reference models

1.7 Explain OSI reference model

1.8 Explain TCP/IP reference model

1.9 Compare OSI and TCP/IP reference models

1.10 List the design issues with layers architectures

1.11 Compare connection-oriented vs. connection-less services

CO2: Illustrate the different Transmission Media and Network Components

2.1 List types of transmission media

2.2 List wired transmission media

2.2.1 Explain the twisted-pair transmission media

2.2.2 Explain the Coaxial cable transmission media

2.2.3 Explain the Fiber cables transmission media

2.3 List the wireless transmission media

2.3.1 Explain the Radio and Microwave Wireless transmission media

2.3.2 Explain the Infrared and Light Wireless transmission media

2.3.3 Compare the Wired and Wireless transmission media

2.4 List Network Devices

2.4.1 Explain the Repeaters and Hubs

2.4.2 Explain the Switches and Bridges

2.4.3 Explain the Gateways

2.4.4 Discuss Routers and Modems

2.4.5 Illustrate Access points

2.5 Explain the Network Interface Card (NICs)

2.6 Define Bandwidth

2.7 Define Propagation time

2.8 Define Transmission time

2.9 Define Switching

2.9.1 Demonstrate Circuit Switching

2.9.2 Demonstrate Packet Switching

2.9.3 Compare Circuit Switching and Packet Switching

CO3: Explain the working principle of Data Link layer and Medium Access layer Protocols

3.1 Define Frame

3.2 List the services provided to network layer

3.3 Explain the Framing

3.4 Define Error control

3.5 Define Flow control

3.6 Discuss Error Detection Error Correction

3.7 List Data link layer protocols for Flow control

3.7.1 Explain the stop and wait protocol for Error free channel

3.7.2 Explain the stop and wait protocol Noisy channel

3.8 Illustrate the IEEE 802.3 Ethernet Frame format

3.9 Illustrate the IEEE 802.11 Frame format

3.10 Wireless Protocol-Bluetooth

3.10.1 Explain the Bluetooth Architecture

3.10.2 List the Bluetooth Applications

3.10.3 Explain the Bluetooth Protocol Stack

3.10.4 Illustrate the Bluetooth Frame format

CO4: Illustrate the Network Address classes and Internet protocols

4.1 List the services offered to Transport layer

4.2 Define Network Address

4.3 Classify Network addressing schemes

4.4 Define Logical address and Physical address

4.5 Demonstrate the IP address Components

4.6 List the IP address classes (classful)

4.7 Define Routing

4.8 Classify the Routing algorithms

4.8.1 Illustrate the Shortest path routing

4.8.2 Explain Flooding

4.8.3 Explain Distance vector

4.9 Define Protocol

4.10 List Network Layer Protocols

4.10.1 Discuss the IPv4 protocol header format

4.10.2 Discuss the IPv6 protocol header format

4.10.3 Compare the IPv4 and IPv6 protocols

4.11 Define Sub netting

4.12 Explain the IP Sub netting with an example

4.13 Define Tunneling

CO5: Compare the header formats of TCP/UDP protocols

5.1 Discuss the Internet Control Message Protocol (messages used)

5.2 Explain Address Resolution Protocol

5.3 List the services offered to Application layer

5.4 What is the Transport addressing format?

5.5 List Transport layer service primitives

5.6 What is the need of Connection Establishment service

5.7 When the connection may Release in data transfer?

5.8 Define Error Control(end-to-end)

5.9 Define Flow Control(end-to-end)

5.10 List Transport layer Protocols

5.10.1 Illustrate the TCP header format

5.10.2 Illustrate the UDP header format

5.10.3 Compare the TCP and UDP protocols

5.11 When we use TCP protocol in data transfer

5.12 When we use UDP protocol in data transfer

CO6: Explain the Domain Name System and Security

6.1 List the services offered by Application layer

6.2 Define DNS

6.2.1 What is the need DNS in Computer networks

6.2.2 Discuss Name Space

6.2.3 Explain the Resource records

6.3 Discuss the Email architecture

6.4 Discuss the World Wide Web (architectural overview),

6.5 What is the need of Hyper Text Transfer Protocol?

6.6 When we need Network Management System

6.6.1 Explain the model for Network Management System

6.6.2 What is the role of a SNMP in Network Management?

6.6.3 What is the purpose of ping command?

6.7 Define Network Security

6.8 Classify the Security Attacks

6.9 List the Security Attacks

6.10 Explain the Security Attacks

6.11 List the Security Services

6.12 Explain the Security Services

6.13 Demonstrate the Network security model

Suggested Student Activities

1. Visit each class, lab, and all HOD rooms and gather the network connection information
2. Classify the network types and topologies based on distance and connectivity
3. Apply the network addressing schemes to make LAN communication and to get Internet
4. Visit the universities or software organization to understand the network Connectivity and Internet sharing
5. Participate in online quizzes and group discussions to get more skill in networking

CO-PO Mapping Matrix

	Basic and Discipline Specific Knowledge	Problem Analysis	Design/Development of Solutions	Engineering Tools, Experimentation and Testing	Engineering Practices for Society, Sustainability and Environment	Project Management	Lifelong Learning	Linked PO
CO	PO1	PO2	PO3	PO4	PO5	PO6	PO 7	
CO1	3	1	1	1			1	1,2,3,4,7
CO2	3	1	1	1			1	1,2,3,4,7
CO3	2	1					1	1,2,7
CO4	2	1	1				2	1,2,3,7
CO5	2	1					1	1,2,7
CO6	2	1		1			1	1,2,4,7

MODEL QUESTION PAPERS

STATE BOARD OF TECHNICAL EDUCATION & TRAINING:TS, HYDERABD

C-24 CS-306 Computer Networks

III-SEMESTER, MID-I MODEL PAPER

Time: 1 Hour **Max. Marks:20**

PART-A

Answer All questions. Each carry 1 marks. 1x4=4 Marks

1. Define Computer Network
2. List any Two home applications of Computer networks
3. What is use of a Repeater
4. List any Two wired transmission media

PART-B

Answer All questions. Each carry 3 marks. 3x2=6Marks

5a) Differentiate between LAN and WAN

OR

b) Explain the Connection-oriented service

6a) What is the need of Network Interface Card

OR

b) Explain Twisted pair cables.

PART-C

Answer All questions. Each carry 5marks. 5x2=10Marks

7a) Explain the TCP/IP reference model

OR

b) Explain any Two network topologies

8a) Compare Infrared vs Microwave wireless media

OR

b) Explain Coaxial cables with neat sketch

MODEL QUESTION PAPERS
STATE BOARD OF TECHNICAL EDUCATION & TRAINING:TS, HYDERABD
C-24 CS-306 Computer Networks
III-SEMESTER, MID-II MODEL PAPER

Time: 1 Hour **Max. Marks:20**

PART-A

Answer <u>All</u> questions. Each carry 1 mark. **1x4=4 Marks**

1. Define Error control
2. List Two services provided to Network layer
3. Define Routing
4. What is the need of IP address.

PART-B

Answer All questions. Each carry 3marks. **3x2=6 Marks**

5a) List Three Applications of Bluetooth

OR

b) Draw the Bluetooth Frame Format

6a) State the need of network address components

OR

b) Explain IP Subnetting

PART-C

Answer All questions. Each carry 5 marks. **5x2=10Marks**

7a) Explain IEEE 802.3 Ethernet frame format

OR

b) Explain the IEEE 802.11 frame format

8a) Explain IPv4 header format

OR

b) Differentiate IPv4 and IPv6 protocols

MODEL QUESTION PAPERS
STATE BOARD OF TECHNICAL EDUCATION & TRAINING:TS, HYDERABD
C-24 CS-306 Computer Networks
III-SEMESTER, END SEMESTER MODEL PAPER

Time: 2 Hours **Max. Marks:40**

PART-A

Answer <u>All</u> questions. Each carry 1 marks. **1x8=08 Marks**

1. Define Network Topology
2. List Two Routing algorithms
3. Define Protocol
4. List Two Security Attacks
5. What is the use of Address Resolution Protocol
6. List Two transport service primitives
7. Define Security Service.
8. What is the use of **ping** command

PART-B

Answer all questions. All questions carry 3 marks **3x4=12 Marks**

9.a) List Three applications of computer networks

OR

b) Explain the UDP header

10.a) What is the need of Network Interface Card

OR

b) Explain the Network Security Model

11. a) What is the need of Connection Establishment in data transfer

OR

b) Explain the Transport addressing system

12 a) Explain the Two security services

OR

b) List the Three application services

PART-C

Answer all the questions. All questions carry 5 marks. 5x4 = 20Marks

13a). Explain the TCP/IP reference model

OR

b). Compare the TCP and UDP protocols

14a). Explain the Switches and Bridges

OR

b). Explain Simple Network Management Protocol

15a). Explain Internet Control Message Protocol messages

OR

b). Illustrate the TCP header format

16a). Explain Hyper Text Transmission Protocol

OR

b). Explain World Wide Web architecture

EC-307 : DIGITAL ELECTRONICS LAB

Course Title	Digital Electronics Lab	Course Code	EC-307
Semester	III	Course Group	Practical
Teaching Scheme in Periods(L:T:P)	1:0:2	Credits	1.25
Methodology	Lecture+ Practical	Total Contact Periods	45
CIE	60 Marks	SEE	40 Marks

PRE REQUISITES

This course requires the basic skills of Handling bread boards and PCB.

COURSE OUTCOMES

On successful completion of the course, the students will be able to attain below Course Outcome

CO1	Familiarize with logic gates and Boolean functions
CO2	Realization of combinational logic circuits
CO3	Realization of sequential logic circuits

Course Outcomes :

CO1: Familiarize with logic gates and Boolean functions

1) Identify Digital ICs of logic gates and note down pin details from data sheets

2) Verify the truth tables of Logic gates (AND, OR, NOT, NAND, NOR, EX- OR, EX –NOR)

3) Implement AND, OR, NOT gates using NAND, NOR gates and verify the Truth Tables.

4) Verify the truth table of XOR gate using NAND and NOR gates.

5) Implement and verify the truth table of a given Boolean function using basic and universal logic gates

CO2: Realization of combinational logic circuits

6) Verify the truth table of half adder using basic and universal logic gates

7) Verify the truth table of full adder implemented with 2 half adders.

8) Verify the truth tables of 4 X 1 MUX and 1 X 4 DE-MUX.

9) Verify the function of 8 X 3 Encoder with truth table

10) Verify the function of 3 X8 Decoder with truth tables.

11) Verify the function of BCD to Decimal Decoder and write the truth tables.

CO3 : Realization of sequential logic circuits

12) Construct clocked SR FF using NAND gates and verify its truth table.

13) Verify the functionality and truth table of SR, JK, D, T flip flops.

14) Construct and verify the working of decade counter with truth table

15) Verify the working of Ring Counter with truth table

16) Construct and verify the working of synchronous up/down counter truth table

17) Verify the working of shift register with truth table

CS-308 : DATA STRUCTURES THROUGH 'C' LAB

Course Title	Data Structures through C Lab	Course Code	CS-308
Semester	III	Course Group	Practical
Teaching Schemein Periods(L:T:P)	1:0:2	Credits	1.25
Methodology	Lecture+ Practical	TotalContactHours	45
CIE	60 Marks	SEE	40 Marks

Prerequisites

Should be familiar with C Language

Course Content and Blue Print of Marks for SEE

Unit No	Unit name	Hours/ Periods	Marks for SEE			Marks weightage	%Weightage
			Coding	Execution	Viva		
1	Data structures through C Lab	45	20	10	10	40	100
	Total	45	40			40	100

Course Outcomes

On successful completion of the course, the students should be able to

Course Outcome	
CO1	Apply the concept of pointers in arrays, functions and structures, should apply dynamic memory allocation functions and understand its differences.
CO2	Should be able to analyze and understand the need of different dynamic memory allocation functions, should know how to analyze the efficiency of programs
CO3	Implement different sorting and searching algorithms.
CO4	Implement the concept of stacks ,queuesand circular queues using arrays.
CO5	Should be able to represent linked list concept.
CO6	Should be able to implement different tree traversal techniques.

Course Content

Unit Number	Unit Name	Periods
1	Pointers	**6**
2	Dynamic memory allocation functions and introduction to data structures	**3**
3	Sorting and Searching	**9**
4	Stacks and Queues	**9**
5	Linked Lists	**12**
6	Non -Linear Data structure	**6**
	Total	**45**

Recommended books:

1. Understanding pointers in C-Yashwanth Kanetk.
2. Data Structures using C–EBalaguruSwamy
3. Data Structures :AP seudocode Approach with C++-Gilberg/ Forouzan
4. Data Structures using C–AaronM. Tanenbaum.
5. Data structures through C-Yashwanth Kanetkar

Suggested E-Learning references:

1. https://www.tutorialspoint.com/data_structures_algorithms/index.htm
2. https://www.programiz.com/dsa
3. https://www.geeksforgeeks.org/data-structures/
4. https://www.w3schools.in/data-structures-tutorial/intro/

Suggested Learning Outcomes

Upon completion of the course, the student shall be able to

LIST OFEXERCISES

1. Write a program to perform arithmetic operations on pointers.
2. Write a program to demonstrate the use of dynamic memory management functions.
3. Write a program on Selection sort.
4. Write a program on insertion sort.
5. Write a program on bubble sort.
6. Implement a program to implement quick sort using recursion.
7. Write a program on linear search.
8. Write a program on binary search.
9. Write a program to implement stacks using arrays.
10. Write a program to implement queue using arrays.
11. Write a program to implement circular queue using arrays.
12. Write a program to evaluate a postfix expression.
13. Write a program to demonstrate insertion, deletion&display operations on singly linked lists.
14. Write a program to implement insertion, deletion and display operations on a doubly linked list.
15. Write a program to perform binary tree traversals operations.

Suggested Student Activities

1. Slip Test on small snippets.
2. Implementation of different application of stacks queues which are beyond the exercise.
3. Implementation of Linked list concept in solving real world problems(Ex:- Addition of two polynomials etc)
4. Implementation of binary search tree.
5. Apply the concept of graphs, and implement different traversal techniques.

CO-PO Mapping Matrix

	Basic and Discipline SpecificKnowledge	Problem Analysis	Design/Development of Solutions	Engineering Tools, Experimentation and Testing	Engineering Practices for Society, Sustainability and Environment	Project Management	Lifelong Learning	Linked PO
CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	
CO1	1		1			2	1	1,3,6,7
CO2	2						1	1,7
CO3	1		1	2	1	2	1	1,3,4,5,6,7
CO4	1	1		2	2	1	1	1,2,4,5,6,7
CO5	1	2	1	3		3	1	1,2,3,4,6,7
CO6	1	1	1		2	1	1	1,2,3,5,6,7

CS-309 : OOPS THROUGH C++ LAB

Course Title:	**OOPs through C++ Lab**	Course Code :	**CS-309**
Semester:	**III Semester**	Course Group :	**Practical**
Teaching Scheme in Periods(L:T:P):	**1:0:2**	Credits :	**1.25**
Methodology :	**Lecture+ Practical**	Total Contact Periods :	**45 Periods**
CIE :	**60 Marks**	SEE :	**40 Marks**

Pre requisites

This course requires the basic knowledge of C programming.

Course Content and Blue Print of Marks for SEE

Unit No	Unit name	Hours/ Periods	Marks for SEE			Marks weightage	%Weightage
			Coding	Execution	Viva		
1	OOPs through C++	45	20	10	10	40	100
	Total	45	40			40	100

Course Outcomes

On completion of the course, the student should be able to

Course Outcome		CL	Linked PO	Teaching Hours
CO1	Develop and execute programs using I/O and functions	R, U, A	1,2,3,4,7	3
CO2	Develop and execute programs using classes and objects	R, U, A	1,2,3,4,7	9
CO3	Develop and execute programs using Files	R,U, A	1,2,3,4,7	3
CO4	Develop and execute programs using constructor and operator overloading	R, U, A	1,2,3,4,7	15
CO5	Develop and execute programsusing Inheritance.	R, U, A	1,2,3,4,7	9
CO6	Develop and execute programs using templates.	R, U, A	1,2,3,4,7	6
			Total Sessions	**45**

Suggested Reference Book

1. Teach yourself C++-- Helbertschildt Osborne McG
2. Object-oriented Programming with C++--- PoornachandraSarang PHI
3. Programming with C++-- E. Balaguruswamy – TMH
4. Computer Science: A Structured Approach using C++--Forouzan/Gillberg - Thomson
5. C++ & OOPS Paradigm-- DebasishJana PHI

Suggested E-learning references

1. https://www.tutorialspoint.com/cplusplus/index.htm
2. http://www.cplusplus.com/doc/tutorial/
3. https://www.programiz.com/cpp-programming
4. https://beginnersbook.com/2017/08/c-plus-plus-tutorial-for-beginners/
5. **https://www.tutorialspoint.com/cplusplus/index.htm**
6. **https://www.javatpoint.com/**
7. **https://www.techguruspeaks.com/c-plus-plus-programming/**
8. **https://www.guru99.com/cpp-tutorial.html**
9. http://digimat.in/nptel/courses/video/106105151/

Suggested Learning Outcomes

Upon completion of the course, the student shall be able to

CO1: Develop and execute programs using I/O and functions

1.1 Develop and execute C++ program using input output operators.
1.2 Write a program to demonstrate the use of function overloading.

CO2: Develop and execute programs using classes and objects

2.1 Develop and execute C++ program using class& object.
2.2 Develop and execute C++ program on array of objects.
2.3 Develop and execute C++ program using Friend function.

CO3: Develop and execute programs using Files

3.1 Develop and execute C++ programs to demonstrate open(),write(),read() and close().

CO4: Develop and execute programs using constructor and operator overloading

4.1 Develop and execute C++ program using default constructor and parameterized constructor.
4.2 Develop and execute C++ program using copy constructor and constructor overloading.
4.3 Develop and execute C++ program to demonstrate Binary Operator overloading with operator function as member function.
4.4 Develop and execute C++ program to demonstrate Unary Operator overloading with operator function as member function.
4.5 Develop and execute C++ program to demonstrate Binary Operator overloading using friend Function.
4.6 Develop and execute C++ program to demonstrate Unary Operator overloading using friend Function.

CO5: Develop and execute programs using Inheritance.

5.1 Write simple programs illustrating use of all types of inheritances.
5.2 Write a Program to illustrate virtual functions.

CO6: Develop and execute programs using templates.

6.1 Write a Program to illustrate function templates and class templates.

Suggested Student Activities

Student activity like mini-project, quizzes, etc. should be done in group of 5-10 students.

- Codingcompetitions
- Quiz Competitions
- Advanced Topics Seminars
- Writing Reports

CO-PO Mapping Matrix

	Basic and Discipline Specific Knowledge	Problem Analysis	Design/Development of Solutions	Engineering Tools, Experimentation and Testing	Engineering Practices for Society, Sustainability and Environment	Project Management	Lifelong Learning	Linked PO
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO 7**	
CO1	1		1	2			1	1,3,4,7
CO2	2	1	2	2			1	1,2,3,4,7
CO3	3	2	2	2			2	1,2,3,4,7
CO4	3	1	1	2			2	1,2,3,4,7
CO5	3	2	1	2			2	1,2,3,4,7
CO6	3	2	2	2			2	1,2,3,4,7

HU – 310 COMMUNICATION SKILLS AND LIFE SKILLS LAB

Course Title	**Communication Skills and Life Skills Lab**	Course Code	**HU - 310**
Semester	**III**	Course Group	**Practical**
Teaching Scheme in Periods -L:T:P	**1 : 0 : 2**	Credits	**1.25**
Methodology	**Lecture + Practical**	Total Contact Hours	**45 Periods (3 Periods per Week)**
CIE	**60 Marks**	SEE	**40 Marks**

Rationale:

The course is designed to impart listening skills and life skills to the students of diploma which will help them a great deal in personal and professional fronts.

Prerequisites:

The course requires the basic knowledge of vocabulary, grammar, and four language learning skills, viz. Listening, Speaking, Reading and Writing.

Course Contents

1. **Listening Skills - I** **Duration: 6 (L 2 P 4)-**

- A paragraph
- A song
- A recipe
- A dialogue

2. **Life Skills - I** **Duration: 9 (L 3 P 6)**

1. Attitude
- Features of attitude
- Attitude and behaviour
- Attitude formation
- Positive attitude
- Negative attitude
- Overcoming negative attitude
- Attitude at workplace

2. Adaptability
- Need for adaptability
- Willingness to experiment
- Fear of failure
- Think ahead
- Stay positive

- Curiosity
- Being in present

3. **Listening Skills- II** **Duration: 6 (L 2 P 4)**

- Biography
- Interview
- A Report
- Telephone Conversation

4. **Life Skills-II** **Duration: 9 (L 3 P 6)**

3. Goal setting

- Importance of setting goals
- What is goal setting
- Short term goals
- Long term goals
- Achieve goals using SMART

4. Creativity

- Flexibility
- Curiosity
- Determination
- Innovative ideas

5. **Life Skills – III** **Duration: 6 (L 2 P 4)**

5. Time Management

- Features of time
- Secrets of time management
- Time wasters
- Prioritization
- Productive time
- Time Quadrant

6. Human Values

- Honesty and integrity
- Work Ethics
- Ego and Respect
- Trust and Truthfulness
- Social Responsibility
- Character formation
- Designing Destiny

6. **Life Skills- IV** **Duration: 9 (L 3 P 6)**

7. Problem Solving and Decision Making

- Define the problem
- Generate Options
- Evaluate and choose an option
- Implement solution
- Monitoring and Seeking Feedback

8. Leadership Qualities and Team Work

- Significance of Leadership
- Factors of leadership
- Leadership styles
- Leadership Skills
- Importance of Team work
- Characteristics of a good team
- Benefits of team work
- Problems of team work
- Qualities of team player

Course Outcomes

CO	At the end of the course the students will have the ability to:
CO 1	Comprehend factual information and infer the required details after listening to auditory input and respond to the given context.
CO 2	Comprehend factual information and infer the required details after listening to auditory input and respond to the given context.
CO 3	Develop positive attitude to adapt oneself to all the situations to succeed in professional and personal life.
CO 4	Set goals using SMART features for life and get inspired to get success in professional and personal life. Create innovative things and think out of the box.
CO 5	Apply various time management techniques and prioritize tasks effectively, and learn to be creative and innovative in thinking and maintain core human values in personal life and professional life.
CO 6	Develop problem-solving skills, make timely decisions, develop trust, confidence, leadership skills and team qualities.

CO-PO Matrix

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	Mapping POs
CO 1	-	-	-	-	3	2	3	5,6 and 7
CO 2	-	-	-	-	3	2	3	5,6 and 7
CO 3	-	-	-	-	3	3	3	5,6 and 7
CO 4		-		-	2	2	3	5,6 and 7
CO 5					2	2	3	5,6 and 7
CO 6					2	2	3	5,6 and 7

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b. https://www.exameng1ish.com/1eveltes/1istenin leveltest.htm

c. https://www.oxfordon1ineenglish.com/1istening?utmreferrer=https%3A%2F%2Fwww.google.co.in%2F

d. https://takeie1ts.britishcounci1.org/prepare-test/free-ie1ts-practice-tests/listening-practice-test-1

e. https://learnenglish.britishcounci1.org/en/listening

f. https://www.cambridgeeng1ish.org/learning-english/activities-for-learners/?ski11=1istening

g. https://www.businesseng1ishsite.com/business-english-listening.html

BOARD DIPLOMA EXAMINATION (C-24)

MID SEMESTER EXAMINATION - I

HU-310 COMMUNICATION SKILLS AND LIFE SKILLS

Time: One Hour **Total Marks: 20**

Part – A **10 Marks**

1. Listening Comprehension (5 X 2 = 10)

Instruction: Questions shall be given before reading the passage.

Emperor Ashoka was an emperor in ancient India. He was also called Ashoka the Great. He lived a long time ago, around 304 BCE. When he was young, he became the king of a big part of India after a fight for power.

At first, Ashoka wanted to win more land and power. He fought many wars and won many battles. But one day, during a battle in a place called Kalinga, Ashoka saw a lot of people suffering and dying. This made him feel very sad and sorry for what he had done. He decided he didn't want to fight anymore.

After this, Ashoka became a follower of Buddhism, a peaceful religion. He started to teach people about being kind and not hurting others. He wrote down his ideas on big stone pillars and put them all over his kingdom. These were called the "Edicts of Ashoka."

Ashoka did many good things for his people. He built hospitals for sick people and shelters for travelers. He also helped spread Buddhism to other countries.

Ashoka's time as king was a peaceful and happy time for India. He is remembered as a great leader who wanted everyone to be happy and peaceful.

Questions:

a. Who was Ashoka?

b. Why did Ashoka stop fighting wars?

c. What religion did Ashoka follow after he stopped fighting?

d. What were the "Edicts of Ashoka"?

e. Name one good thing Ashoka did for his people.

Part – B **10 Marks**

2. How can maintaining a positive attitude in the face of challenges contribute to personal and professional growth?

3. Give an example of a situation where you had to adapt to unexpected changes or circumstances. How did your adaptability skills help you navigate through the situation effectively?

BOARD DIPLOMA EXAMINATION (C-24)
MID SEMESTER EXAMINATION - II
HU -310 COMMUNICATION SKILLS AND LIFE SKILLS

Time: One Hour **Total Marks: 20**

Part – A **10 Marks**

1. Listening Comprehension (5 X 2 = 10)

Instruction: Questions shall be given before reading the passage

Prithviraj Chauhan was a courageous emperor who ruled parts of northern India during the 12th century. He was born into the Chauhan dynasty, a family known for its valor and leadership. Prithviraj ascended to the throne at a young age after the death of his father, Someshwar Chauhan.

Prithviraj's reign was marked by numerous military conquests and battles to defend his kingdom against rival Rajput clans and foreign invaders. He was renowned for his exceptional skill in warfare, especially archery and horse riding. His bravery and strategic prowess earned him the admiration of his allies and the fear of his enemies.

One of the most famous events in Prithviraj's life was his legendary rivalry with the Afghan ruler, Muhammad Ghori. The two clashed in a series of battles for supremacy in northern India. The most notable of these battles was the Battle of Tarain, fought in 1191 CE. Despite being outnumbered, Prithviraj displayed remarkable leadership and tactical brilliance, leading his forces to victory and capturing Muhammad Ghori. However, the tide turned in the subsequent battle at Tarain in 1192 CE. Due to a betrayal by one of his allies and underestimating Ghori's tactics, Prithviraj faced defeat and was captured. He was taken as a prisoner to Ghori's capital, where he met his tragic end.

Prithviraj Chauhan's legacy remains etched in the annals of Indian history as a symbol of bravery, resilience, and honor. His valorous deeds continue to inspire generations, and his name is remembered with reverence as one of India's greatest warriors and emperors.

Questions:

1. Who was Prithviraj Chauhan?
2. What dynasty did Prithviraj Chauhan belong to?
3. What were Prithviraj Chauhan's notable skills in warfare?
4. Describe the rivalry between Prithviraj Chauhan and Muhammad Ghori.
5. What happened to Prithviraj Chauhan after the Battle of Tarain in 1192 CE?

PART-B **10 Marks**

Instruction: Answer any one of the following questions in 150 words.

1. Why is it important to set clear and achievable goals in both personal and professional life? give an example of a goal you have set for yourself and explain how you plan to achieve it.
2. How do you use a ‘pen’ in ten different ways apart from using it for writing?

BOARD DIPLOMA EXAMINATION (C-24)

SEMESTER END EXAMINATION

HU-310 COMMUNICATION SKILLS AND LIFE SKILLS

Time: Three Hours **Total Marks: 40**

Part – A **10 Marks**

1. Listening Comprehension (5 X 2 = 10)

Instruction: Questions shall be given before reading the passage

Gautama Buddha, also known simply as the Buddha, was a spiritual leader who lived in ancient India around the 6th century BCE. Born into a noble family in Lumbini, now located in present-day Nepal, Siddhartha Gautama, as he was originally named, led a life of luxury and privilege.

However, Siddhartha's life took a profound turn when he encountered the realities of human suffering. Despite being sheltered from the harshness of the world, he witnessed old age, sickness, and death, which deeply troubled him. Determined to find answers to the mysteries of life and alleviate human suffering, Siddhartha renounced his princely status and embarked on a spiritual quest.

For years, Siddhartha wandered the forests of India, seeking enlightenment through meditation and ascetic practices. After undergoing rigorous self-discipline and introspection, he finally attained enlightenment under a Bodhi tree in Bodh Gaya, Bihar. It was during this transformative moment that Siddhartha became the Buddha, meaning the "Enlightened One."

Following his enlightenment, the Buddha dedicated his life to teaching others the path to liberation from suffering. He expounded the Four Noble Truths and the Eightfold Path, which form the core teachings of Buddhism. The Four Noble Truths explain the nature of suffering, its causes, its cessation, and the path to its cessation, while the Eightfold Path outlines the ethical and spiritual practices necessary to achieve liberation.

The Buddha's teachings emphasized compassion, mindfulness, and inner peace. He encouraged his followers to cultivate wisdom and lead a virtuous life guided by right understanding, intention, speech, action, livelihood, effort, mindfulness, and concentration.

Throughout his lifetime, the Buddha traveled extensively across northern India, preaching his message of enlightenment and compassion to people from all walks of life. His teachings transcended social barriers and cultural boundaries, attracting followers from diverse backgrounds.

Gautama Buddha's legacy endures as one of the most influential spiritual figures in human history. His teachings continue to guide millions of people around the world on the path to inner peace, compassion, and liberation from suffering.

Comprehension Questions:

1. Who was Gautama Buddha, and when did he live?
2. What prompted Siddhartha Gautama to leave his life of luxury?
3. Where did Gautama Buddha attain enlightenment?
4. What are the Four Noble Truths and the Eightfold Path?
5. How did Gautama Buddha's teachings impact society?

PART-B **15Marks**

Instruction: Answer any one of the following questions in 150 words.

2. Seminar on Life Skills Topics

PART- C **15Marks**

3. Viva Voce