Model Curriculum for Three/Four Year Degree Course
(With Multiple Entry/Exit Option)
Based on NEP-2020

B.Sc. ITM

Odisha State Higher Education Council, Bhubaneswar

Government of Odisha

Program Outcome:

The Department of Information Technology Management (ITM) is dedicated to promote learning the various subjects and technologies in the field of information technology and management. This program inspires the students who want to shape their career in IT professional world. As the IT industry is the fastest growing industry in India and in the world, this program generates ample opportunities for employment. The program prepares the students for a range of computer applications, techniques of computer networking, software engineering, Web Development, Data Analytics, SQL, Python and Java etc. which helps them to enter into the software industry. Apart from these, the program focuses on principle of management and organization behaviour through which the students gain the knowledge of management which help them to effectively understand and handle managerial requirements in the industry. This program incorporates human values and morality by responsibly accepting the roles to work for the sustainable development of self and society. It also focuses on acquiring the ability to survive in the environment of rapid technological changes through dynamic learning. Students will develop leadership and communication skills, goal setting, time management techniques and to collaborate more effectively in teams in their workplaces.

SEMESTER-1

SN	SUBJECT NAME
1	DATA STRUCTURE USING C (T+P)
2	OPERATING SYSTEM (T+P)
3	PHYSICS
4	ODIA/HINDI
5	ENVIRONMENT STUDY AND DISASTER MANAGEMENT

Semester-I
Data structure Using C

Core I

Course Objectives:

The course is designed to provide complete knowledge of C language and its use in data structure. Students will be able to develop logics which will help them to write programs C. Also, by learning the basic programming constructs they can easily switch over to any other programming languages in future. It strengthens the ability of the students to identify and apply the suitable data structure for the given real- w o r l d problems. It enables them to gain knowledge in practical applications of data structures.

Course Outcome:

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

- Learn various elements of C language including data types, Operators, expressions, decision making implementation in programs.
- Write complex programs using arrays, structure, pointer & functions.
- Know the concept of stack, queue, linked list to represent data in various ways to solve real time applications.
- Search and sort the data using various searching and sorting methods.

Unit-I:

Introduction: Introduction to Programming Language, Character sets, Keywords & Identifiers, Constants, Variables, Input and Output statements (Formatted and Unformatted), Data types and modifiers, Types of Operators, Precedence and associativity of operators.

Control statements (Simple IF Statement, IF...ELSE, Nested IF...ELSE, IF...ELSE...IF Ladder), Switch Statement. Looping: Do...WHILE, WHILE and FOR Loop. Array Concept (1D and 2D Array).

Outcome: Students will able to understand the basics of C language to write programs and to store the data using array.

Unit-II:

Pointers and its types, Pointer arithmetic, Array of Pointers, Pointer to pointer. Storage classes. Functions: Types, Function Calls, Recursion, String, Structure, Self-Referential Structure, Array of Structures, Union.

Outcome: Students will be able to understand the use of Pointers in data structures

can learn the reusability of codes through functions, can be able to write complex programs in C.

Unit-III:

Dynamic Memory allocation (calloc, malloc, realloc &, free). **Stack:** Definition, Representation, Stack operations, Applications (Infix–Prefix–Postfix Conversion &Evaluation). **Queues:** Definition, Representation, queue operations & Applications. **Linked Lists:** Definition, Types (Single and Doubly Linked List), representation, and Linked list insertion and deletion operations.
Outcome: Students will be aware of data arrangements and accessing those data for various real-time applications.

Unit-IV:

Trees: Tree Terminologies, Binary Tree, Representation, Binary search Tree, Traversing BST, Operations on BST, Heap Tree (max-Heap & Min-Heap). Sorting: Bubble Sort, Insertion Sort, Selection Sort, Quick Sort. Searching: Linear Search, Binary Search.
Outcome: Students will be able to search and sort the data and will come to know about the arrangements of data in a hierarchical manner.

Text Books:

- ✓ *E. Balagurusamy, "Programming in ANSIC",4/e, (TMH)*
- ✓ *Classic Data Structure, P. Samanta, PHI,2/ed*

Reference Books:
- ✓ *B. Kernighan &Dennis Ritchie, "The C Programming Language",2/ePHI*
- ✓ *Paul Deitel, Harvey Deitel, "C: How to Program",8/prentice Hall.*
- ✓ *P.C. Sethi, P.K. Behera,"Programming using C", Kalyani Publisher, Ludhiana*
- ✓ *Ellis Horowitz, Sartaj Sahni, "Fundamentals of Data Structures", Galgotia Publications, 2000.*
- ✓ *Sastry C.V.,Nayak , R,Ch. Rajaramesh, Data Structure & Algorithms, I.K. International Publishing HousePvt .Ltd, NewDelhi.*

Practical

Tutorial C& Data Structure Lab Write C'

- Basic programs in C language.
- Programs using conditional statements (if. Else, else if ladder, nested if, switch case)
- Programs using various loops
- Programsusing1D, 2D and multidimensional array.
- Program base doing pointers.
- Programs using functions, recursion and strings.
- Programs based on structure and union.
- Programs on command line arguments.
- To search an element and print the total time of occurrence in the array.
- To delete all occurrence of an element in an array.
- Array implementation of Stack.
- Array implementation of Linear Queue.
- To implement linear linked list and perform different operations such as node insert and delete, search of an item, reverse the list.
- To implement double linked list and perform different operations such as node insert and delete.
- Linked list implementation of Stack.
- Linked list implementation of Queue.
- To implement a Binary Search Tree.
- To perform binary search operation.
- Bubble sort, Insertion sort, Selection sort, Quicksort.

Operating Systems

Core-II
Course Objectives:

This course has two components: a theory component to teach you the concepts and principles that underlie modern operating systems, and a practice component to relate theoretical principles with operating system implementation. In the theory component, you will learn about processes and processor management, concurrency and synchronization, memory management schemes, file system and secondary storage management, security and protection, etc.

Course Outcome: On completion of this course, students will be able to
- UnderstandthedifferentservicesprovidedbyOperatingSystematdifferentlevel.
- Learn real life applications of Operating System in every field.
- Understandtheuseofdifferentprocessschedulingalgorithmandsynchronization techniques to avoid deadlock.
- Learn different memory management techniques like paging, segmentation and demand paging etc.

Unit-I:

Introduction to Operating System, System Structures: Operating system services, system calls, system programs, Operating system design and implementation, Operating system structure.

Outcome: Students will be able to know the basic components and services of operating system.

Unit-II:

Process Management: Process Concept, Operations on processes, Process scheduling and algorithms, Inter-process Communication, Concepts on Thread and Process, Deadlocks: Dead lock detection, dead lock prevention and dead lock avoidance fundamentals.

Outcome: Students will be able to discuss various scheduling algorithms and know the concept of deadlock.

Unit-III:

Memory Management Strategies: Swapping, Contiguous Memory Allocation, Paging, Segmentation, Virtual Memory Management: Concepts, implementation (Demand Paging), Page Replacement, Thrashing.

Outcome: Students will be able to comprehend how an operating system virtualizes CPU and memory.

Unit-IV:

Storage Management: File System concept, Access Methods, File System Mounting, File Sharing and File Protection, Implementing File Systems, Kernel I/O Systems.
Outcome: Students will be able to understand the functionality of file systems.

Text Books:
- ✓ *Operating System Concepts, Abraham Silberschatz, Peter B. Galvin, and Greg Gagne, Eighth Edition, WileyStudentEdition2009.*

Reference Books:
- ✓ *Modern Operating System, Tanenbaum, Pearson,4/Ed.2014.*
- ✓ *Richard Ashley, Linux with Operating System Concepts, Chapman and Hall/CRC Published, August 26, 2014.*
- ✓ *Richard Blum, Linux Command Line and Shell Scripting Bible, O'Reilly.*

Core II- Operating Systems Lab

- Write a program (using *fork ()* and/or *exec ()* commands) where parent and child execute: same program, same code. Same program, different code. Before terminating, the parent waits for the child to finish its task.
- Write a program to report behavior of Linux kernel including kernel version, CPU type and model.(CPU information)
- Write a program to report behavior of Linux kernel including information on configured memory, amount of free and used memory. (memory information)
- Write a program to print file details including owner access permissions, file access time, where file name is given as argument.
- Write a program to copy files using system calls.
- Write a program using C to implement FCFS scheduling algorithm.
- Write a program using C to implement Round Robin scheduling algorithm.
- Write a program using C to implement SJF scheduling algorithm.
- Write a program using C to implement non-preemptive priority-based scheduling algorithm.
- Write a program using C to implement preemptive priority-based scheduling algorithm.
- Write a program using C to implement SRTF scheduling algorithm.
- Write a program using C to implement first-fit, best-fit and worst-fit allocation strategies.

Physics

Course objective:
The course has objectives to provide Basic knowledge of Physics with a special reference to electronics part. Students will be able to know the fundamentals of electronics devices.

Course Outcome:
After completion of this course, the students will be able to
- Understand the basic of electric current as they have to deal with electronic devices.
- Get idea regarding semiconductor and components like diode.
- Know the fundamentals of transistor

UNIT-I
Electric Current, Electric Currents in Conductors, Ohm's law, Drift of Electrons and the Origin of Resistivity, Limitations of Ohm's Law, Resistivity of Various Materials, Temperature Dependence of Resistivity, Electrical Energy, Power, Cells, emf, Internal Resistance, Cells inSeries and in Parallel, Kirchhoff's Rules, Wheatstone Bridge

UNIT-II
Semiconductor: Bonds in Semiconductors, Crystals, Commonly Used Semiconductors, Energy Band Description of Semi- conductors, Effect of Temperature on Semi- conductors, Hole Current, Intrinsic & Extrinsic Semiconductor, n-type & P-Type Semiconductor, Charge on n- type and p-type Semiconductors, Majority and Minority, Carriers.

UNIT-III
Properties of pn-Junction, Applying D.C. Voltage across pn- Junction or Biasing a pn-Junction, Current Flow in a Forward Biased pn-Junction, Volt-Ampere Characteristics of pn Junction, Important Terms, Limitations in the Operating Conditions of pn- Junction.

UNIT-IV
Transistor, Some Facts about the Transistor, Transistor Symbols, Transistor Connections, Characteristics of Common Base Connection, Measurement of Leakage Current, Common Collector Connection, Commonly Used Transistor Connection, Transistor Load Line Analysis, Practical Way of Drawing CE Circuit, Performance of Transistor, Amplifier, Power Rating of Transistor, Semiconductor Devices Numbering System

Text Books:

- ✓ *PHYSICS PART – I TEXTBOOK FOR CLASS XII*

Reference Books:
- ✓ *Principles of Electronics by V K Mehta & Rohit Mehta*

SEMESTER-I

AEC

प्रयोजनमूलक हिंदी

UNIT - I

प्रयोजनमूलक हिंदी :

प्रयोजनमूलक हिंदी का स्वरूप और परिभाषा, प्रयोजनमूलक हिंदी के भेद, प्रयोजनमूलक हिंदी की विशेषताएँ, प्रयोजनमूलक हिंदी की समस्याएँ और संभावनाएँ

UNIT - II

राजभाषा हिंदी की संवैधानिक स्थिति:

राजभाषा समिति, 1957, राजभाषा के संबंध में राष्ट्रपति के आदेश, 952, 1955, 1960, राजभाषा अधिनियम 1963, राजभाषा अधिनियम 1967, राजभाषा अधिनियम 1976

UNIT - III

कार्यलयी हिंदी:

हिंदी के विविध रूप : राजभाषा, राष्ट्रभाषा, संपर्क भाषा, संचार भाषा, मातृभाषा, सर्जनात्मक भाषा राष्ट्रभाषा और राजभाषा में अंतर, मानक हिंदी

कार्यालयी हिंदी के प्रमुख प्रकार्य

आलेखन: परिभाषा, स्वरूप, विशेषता, प्रारूप

टिप्पण: परिभाषा, स्वरूप, विशेषता, प्रारूप

पत्रलेखन, पल्लवन, संक्षेपण

पारिभाषिक शब्दावली : पारिभाषिक शब्दावली का स्वरूप एवं महत्त्व पारिभाषिक शब्दावली निर्माण के सिद्धांत, पारिभाषिक शब्दावली के भेद, ज्ञा विज्ञान के विभिन्न क्षेत्रों में प्रयुक्त कुछ निर्धारित पारिभाषिक शब्दाबली

UNIT – IV

हिंदी में कंप्यूटर का अनुप्रयोग:

कंप्यूटर का परिचय, कंप्यूटर की संरचना, कंप्यूटर के प्रकार, कंप्यूटर की उपयोगिता, हिंदी में शब्द संसाधन, हिंदी में डाटा संसाधन, वेब पब्लिशिंग, वे पेज डिजाइनर

इंटरनेट :

इंटरनेट स्वरूप और विकास इंटरनेट : कार्यप्राणाली, इंटरनेट के संपर्क उपकरणों का परिचय, इंटरनेट एक्सप्लोटर, इंटरनेट की अनुप्रयुक्तता।

लिंक, ई-मेल, ब्राउजिंग, अपलोडिंग, डाउनलोडिंग, न्यू मीडिया, वेब पत्रकारि ब्लागिंग, इंटरनेट रिले चैट, हिंदी के प्रमुख इंटरनेट पोर्टल।

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पाठ्य पुस्तक:

1. प्रयोजनमूलक हिंदी-   प्रो. राधाकांत मिश्र,

डॉ. अमूल्य रत्न महांती,

प्लैनेट वी. हिंदी बक सेंटर. बादामबाडी. कटक

ସାମର୍ଥ୍ୟବର୍ଦ୍ଧକ ପାଠ୍ୟକ୍ରମ

Ability Enhancement Course (AEC)

ପରିଶୁଦ୍ଧ ଭାଷା ଓ ଲିଖନ ଧାରା

Course Outcome (ପାଠ୍ୟପତ୍ର ଫଳଶ୍ରୁତି):

ସାହିତ୍ୟର ସିଖନ ଓ ଅଧ୍ୟୟନ କ୍ଷେତ୍ରରେ ଭାଷାର ପରିଶୁଦ୍ଧତା ନିହାତ ଆବଶ୍ୟକ । ସାହିତ୍ୟକର୍ମ ବ୍ୟତିରେକେ ଦୈନନ୍ଦିନ ଜୀବନକ୍ଷେତ୍ରରେ ନିର୍ଭୁଲଭାଷା ବ୍ୟବହାର ହେବା ବାଞ୍ଛନୀୟ । ଭାରତର ସମ୍ବିଧାନସ୍ୱୀକୃତ ଭାଷାମାନଙ୍କ ମଧ୍ୟରେ ଓଡ଼ିଆଭାଷାର ସ୍ଥାନ ପ୍ରଚୁର୍ଯ୍ୟପୂର୍ଣ୍ଣ । ଶିକ୍ଷାର୍ଥୀମାନେ ନିର୍ଭୁଲ ଭାଷା ପ୍ରୟୋଗକ୍ଷେତ୍ରରେ ଜିପଣି ସମର୍ଥ ହେବେ, ସେଥୁନିମିତ୍ତ ଏହି ପାଠ୍ୟପତ୍ରଟି ପରିକଳ୍ପିତ । ଦିଜିଟ ପ୍ରତିଯୋଗିତାମୂଳକ ତଥା ପ୍ରାଶାସନିକ ସେବାମୂଳକ ନିଯୁକ୍ତି ହେବାପାଇଁ ସମ୍ମୁଖୀନ ହେଉଥୁବା ପରୀକ୍ଷାନିମିତ୍ତ ମଧ୍ୟ ଏହା ଶିକ୍ଷାର୍ଥୀଙ୍କୁ ସାହାଯ୍ୟ କରିବ ।

Unit wise Learning Outcome (ପ୍ରତି ଏକକର ଅଧ୍ୟୟନ ଫଳଶ୍ରୁତି):

୧ମ ଏକକ: କ) ଶବ୍ଦ ଗଠନରେ ଶୁଦ୍ଧତା

   ଖ) ରୁଢ଼ିର ଅର୍ଥ ଅବଗତି

   ଗ) ରୁଢ଼ିର ପ୍ରୟୋଗବିଧ୍ ଶିକ୍ଷା

୨ୟ ଏକକ: କ) ବାକ୍ୟର ଗଠନରୀତି ଶିକ୍ଷା

   ଖ) ବିବିଧ ପ୍ରକାର ବାକ୍ୟ ସମ୍ପର୍କରେ ଧାରଣା

   ଗ) ନିର୍ଭୁଲ ବାକ୍ୟଲିଖନ ବିଦ୍ୟା

୩ୟ ଏକକ: କ) ବୃହତ୍ ଅନୁଚ୍ଛେଦକୁ ସଂକ୍ଷିପ୍ତ କରିବାର କୌଶଲ

   ଖ) ବିଷୟଗତ ଶୀର୍ଷକ ନିର୍ଦ୍ଧାରଣ କଲା

   ଗ) ଅନୁଚ୍ଛେଦରୁ ଦିଆଜିନ ପ୍ରଶ୍ନର ଉତ୍ତର ପ୍ରଦାନ

୪ର୍ଥ ଏକକ: କ) ସ୍ୱୟଂଲିଖନ ଜ୍ଞାନ

   ଖ) ଫିଚର୍ ପ୍ରସ୍ତୁତି

   ଗ) ନିର୍ଭୁଲ ପତ୍ରଲିଖନ ଓ ବିଜ୍ଞାପନ ପ୍ରସ୍ତୁତି କଲା

ପାଠ୍ୟ ବିଷୟ

ପ୍ରଥମ ଏକକ: (କ) ଶବ୍ଦର ସଂଜ୍ଞା, ଶୁଦ୍ଧ ଶବ୍ଦ ଓ ବର୍ଣ୍ଣାଶୁଦ୍ଧି

   (ଖ) ରୁଢ଼ିର ଅର୍ଥ ଓ ପ୍ରୟୋଗ ବିଧ୍

ଦ୍ୱିତୀୟ ଏକକ: ବାକ୍ୟ ଗଠନରୀତି ଓ ପ୍ରକାର ଭେଦ

ତୃତୀୟ ଏକକ: ଅନୁଚ୍ଛେଦ ସଂକ୍ଷେପଣ, ଶୀର୍ଷକ ନିର୍ଦ୍ଧାରଣ ଓ ପ୍ରଶ୍ନୋତ୍ତର

ଚତୁର୍ଥ ଏକକ: ନିର୍ଭୁଲ ଲିଖନ ପଦ୍ଧତି, ସ୍ୱୟଂ ଲିଖନ, ଫିଚର୍, ପତ୍ର ଲିଖନ, ବିଜ୍ଞାପନ ପ୍ରସ୍ତୁତି

ସହାୟକ ଗ୍ରନ୍ଥସୂଚୀ (Book of reference) :

୧. ସର୍ବସାର ବ୍ୟାକରଣ - ଶ୍ରୀଧର ଦାସ, ଗ୍ରନ୍ଥ ମନ୍ଦିର, କଟକ ।

୨. ସାରସ୍ୱତ ବ୍ୟାବହାରିକ ବ୍ୟାକରଣ - କୃଷ୍ଣଚନ୍ଦ୍ର ପ୍ରଧାନ, ସତ୍ୟ ନାରାୟଣ ବୁକ୍ ଷ୍ଟୋର ।

୩. ବୃହତ ଓଡ଼ିଆ ବ୍ୟାକରଣ- ତ୍ରିଲୋଚନ ବେହେରା, ଗୋବିନ୍ଦ ଚନ୍ଦ୍ର ଲେକା, ଫ୍ରେଶସ୍ ପବ୍ଲିଶର୍ସ, କଟକ ।

୪. ଆଧୁନିକ ଓଡ଼ିଆ ବ୍ୟାକରଣ- ଧନେଶ୍ୱର ମହାପାତ୍ର, ଜିତାବ୍ ମହଲ, କଟକ ।

୫. ସାଧାରଣ ଓଡ଼ିଆ ବନାନ ଶୁଦ୍ଧି- ଓଡ଼ିଆ ଭାଷା ପ୍ରତିଷ୍ଠାନ, ଭୁବନେଶ୍ୱର ।

୬. ଶଦ୍ଧୋପାଧ୍ଯ ଓ ଶଦ୍ଧଯୋଗାଯୋଗ – ଶିଶିର ବେହେରା, ଫ୍ରେଶସ୍ ପବ୍ଲିଶର୍ସ, କଟକ ।

୭. ଯୋଗାଯୋଗ ମୂଳକ ମାତୃଭାଷା – ଦିରଞ୍ଜି ନାରାୟଣ ସାମଲ, ସତ୍ୟନାରାୟଣ ବୁକ୍ ଷ୍ଟୋର, କଟକ ।

୮. ଯୋଗାଯୋଗର ଭାଷା – ସୁଧୀର ଚନ୍ଦ୍ର ମହାନ୍ତି, ପ୍ରାଚୀ ପ୍ରକାଶନ, କଟକ ।

୯. ନିଖିଳ ଲେଖାର ମୂକସୂତ୍ର, ନାଲାନ୍ଦୁ ଭୂଷଣ ହରିଚନ୍ଦନ, କିତାବ ମହଲ, କଟକ ।

୧୦.ଓଡ଼ିଆ ଭାଷା ବ୍ୟାକରଣ ସୌରଭ, ଚନ୍ଦ୍ରଶେଖର ପତି, ଓଡ଼ିଶା ବୁକ୍ ଏମୋରିୟମ୍, କଟକ ।

ନମୁନା ପ୍ରଶ୍ନ (Sample Questions) :

୧. ଶବ୍ଦ କାହାକୁ କୁହାଯାଏ ? (୧ ମାର୍କ)

୨.ପର୍ବତର ଦୁଇଟି ପ୍ରତିଶବ୍ଦ ଲେଖ । (୨ ମାର୍କ)

୩.ବାକ୍ୟର ପ୍ରକାରଭେଦ ଦର୍ଶାଅ। (୫ ମାର୍କ)

୪.ତୁମ ମହାବିଦ୍ୟାଳୟରେ ଏକ ଶିକ୍ଷକ ନିଯୁକ୍ତିପାଇଁ କୌଣସି ସମ୍ବାଦପତ୍ରରେ ଓଡ଼ିଆ ଭାଷାରେ କିପରି ବିଜ୍ଞାପନ ଦିଆଯିବ,
ତାହାର ଏକ ନମୁନା ଲେଖ । (୮ ମାର୍କ)

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Environmental Studies
&
Disaster Management

SEMESTER-I
For Under Graduate Compulsory Courses for Arts, Science and Commerce

FULL MARK-100 (Credit-3)

Unit 1: Multidisciplinary nature of environmental studies   (8 Period)
Definition, scope and importance
Need for public awareness
Environmental Pollution
Definition
• Cause, effects and control measures of:-
   a) Air pollution
   b) Water pollution
   c) Soil pollution
   d) Marine pollution
   e) Noise pollution
   f) Radiation pollution

Unit 2: Natural Resources: (8 Period)
Renewable and non-renewable resources:
Natural resources and associated problems.
   a) <u>Forest resources:</u> Use and over-exploitation, deforestation, case studies.
            Timber extraction, mining, dams and their effects on forest and tribal
            people.
   b) <u>Water resources</u> : Use and over-utilization of surface and ground water,
            floods, drought, conflicts over water, dams-benefits and problems.
   c) <u>Mineral resources</u> : Use and exploitation, environmental effects of extracting
            and using mineral resources, case studies.
   d) <u>Food resources</u> : World food problems, changes caused by agriculture and
            Overgrazing,   effects   of   modern   agriculture,   fertilizer-pesticide
            problems, waterlogging, salinity, case studies.
   e) <u>Energy resources :</u> Growing energy needs, renewable and non-renewable
            energy sources, use of alternate energy sources. Case studies.
Biodiversity:-
Introduction-Definition; Biogeographically classification of India
India as a mega diversity nation. Hot sports of biodiversity, Threats to biodiversity.
Endangered and endemic species of India. Conservation of biodiversity. In Situ and Ex-so
conservation of biodiversity
Unit-3: Disaster Management   (8 Period)

1. **Disaster Management:** Types of disasters (natural and Man-made) and their causes and effect)
2. **Vulnerability Assessment and Risk analysis:** Vulnerability to various disasters (Flood, Cyclone, Earthquake, Heat waves, Desertification and Lighting)
3. **Institutional Framework:** Institutional arrangements for disaster management (National Disaster Management Authority (NDMA), State Disaster Management Authority (SDMA), Disaster Management Act, 2005, District Disaster Management Authority (DDMA), National Disaster Response Force(NDRF) and Odisha Disaster Rapid Action Force(ODRAF)
4. **Preparedness measures:** Disaster Management cycle, Early Warning System, Pre-Disaster and Post-Disaster Preparedness, strengthening of SDMA and DDMA, Community Preparedness for flood cyclone, heat waves, fire safety, lightening and snake biting. Stakeholders participation, Corporate Social Responsibility (CSR)
5. **Survival Skills:** Survival skills adopted during and after disaster (Flood, Fire, Earthquake, Cyclone and Lightening), Disaster Management Act-2005, Compensation and Insurance

Unit 4: Social Issues and the Environment   (6 Period)
   A.
   a) Environmental Ethics: Issues and possible solutions.
   b) Climate change, global warming, acid rain, ozone layer depletion, nuclear
            accidents and holocaust. Case studies
   c) Environment Protection Act
   d) Air(Preservation Control of Pollution) Act
   e) Water(Preservation Control of Pollution) Act
   f) Wildlife Protection Act
   g) Forest Conservation Act
   h) Solid waste management Cause, effect and Control Measure of Urban and Industrial waste
            (Role of each individual in conservation of Natural resources and
             prevention of pollution)
   B. Human Population and the Environment
            Population Ecology: Individuals, species, population, community
            Human population growth, population control method
            Urbanisation and its effect on society

Unit 5: Field work   (15 Periods of 30 hrs)
   • Visit to an area to document environmental assets: river/forest/flora/fauna, etc.
   • Visit to a local polluted site- Urban/Rural/Industrial/Agricultural
   • Study of common plants, insects, birds and basic principles of identification.
   • Study of simple ecosystems-pond, river, Delhi Ridge ,etc.

Semester 2

SN	SUBJECT LIST
1	PRINCIPLE OF MANAGEMENT (T+P)
2	JAVA PROGRAMMING (T+P)
3	MATHEMATICS OF COMPUTER SCIENCE
4	ENGLISH
5	SEC(NOT GIVEN BY UNIVERSITY)

Core III

Course Objectives:

The objective of this course is to help the students to get aware towards varied management principles and practices. This course covers the explanations about the fundamentals of management disciplines in organizational context. It details the different functions of management such as planning, organizing, staffing, directing and controlling.

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

- Understand the concepts related to Business.
- Demonstrate the roles, skills and functions of management.
- Focus on the theories of management.
- Demonstrate a clear understanding of the concepts, tools & techniques used by executives in developing and executing strategies and will appreciate its integrative and interdisciplinary nature.

Unit-I:
- **Nature of Management:** Meaning, Definition, importance & Functions, Nature of Management as Art, Science & Profession, levels of management, managerial tasks and skills.
- **Different Schools of Thoughts:** Classical School-contributions of Taylor and Henri Fayol Neo-classical School-Human Relations approach and Behavioural Science Approach; Modern School; System approach and Contingency approach.
- **Outcome:** The students will be able to understand the basic concepts, principles, approaches and practices of management. It inculcates the ability to apply multifunctional approach to organizational objective.

Unit-II:
- **Planning -** Meaning - Need & Importance, types, – advantages & limitations, **Forecasting** -Need & Techniques, **Decision making** - Types - Process of rational decision making & techniques of decision making,
- **Organizing-** Concept, importance, principles, different organization models-line and staff; Functional; Depart mentation-need, basis, principles, **Delegation of Authority**-Elements, steps barriers; Centralization and Decentralization of Authority; Span of Management; concept and determining factors.
- **Outcome:** The students will be able to have a conceptual knowledge about the planning and decision making and also able to apply the concept of organizing for the

effective functioning of management.

Unit-III:
- **Staffing -** Meaning & Importance. **Directing:** concepts, importance of directing, Leadership: Concept, importance, types, leadership traits, Tannenbaum& Schmidt's Model and Blake &Mouton's Model.
- **Outcome:** The students will be able to evaluate leadership style to anticipate the consequences of each leadership style, diagnose qualities of efficient leadership, and able to demonstrate elements of directing and its applications.

Unit-IV:
- **Motivation:** Concept, importance, importance of need theory, and contributions of McGregor, Maslow, Herzberg. Coordination: concepts, importance, principles and implementation techniques. Control: concepts, importance, process and tools of control.
- **Outcome:** The students will be able to demonstrate clear understanding of the concepts, tools and models of Motivation, coordination and controlling.

Text Books:

- ✓ *Harold Koontz and Iteinz Weibrich, Essential of Management, McGraw Hills International.*
- ✓ *K. Aswathapa, Essential of Business Administration, Himalaya Publishing House.*

Reference Books:

- ✓ *L.M. Prasad Principles & practice of management - Sultan Chand & Sons – New Delhi.*
- ✓ *Tripathi, Reddy, Principles of Management, Tata McGraw Hill.*

Core III- Project Work
Guidelines for the Project:

Project is an assignment to strengthen the understanding of fundamentals through effective application of theoretical concept. The objective of the project course is to help the student develop ability to apply multidisciplinary concepts, tools and techniques to solve organizational problems. The project may be from any one of your areas related to the concerned subject.

Project report: The Project Report must have the following.
- Cover Page – must have the name and roll no. of the student and the name &

designation of theguide along with the title of the Project.

- Acknowledgement, declaration, Certificate of originality signed by the guide with date
- Detailed tables & figures of contents with page nos.
- All pages of the Project Report must be numbered as reflected in Index of Chapters.

Index of Chapters:

- Chapter-I: Introduction & Review of literatures
- Chapter-II: Research Methodology
- Chapter-III: Conceptual & Theoretical Descriptions
- Chapter-IV: Data Analysis & Interpretations
- Chapter-V: Conclusion, Findings, suggestions & Scope for further research.
- References, Annexure, etc.

Java Programming

Core IV

Course Objectives:
- To understand the basic concepts and fundamentals of platform independent object-oriented language.
- To demonstrate skills in writing programs using exception handling techniques andmultithreading.
- To understand streams and efficient user interface design techniques.
- Use the syntax and semantics of java programming language and basic concepts of OOP.

Course Outcomes:

 On completion of this course, students will be able to

- Develop reusable programs using the concepts of inheritance, polymorphism, interfacesand packages.
- Apply the concepts of Multithreading and Exception handling to develop efficient anderror free codes.
- Design event driven GUI and web related applications which mimic the real wordscenarios

Unit-I:

Introduction to Java: Java History, Architecture and Features, Understanding the semantic and syntax differences between C++ and Java, Compiling and Executing a Java Program, Variables, Constants, Keywords (super, this, final, abstract, static, extends, implements, interface) , Data Types, Wrapper class, Operators (Arithmetic, Logical and Bitwise) and Expressions, Comments, Doing Basic Program Output, Decision Making Constructs (conditional statements and loops) and Nesting, Java Methods (Defining, Scope, Passing and Returning Arguments, Type Conversion and Type and Checking, Built-in Java Class Methods). Input through keyboard using Command line Argument, the Scanner class, Buffered Reader class.
Outcome: Students will be able to identify java language components and how they work together in applications.

Unit-II:

Object-Oriented Programming Overview: Principles of Object-Oriented Programming, Defining& Using Classes, Class Variables & Methods, Objects, Object reference, Objects as parameters, in all classes, Garbage Collection. Constructor-types of constructor, this keyword, super keyword. Method overloading and Constructor overloading. Aggregation vs Inheritance, Inheritance: extends vs implements, types of Inheritance, Interface, Up-Casting, Down-Casting, Auto-Boxing, Enumerations, Polymorphism, Method Overriding and restrictions. Package: Pre-defined packages and Custom packages.

Outcome: Students will be able to solve real world problem using OOP techniques.

Unit-III:
Arrays: Creating & Using Arrays (1D, 2D, 3D and Jagged Array), Array of Object, Referencing Arrays Dynamically. Strings and I/O: Java Strings: The Java String class, Creating & Using String Objects, Manipulating Strings, String Immutability & Equality, and Passing Strings to & from Methods, String Buffer Classes and String Builder Classes. IO package: Understanding Streams File class and its methods, Creating, Reading, Writing using
Classes: Byte and Character streams, File Output Stream, File Input Stream, File Writer, File Reader, Input Stream Reader, Print Stream, Print Writer. Compressing and Uncompressing File.
Outcome: Students will be able to solve the various problems in array and string, working with file.

Unit-IV:
Exception Handling, Threading, Networking and Database Connectivity: Exception types, uncaught exceptions, throw, built-in exceptions, creating your own exceptions; Multi-threading:The Thread class and Run able interface, creating single and multiple threads, Thread prioritization, synchronization and communication, suspending/resuming threads. Using java.net package, Overview of TCP/IP and Datagram programming. Accessing and manipulating databases using JDBC.
Outcome: Students will be able to develop multithreaded applications with synchronization, working with how to handle exception.

Text Books:

- ✓ *E. Balagurusamy, "Programming with Java", TMH, 4/Ed.*

Reference Books:

- ✓ *Herbert Schildt, "The Complete Reference to Java", TMH,10/Ed.*

Core IV- Java Programming Lab

Write the following programs using Java

- To find the sum of any number of integers entered as command line arguments.
- To find the factorial of a given number.
- To convert a decimal to binary number.
- To check if a number is prime or not, by taking the number as input from the keyboard.
- To find the sum of any number of integers interactively, i.e., entering every number

from the keyboard, whereas the total number of integers is given as a command line argument.

- Write a program that show working of different functions of String and String Buffer classes like set Char At(), set Length(), append(), insert(), concat() and equals().
- Write a program to create a – "distance" class with methods where distance is computedin terms of feet and inches, how to create objects of a class and to see the use of this pointer.
- Modify the– "distance" class by creating constructor for assigning values (feet and inches) to the distance object. Create another object and assign second object as reference variable to another object reference variable. Further create a third object which is a clone of the first object.
- Write a program to show that during function overloading, if no matching argument isfound, then Java will apply automatic type conversions (from lower to higher datatype).
- Write a program to show the difference between public and private access specifiers. The program should also show that primitive data types are passed by value and objectsare passed by reference and to learn use of final keyword.
- Write a program to show the use of static functions and to pass variable length arguments in a function.
- Write a program to create a multilevel package and also creates a reusable class to generate Fibonacci series, where the function to generate Fibonacci series is given in a different file belonging to the same package.
- Write a program – "Divide by Zero" that takes two numbers a and b as input, computes a/b, and invokes Arithmetic Exception to generate a message when the denominator is zero.
- Write a program to show the use of nested try statements that emphasizes the sequenceof checking for catch handler statements.
- Write a program to create your own exception types to handle situation specific to your application (Hint: Define a sub class of Exception which itself is a sub class of Throw able).
- Write a program to demonstrate priorities among multiple threads.
- Write a program to demonstrate different mouse handling event like mouse Clicked (), mouse Entered (), mouse Exited (), mouse Pressed (), mouse Released ( ) & mouse Dragged ().
- Write a program to demonstrate different keyboard handling events.
- Write a program to demonstrate the concept of boxing and unboxing.
- Create a multi-file program where in one file a string message is taken as in put from the user and the function to display the message on the screen is given in another file (makeuse of Scanner package in this program).
- Write a program that creates illustrates different levels of protection in classes/sub classes belonging to same package or different packages

Mathematics for Computer Science

Course Objective:

The course stresses the students to learn how to think logically and mathematically. It describes different ways to solve mathematical problems and how to use it in computer science. There are four thematic areas covered in this course: mathematical foundations, combinatorial analysis, Graph Theory and Group Theory.

Course Outcome:
On completion of this course, students will be able to
- Understand the basic principles of sets and operations in sets.
- Demonstrate an understanding of relations and functions and be able to determine theirproperties.
- Apply counting principles in various field of computer science.
- Model problems in Computer Science using graphs and trees.
- Use shortest path and other techniques of Graph theory in Computer Networking.
- Demonstrate different traversal methods for trees and graphs.
- Get basic ideas of Group Theory.

UNIT-I

Sets and Functions**:** Sets, Relations, Functions, Closures of Equivalence Relations, Partial ordering, Lattice, Sum of products and product of sumsand Exclusions

UNIT-II

Combinatory: Permutations, Combinations, Pigeon hole principle. Recurrence Relation: Recurrence Relations, Solving Recurrence relation, Generating Functions.

UNIT-III
Graphs: Introduction to graphs, graphs terminologies, Representation of graphs, Isomorphism, **Connectivity& Paths:** Connectivity, Euler and Hamiltonian Paths, Introduction to tree, tree traversals, spanning tree and tree search: Breadth first search, Depth first search, cut-set, cut-vertex.

UNIT-IV
Group Theory: Groups, Abelian Group, Finite & Infinite Group, Properties of Group, Permutation Group, Cyclic Permutation, Sub Group, Lagrange Theorem

Text Books:
- ✓ *Discrete Mathematics and its Applications by Kenneth H. Rosen.*
- ✓ *Modern Algebra by A R Vasishta*

Reference Books:
- ✓ *Elements of Discrete Mathematics by C.L. Liu and D.P. Mohapatra, TMH,2012*
- ✓ *J. P Tremblay, R. Manohar, "Discrete Mathematical Structures with Applications to Computer Science", TMH,1997.*

English

Introduction

This Course aims at providing students familiarity with all components of language learning; listening, speaking, reading, writing, grammar and vocabulary which will eventually help in development of communication skills. This is an activity-based, goal-oriented, functional course, which aims to make the students able and efficient communicators by helping them to be self-reflexive about English. This course has a predefined context of being supportive and complementary to the core courses in various disciplines. Therefore, unlike most other courses in English Communication on offer, it does not seek to build facile fluency that passes off as communicative competence. Rather, it intends to equip the students with the relevant skills of presentation and expression needed in the academic as well as in the professional domains. While reading skills exercises are meant to promote the acquisition of analytical and comprehension skills, writing skills exercises are centred on sentence construction, paragraph development and précis writing. In this course there is ample scope to build the speaking and listening skills of students with an emphasis on interactive learning and articulation.

Course Objectives

- Develop in students the required knowledge, skills, and judgement around human communication that facilitate their ability to work collaboratively with others.
- Enable the students to understand and practise different techniques of communication. Through this course, they will familiarise themselves with different types of communication. Enhance the employability of students by developing in them the required skills of communication in English, so as to enable them to: 2 i. Speak correctly, intelligibly and fluently as well as to listen and comprehend accurately when spoken to, so as to be able to communicate effectively and with confidence in a variety of social, academic and work-related situations; ii. Read and comprehend accurately the various kinds of written texts which they may be expected to deal with; iii. Write effectively in a number of different genres (forms) of writing, relevant to social, academic and work-related needs;
- Develop interpersonal skills and the attitudes required for effective functioning in different social and work-related situations.
- Provide cognitive and cultural enrichment through exposure to a variety of humanistic learning experiences. General Pedagogical Principles 1. Instruction will essentially be activity-based. Each session will provide a variety and range of activities, pitched at different levels of linguistic competence. Group activities will be encouraged. The links between theory and practice will constantly be exemplified and highlighted. Theoretical inputs will be provided, as far as possible, in a non-technical manner. 2. Periodical tests may be conducted to assess skills and application of theoretical principles and not recalling information from memory. The skills of Listening and Speaking may be tested through oral examinations in the classes, depending on time and scope. 3. An inventory of available software, including audio/ audio-visual materials should be made, and the use of such

materials be standardised across all colleges. If necessary, software tailored to the requirements of the program should be produced in collaboration with appropriate agencies. 4. Although portions of selected texts will be used to develop the skills, a teacher is free to use material recommended by the experts. 5. The course cannot be effectively implemented unless all instructors are properly oriented. It should be ensured that orientation programs are organised before the curriculum is implemented. Handbooks must be produced and made available to all instructors. 3 6. Workshops for the development of instructional materials by members of college faculties should be organised periodically, as a part of on-going orientation.

Attention

The course drives away the myth that communicative competence in a language is honed, built and effectively practiced by learning and mastering the grammar, phonetics of a language or appropriating the accent and structures of the native tongue. Rather it is an adaptation with equal blend of the first language and the context in collaboration with the foreign tongue achieved by suitable use of texts from literature. So the teachers as well as students are advised to use as much literary texts as possible from the texts prescribed and other sources for providing an exposure to the students to be aware of the truth that literature enables skilful communication. The examination questions will be set according to the texts and topics prescribed.

<u>Unit-I</u>

English Language and Communication: Introduction (9 hours)

I.   Communication, its importance and factors that determine communication (sender, receiver, channel, code, topic, message, context, feedback, barriers) models of communication, the information gap principle: given and new information; information overload, redundancy and cliches, the importance of audience and purpose ii. Types of communication: horizontal, vertical, interpersonal, lateral and grapevine iii. Verbal and nonverbal communication, body language and its manifestations in different cultures, written and oral communication, bias-free communication, political correctness. iv. Styles of Communication: formal, informal and semi formal Note: The topics listed above should be introduced briefly in the theory classes. The reflections of the students' understanding may be assessed by the facilitator through exercises. The teacher/facilitator can refer to the books recommended under 'prescribed readings' for teaching and exercise purposes. He/she can refer to valid and recognised web-resources and additional titles from renowned publishing houses for the same purpose.

Texts

   ✓ Communicative English OSHEC Publication. Chapters: Unit-I

- Literature and Art of Communication by Asima Ranjan Parhi, Madhusmita Pati, Subhra Prakash Das and Shakina Mohol, Cambridge University Press, 2019.
- The International Encyclopedia of Communication. Malden, MA: Blackwell Publishing. (ebook) 4

Suggested Readings

- A Cognitive Approach to Language Learning. Oxford University Press Donsbach, Wolfgang. (2008).
- 'Prospect of Electronic Media as Curriculum in Non-Native Contexts', by Parhi and Dutta in I-Manager's Journal on English Language Teaching, 4(2)2014. https://files.eric.ed.gov. pdf
- 21st CenturyCommunication: A Reference Handbook. Thousand Oaks, Calif: SAGE Reference. (e-book)
- Written and Spoken Communication in English published by Orient Blackswan
- Indian English through Newspapers, A R Parhi, Concept, New Delhi, 2008.
- An Introduction to Professional English and Soft Skills by Das et al
- *Communicative Competence.* T T Panigrahi, Notion Press, India, Singapore and Malaysia
- Soft Skills for Your Career, by Kalyani Samantaray. OUP
- An Anthology of English Prose 1400–1900 Cambridge University Press 2015.

Unit-II

English Language and Communication: Listening and Speaking (9 hours)

I. Types of listening (active and passive), listening to respond (how, when and why), empathic listening and interactive listening ii. Speaking to communicate effectively: fluency, accuracy. intelligibility and clarity iii. Style of speaking in various situations:formal, informal and semi-formal, tentative and cautionary, simple and plain English iv. English pronunciation: vowel and consonant sounds, diphthong, IPA, syllable division and primary stress in words, stress shift, sentence rhythm and weak forms, contrastive stress in sentences, intonation: falling and rising tones, varieties of spoken Englishes: Standard Indian, American and British (R.P.); 'Neutral English' , newspapers, ad captions and their contribution to the shaping of Indian English as a standard language

Note: This unit does not go deep into phonetics. The objective is to train students to refer to a Learners' Dictionary to find out the correct pronunciation of words. Students will be introduced to phonemic transcription using IPA symbols in theory classes and further practice will be provided during exercises/practices. The teacher/facilitator will include simple questions on phonemic transcription and the marking of stress in words and sentences. The teacher/facilitator can refer to the books recommended under both 'Texts' and 'Suggested Readings' for teaching and exercise purposes. He/she can refer to valid and recognised

webresources and additional titles from renowned publishing houses for the same purpose.

Texts
- ✓ Communicative English OSHEC publication. Chapter-Unit I
- ✓ The Sound of English by www.pronunciationstudio.com
- ✓ 'Towards the Anti-Canon: A Brief Focus on Newspaper English in India', SHSS (Studies in Humanities and Social Sciences, UGC Care), Ed. T.R. Sharma, IIAS (Indian Institute of Advanced Study), Shimla, Vol. XIII, No.1, Summer 2006, pp.143-155. http://14.139.58.200, iias.ac.in.journals Asima Ranjan Parhi.

Suggested Readings
- ✓ The Sounds of English Around the World: An Introduction to Phonetics and Phonology Cambridge University Press
- ✓ "Listening in the Language Classroom", pp. 58 - 76 DOI: https://doi.org/10.1017/CBO9780511575945.006, Cambridge University Press, Print publication year: 2009
- ✓ An Introduction to Professional English and Soft Skills by Das et al.
- ✓ Teaching the Spoken Language. Cambridge University Press Speaking. Oxford University Press
- ✓ *Communicative Competence.*Notion Press, India, Singapore and Malaysia
- ✓ Exploring Spoken English. Cambridge University Press English Conversation. Oxford University Press
- ✓ **The English Language in India: From Racial-Colonial to Democratic",** *EJBS (The European Journal of Behavioural Sciences)* **3 (1): page:8-16, Dec. 2020**. **DOI-10.33422/ejbs.v3i1.302**

Unit-III
English Language and Communication: Reading and Writing (9 hours)

I. Reading methods and techniques: fluency, accessing meaning, levels of competence, skimming and scanning, global and local reading, silent reading and reading aloud ii. Reading texts to understand literal, metaphorical and suggested meanings (essays, poems and stories), identifying the tone (admiring, accusatory, ironical, sympathetic, ambiguous and neutral etc.) of the writer iii. Writing process: brainstorming, pre-writing, writing and post writing, coherence, cohesion, style, iv. Writing short texts: paragraph writing; writing longer texts: literary writing, academic writing and media writing

Note: This unit will focus on the basic principles of reading and writing as forms of communication. The teacher/facilitator may use reading material from literary texts, media writings, non-fiction prose and other written discourses. He/she needs to adopt caution in selecting the reading materials. Reading and writing are related activities. The insights gained through training in reading can

be utilised for effective writing. The teacher/facilitator must refer to the chapters and topics from the books recommended under 'Prescribed Texts' for teaching and exercise purposes. From which questions will be set for the examination. He/she can refer to valid and recognised web-resources and additional titles from renowned publishing houses for the same purpose.

Prescribed Pieces/Texts
- ✓ *Communicative English* OSHEC Publication. Chapters:Unit-III
- ✓ From *The Winged Word,* David Greene, Macmillan*.*1974 and *Melodious Songs and Memorable Tales,* 2015:
- ✓ 'Daffodils' by William Wordsworth, 'When we two Parted' by Lord Byron, 'The Last Ride Together' by Robert Browning, "Self Portrait" by A K Ramanujan.
- ✓ From *The Widening Arc*. Kitab Bhavan, 2016, A R Parhi, S Deepika, P Jani :
- ✓ 'No Learning without Feeling' by Claire Needell Hollander and 'The Empty Page' by Steven Harvey, 'George V High School' by Dinanath Pathy

Suggested Readings
- ✓ The Oxford Essential Guide to Writing Oxford University Press 2000.
- ✓ An Introduction to Professional English and Soft Skills Das et al
- ✓ The Classic Guide to Better Writing: Step-by-Step Techniques and Exercises to Write Simply, Clearly and Correctly Oxford University Press, 1996
- ✓ Ways of Reading: Advanced Reading Skills for Students of Literature Routledge. 2007.
- ✓ 'Semantic Excess or New Canons? Exploring the Print Media', Journal of Media and Communication, 2010. Research Gate https://www.researchgate.net.237. A R Parhi
- ✓ An Anthology of English Prose 1400–1900Cambridge University Press 2015

Unit-IV
I.   English Language and Communication: Grammar and Vocabulary (9hours) i. Grammar for meaning, multiplicity of meaning, grammar in communication ii. Stative and dynamic verbs, modals and auxiliaries, tense and time reference, aspect,voice, modality, negation, interrogation; reported questions and tag questions, complex noun phrases, concord phrasal verbs. iii. Sentence structure: simple, compound and complex, clauses, types of sentences:statement, questions, exclamations,commands iv. Functions of language,usage-oriented vocabulary, neutral vocabulary Note: The teaching of grammar and vocabulary in this unit need to be connected to communication teaching. Teachers/Instructors may select other areas of grammar for review depending on the needs. They will identify the grammatical errors commonly made by their students in speech as well as writing. The remediation of these errors may require some explanations of grammar. Instructors should use many grammar and vocabulary related exercises and through them will provide all the grammatical information needed to explain the errors that are identified. The teacher/facilitator can refer to the books recommended under 'suggested

readings' for teaching and exercise purposes. He/she can refer to valid and recognised web-resources and additional titles from renowned publishing houses for the same purpose.

Texts
- ✓ Communicative English OSHEC publication. Chapters: Unit-III Communicative Grammar of English by Geoffrey Leech. Routledge publications, 2002
- ✓ Oxford Practical English Usage (International Edition 2016) by Michael Swan
  Suggested Readings
- ✓ The Widening Arc, Kitab Bhavan, Asima R Parhi, S Deepika, P Jani, 2016.
- ✓ Writing Skills Remapping: An Anthology for Degree Classes Orient Blackswan
- ✓ An Anthology of English Prose 1400–1900 Cambridge University Press 2015
  Scheme of Evaluation
- ✓ Midterm test: 20 marks

5x1=5 (short answer, short notes, comprehension questions)
5x1=5 (Analytical, perspective-based and critical-analysis questions)
5x2=10 (activity/practice/reports/case studies/response papers/assignments etc.)

The teacher will have the flexibility of conducting internal examinations or assess the students' learning outcomes through activities, short projects, case studies etc. from all 20 marks/ in parts

_____

Final Examination: 80 marks

Unit1: 1 long answer question+ 1 short note/analysis (15+05) =20 marks

Unit 2: 1 long answer question+ 1 short note/analysis (15+05) =20 marks

Unit 3: 1 long answer question+ 1 short note/analysis (15+05) =20 marks

Unit 4: 1 long answer question+ 1 short note/analysis (15+05) =20 marks

SEC

SEMESTER III

SN	SUBJECT LIST
1	DIGITAL LOGIC (T+P)
2	COMPUTER NETWORK (T+P)
3	BUSINESS ACCOUNTING (T+P)
4	OPERATION REASEARCH
5	VALUE ADDED COURSE(TO CHOOSE ANY ONE FROM LIST)

Semester-III
Digital Logic

Core V

Course Objectives:

Introduce the concept of digital and binary systems. Be able to design and analyze combinational logic circuits. Be able to design and analyze sequential logic circuits. Understand the basic software tools for the design and implementation of digital circuits and systems.

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

- Convert different type of codes and number systems which are used in digital communication and computer systems.
- Compare different types of logic families which are the basic unit of different types of logic gates in the domain of economy, performance and efficiency.
- Analyze different types of digital electronic circuit using various mapping and logical tools and know the techniques to prepare the most simplified circuit using various mapping and mathematical methods.
- Design different types of digital electronic circuits for particular operation.

Unit-I:

Character Codes, Decimal System, Binary System, Decimal to Binary Conversion, Hexadecimal Notation, Boolean Algebra, Basic Logic Functions: Electronic Logic Gates, Synthesis of Logic Functions, Minimization of Logic Expressions, Minimization using Karnaugh Maps, Synthesis with NAND and NOR Gates, Tri-State Buffers.
Outcome: Students will be able to understand the various types of number systems and their conversions and simplify Boolean expression and apply the Boolean theorems through logical gates.

Unit-II:

Arithmetic: Addition and Subtraction of Signed Numbers, Addition/ Subtraction Logic Unit, Design of Fast Adders: Carry-Look ahead Addition, Multiplication of Positive Numbers, Signed- Operand Multiplication: Booth Algorithm, Fast Multiplication: Bit-Pair Recoding Multipliers, Carry-Save Addition of Summands, Integer Division, Floating-Point Numbers and Operations: IEEE Standard for Floating-point Numbers, Arithmetic Operations on Floating-Point Numbers, Guard Bits and Truncation, Implementing Floating-Point Operations.
Outcome: Students will be able to design and implement variety of logical devices

using combinational circuits concept.

Unit-III:

Flip-Flops, Gated Latches, Master-Slave Flip-Flops, Edge-Triggering, T Flip-Flops, JK Flip Flops. Registers and Shift Registers, Counters, Decoders, Multiplexers, Programmable Logic Devices (PLDs), Programmable Array Logic (PAL), Complex Programmable Logic Devices (CPLDs), Field-Programmable Gate Array (FPGA), Sequential Circuits, UP/DOWN Counters.
Outcome: Students will be able to analyze sequential circuits like registers and counters using flip-flops.

Unit-IV:

Memory System: Semiconductor RAM Memories, Internal Organization of Memory Chips, Static Memories, Asynchronous DRAMS, Synchronous DRAMS, Structure of Large Memories, Memory System Considerations, RAMBUS Memory. Read-Only Memories: ROM, PROM, EPROM, EEPROM, Flash Memory, Speed, Size, and Cost of Memory. Secondary Storage: Magnetic Hard Disks, Optical Disks, Magnetic Tape Systems.
Outcome: Students will be able to demonstrate and compare the construction of programmable logic devices and different types of ROM and RAM.

Text Books:
  ✓ *Carl Hamacher, Z. Vranesic, S. Zaky: Computer Organization, 5/e (TMH).*

Refence Books:
  ✓ *M. Morris Mano: Digital Logic and Computer Design, Pearson.*

Core V- Practical/Tutorial: Digital Logic Lab

Introduction to Xilinx S/W (VHDL). Write the codes for the following using VHDL.

- Realizing all logic gates.
- Combination Circuit.
- ADDER.
- SUBTRACTOR.
- MUX.
- DE-MUX.
- Encoder.
- Decoder.
- PAL.
- PLA.

Also write the codes using VHDL for the following Sequential Logic Circuits:

- Flip Flops.
- Shift Registers.
- Counters.
- Memory Elements.

Core VI   **Computer Networks**

Course Objectives:

This course is intended to provide an overview of the concepts and fundamentals of data communication and computer networks. It will help the students in understanding of various types of computer networks, different components of computer networks, various protocols, e-mail and communication protocols, network naming and addressing, modern technologies used in networking and their applications.

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

- Understand network communication using the layered concept, Open System Interconnect (OSI) and the Internet Model.
- Understand various types of transmission media, network devices.
- Understand the concept of flow control, error control and LAN protocols.
- Explain the design of and algorithms used in the physical, data link layers.
- Understand the working principles of LAN and the concepts behind physical and logicaladdressing, subnetting and super netting.
- Analyze the contents in a given Data Link layer packet, based on the layer concept.
- Determine the various modulation and error detection and correction techniques andtheir application in communication systems.

Unit-I:

Introduction to Data Communications and Network Models: Protocols and Standards, Layers in OSI Models, Analog and Digital Signals, Transmission Modes, Transmission Impairment, Data Rate Limits, Performance, Digital Transmission, Network Devices & Drivers: Router, Modem, Repeater, Hub, Switch, Bridge (fundamental concepts only).
Outcome: Students will have the basic knowledge about computer network, causes of network errors, layers in networking and network devices & drivers.

Unit-II:

Signal Conversion: Digital-to-Digital Conversion, Analog-to-Digital Conversion, Digital-to- analog Conversion, Analog-to-analog Conversion. Transmission Media: Guided Media, Unguided Media, Switching Techniques: Packet Switching, Circuit Switching, Datagram Networks, Virtual- Circuit Networks, and Structure of a Switch.
Outcome: Students will have the knowledge about how data transmission takes place through signals and use of switching techniques.

Unit-III:

Error Detection and Correction: Checksum, CRC, Data Link Control: Framing, Flow and Error Control, Noiseless Channels, Noisy channels, (Stop and Wait ARQ, Sliding Window Protocol, Go Back N, Selective Repeat) HDLC, Point-to-Point Protocol. Access Control: TDM, CSMA/CD, and Channelization (FDMA, TDMA, and CDMA).
Outcome: Students will come to know about identifying and correcting errors occurred during data transmission.

Unit-IV:

Network Layer: Logical Addressing, IPv4 Addresses, IPv6 Addresses, Virtual-Circuit Networks: Frame Relay and ATM, Transport Layer: Process-Process Delivery: UDP, TCP. Application layers: DNS, SMTP, POP, FTP, HTTP, Basics of WiFi (Fundamental concepts only), Network Security: Authentication, Basics of Public Key and Private Key, Digital Signatures and Certificates (Fundamental concepts only).
Outcome: Students will able to understand various protocols used in network to transmit different types of data.

Text Books:
- ✓ *Data Communications and Networking, Fourth Edition by Behrouza A. Forouzan,T*

Reference Books:
- ✓ *Computer Networks, A.S. Tanenbaum, 4th edition, Pearson Education.*

Core VI- Computer Network Lab using C/C++/any Simulator

- Simulate Even Parity generator and checker.
- Simulate two-dimensional Parity generator and checker.
- Simulate check sum generator and checker.
- Simulate Hamming code method.
- Simulate Cyclic Redundancy Check (CRC) error detection algorithm for noisy channel.
- Simulate and implement stop and wait protocol for noisy channel.
- Simulate and implement go backsliding window protocol.
- Simulate and implement selective repeat sliding window protocol.
- Simulate and implement distance vector routing algorithm.

Core VII   **Business Accounting**

Course Objectives:

The objective of this course is to introduce problems of financial accounting such as measuring and reporting issues related to assets and liabilities and preparing the financial statements. Students are expected to gain the ability of using accounting information as a tool in applying solutions for managerial problems, evaluating the financial performance, and interpreting the financial structure.

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

- Enable the students learn basic accounting principles, concepts, principles andconventions.
- Practice Financial and Management accounting applications.
- Construct the financial statements of company.
- Able to understand the provisions of Companies Act, 1956.
- Exposure on the different accounting software packages.

Unit-I:

Introduction: Financial Accounting-definition and Scope, objectives of Financial Accounting, Accounting v/s Book Keeping terms used in accounting, users of accounting information and limitations of Financial Accounting. Conceptual Framework: Accounting Concepts, Principles and Conventions, Accounting Standards concept, objectives, benefits, briefer view of Accounting Standards in India, Accounting Policies, Accounting as a measurement discipline, valuation Principles, accounting estimates.

Outcome: The students will be able to learn basic accounting principles, concepts, principles and conventions which used in business transactions and its applications.

Unit-II:

Recording of transactions: Voucher system; Accounting Process, Journals, Subsidiary Books, Ledger, Cash Book, Bank Reconciliation Statement, Trial Balance. Depreciation: Meaning, need & importance of depreciation, methods of charging depreciation.

Outcome: The students will be able to prepare trial balance, bank reconciliation statement, identify and rectify the errors in bank reconciliation statement and also understand methods of charging Depreciation.

Unit-III:

Preparation of final accounts: Preparation of Trading and Profit & Loss Account and Balance Sheet of sole proprietary business.

Outcome: The students will be able to prepare financial statements in accordance with generally accepted accounting principles, employ critical thinking skills to analyze financial

data as well as the effects of differing financial accounting methods on the financial statements.

Unit-IV:

Introduction to Company Final Accounts: Important provisions of Companies Act, 1956 in respect of preparation of final accounts, Understanding of final accounts of a company. an overview of computerized accounting system –Salient features and significance
Outcome: The students will be able to understand the provisions of companies act 1956, significance and application of computerized accounting system.

Text Books:
- ✓ *Anil Chowdhry, "Fundamentals of Accounting & Financial Analysis", Pearson Education.*
- ✓ *Agarwal, R.Srinivasan, "Accounting Made Easy", TMH*

Reference Books:

- ✓ *Amrish Gupta, "Financial Accounting for Management", Pearson Education*
- ✓ *S.N.Maheshwari, "Financial Accounting for Management: Vikas Publishing House*

Core VII- Business Accounting

- Introduction to Tally, Features and Versions of Tally.
- Components of Tally Screen, Creation, Alteration & Deletion of Company.
- Primary Group & Subgroup, Creation.
- Alteration & Display of Ledger Accounting.
- Recording of Transactions through vouchers.
- DisplayofFinancialreportsF11andF12configuration.
- Introduction to Inventory system: Advantages of maintaining inventory system in Tally stock group Stock category, stock item units of measure, creation of inventory system.

Operation Research

Course Objectives:

To familiarize the students with the role of operations and its interaction withother activities of a firm and their integration in a highly competitive global environment. To enable the students to apply the understanding of production processes in quantitative analysis of problems arising in the management of operations.

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

- Design new simple models, like: CPM to improve decision –making and develop critical thinking and objective analysis of decision problems.
- Determine the optimal solution for Transportation problems.
- Plan, Schedule and Control the given project.

UNIT-I

Definition of operation research, models of operation research, scientific methodology of operations research, Stages of Development of Operations Research, scope of operations research, importance of operations research in decision making, role of operations management, limitations of OR.

UNIT-II

Transformation process model: Inputs, Process and outputs; Classification of operations; Responsibilities of Operations Manager, Process types in manufacturing: Project, jobbing, batch, line, mass, continuous; Process types in services: professional services, services shops, mass services; Plant location; Layout planning.

UNIT-III

Quality management: Introduction; Meaning; Quality characteristics of goods and services; Tools and techniques for quality improvement: check sheet, histogram, scatter diagram,cause and effect diagram, Pareto chart, process diagram, statistical process control chart; Qualityassurance; Total quality management (TQM) model; Service quality, concept of Six Sigma and its application.

UNIT-IV

Transportation problem –Introduction, Initial basic feasible solution - NWC method, Vogel's method. Network model for project analysis- PERT and CPM.

Text Books:
✓ *Gupta P. K., Hira D.S., "Operations Research", S Chand Publishers*

Reference Books:

✓ *V.K. Kapoor, Introduction to operational Research – Sultan Chand & Sons – New Delhi*
✓ *Aswathappa. K, Production and Operations Management, Himalaya Publishing House,*

VAC

Value Added Courses under Model Curriculum

Sl No.	VAC
1.	**Environmental Studies & Disaster Management**
2.	**Ethics and Values**
3.	**Contemporary Cross Cutting Issues**
4.	**Yoga for all**
5.	**Understanding India**
6.	**Understanding Odisha**
7.	**Management Concepts and Practices**
8.	**Operations Research**
9.	**Organizational Behaviour**
10.	**Research Methodology**
11.	**Revised Indian Society**

SEMESTER IV

SN	SUBJECT LIST
1	DATABASE SYSTEMS (T+P)
2	ORGANIZATION BEHAVIOUR (T+P)
3	Foundation of Data Science and Data Analytics
4	Community Engagement & Services/ Field work /Internship

Core VIII   **Database Systems**

Course Objectives:

To explain basic database concepts, applications, data models, schemas and instances. To demonstrate the use of constraints and relational algebra operations. Describe the basics of SQL and construct queries using SQL. To emphasize the importance of normalization in databases. To facilitate students in Database design. To familiarize issues of concurrency control and transaction management.

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

- Apply the basic concepts of Database Systems and Applications.
- Use the basics of SQL and construct queries using SQL in database creation and interaction.
- Design a commercial relational database system (Oracle, MySQL) by writing SQL usingthe system.
- Analyze and Select storage and recovery techniques of database system

Unit-I:

Introduction to Database and Database Users, Database System Concepts and Architecture: data Models, schema, and instances, Conceptual Modeling and Database Design: Entity Relationship(ER) Model: Entity Types, Entity Sets, Attributes, Keys, Relationship Types, Relationship Sets, Roles and Structural Constraints, Weak Entity Types, ER Naming Conventions. Enhanced Entity- Relationship (EER) Model.
Outcome: Students will understand the database, its types, uses and applications. They will able to understand various data models.

Unit-II:
Database Design Theory and Normalization: Functional Dependencies, Join Dependencies, Normal Forms based on Primary Keys, Second and third Normal Forms, Boyce-Codd Normal Form, Multi valued Dependency and Fourth Normal Form.
Outcome: Students will understand details of database design and will be able to design the real time data using various normal forms.

Unit-III:
Relational data Model and SQL: Relational Model Concepts, Basic SQLs, SQL Data Definition and Data types, Constraints in SQL, Retrieval Queries in SQL, INSERT, DELETE, UPDATE Statements in SQL, Relational Algebra and Relational Calculus: Unary Relational Operations: SELECT and PROJECT, Binary Relation: JOIN and DIVISION.
Outcome: Students will able to access and manipulate the data using SQL.

Unit-IV:
Introduction to Transaction Processing Concepts and Theory: Introduction to Transaction Processing, Properties of Transactions, Recoverability, Serializability, Concurrency Control: locking techniques and Time-Stamp Ordering.

Outcome: Students will learn about transaction processing in real world, how to handle data when more than one user accessing the same database using various methods.

Text Books:
- ✓ *Fundamentals of Database Systems, 6th edition, Ramez Elmasri, Shamkant B. Navathe, Pearson Education.*

Reference Books:
- ✓ An Introduction to Database System, Date C.J.- Pearson Education, New Delhi-2005.

Database Systems
Create and use the following database schemas to answer the given queries.

EMPLOYEE Schema			
Field	**Type**	**NULLKEY**	**DEFAULT**
Eno	Char (3)	NO	PRI
Ename	Varchar (50)	NO	
Job_type	Varchar (50)	NO	
Manager	Char (3)	Yes	FK
Hire_date	Date	NO	
Dno	Integer	YES	FK
Commission	Decimal (10,2)	YES	
Salary	Decimal (7,2)	NO	
DEPARTMENT Schema			
Field	**Type**	**NULLKEY**	
Dno	Integer	No	PRI

Dname	Varchar (50)	Yes	
Location	Varchar (50)	Yes	

Query List:

- Query to display Employee Name, Job, Hire Date, Employee Number; for each employee with the Employee Number appearing first.
- Query to display unique Jobs from the Employee Table.
- Query to display the Employee Name concatenated by a Job separated by a comma.
- Query to display all the data from the Employee Table. Separate each Column by acomma and name the said column as THE_OUTPUT.
- Query to display the Employee Name and Salary of all the employees earning more than
- $2850.
- Query to display Employee Name and Department Number for the Employee No=7900.
- Query to display Employee Name and Salary for all employees whose salary is not in therange of $1500 and $2850.
- Query to display Employee Name and Department No. of all the employees in Dept10 and Dept 30 in the alphabetical order by name.
- Query to display Name and Hire Date of every Employee who was hired in 1981.
- Query to display Name and Job of all employees who don't have a current Manager.
- Query to display the Name, Salary and Commission for all the employees who earncommission.
- Sort the data in descending order of Salary and Commission.
- Query to display Name of all the employees where the third letter of their name is 'A'.
- Query to display Name of all employees either have two 'R's or have two 'A's in theirname and are either in Dept No=30 or their Mangers Employee No= 7788.
- Query to display Name, Salary and Commission for all employees whose CommissionAmount is 14 greater than their Salary increased by 5%.
- Query to display the Current Date.
- Query to display Name, Hire Date and Salary Review Date which is the 1st Monday aftersix months of employment.
- Query to display Name and calculate the number of months between today and the dateeach employee was hired.
- Query to display the following for each employee <E-Name> earns <Salary> monthlybut wants <3* Current Salary>. Label the Column as Dream Salary.
- Query to display Name with the 1stletter capitalized and all other letter lower case andlength of their name of all the employees whose name starts with 'J', 'A' and 'M'.
- Query to display Name, Hire Date and Day of the week on which the employee started.
- Query to display Name, Department Name and Department No for all the employees.

- Query to display Unique Listing of all Jobs that are in Department #30.
- Query to display Name, Department Name of all employees who have an 'A' in theirname.
- Query to display Name, Job, Department No. and Department Name for all the employees working at the Dallas location.
- Query to display Name and Employee no. Along with their Manger's Name and the Manager's employee no; along with the Employees Name who do not have a Manager.
- Query to display Name, Department No. And Salary of any employee whose department No. and salary matches both the department no. And the salary of any employee who earns a commission.
- Query to display Name and Salaries represented by asterisks, where each asterisk (*) signifies $100.
- Query to display the Highest, Lowest, Sum and Average Salaries of all the employees.
- Query to display the number of employees performing the same Job type functions.
- Query to display the no. of managers without listing their names.
- Query to display the Department Name, Location Name, No. of Employees and the average salary for all employees in that department.
- Query to display Name and Hire Date for all employees in the same dept. as Blake.
- Query to display the Employee No. And Name for all employees who earn more than the average salary.
- Query to display Employee Number and Name for all employees who work in a department with any employee whose name contains a 'T'.
- Query to display the names and salaries of all employees who report to King.
- Query to display the department no, name and job for all employees in the Salesdepartment.

Core IX   **Organizational Behaviour**

Course Objectives:

The objective of this course is to learn the modern trends, theories and changes in organizational behaviour. This course covers the explanations about the human behavior in the organizational context. It details the impact of individual, group and organizational factors on human behavior. The course also focuses on understanding the behavior of the employees working in the organization. It highlights the significance of Challenges and Opportunities of OB, perception, attribution, learning, organizational change, organizational culture, motivation, leadership and conflict management.

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

- Understand the behaviour of people in the organization.
- Analyze the complexities associated with management of individual behaviour in the organization.
- Understand the motivation (why) behind behaviour of people in the organization.
- Cover the explanations about human behavior in the organizational context.
- Impact of individual, group and organizational factors on human behavior.
- Understand the concept of personality, learning and attitude.

Unit-I:

Organizational Behaviour- Meaning, Definition and importance, Foundations of OB, OB Models, and Challenges to OB.
Outcome: The students will be able to understand the conceptual framework of the discipline of OB, OB Models and its practical applications in the organizational set up.

Unit-II:

Individual Behaviour: Perception: Definition &Concept; Personality: Concept, Determinants and Personality Types (Type A and Type B, Big Five Model, MBTI Model); Learning: Concept and Theories (Classical and Operant Conditioning); Attitude: Components& Formation.
Outcome: The students will be able to interpret key concepts and theories of perception, learning with regard to individual differences and apply these appropriately to specific situations.

Unit-III:

Group Behaviour: Group Dynamics: Meaning, Formation and Types of Groups (Formal & Informal Groups), Stages of Group Development, Individual vs. Group decision making. Group

vs Team. Types of Team. **Group Communication:** Communication Types, Communication Process, Barriers to communication; Effective Communication Methods.

Outcome: The students will be able to interpret the key concepts and theories with regard to group behaviour and apply these appropriately to specific situations.

Unit-IV:

Motivation-Meaning, Nature &Importance. Motivational Theories (Maslow's Need Hierarchy Theory, Herzberg's two factor Theory, McClelland's Need Theory, Vroom's Expectancy Theory, Equity Theory); Motivational Challenges. **Leadership -** Leadership: Nature and Importance; Leadership Styles; Leadership Theories (Trait Theory, Behaviour Theory, Contingency Theory).

Outcome: The students will be able to understand how the organizational behavior can integrate in understanding the motivation behind behavior of people in the organization. Students also able to identify and develop effective motivational and leadership skills.

Text Books:

- ✓ *Organizational Behaviour: L.M. Prasad*
- ✓ *Organizational Behaviour: Rao &Narayana*
- ✓ *Organizational Behaviour: Gupta and Joshi (KP)*

Reference Books:

- ✓ *Organizational Behaviour: K Aswathappa(HPH)*
- ✓ *Organizational Behaviour: Stephen Robbins(PHI)*

Core IX- Project Work
Organizational Behavior

Guidelines for Project

Project is an assignment to strengthen the understanding of fundamentals through effective application of theoretical concept. The objective of the project course is to help the student develop ability to apply multidisciplinary concepts, tools and techniques to solve organisational problems. The project may be from any one of your areas related to the concerned subject.

Project report: The Project Report must have the following:

- Cover Page – must have the name and roll no. of the student and the name & designation of theguide along with the title of the Project.
- Acknowledgement, declaration, Certificate of originality signed by the guide with date
- Detailed tables & figures of contents with page

nos.

- All pages of the Project Report must be numbered as reflected in Index of Chapters

Index of Chapters:

- Chapter-I: Introduction & Review of literatures
- Chapter-II: Research Methodology
- Chapter-III: Conceptual & Theoretical Descriptions
- Chapter-IV: Data Analysis & Interpretations
- Chapter-V: Conclusion, Findings, suggestions & Scope for further research.
- Chapter-VI: References, Annexures etc.

Core X   **Foundation of Data Science and Data Analytics**

Course Objectives:

This course is intended to understand data management like data collection, processing, analysis, interpretation and visualization by applying quantitative modelling and data analysis techniques for real world business problems. The course also provides the knowledge of statistical data analysis techniques utilized in business decision making.

Course Outcome: On completion of this course the students will be able to

- Explain various software tools for data storage, analysis and
- Visualize the data.
- Choose EDA, inference and regression techniques.
- Apply R programming for analyzing statistical data for business decision making.
- Analyze different clustering methods for big data sets.

Unit-I:

Definition of Big Data, Big data characteristics & considerations, Data Repositories – analyst perspective, Business drivers for analytics, Typical analytical architecture, Business Intelligence Vs Data Science, Drivers of Big Data analytics, Role of data scientist in Big data ecosystem, Application of Big data analytics.

Outcome: The students will have to get Fundamentals of Big Data, Use software tools for data storage, analysis and visualization in big-data analytics.

Unit-II:

Need of Data analytic lifecycle, Key roles for successful analytic project, various phases of Data analytic lifecycle: Discovery, Data Preparation, Model Planning, Model Building, Communicating Results, Operationalization.

Outcome: The students can utilize EDA, inference and regression techniques.

Unit-III:

Introduction to R: GUI of R, Getting data into & out of R, Data types in R, Basic operations, Descriptive Statistics.

Outcome: The students can apply R programming for analyzing statistical data for business decision making.

Unit-IV:

Overview of Clustering, K- means, Association Rules, Apriori Algorithm, Linear Regression, Logistic Regression.

Outcome: The students can understand different clustering methods for big data sets.

Text Book:

- ✓ *David Dietrich, Barry Hiller, "Data Science & Big Data Analytics", EMC education services, Wiley publications,2012*

Reference Book:

- ✓ *Trevor Hastie, Robert Tibshirani, Jerome Friedman, "The Elements of Statistical Learning", Springer, Second Edition, 2011.*

Community Engagement & Services/ Field work /Internship

Semester-V

SN	SUBJECT LIST
1	WEB TECHNOLOGY (T+P)
2	SOFTWARE ENGINEERING (T+P)
3	DIGITAL MARKETING (T+P)
4	SEC(NOT GIVEN BY UNIVERSITY)
5	VAC(CHOOSE ANY ONE FROM GIVEN LIST)

Core XI   **Web Technology**

Course objectives:

On completion of this course, a student will be familiar with client server architecture and able to develop a web application using web technologies. Students will gain the skills and project-based experience needed for entry into web application and development careers. Students are able to develop a dynamic webpage by the use of java script.

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

- Analyze a web page and identify its elements and attributes.
- Create web pages using HTML and Cascading Style Sheets.
- Build dynamic web pages using JavaScript (Client - s i d e programming).
- Work with PHP application (Server-side Programming) for any database operation.

Unit-I:

Web Essentials: Clients, Servers and Communication: The Internet –Basic Internet protocols– The WWW, HTTP request message –response message, web client's webservers –case study. Introduction to HTML: HTML, HTML domains, basic structure of an HTML document–creating an HTML document, mark up tags, heading, paragraphs, line breaks, HTML tags. Elements of HTML, working with text, lists, tables and frames, working with hyperlink, images and multimedia, forms and controls.
Outcome: Students will be able to explain client and server-side communication and able to design web applications

Unit-II:

Introduction to cascading style sheets: Concepts of CSS, creating style sheet, CSS properties, CSS styling (background, text format, controlling fonts), working with the block elements and objects. Working who lists and tables, CSS ID and class. Box model (introduction, border properties, padding properties, margin properties), CSS colour, groping, Dimensions, display, positioning, floating, align, pseudo class, Navigation bar, image sprites
Outcome: Students will be able to design web pages using CSS and BOX model

Unit-III:

Java scripts: Client-side scripting, what is java script, simple java script, variables, functions, conditions, loops and repetitions. Java scripts and objects, java script own objects, the DOM and web browser environment, forms and validations. DHTML: Combining HTML, CSS, java scripts, events and buttons, controlling your browser.
Outcome: Students will be able to integrate java script in a web page and check for validation (Client-side programming)

Unit-IV:

PHP: Starting to script on server side, PHP basics, variables, data types, operators, expressions, constants, decisions and loop making decisions. Strings – creating, accessing strings, searching, replacing and formatting strings. Arrays: Creation, accessing array, multidimensional arrays, PHP with Database.
Outcome: Students will be able to explain server-side scripting and their applicability

Text Book:

- ✓ *Web Technologies–Black Book–Dream Tech Press*
- ✓ *Matt Doyle, BeginningPHP5.3(wrox -Willey publishing)*
- ✓ *John Duckett, Beginning HTML, XHTML, CSS and Javascript.*

Reference Book:

- ✓ *HTML, XHTML and CSS Bible,5ed, Willey India-Steven M. Schafer.*

Core XI- Project Work

Web Technology Lab

- Acquaintance with elements, tags and basic structure of HTML files.
- Practicing basic and advanced text for formatting.
- Practice use of image, video and sound in HTML documents.
- Designing of webpages- Document layout, list, tables.
- Practicing Hyperlink of webpages, working with frames.
- Working with forms and controls.
- Acquaintance with creating style sheet, CSS properties and styling.
- Working with background, text, font, list properties.
- Working with HTML elements box properties in CSS.
- Develop simple calculator for addition, subtraction, multiplication and division operation using java script.
- Create HTML page with java script which takes integer number as a input and tells whether the number is odd or even.
- Create HTML page that contains form with fields name, Email, mobile number, gender, favorite colour and button; now write a java script code to validate each entry. Also write a code to combine and display the information in text box when button is clicked.
- Write a PHP program to check if number is prime or not.
- Write a PHP program to print first ten Fibonacci numbers.
- Create a MySQL database and connect with PHP.
- Write PHP script for storing and retrieving user information from MySQL table.

- Write a HTML page which takes Name, Address, Email and Mobile number from user(register PHP).
- Store this data in MySQL database.
- Next page displays all user in HTML table using PHP (display .PHP).
- Using HTML, CSS, Java script, PHP, MySQL, design an authentication module of a webpage.

Core XII   **Software Engineering**

Course Objectives:

Basic knowledge and understanding of the analysis and design of complex systems. To apply software engineering principles and techniques. Ability to develop, maintain and evaluate large-scale software systems. To provide the idea of decomposing the given problem into Analysis, Design, Implementation, Testing and Maintenance phases. To provide an idea of using various process models in the software industry according to given circumstances. To gain the knowledge of how Analysis, Design, Implementation, Testing and Maintenance processes are conducted in a software project. To perform independent research and analysis. Ability to work as an effective member or leader of software engineering teams.

Course Outcome: On completion of this course, the students will be able to
- Understand of software process models such as waterfall and evolutionary model is required.
- Understand the problem statement and able to describe the Requirement analysis, creating a data model, use cases, computing function point, effort, architectural design and path testing of a software project.
- Learn about Software requirements and SRS documents.
- Understand project management's responsibilities, which includes planning, scheduling, risk management, and so on.
- Explain the differences between data models, object models, context models, and behavioral models.
- Familiar with implementation difficulties like modularity and coding standards.
- Gain knowledge of verification and validation methods, such as static analysis and reviews.
- Know about different software testing methodologies such as unit and integrated testing etc.
- Describe how to measure software and how to avoid software risks.

Unit-I:
Introduction: Evolution of Software to an Engineering Discipline, software development projects, Software Lifecycle Models: Waterfall Model and its Extensions, Rapid Application Development (RAD), Agile Development Models, Spiral Model.
Outcome: Students will be able to understand fundamental principles of Software engineering discipline & get an idea of various life cycle models used in software development.

Unit-II:
Software Project Management: Software Project Management Complexities, Responsibilities of a Software Project Manager, Project Planning, Metrics for Project Size Estimation, Project Estimation Techniques, Empirical Estimation Techniques, COCOMO, Halstead's Software

Science, Staffing Level Estimation, Scheduling, Organization and Team Structures, Staffing, Risk Management, Software Configuration Management.

Outcome: Students will get a brief idea of various project management activities & will understand various cost estimation techniques, organization team structure and management of staff & risk handling.

Unit-III:

Requirement Analysis and Specification: Requirements Gathering and Analysis, Software Requirement Specifications, Formal System Specification Axiomatic Specification, Algebraic Specification, Executable Specification and 4GL.Software Design: Design Process, Characterize a Good Software Design, Cohesion and Coupling, Layered Arrangements of Modules, Approaches to Software Design (Function Oriented & Object-Oriented).

Outcome: Students will get knowledge of various requirement analysis techniques and design process during software development work.

Unit-IV:

Coding and Testing: Coding: Code Review, Software Documentation, Testing, Unit Testing, Black Box and White Box Testing, Debugging, Program Analysis Tools, Integration Testing, System Testing, Software Maintenance.

Outcome: The students will understand of coding and testing process & will able to learn maintenance in software development projects.

Text Book:

- ✓ *Fundamental of Software Engineering, Rajib Mall, Fifth Edition, PHI Publication, India.*

Reference Books:

- ✓ *Software Engineering– IanSommerville,10/Ed, Pearson.*
- ✓ *Software Engineering Concepts and Practice – Ugrasen Suman, Cengage Learning IndiaPvt, Ltd.*

Core XII- Project Work

Software Engineering

Guidelines for Project

Project is an assignment to strengthen the understanding of fundamentals through effective application of theoretical concept. The objective of the project course is to help the student develop ability to apply multidisciplinary concepts, tools and techniques to implement

software engineering. The project may be from any one of your areas related to the concerned subject.

Project report: The Project Report must have the following:
- Cover Page – must have the name and roll no. of the student and the name & designation of theguide along with the title of the Project.
- Acknowledgement, declaration, Certificate of originality signed by the guide with date
- Detailed tables & figures of contents with page nos.
- All pages of the Project Report must be numbered as reflected in Index of Chapters

Sample Projects:

- *Criminal Record Management: Implement a criminal record management system for jailers, police officer sand CBI officers.*
- *Route Information: Online information about the bus routes and their frequency and fares*
- *Car Pooling: To maintain a web-based intranet application that enables the corporate employees within an organization to avail the facility of carpooling effectively.*
- *Patient Appointment and Prescription Management System*
- *Organized Retail Shopping Management Software*
- *Online Hotel Reservation Service System*
- *Examination and Result computation system*
- *Automatic Internal Assessment System*
- *Parking Allocation System*
- *Wholesale Management System*

Core XIII   **Digital Marketing**

Course Objective:

The key aim of this course is to understand the concepts of marketing management, to learn about the marketing process for different types of products and services, to understand the tools used by marketing managers in decision situations and to understand the marketing environment.

Course Outcomes: On completion of this course, the students will be able to
- Demonstrate strong conceptual knowledge in the functional area of marketing management.
- Demonstrate effective understanding of relevant functional areas of marketing management and its application.
- Demonstrate analytical skills in identification and resolution of problems pertaining to marketing management.
- Understand the 'Marketing mix' elements and the strategies and principles underlying the modern marketing practices.
- Explore for themselves the role of a marketing manager and the boundaries of marketing

Unit-I:
Marketing: Objectives of Marketing, Marketing vs Selling, Marketing Environment, Consumer Behaviour, Consumer Buying Process, Factors influencing consumer decision making, **Product:** Product concept, Product classification, New Product Development, Product lifecycle, Product mix.

Outcome: The students will be able to identify core concepts of marketing and the role of marketing in business and society. able to analyse the impact of different environmental factors, factors affecting consumer buying behavior, and different strategies related to product and its application.

Unit-II:
Price: Objective of pricing, Factors Influencing Product Pricing, Pricing policies. Distribution: Channel of Distribution- Meaning and Importance, Types of Distribution Channel. **Promotion:** Meaning, Importance of Promotion, Types of Promotion, Factors affecting promotion mix decisions.

Outcome: The students will be able to develop marketing strategies based on price, place and promotion objectives. Develop analytical skills in identification and resolution of problems pertaining to price, place and promotion mix.

Unit-III:
Fundamentals of Digital marketing & Its Significance, Traditional marketing Vs Digital Marketing, Evolution of Digital Marketing, Digital Marketing Landscape. Fundamentals of Social Media Marketing & its significance, Facebook Marketing-Different types of Ad

formats, LinkedIn Marketing- LinkedIn Strategy, Twitter Marketing- Twitter usage, Twitter Ads, Twitter ad campaigns.

Outcome: The students will be able to use the digital platform in the optimal way to formulate possible solutions to marketing problems faced by several firms and also able to Identify and utilize various tools through social media.

Unit-IV:
Digital Advertising, Different Digital Advertisement, Performance of Digital Advertising: - Process & players, Display Advertising Media, Digital metrics. **YouTube Advertising:** - YouTube Channels, YouTube Ads, Type of Videos, Buying Models, Targeting & optimization, Designing & monitoring Video Campaigns, Display campaigns

Outcome: The students will be able to explain the key digital marketing activities needed for competitive success and also Leverage digital strategies to gain competitive advantage for business and career. Able to initiate marketing strategies through the use of Social Media Platform like Face book, Twitter, YouTube & LinkedIn etc.

Text Books:
- ✓ *Marketing Management in Indian Context, Sontakki, KP*
- ✓ *Marketing Management, Karunakaran,*
- ✓ *Digital Marketing –Kamat and Kamat-Himalaya*
- ✓ *Digital Marketing, S.Gupta, McGraw-Hill*

Reference Books:
- ✓ *Marketing Management, Kotler, Keler, Koshi, Jha, Pearson*

Core XIII- Project Work

Digital Management

Guidelines for the Project:
Project is an assignment to strengthen the understanding of fundamentals through effective application of theoretical concept. The objective of the project course is to help the student develop ability to apply multidisciplinary concepts, tools and techniques to solve organizational problems. The project may be from any one of your areas related to the concerned subject.

Project report: The Project Report must have the following.
- Cover Page – must have the name and roll no. of the student and the name & designation of theguide along with the title of the Project.
- Acknowledgement, declaration, Certificate of originality signed by the guide with date
- Detailed tables & figures of contents with page nos.
- All pages of the Project Report must be numbered as reflected in Index of Chapters

Index of Chapters:

- Chapter-I: Introduction & Review of literatures
- Chapter-II: Research Methodology
- Chapter-III: Conceptual & Theoretical Descriptions
- Chapter-IV: Data Analysis & Interpretations
- Chapter-V: Conclusion, Findings, suggestions & Scope for further research.
- Chapter-VI: References, Annexures, etc.

SEC

VAC

Value Added Courses under Model Curriculum

Sl No.	VAC
12.	**Environmental Studies & Disaster Management**
13.	**Ethics and Values**
14.	**Contemporary Cross Cutting Issues**
15.	**Yoga for all**
16.	**Understanding India**
17.	**Understanding Odisha**
18.	**Management Concepts and Practices**
19.	**Operations Research**
20.	**Organizational Behaviour**
21.	**Research Methodology**
22.	**Revised Indian Society**

Semester VI

SN	SUBJECT LIST
1	THEORY OF COMPUTATION (T+P)
2	PYTHON PROGRAMMING (T+P)
3	SEC(NOT GIVEN BY UNIVERSITY)
4	VAC(CHOOSE ANYONE FROM LIST)

Core XIV   **Theory of Computation**

Course Objectives:

This course focuses on the basic theory of Computer Science and formal methods of computation like automata theory, various machines, grammars and Turing Machines. To explore the theoretical foundations of computer science from the perspective of formal languages and classify machines by their power to recognize languages.

Course Outcomes: On completion of this course, the students will be able to
- Understand the basic properties of formal languages and grammars.
- Differentiate among regular,context-free and recursively enumerable languages.
- Make grammars to produce strings from a specific language.
- Minimize the finite automata.
- Acquire concepts relating to the theory of computation and computational models including decidability and intractability.
- Design and deal with Turing machines.
- Get the basic foundation of compiler design.

Unit-I:
Alphabet, Languages, Grammars, Finite Automata (DFA, NFA), Regular operations, Regular Languages/Grammars, Regular Expressions, Finite Automaton With $\dot{\varepsilon}$ -Moves, Equivalence of NFA and DFA.
Outcome: The students will be able to understand the basic properties of formal languages and grammars, DFA & NFA.

Unit-II:
Minimization of Finite Automata, Closure Properties of Regular operations, Pumping Lemma of Regular Languages, Context Free Grammars, Context Free Languages, Derivation Tress, Ambiguity, Properties of Context Free Languages, Left and Right Linear Grammars.
Outcome: The students can minimize the finite automata, understand Pumping lemma and Right linear and Left Linear grammar.

Unit-III:
Chomsky Normal Form (Elimination of Useless Symbols, Unit Productions, Null Productions), Pushdown Automata, Deterministic Pushdown Automata, Equivalence of Pushdown Automata and Context Free Languages.
Outcome: The students can be able to Design Push down automata, convert a grammar to CNF'

Unit-IV:
Turing Machines, Turing Computability, Type 0 Languages, Techniques for Turing Machine Construction, Multihead And Multitape Turing Machines, Church Turing thesis, Recursive and Recursively Enumerable Set, Chomsky Hierarchy of Languages.
Outcome: The students will be able to Design and deal with Turing machines. Get the basic

foundation of compiler design, Differentiate regular, context-free and recursively enumerable languages.

Text Books:
- ✓ *Introduction to the theory of Computation, Michael Sipser, Cengage Learning.*
- ✓ *Introduction to Automata Theory, Languages and Computation, J. E. Hopcrpft and J.D. Ullman, Pearson Education, 3rdEdition.*

Reference Books:
- ✓ *JFLAP - An Interactive Formal Languages and Automata Package Rodger, Finley,ISBN:0763738344*
- ✓ *JFLAP User Manual and Exercises, Tobias Fransson. Available in the Web.*

Core XIV- Practical/Tutorial: Theory of Computation Lab

Use Java Formal Language and Automata Language (FLAP) software Package (can be downloaded from www.jflap.org) to carry out the following experiments:

- Regular Language-Create: DFA, NFA, Regular Grammar, and Regular Expression.
- Regular Language – conversions: NFA to DFA to Minimal DFA, NFA to regular expression& vice versa.
- NFA to regular grammar & vice-versa.
- Context-free language–create: push-down automaton, context-free grammar.
- Context-free language – transform: PDA to CFG, CFG to PDA (LL parser), CFG to PDA (SLR Parser), CFG to CNF, CFG to LL parse table and parser, CFG to SLR parse table and parser.
- Recursively Enumerable language: Turing machine (1 tape), Turing machine (multi tape), Turing machine (building blocks), unrestricted grammar.

Core XV   **Python Programming**

Course Objectives:
To acquire programming skills in core Python. To acquire Object Oriented Skills in Python. Todevelop the ability to write database applications in Python.

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

- Explain basic principles of Python programming language.
- Implement object-oriented concepts.
- Implement database and GUI applications

Unit-I:
Python: Features of Python , Installing Python for windows and setting up paths, writing and Executing of a python programs, Python Virtual machine, Frozen binaries, Comparison between C, Java and python , Comments , Doc strings ,How python sees variables, Data typesinPython,builtintypes,sequencesinpython,sets,literalsinPython,userdefineddatatypes, identifiers & reserved words, Naming convention in python.
Outcome: Students will be able to understand the syntax and basic concepts of python programming language.

Unit-II:
Various Operators in Python, Input & Output, Control statements, if statements, while loop, for loop, infinite loop, nested loop, else suit, break, continue, pass, assert, return statements, command line arguments.
Arrays in python, advantages using arrays, creating arrays, importing the array module, indexingand slicing on arrays, Processing the arrays, Comparing arrays.
Strings in Python, creating strings, Length of a string, indexing in strings, slicing strings, Concatenation and Comparing strings, Finding Sub Strings, Replacing a String.
Outcome: Students will be able to build basic programs using fundamental programming constructs

Unit-III:
Functions in Python, define a function, calling a function, return from function, pass by object Reference, Positional arguments, Default arguments, Recursive functions. Introduction to OOP, features of OOP, creating classes, the self-variable, constructor, types ofvariables, namespaces, types of methods.
Outcome: Students will be able to articulate the OOPs concepts as well as use of functions.

Unit-IV:
Inheritance: Define inheritance, types of inheritance, and constructors in inheritance, overriding superclass constructors& methods, the super () method, MRO Polymorphism: Duck typing philosophy of Python, operator overloading, method over riding,interfaces in python.

Exceptions: Errors in a python program, Exceptions, Exception handling, Types of Exceptions, the Exception block, the assert statement, user defined exceptions.

Python Database Connectivity: DBMS, types of databases used with Python, installation of MySQL database, setting path, verifying MySQL, installing MySQL connector, working with MySQL database, Using MySQL from python, retrieving rows, deleting rows, updating rows in a table.

Outcome: Students will be able to articulate the OOPs concepts such as inheritance and able to know how to handle exception and python database connectivity.

Text Books:

- ✓ *T.Budd, Exploring Python, TMH, 1stEd, 2011.*
- ✓ *Core Python Programming, Dr.R. Nageswar Rao, Dreamtech Press.*
- ✓ *Python Programming for Absolute Beginners, Michael Dawson, CENGAGE Learning.*

Reference Books:

- ✓ *Allen Downey, Jeffrey Elkner, Chris Meyers, How to think like a computer scientist: Learning with Python, Freely available online.2012.*

Online References:

- ✓ *Python Tutorial/Documentation www.python.or 2015*
- ✓ *http://docs.python.org/3/tutorial/index.html*
- ✓ *http://interactivepython.org/courselib/static/pythonds*
- ✓ *http://www.ibiblio.org/g2swap/byteofpython/read/*

Core XV- Software Lab based on Python Programming

- Write a menu driven program to convert the given temperature from Fahrenheit to Celsius and vice versa depending upon user's choice.

- Write a Program to calculate total marks, percentage and grade of a student. Marks obtained in each of the three subjects are to be input by the user. Assign grades according to the following criteria: Grade A: Percentage>=80, Grade B: Percentage>=70 and <80Grade C: Percentage>=60 and <70Grade D: Percentage>=40 and <60GradeE: Percentage<40.

- Write a menu-driven program, using user-defined functions to find the area of rectangle, square, circle and triangle by accepting suitable input parameters from user.

- Write a Program to display the first n terms of Fibonacci series.

- Write a Program to find factorial of the given number.

- Write a Program to find sum of the following series for n terms: 1 –2/2! +3/3! -----

- Write a Program to calculate the sum and product of two compatible matrices.

- Install MySQL and connector and write Python programs to retrieve, inserting, delete,update rows in a table.

SEC

VAC

Value Added Courses under Model Curriculum

Sl No.	VAC
23.	**Environmental Studies & Disaster Management**
24.	**Ethics and Values**
25.	**Contemporary Cross Cutting Issues**
26.	**Yoga for all**
27.	**Understanding India**
28.	**Understanding Odisha**
29.	**Management Concepts and Practices**
30.	**Operations Research**
31.	**Organizational Behaviour**
32.	**Research Methodology**
33.	**Revised Indian Society**

END