Course Curriculum (in line of NEP 2020) for Diploma

In

Computer Engineering (Draft)

(For students admitted in 2024-25 onwards)

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Inclusion of National Education Policy, 2020:

As envisioned in the NEP 2020 the State Council for Technical Education, Assam will be responsible for mentoring its affiliated Polytechnics so that they develop capabilities and achieve minimum benchmarks in academic and curricular matters, teaching and assessment.

State Council for Technical Education (SCTE), Assam will notify the pool of MOOCs courses duly approved by its statutory bodies and map them in Academic Bank of Credits (ABC). Affiliated Polytechnics may opt for any of these courses as required. State Council for Technical Education (SCTE) will take suitable action for preparation of syllabus for these courses including learning objective and learning outcome.

The State Council for Technical Education (SCTE) may fix the minimum number of credits to be earned by the students from a parent institution.

All the affiliating institutions will complete Academic Bank of Credits registration through SCTE. Institute will monitor the opening of ABC account by all the students.

Salient features

Salient features that are to be considered for developing the curriculum aligned to NEP 2020 are as follows:

- Reduced number of credits.
- Introduction of Student Induction Program.
- Well defined learning objectives & outcomes for each course.
- Inclusion of courses on socially relevant topics.
- Built-in flexibility to the students in terms of professional elective and open Elective courses.
- Mandatory internship to equip the students with practical knowledge and provide them exposure to real time industrial environments.
- Virtual Labs.
- Mapping of Courses to its equivalent NPTEL/SWAYAM Course.
- Course on 'Entrepreneurship and Startups' to encourage entrepreneurial mindset.
- Introduction of Design Thinking and Universal Human Value course.

Basic Guidelines:

The existing Credit System is revised as Choice Based Credit System (CBCS) in line with NEP guidelines, to infuse innovation and flexibility. No hard separation between streams, between curricular and extra-curricular, between Vocational and Academic, Multidisciplinary and holistic education across the disciplines, Ethics and Human & Constitutional values, Life skills, use of technology as part of all curriculum.

- An academic year is divided into two semesters as per AICTE guidelines.
- A semester consists of approximately 90 working days. One working week will have approximately 40 hours of instructional time.
- There shall also be a Winter Internship Program for duration of 4 weeks/one month from 1st January to -31st January.
- Summer term courses may be offered on a fast-track mode to enable students to complete arrears/special courses.
- Teachers may avail semester end vacations after the end of each semester. Subject to completion all kinds of examination related work.
- The Polytechnics under the Directorate of Technical Education can decide on the kind of courses to be offered in the summer term, based on the requirements and also based on the availability of teaching faculty.
- Internship/apprenticeship can be carried out during the winter term, mandatorily for regular student.
- Students who wish to exit after 1st year or 2nd year of study, have to undergo mandatory bridge courses as defined in the course structure.

Induction Program:

The Essence and Details of Induction program can be find from the 'Detailed Guide on Student Induction program', as available on AICTE Portal,

(Link: https://www.aicteindia.org/sites/default/files/Detailed%20Guide%20on%20Student %20Induction%20program.pdf),

The Induction program for students to be offered right at the start of the first year for three-week duration.

- Physical activity
- Creative Arts
- Universal Human Values
- Literary
- Proficiency Modules
- Lectures by Eminent People
- Visits to local Areas

Mandatory Visits/ Workshop/Expert Lectures:

a) It is mandatory to arrange one industrial visit every semester for the students of each branch.

b) It is mandatory to conduct a One-week workshop during the winter break after fifth semester on professional/ industry/ entrepreneurial orientation.

c) It is mandatory to organize at least one expert lecture per semester for each branch by inviting resource persons from domain specific industry.

GENERAL COURSE STRUCTURE & CREDIT DISTRIBUTION

Definition of Credit:

1 Hr. Lecture (L) per week	1 credit
1 Hr. Tutorial (T) per week	1 credit
1 Hr. Practical (P) per week	0.5 credit
2 Hours Practical (P) per week	1 credit

A. Range of Credits:

In the light of the fact that a typical Model Four-year Under Graduate degree program in Engineering has about 160 credits, the total number of credits proposed for the three-year Diploma program in Engineering & Technology is 120.

B. Structure of Diploma Engineering program:

The structure of Diploma Engineering program shall have essentially the following categories of courses with the breakup of credits as given:

Sr. No.	Category	Suggested Breakup of Credits
1.	Humanities & Social Sciences courses	8*
2.	Basic Science courses	19*
3.	Engineering Science courses	15*
4.	Program Core courses (Branch specific)	45*
5.	Program Elective courses (Branch specific)	12*
6.	Open Elective courses (from other technical and /or emerging subjects)	9*
7.	Project work, seminar and internship in industry or elsewhere	12*
8.	Audit Courses [Environmental Sciences, Induction training, Indian Constitution, Essence of Indian Traditional Knowledge etc.]	(non-credit)
	Total	**120***

Minor variation is allowed as per need of the respective disciplines.

C. Course code and definition:

Course code	Definitions
L	Lecture
T	Tutorial
P	Practical
HS	Humanities & Social Sciences Courses
BS	Basic Science Courses
ES	Engineering Science Courses
PC	Program Core Courses
PE	Program Elective Courses
OE	Open Elective Courses
AU	Audit Courses
SI	Summer Internship
PR	Project
SE	Seminar

D. Course level coding scheme:

Three-digit number (odd numbers are for the odd semester courses and even numbers are for even semester courses) used as suffix with the Course Code for identifying the level of the course e.g.

101, 102 … etc. for first year
201, 202 …. Etc. for second year
301, 302 … for third year

E. Evaluation Scheme for 3rd Semester of Diploma in Engineering courses under State Council for Technical Education (SCTE), Assam

For Theory Courses:

(The weightage of Internal assessment is 40% and for End Semester Exam is 60%) The student has to obtain at least 40% marks individually both in internal assessment and end semester exams to pass.

For Practical Courses:

(The weightage of Internal assessment is 60% and for End Semester Exam is 40%) The student has to obtain at least 40% marks individually both in internal assessment and end semester exams to pass.

For Summer Internship / Projects / Seminar etc.

Evaluation is based on work done, quality of report, performance in viva-voce, presentation etc.

Note: The internal assessment is based on the student's performance in mid semester tests (two best out of three), quizzes, assignments, class performance, attendance, viva-voce in practical, lab record etc.

F. Mapping of Marks to Grades

Each course (Theory/Practical) is to be assigned 100 marks, irrespective of the number of credits, and the mapping of marks to grades may be done as per the following table:

Range of Marks	Assigned Grade	Grade Point
91-100	A^+	10
81-90	A	9
71-80	B^+	8
61-70	B	7
51-60	C^+	6
46-50	C	5
40-45	D	4
< 40	F (Fail due to less marks)	-
-	F^R (Fail due to shortage of attendance and therefore, to repeat the course)	-

A. Credit Distribution, Mark Distribution and Break up of Internal Assessment Marks as per following table:

A. Semester wise Credit point distribution

SL. NO	SEMESTER	CREDIT POINTS
1	THIRD	20
2	FOURTH	20
3	FIFTH	20
4	SIX	20
TOTAL CREDIT POINTS		80

1.1 Subject Category wise Credit point Distribution

COURSE CATEGORY	SEM III	SEM IV	SEM V	SEM VI	TOTAL CREDIT POINT
Programme Core Courses	18	12	10	8	48
Programme Elective Courses	0	2	6	0	08
Open Elective Courses	2	2	2	2	08
Audit Courses	0	0	0	0	00
Semester Internship	0	2	0	2	04
PROJECT and Seminar	0	2	2	5	09
HSC	0	0	0	3	03
TOTAL CREDIT	20	20	20	20	80

Course Structure:

THIRD SEMESTER						
SL.NO	COURSE CODE	COURSE TITLE	L	T	P	C
1	COPC-301	Programming in C and C++(OOP)	3	0	0	3
2	COPC-302	Software Engineering	3	0	0	3
3	COPC-303	Computer Hardware and Networking	1	1	0	2
4	COPC-304	Database Management System	3	0	0	3
5	COPC-305	Programming in C and C++ Lab(OOP)	0	0	4	2
6	COPC-306	Computer Hardware and Networking Lab	0	0	2	1
7	COPC-307	Database Management System Lab	0	0	2	1
8	COPC-308	Internet and Web Technology	2	0	0	2
9	COPC-309	Internet and Web Technology Lab	0	0	2	1
10	OE-301	Engineering Economics and Accountancy	2	0	0	2
11	OE-302	Data Visualization and Analysis with Excel (IS)	0	0	4	2
12	OE-303	Fundamental of Innovation and Design Thinking	0	0	4	2
13	AU-301	Essence of Indian Knowledge and Tradition	2	1	0	0

*NOTE:- Choose any one subject code OE-301 or OE-302 or OE-303

Marks Distribution (3ʳᵈ Semester):

S. No.	Course Code	Course Title	Internal Assessment (Theory)		ESE		Internal Assessment (Practical)		Practical Test		Total Marks (Course)	Pass Marks (Course)
			Total Marks	Pass Marks	Total Marks	Pass Marks	Total Marks	Pass Marks	Total Marks	Pass Marks		
1	COPC-301	Programming in C and C++(OOP)	40	16	60	24	-	-	-	-	100	40
2	COPC-302	Software Engineering	40	16	60	24	-	-	-	-	100	40
3	COPC-303	Computer Hardware and Networking	40	16	60	24	-	-	-	-	100	40
4	COPC-304	Database Management System	40	16	60	24	-	-	-	-	100	40
5	COPC-305	Programming in C and C++ Lab(OOP)	-	-	-	-	60	24	40	16	100	40
6	COPC-306	Computer Hardware and Networking Lab	-	-	-	-	60	24	40	16	100	40
7	COPC-307	Database Management System Lab	-	-	-	-	30	12	20	8	50	20
8	COPC-308	Internet and Web Technology	40	16	60	24	-	-	-	-	100	40
9	COPC-309	Internet and Web Technology Lab	-	-	-	-	30	12	20	8	50	20
10	OE-301	Engineering Economics and Accountancy	40	16	60	24	-	-	-	-	100	40
11	OE-302	Data Visualization and Analysis with Excel (IS)					60	24	40	16	100	40
12	OE-303	Fundamental of Innovation and Design Thinking					60	24	40	16	100	40
12	AU-301	Essence of Indian Knowledge and Tradition	40	16	60	24	-	-	-	-	100	40
		Total									1000	

N.B: The marks of Audit Course is not included in total marks.

a) Break Up of Internal Assessment Marks
Internal Assessment for Theory (TA+HA&CT)

Component	Teacher's Assessment (TA)			Home Assignment & Class Test (HA&CT)				Total
	Attendance	Discipline	Class Participation	Home Assignment	Presentation / Seminar	Quiz	Class Test	
Maximum Marks	5	1	2	4	6	2	20	**40**

Note: Three (3) class tests must be conducted for each course. For calculation of Internal Assessment, best two (2) class tests out of the three (3) conducted is to be considered.

Internal Assessment for Practical (PA)

For 60 marks

Component	Maximum Marks
Teacher's Assessment (TA)	
Attendance	10
Discipline	2
Practical Assignment	
Practical Work and/or Laboratory Report	30
Presentation	10
Viva	8
Total	**60**

b) **Grading System proposed is Absolute Grading System.**
c) **Conversion factor from Cumulative Grade Point Average (CGPA) to Percentage (%) is 10.**

Range of Attendance with Marks (for Theory):

Sl No.	Range of Attendance	Marks
1	96% and above	5 Mark
2	91% to 95%	4 Mark
3	86% to 90%	3 Mark
4	81% to 85%	2 Mark
5	76% to 80%	1 Mark
6	75%	Only permitted to appear in the exam
7	Between 60% to 75%	NC: May appear in the exam if there are genuine reasons
8	Below 60%	DC: Cannot appear in the exam

Range of Attendance with Marks (for Practical):

Sl No.	Range of Attendance	Marks
1	96% and above	10 Mark
2	91% to 95%	9 Mark
3	86% to 90%	8 Mark
4	81% to 85%	7 Mark
5	76% to 80%	5 Mark
6	75%	Only permitted to appear in the exam
7	Between 60% to 75%	NC: May appear in the exam if there are genuine reasons
8	Below 60%	DC: Cannot appear in the exam

Valid Ground for Non-collegiate students:
1. Medical grounds.
2. Participation in a state/national level competition, including the journey period as approved by the Head of Institution.
3. Participation in a seminar of national/international level, workshop or conference, including the journey period as approved by the Head of Institution.
4. Participation in voluntary programmes conducted by the Institute/Directorate as per Government notification.
5. Any other grounds which the Examination Committee, in consultation with the Secretary, SCTE may approve.

Current Examination Fee structure:
- Non Collegiate Fees: Rs. 300/- (per subject)
- Examination Fee: Rs. 500/-
- Retest Fee: Rs. 200/- (per subject)

N.B: The rates may be changed subject to Government order.

Conditions for Dis-Collegiate (DC) student:
(i) Any candidate who is an internal student but has attended less than 60% of classes in any one or more subjects on theory and/ or practical shall not be eligible to appear in the respective semester examination and termed as Dis-collegiate student.
(ii) Dis-collegiate students will have to repeat the semester by taking admission in the next session.

Note: The above guidelines may be changed/modified as per AICTE and Government of Assam notification from time to time.

Detailed Third Semester
Curriculum Contents
(Computer Engineering Branch)

1. Course Title : Programming in C & C++(OOPS)

Semester: 3rd

Course Code : COPC-301
Credits : 1 (L : 3 T : 0 P : 0)

Course Objectives:

- To develop idea about concepts in programming
- To learn C Programming and develop programs of medium complexity
- Understand the principles of object-oriented programming.
- Learn to design and implement object-oriented programs in C++.
- Develop problem-solving skills using OOP concepts.
- Master the use of C++ language features for efficient coding.

Course Outcomes :

CO1: Explain fundamental concepts of programming using different control structures.
CO2: Demonstrate the use of functions, arrays, strings, pointers and structures in C.
CO3: Explain the principles of object-oriented programming.
CO4 : Develop problem-solving skills using OOP concepts.
CO5 : Implement file handling concepts in C & C++.

Unit No.	Contents	ILO	Hours
I	**Overview of C:** Basic structure of C program, executing a C program, executing a C program. Data types, Decision and control structure.	1. Acquire the basics of C Programming Language 2: Write small C programs using control structures	4
II	Array, Functions, Pointers and File: Arrays- definition, types, initialization, passing arrays to functions, Strings, Functions- definition, prototype, passing parameters, Recursion, Pointer declaration, operations on pointers, pointers and arrays, pointers and functions, pointers and strings. Structure & Union - definition, processing, structure and pointers, passing structures to functions, File- defining, opening and closing file, I/O operations on file, error handling, random access, command line arguments.	1. Explain the basic data structures 2.Explain what a pointer is and it is beneficial in dynamic memory allocation 3.Define own functions and data types 4. Choose the better parameter passing technique. 5. Minimize the memory usage 6. Provide better security to the transferred data 7. Manage data permanently based on the concept of file handling in C	10

III	Introduction to C++: Basic concepts of object oriented programming, data types, operators, expressions, scope resolution operator, type cast operator, manipulator	1. Define OOPS and its characteristics. 2. Handle data in improved way based on the enhanced data type knowledge. 3.Define scope resolution Operator	3
IV	Classes and Objects: Class declaration and definition, creating objects, defining member function, private member function, static data member, static member function, array of objects, object as function arguments, constructor and destructor, copy constructor	**1**. Define the basic concepts of OOPS-class and object **2**. Explain the different access specifiers used in C++. **3**. Differentiate between member data and member function. **4**. Differentiate between constructor and destructor and their usage **5**. Develop Objects based programs.	**4**
V	Function and Operator Overloading: Function prototyping, call by reference, return by reference, inline function, friend function, virtual function, function overloading, operator overloading, rules for overloading operators, overloading unary and binary operator, type conversion, pointers, pointers and string, pointers to objects, this pointer	**1**. Differentiate amongst the parameter passing techniques . **2**. Access private members of different classes. **3**. Assign different tasks to the same functions and operators based on the knowledge of overloading. **4**. Use 'this' pointer. **5**. Handle strings in programming in better way 6. Explain and use dynamic programming based on virtual function and pointers 7. Develop more efficient programs after completion of the chapter	6
VI	Inheritance Definition of inheritance, various forms of inheritance, defining derived classes, virtual base class, abstract classes	**1.Define inheritance** 2.Differentiate amongst different types of inheritance 3. Explain virtual base class and abstract 4. Provide security to the	7

				members of a class	
VII	**Template and Exception handling** Definition of templates, class templates, function templates, overloading template functions, member function templates, non-type template arguments, Catch statement, Throwing exception		1. Manipulate different types of data by the same functions based on the concept of template 2. Develop objects based softwares		3
VIII	**File handling** Classes for File stream, Opening and closing file, File modes, Types of files- Sequential and random		1: Define the basic concepts in file handling 2:Write programs using file.		5
	Internal Assessment				3

Distribution of Marks:

Unit	Topic	Type of Question			Total
		Objective	Short	Descriptive	Marks
1	**Overview of C**	2	-	-	2
2	**Arrays, Functions, Pointers and File**	2	-	6	8
3	**Introduction to C++**	2	2	5	9
4	**Classes and Objects**	2	3	5	10
5	**Function and Operator Overloading**	2	2	5	9
6	**Inheritance**	2	3	3	8
7	**Templates and Exception handling**	2	-	4	6
8	**File handling**	1	2	5	8
		15	12	33	60

Suggested Learning Resources:

1. Let us C by Y. Kanetkar, BPB

2. Programming in ANSI C / E. Balagurusamy / Tata McGraw-Hill

3. Object Oriented Programming with C++, E Balagurusamy, Tata McGraw-Hill

2: Course Title - Software Engineering

1:Course Code – COPC-302

2.Credits : 3 (L : 3 T : 0 P : 0)

3.Semester- 3rd

4.Course Objectives

- Learn about the software engineering principles.
- Learn about software testing fundamentals.
- Learn about concepts in software project management.
- Learn about recent developments in software engineering paradigmn.

5: Course Outcome :

On completion of this course, students will be able to :

☐ 1: Demonstrate the steps of software development process.

☐ 2: Design software using design principles.

☐ 3: Explain the basics of software testing

☐ 4: Estimate effort and size of a software project.

5: Explain recent developments in the area of software development.

6: **Pre-requisite :**

☐ Basic concept of a software.

7: Detailed Course Content :

Unit No.	Topic/Sub-Topic	ILO	Hours
1	**Introduction to** Software Engineering 1.1 What is software? 1.2 Types of software 1.3 Characteristics of Software 1.4 Attributes of good software 1.5What is software engineering? 1.6Software engineering costs 1.7 What are the key challenges facing software engineering?	1. State the role of software engineering.	3

	1.8 Systems engineering & software Engineering		

2	**Software Development Process Models**
	2.1 What is a software process?
	2.2 What is a software process model?
	   The waterfall model
	   Evolutionary development
	   Component-Based
	   Software Engineering
	   (CBSE)
	2.3 Process Iteration
	   Incremental delivery
	   Spiral development
	2.4 Rapid software development
	   Agile methods
	   Extreme programming
	      Rapid application development (RAD)
	    Software prototyping
	2.5 Computer Aided Software Engineering (CASE)
	   Overview of CASE approach
	   Classification of CASE tools
		2. Explain the various software development process models	**6**

3	**Software Requirement Analysis and Specification**
	3.1 System and software requirements
	3.2 Types of software requirements
	   Functional and non-functional
	    requirements
	   Domain requirements
	   User requirements
	3.3 Elicitation and analysis of
	   requirements
	   Overview of techniques
	   Viewpoints
	   Interviewing
	   Scenarios
	   Use-cases
	   Process modeling with physical
	    and logical DFDs
	   Entity Relationship Diagram
	   Data Dictionary
	3.4 Requirement validation
	3.5 Requirement specification
	    Software requirement
	    Specification (SRS)
	    Structure and contents
	    SRS format
	3.6 Feasibility
		3.Explain the procedure of
		requirement analysis.
		
		4. Prepare the contents of
		specification document.
		
		5. Prepare ERDs.
		
		6. Prepare DFDs and data dictionary.
			9

4	**Software Design**
	4.1 Design concepts
	   Abstraction
	   Architecture
	   Patterns
	   Modularity
	   Cohesion
	   Coupling
	   Information hiding
	   Functional independence
	   Refinement
	4.2 Design of input and Control
	4.3 Design of User Interface design
	   Elements of good design
	   Design issues
	   Features of modern GUI
	   Menus, Scroll bars, windows,
	   Buttons, icons, panels, error
	   Messages etc.
		7. State the important design considerations.
		
		8. Develop UI design using UI design concepts.
			5

5	**Coding**
	5.1 Programming languages and
	   development tools
	5.2 Selecting languages and tools
	5.3 Good programming practices
	5.4 Coding Standards
		9: Develop concepts on
		   coding.
		10: Implement good
		   programming
		practices.
			3

6	**Software Testing and Quality Assurance**
	6.1 Verification and validation
	6.2 Techniques of testing
	   Black-box and White-box
	   testing
	   Inspections
	6.3 Levels of testing
	   Unit testing
	   Integration Testing
	   Interface testing
	   System testing
	   Alpha and beta testing
	   Regression testing
	6.4 Design of test cases
	6.5 Quality management activities
	6.6 Product and process quality
	6.7 Standards
	   ISO9000
	   Capability Maturity Model
	   (CMM)
		11. Define the basic concepts
		in software testing.
		
		12. Differentiate between
		black box and white box testing.
		13. Explain a few software
		testing strategies.
		
		14: Design test cases
		
		15: Define quality related
		concepts.
		16. Discuss the procedure to achieve quality standards.
			7

7	**Managing Software Projects** 7.1 Need for the proper management of software projects 7.2 Management activities	17. State the objectives of project management.	

	Project planning
	7.3 Software Size Estimation and Cost Estimation
	   Software Estimation –Size
	    Estimation
	    Function Point Analysis
	    LOC Estimation
	7.4 What is Productivity
	    COCOMOII
	7.5 Project scheduling
	    Task set for Software project
	    Defining a task network
	    Scheduling
	    Earned value analysis
	7.6 Risk management
	    Reactive versus proactive
	    Software Risk
	    Risk Identification
	    Risk projection,
	    Risk refinement
	    Risk mitigation, monitoring &
	     management-The RMMM
	7.7 Managing people
		18. Describe the project planning activities.
		
		19. Estimate project duration and cost.
		
		20. Explain the project monitoring activities.
		
		21. Describe the risk analysis process.
			7

8	**Current trends in Software Engineering**
	8.1 Software Engineering for
	   projects and products.
	8.2 Introduction to Web
	   Engineering and Agile process
		22: Explain current practices followed in software development.	2

	Internal Assessment		3
		Total	**45**

Distribution of Marks:

Unit	Topic	Type of Question			Total Marks
		Objective	**Short**	**Descriptive**	
1	Introduction to Software Engineering	2	-	-	2
2	Software Development Process Models	2	-	8	10
3	Software Requirement Analysis and Specification	2	3	7	12
4	Software Design	2	2	6	10
5	Coding	2	2	-	4

6	Software Testing and Quality Assurance	2	3	3	8
7	Managing Software Projects	2	2	6	10
8	Current trends in Software Engineering	1	3	-	4
	Total	15	15	30	60

Suggested Learning Resources :

1. Software Engineering Beginners Approach by –Pressman –TMH

2. Software Engineering –by Pankaj Jalote

3. Fundamentals of Software Engg –Carlo Ghezzi, Mehdi Jazayeri, & Dino Mandrioli –PHI

4. Software Engineering –by Sommerville

5: MongoDB Fundamentals - Amit Phaltankar, Juned Ahsan, Michael Harrison, Liviu Nedov - Packt publishing

3. Course Title – Computer Hardware and Networking

I: Course Code: COPC-303   Credits : 2 (L : 1 T : 1 P : 0)

II: Semester: 3rd

III: Aim of the Course:

➢ To give knowledge about computer parts and networking devices.
➢ To provide hands on practice in assembling, de-assembling of computer.
➢ Provide hands on practice of installation and networking basics.

IV: Course Outcome:

On completion of this course students will be able to:

CO-202.CO1 (T): Explain the basics of computer system
CO-202.CO2 (T): Explain the basics of computer networks.

V: Pre-requisites:

➢ Basic knowledge of computer and peripherals.

VI: Teaching Scheme:

Teaching Scheme			
L	T	P	Total hours per week
1	1	0	2

VII: Examination Scheme:

	Theory (T)	Sessional (TS)
Full Marks	60	40
Pass Marks	24	16

VIII: Detailed Course Content:

Chapter no.	Chapter Title	Content	Intended Learning Outcomes	Hours
1	Introduction to Computer System Layout	1.1 Identification of System Layout: a) Front Panel Indicators and Switches. b) Front side and rear side Connectors. 1.2 Familiarize the Computer System Layout: Making Positions of SMPS, Motherboard, FDD, HDD, CD, DVD and add on cards	1. Identify system Layout and to locate the internal components of a computer system.	3
2	Installation and configuration of Secondary memory and BIOS	2.1 BIOS set up: Configuring bios setup program and practicing the trouble shooting of typical problems using BIOS utility. 2.2 a) Install Hard disk. b) Configure CMOS- Setup. c) Partition HDD using FDISK. d) Format Hard Disk. e) Master/Slave/IDE Devices. 2.3a) Install and configure a CD- Writer and a DVD writer. b) Recording a blank CD and DVD.	2. Configure BIOS and CMOS setup. 3. Partition, format and install a hard disk. 4. Configure and install a CDRom/ CD and DVD writer and burn CD/DVD	2
3	Installation of different devices	3.1 Printer Installation and Servicing: a) Head Cleaning. b) Install and Configure Dot Matrix and Laser Printer.	5. Install, configure and troubleshoot dot matrix, inkjet and laser printer.	6

		c) Troubleshoot DMP and Laser printer. d) Check the data cable connectivity. 3.2 Network Installation and Troubleshooting: a) NIC, Router Installation. b) Installing NIC, router and Modem for XP/Linux Environment. c) Configuring using device drivers. d) Diagnosis and trouble shooting. 3.3 Installation of multimedia components: a) Install audio/video devices, microphone, speaker and head set and Digital camera. b) Troubleshoot the audio-video devices. c) Install and configure Web Cam.	6. Install and configure NIC, Router, audio-visual devices like: microphone, speaker, head-set, digital camera and web-cam.	
4	Trouble shooting basics	4.1 a) Identifying the Problems in PC with add on Cards. b) Identify problems with software installation using drivers available in the motherboard CD. 4.2 Practice with scan disk, disk cleanup, disk Defragmentation, Virus Detection and Rectification Software. 4.3 Practice with backup and restore data in a network server using external storage Device.	7. Troubleshoot a PC, to solve hardware-software problem and to use software diagnostics tools. 8. Perform backup and recovery of data using an external hard disk. 9. Assemble a PC.	5

		4.4 Assemble a PC with add on cards and check the working condition on the system.		
5	OS installation	5.1 Windows and Linux- Operating System Installation.	10. Install OS : Linux and Windows	2
6	Basics of Networking	6.1 Do the following cabling works in a network a)Cable Crimping. b)Creating straight Cable. c)Creating Cross Cable. 6.2 Establish a LAN connection amongst three nodes in a bus topology. 6.3 Establish Peer to Peer network connection between two nodes in LAN. 6.4 Interface PCs using connectivity devices-Hub, router and switch.	11. Learn networking basics. 12. Establish LAN and peer-topeer connections amongst the PCs. 13. To use hub, router and switch.	3
7	LAN Configuration	7.1 a) Configure IP address in a system in LAN (TCP/IP Configuration). b) Configure DNS to establish interconnection between systems. 7.2 a) Transfer files between systems in LAN using FTP Configuration. b) Login a system remotely using telnet protocol. 7.3 a) Install and configure Network interface card in a LAN system.	14. Configure LAN. 15. Transfer files between nodes within a network. 16. Share files and printers remotely.	2

		b) Share a file and printer(remotely) between two system in a LAN.		
8	Security fundamentals	8.1 Establish security in a system using firewall configuration. 8.2 Create and share the user rights by accessing server for a specific user groups. 8.3 Install and configure the following: a) A DHCP server in windows with IP Address ranging from 192.168.1.1 to 192.168.1.100 b) Configure a DHCP Client 8.4 Transfer Files Between systems using wireless Communication. 8.5 Configure Mail Server.	17. Configure firewall and different servers like: mail server, DHCP client & server.	2
9	Implementation of networking basics	9.1 Write a Client Server Program to connect different PCs	18. Write programs to connect PCs	2
Internal Assessment				3

Distribution of Marks:

Chapter	Name of the Chapter	Type of Question			Total
		Objective	Short	Descriptive	Marks
1	Introduction to Computer System Layout	2	2	5	9
2	Installation and configuration of Secondary memory and BIOS	2	2	3	9
3	Installation of different devices	1	2	5	8

4	Trouble shooting basics	1	2	5	8
5	OS installation	2	2		4
6	Basics of Networking	1		5	6
7	LAN Configuration	1		5	6
8	Security fundamentals	2	2	3	7
9	Implementation of networking basics	3			3
		15	12	33	60

Suggested Learning Resources:

1: Repairing and Upgrading PC's by Scott Mueller, Pearson

2: The Complete PC Upgrade and Maintenance Guide by Mark Minasi

3: Modern Computer Hardware Course by by ManaharLotia , Pradeep Nair and PayalLotia.

4: Course Title - Database Management Systems

1: Course Code – COPC-304

2: Credits : 3 (L : 3 T : 0 P : 0)

3: Semester- 3rd

4: Aim of the Course :

- To learn about the database system management.
- To learn designing of a good database considering various aspects of designing.
- To use DDL, DML and DCL .

5: Course Outcome :

On completion of the course, students will be able to :

- Describe the fundamental concepts in DBMS

- Retrieve data writing SQL queries.

- Design database using normalization concept.

- Implement security concepts in database design.

- Differentiate between centralized and distributed database design.

6: **Pre-requisite :**

- Knowledge and concept of files and database.

7: **Teaching Scheme :**

Teaching Scheme			
L	T	P	Total Hours per week
3	-	-	3

8: **Detailed Course Content:**

Unit	Topics/Sub-topics	Intended Learning Outcome	Hours
1	**Introduction to Database Management System :** 1.2 Database System Environment 1.2 File oriented Approach 1.3 Database Approach 1.4 Users of DBMS 1.5 Intended use of DBMS 1.6 Benefit of using database Approach 1.7 Concepts of Client Server Architecture and distributed system	**1**. Demonstrate the role that database play in an organization. 2. Distinguish between the database approach and traditional approach of programming with data file. 3. Demonstrate different types of DBMS Architectures.	4
2	**Database system concept and Application :** 2.1 Data Models, Schemes and instances 2.2 DBMS architecture and Independence 2.3 Database Languages and Interfaces	1. Describe the modelling concept of database, Data dependency, Database language and interfaces.	4
3	**Relational Data Model:** 3.1 Domains, Attributes, Tuples, and Relations 3.2 Relational Model Constraints and Relational Database Schemas	1: Implement the concepts of relational database.	4
4	**E-R diagram:** 4.1 Defining relations, Entity Set 4.2 E-R Model concept with examples	1. Demonstrate knowledge of relational database concepts, entities/relations and entity relationship diagrams	5
5	**SQL :** 5.1 Data Definition in SQL 5.2 Queries in SQL 5.3 Create, Update, Insert statement in SQL 5.4 Views in SQL	1.Demonstrate knowledge of querying relational database using SQL Commands.	4
6	**Normalization:** 6.1 Functional dependencies 6.2 Normal forms based on primary keys 6.3 General definitions of second and third normal forms 6.4 Boye Codd Normal Form	1. Analyze the status of a relation and demonstrate Normalization in order to avoid anomalies.	5
7	**Transaction processing and Concurrency Control:** 7.1 Introduction to transaction processing. 7.2 Desirable properties of transactions 7.3 Basic Concepts of Concurrency Control; Concepts of Locks; live lock, dead lock.	1. Explain database transaction and its properties. 2. Demonstrate Concurrency control techniques with special emphasis on locks.	4
8	**Security and Integrity :** 8.1 Security and integrity violation 8.2 Authorization 8.3 Authorization and Views	1. Discuss briefly database security process and some techniques.	3
9	**Distributed databases :** 9.1 Principle of distributed database. 9.2 Data fragmentations, transparency, integrity, allocation of fragments.	1. Describe the Basics of distributed database.	5
10	**Introduction to Mongodb :** 10.1 Working and features.		4

	10 Advantages and Disadvantages **.** 10.3 Difference between Mongo-DB and RDBMS 10.4 Basic Commands in Mongo-DB			
	Internal Assessment			**3**

Marks Distribution:

Unit No.	Unit Title	Type of Question			Total Marks
		Objective	Short	Descriptive	
1	**Introduction to Database Management System :**	1	3	4	8
2	**Database system concept and Application**	2	3		5
3	**Relational Data Model**			5	5
4	**E-R Diagram**	1		4	5
5	**SQL**	3	3		6
6	**Normalisation**	1	2	4	7
7	**Transaction processing and Concurrency Control**	1	3	4	8
8	**Security and Integrity**	2	3		5
9	**Distributed Databases**	2	3		5
10	**Introduction to MongoDB**	2		4	6
	Total	15	20	25	60

Suggested Learning Resources :

1. Fundaments of Database System- by Elmasri and Navathe
2. Database Management- by CJ Date
3. Principles of Database Systems- by John E. Hopcroft & Jeffrey D. Ullma
4. MySQL by Paul DuBois, Addison Wesley

5. MongoDB Basics, A quick introduction to MongoDB by Davis Hows, Peter Membrey and Eelco Plugge, Apress

5.Course Title : Programming in C & C++(OOPS) Lab

Semester: 3rd

Course Code : COPC-305

Credits : 2 (L : 0   T : 0   P : 4)

CO1: Develop various C programs realizing the concept of control structures, array, function, pointer, structure, union & file.
CO2: Explain the basic concept of Object Oriented features, developing and testing simple C++ programs.
CO3: Design and develop C / C++ programs to solve real world problems.

Intellectual skills :
- Reasoning and developing C & C++ Program.
- Problem solving using C and C++ Language.

Motor Skills :
- Proper use of computer and related software.

List of Lab Exercises :
I. Programming in C
Programming exercise on control structure- Branching and Looping
Programming exercise on use of array, function, pointer, structure, union and file
II. Programming in C++
Programming exercise on class, objects and constructor
Programming exercise on function overloading, inline function
Programming exercise on operator overloading (unary and binary), virtual function and pointers
Programming exercise on various forms of inheritance
Programming exercise on use of Templates (class and function)

Programming exercise on File handling

6.Course Title : <u>**Computer Hardware and Networking Lab**</u>

Course Code : COPC-306   **Credits : 1 (L : 0 T : 0 P : 2)**
Semester: 3rd

Intellectual skills:
  ➢ Develop logical thinking for troubleshooting.
  ➢ Decide on LAN structure depending on the number of nodes.

Motor skills:
  ➢ Proper handling of tools.
  ➢ Proper technique for Assembling and De - assembling a PC.
  ➢ Connecting the components to establish a LAN.

Practical Course Outcomes:
   On completion of this course, students will be able to:

COPC-307**.CO1 (P):** Identify various components of Computer Systems and their functions
COPC-307**.CO2 (P):** Maintain, upgrade, and troubleshoot PC system.
COPC-307**.CO3 (P):** Connect computers and set up network connections

The lab exercises are to be conducted in connection with the theory syllabus provided.

7.Course Title : <u>**Database Management Systems Lab**</u>

Course Code : COPC-307   **Credits : 1 (L : 0   T : 0   P : 2)**

Semester : 3rd

DBMS Lab COs -
- Apply SQL commands to create and query database.
- Install and maintain DBMS software.
- Familiarizing with basic commands in Mongodb .

Intellectual skills :
- Reasoning and developing queries.
- Problem solving

Motor Skills :
- Proper use of computer and related software.

Lab Exercises :

1: **Installation and use of MySQL**

    1.1 Introduction to MySQL
    1.2 Data-types and attributes constraints, primary key, unique, foreign key, Check not null

2. **Introduction to Structured Query Language(SQL)**
    2.1 Data Definition Language(DDL)-Create, alter, drop table
    2.2 Data Manipulation Language(DML)-select, insert, update, delete
    2.3 Data Control Language-Grant, revoke
    2.4 Creating and deleting Views.

3. **Basic commands in Mongo-DB.**

Suggested Learning Resources :

6. Fundaments of Database System- by Elmasri and Navathe
7. Database Management- by CJ Date
8. Principles of Database Systems- by John E. Hopcroft & Jeffrey D. Ullma
9. **MySQL by Paul DuBois, Addison Wesley**

10. **MongoDB Basics, A quick introduction to MongoDB by Davis Hows, Peter Membrey and Eelco Plugge, Apress**

8. Course Title <u>**Internet and Web Technology**</u>

Course Code – COPC-308   Credits : 2 (L : 2   T : 0   P : 0)

Semester : 3ʳᵈ

Course Outcomes (Theory):

1: Explain basic concepts of internet, ISP and IP address.

2: Describe different web architectures and applications of internet.

3: Design and develop web applications using HTML, JavaScript, and PHP

Proposed course contents (Theory) - 30 Hours

Unit	Topics/Sub-topics	Intended Learning Outcome	Hours
1.	**Internet Fundamentals :** 1.1 Motivation for internetworking 1.2History and scope of internet. 1.3 Internet protocol and standardization 1.4 Role of ISP & Factors for choosing an ISP 1.5 Internet Service providers in India 1.6 Types of connectivity such as Dial Up, Leased, VSAT etc. 1.7 Internet server and client modules on various operating systems 1.8 Secure connections, application and development tools, the web browser 1.9 IP address, Domain Name System, DHCP	1. Define Internet. 2. Explain the role of Internet working. 3. Discuss about protocol 4. Explain the role & factors for choosing ISP 5. Discuss various types of ISP 6. Explain various types of connectivity. 7. Explain the working principle of web browser 8. Explain IP address	5
2.	**Web Architecture** 2.1 Basic components of web architecture 2.2 Client-server architecture - 2-tier, 3-tier architecture.	1. Explain principles of web architecture 2. Explain 2-tier and 3-tier architecture	4
3	**Application of Internet:- E-Commerce** 3.1 Introduction to Electronic commerce 3.2 Modes of electronic commerce 3.3 Electronic data interchange 3.4 Migration to OPEN EDI 3.5 Electronic commerce with www/Internet 3.6 Different types of Electronics Payment System- Credit card, Debit card, Smart Card, E-Cash ,E-Wallet	1. Define E- Commerce 2. Explain various modes of E-Commerce 3. Explain EDI 4. Explain different types of electronic payment system	3
4	**Basics of Web page design** 4.1 Web Page Design, Consideration and Principles 4.2 Overview of HTML document and tags 4.3 Overview of CSS	1. Design a simple web page using HTML and CSS 2. Designing dynamic web page using JavaScript	8

	4.4 Client side scripting: JavaScript, variables, functions, conditions, loops and repetition 4.5 JavaScript and objects, JavaScript own objects, DOM and web browser environments, forms and validations 4.6 DHTML: Combining HTML, CSS and JavaScript, events and buttons	3. Design HTML form using various events and buttons and validate using JavaScript	
5	**Introduction PHP** 5.1 Basic PHP document structure 5.2 PHP variables, Arrays, function and forms 5.2 Advanced PHP Databases: Basic command with PHP examples, Connection to server, creating database, selecting a database, listing database, listing table- names creating a table, inserting data, altering tables, queries, deleting database, deleting data and tables.	1. Design sever-side page using PHP 2. Establish connection to database server using PHP script 3. Perform various database operations through webpage	7
6	**Internal Assessment**		3

Marks Distribution:

Unit No.	Unit Title	Type of Question			Total Marks
		Objective	Short	Descriptive	
1	**Internet Fundamentals :**	3	3	5	11
2	**Web Architecture**	3	3	5	11
3	**Application of Internet:- E-Commerce**	3	3	5	11
4	**Basics of Web page design**	3	6	5	14
5	**Introduction PHP**	3	5	5	13
	Total	15	20	25	60

Reference Books:

1. "Web Technologies--A Computer Science Perspective", Jeffrey C.Jackson,

2. "Internet & World Wide Web How To Program", Deitel, Deitel, Goldberg, Pearson Education

3. "Web programming- Building Internet Application", Chris Bales

4. Web Applications: Concepts and Real World Design, Knuckles

9. Course Title **Internet and Web Technology Lab**

Course Code – COPC-309   **Credits : 1 (L : 0 T : 0 P : 2)**

S.No.	Topics for Practice
1	Design a simple web page using basic HTML tags
2	Include table, image, video and animation in a html page
3	Integrate CSS in a webpage
4	Creation of a dynamic web page using JavaScript
5	Creation of HTML forms and validate using JavaScript (Client side validation)
6	Design a simple server side page using PHP
7	HTML Form validation using PHP (Sever side validation)
8	Connecting database using PHP script
9	Perform basic database operations using PHP script
10.	Developing a fully functional Web Service Application using all the technologies learned in this course.

Course Outcomes (Practical)

1. Design web pages using HTML, CSS and JavaScript

2. Implementation of PHP scripts and establish database connection.

3. Hosting of a simple website.

Reference Books:

5. "Web Technologies--A Computer Science Perspective", Jeffrey C.Jackson,

6. "Internet & World Wide Web How To Program", Deitel, Deitel, Goldberg, Pearson Education

7. "Web programming- Building Internet Application", Chris Bales

8. Web Applications: Concepts and Real World Design, Knuckles

10. Course Title::**ENGINEERING ECONOMICS AND ACCOUNTANCY**

Course Title	:	Engineering Economics and Accountancy
Course Code	:	OE 301
Semester	:	Third
Number of Credits	:	2 (L: 2, T: 0, P: 0)
Prerequisites	:	Nil
Course Category	:	Open Elective

LEARNING OBJECTIVES:

LO1	:	To introduce the students to some important economic and accounting terms.
LO2	:	To acquaint the students with some economic laws and banking organizations etc.
LO3	:	To make the students capable of recording business transaction under double entry system.
LO4	:	To introduce the students about financial statements.

COURSE OUTCOME: After the end of the course, students will be able to:

CO1	:	Define some important economic and accounting terms.
CO2	:	Explain some basic economic laws.
CO3	:	Explain double entry system of book keeping.
CO4	:	Record business transactions under double entry system of book keeping.
CO5	:	Define Financial Statements.

TEACHING SCHEME: (in hours/week)

Theory			Practical (credit)
Lecture	Tutorial	Total credits	
2	0	2	0

TEACHING SCHEME: (in hours)

Theory			Practical
Lecture	Tutorial	Total	Practical
30	0	30	0

EXAMINATION SCHEME:

Theory				Practical				Total Marks
ESE		IA		ESE		IA		
Full Marks	Pass Marks	Full Marks	Pass Marks	Full Marks	Pass Marks	Full Marks	Pass Marks	100
60	24	40	16	0	0	0	0	

DETAILED COURSE CONTENT

Unit	Chapter Title	Contents	Hours
Part A: Engineering Economics			
1	Introduction to Economics	Introduction to Economics : 1.1 Definition of Economics, its utility and definition of engineering economics 1.2 Meaning and concepts of utility, National income, inflation and wants.	2hrs
2	Demand and Supply	2.1 Meaning of demand, The Law of demand and demand schedule 2.2 Meaning of supply and The Law of supply	2hrs
3	Production	3.1 Meaning and factors of production and meaning of production function 3.2 Factors determining efficiency of labour	2hrs
4	Banking Organisations	4.1 Central Bank – its functions 4.2 Commercial banks – its functions	2hrs
5	Pricing	5.1 Objectives of pricing policy 5.2 price determinants 5.3 Price discrimination	2hrs
B. Accountancy			
6	Introduction to Book-Keeping and Accounting	6.1 Definition & objectives of Book- keeping 6.2 Need and advantages of Book- keeping 6.3 Definition of Accounting 6.4 Difference between Book- keeping and Accounting 6.5 Double Entry System – main features 6.6 Advantages and disadvantages of 6.7 Double Entry System	4hrs

		6.8 Concept of Computerized Accounting Software 6.9 Need for Computerized Accounting 6.10 Difference between Manual and Accounting and Computerized Accounting	
7	Transaction	7.1 Definition 7.2 Meaning of Account 7.3 Classification of Accounts: Traditional Approach, Modern Approach 7.4 Meaning of Debit and Credit 7.5 Rules of Debit and Credit	2hrs
8	Journal and Ledger	8.1 Meaning Journal 8.2 Recording of Transactions in Journal 8.3 Meaning of Ledger 8.4 Objectives and utility of Ledger 8.5 Posting and balancing of Ledger 8.6 Distinction between Journal and Ledger 8.7 Names of different Books of Accounts	4hrs
9	Cash Book	9.1 Meaning and importance of Cash Book 9.2 Characteristics and advantages of Cash Book 9.3 Discount – Trade Discount and Cash Discount 9.4 Different types of Cash Book:-Single Column Cash Book, Double Column Cash Book, Triple Column Cash Book 9.5 Bank Reconciliation Statement –Basic idea	4hrs
10	Trial Balance & Errors in Accounting	10.1 Meaning and objects of Trial Balance 10.2 Main features and advantages of Trial Balance 10.3 Preparation of Trial Balance 10.4 Types of errors in accounting.	3hrs
11	Components of Final Accounts:	11.1 Meaning and objectives of trading Account 11.2 Contents of Trading Account 11.3 Meaning and objectives of Profit and Loss Account 11.4 Contents of Profit and Loss Account 11.5 Meaning of depreciation, revenue expenditure and capital expenditure 11.6 Contents of Balance	3hrs
Total Contact Hours			**30**

Table of Specification														
Units	Allotted Hours	Objective			Short Answer Type				Long Answers Type						Total
		R	U	AP	R	U	AP	AN	R	U	AP	AN	E	C	Marks
1.	2hrs	1			2										3
2.	2hrs		1			2									3

Sl No.	Time									Total
3.	2hrs	2	1							3
4.	2hrs							4		4
5.	2hrs	2	1							3
6.	4hrs	2		2				4		8
7.	2hrs							5		5
8.	4hrs	1			2				6	9
9.	4hrs		1				2		6	9
10.	3hrs	1	1	2		2				6
11.	3hrs	1		2	2		2			7
Total	30 hrs									
Total Marks		**15**			**20**			**25**		**60**

NB:R: Remember, **U:** Understand, **AP:** Apply, **AN:** Analyze, **E:** Evaluate, **C:** Create

REFERENCE BOOK LIST:

Sl No.	Book Name	Author Name	Publishing House, Volume, ISBN
1	Introductory Micro Economics	Sandeep Garg	DhanpatRai Publication Pvt. Ltd. New Delhi
2	Introductory Macro Economics	Sandeep Garg	DhanpatRai Publication Pvt. Ltd. New Delhi
3	Theory and Practice of Accountancy	B. B. Dam R. A. Sarda R. Barman B. Kalita	Capital Publishing Company, Guwahati – 5
4	Book-Keeping & Accountancy	Juneja, Chawla &Saksena	Kalyani Publisher, New Delhi – 110002
5	Tally. ERP 9 For Beginners	Tally Solutions Pvt. Ltd.	Sahaj Enterprises, Bangalore

11. Course Title: Data Visualization & Analysis with Excel

Course Code –OE - 302   **Credits : 2 (L : 0   T : 0   P : 4)**

Module	Title	Link	Hours
1	Zero to Hero in Microsoft Excel:Complete Excel Guide 2020	https://infyspringboard.onwingspan.com/web/en/app/toc/lex_auth_01329473671965900829608_shared/overview	6h 48m
2	The Microsoft Excel Data Analysis Toolkit Bundle	https://infyspringboard.onwingspan.com/web/en/app/toc/lex_auth_01384379798902374447509_shared/overview	25h 28m

OE- 303   Fundamental of Innovation and Design Thinking

Note : Course contents will be provided by TATA .

12.COURSE TITLE: ESSENCE OF INDIAN KNOWLEDGE AND TRADITION

Course Code:	Subject Title	Semester	Hours Per Week			Credit
AU-301	Essence of Indian Knowledge and Tradition	III	L	T	P	0
			2	0	0	

Pre-requisites: Nil

Learning Objectives:

1. To introduce the foundational elements of Indian Knowledge Systems (IKS).
2. To explore the scientific and technological heritage of India in ancient times.
3. To build awareness of traditional Indian philosophy, ethics, and medicine.
4. To encourage appreciation for the relevance of IKS in modern contexts.
5. To develop basic research interest in India's indigenous knowledge base and innovations.

Course Outcome (CO): After completion of this course, the students will be able to:

CO	Statement of Course Outcomes
CO1	Explain the concept, scope, and sources of Indian Knowledge Systems.
CO2	Identify significant contributions of ancient India to science, technology, and mathematics.
CO3	Understand traditional Indian governance, education, and core societal values.
CO4	Understand traditional wellness systems and sustainable living practices rooted in Indian Knowledge Systems.
CO5	Appreciate Traditional Indian Knowledge and its relevance in modern contexts.

Syllabus:

Unit No.	Description	Contact Hours
I	**Fundamentals of Indian Knowledge System(IKS):** • Definition, Importance, and Scope of IKS • Overview of major IKS Texts: Vedas, Upanishads, Puranas etc. • Classification of knowledge in Indian traditions: Vidyas (Science) and Kalas (Arts)	4
II	**Science and Technological Heritage:** • Mathematics: Sulbasutras, Contributions of Aryabhatta, Bhaskaracharya • Astronomy and Cosmology: SuryaSiddhanta, Planetary motion, Concept of Time • Metallurgy and Material Sciences: Iron Pillar, Woltz Steel, Ayurvedic alloys • Chemistry of Dyes, Pigments and Chemicals • Civil Engineering and Architecture: Temple architecture, Town planning and water • management	12
III	**Governance, Society and Education Systems:** • Ancient Indian Polity and Administration • Education systems: Gurukula, Nalanda, Takshashila • Value based education: Satya, Ahimsa, Seva • Role of Teacher and Student in Society	6
IV	**IKS in Holistic Wellness and Sustainable Living:** • Foundations of Ayurveda, Yoga and Siddha • Holistic health and wellness practices • Agriculture, Animal husbandry, Sacred groves, Sacred water bodies; Land, Water and Soil Conservation and Management practices.	4
V	**The Modern Relevance of Indian Knowledge Systems:** • Practices of Traditional Indian Knowledge in Modern Science and Engineering • IKS and Entrepreneurships: Organic Farming ,Ayurveda based Start-ups • Government initiatives: National Education Policy 2020, IKS Division under AICTE	4
	Total Contact Hours	30

Suggested Books and Other Study Materials:

1. "Indian Knowledge Systems"-Kapil Kapoor and Avadhesh Kumar Singh.
2. "Ancient Indian Leaps into Mathematics"- B.S.Yadav.
3. "Science and Technology in Ancient India"- O.P.Jaggi.
4. "The Positive Sciences of the Ancient Hindus"- Brajendranath Seal.
5. AICTE Model Curriculum for IKS(Available online)

- NPTEL/SWAYAM courses on IKS
- AICTE-IKS Portal(https://iksindia.org/)
- Digital Library of India (https://dli.gov.in)

Table of Specification for Essence of Indian Knowledge and Tradition (Theory)

Sl No	Contact Hours	Units	Objective			Short answer type				Long answer type						Total Marks
			R	U	AP	R	U	AP	AN	R	U	AP	AN	E	C	
1	4	Unit I	1	1	1	1	2	0	0	0	0	2	0	0	0	8
2	12	Unit II	3	1	1	2	2	0	0	1	2	3	9	0	0	24
3	6	Unit III	1	1	0	2	1	0	0	2	1	1	3	0	0	12
4	4	Unit IV	1	1	0	1	1	0	0	2	1	1	0	0	0	8
5	4	Unit V	1	1	1	2	0	0	0	0	1	2	0	0	0	8
	30	Total Marks	7	5	3	8	6	0	0	5	5	9	12	0	0	60

NB: R: Remember, **U**: Understand, **AP**: Apply, **AN**: Analyze, **E**: Evaluate, **C**: Create

Annexure-1: Essence of Indian Knowledge and Tradition (Theory)

SI No	Units	Time Allotted (Hrs)	Percentage Weightage	R	U	AP	AN	E	C	Total Marks
1	I	4	13.33%	2	3	3	0	0	0	8
2	II	12	40.00%	6	5	4	9	0	0	24
3	III	6	20.00%	5	3	1	3	0	0	12
4	IV	4	13.33%	4	3	1	0	0	0	8
5	V	4	13.33%	3	2	3	0	0	0	8
	Total	30	100%	20	16	12	12	0	0	60

Curriculum Development cell, State Council for Technical Education,Directorate of Technical Education, Assam

Sl. No.	Name	Designation
1	Shri Dhrubajyoti Borah, ACS	Director of Technical Education, Assam
2	Dr. Indrani Gogoi	Joint Director of Technical Education, Assam
3	Dr. Mrinalini Das	Controller of Examination, State Council for Technical Education, DTE, Assam
4	Mr. Ankush Borgohain	Training cum Placement Officer, DTE, Assam
5	Shri Ashok Das	Principal, Assam Textile Institute
6	Dr. Utpal Baruah	Principal, Kamrup Polytechnic
7	Shri Boobool Sarma	Assistant Controller of Examination, SCTE, DTE, Assam

Academic Expert Committee for Computer Engineering

Sl No.	Name	Institute	Designation
1	Mrs. Plabita Borbora, HOD (M.Secy)	Assam Engineering Institute, Guwahati	Member Secretary
2	Mrs Jyotsna Das, HOD, Computer	PCPS Girls' Polytechnic	Member
3	Mr. Kangka Chakravarty	Nalbari Polytechnic	Member
4	Mr. Ramen Kr. Choudhury	Nalbari Polytechnic	Member