DR. BABASAHEB AMBEDKAR MARATHWADA UNIVERSITY, CHHATRAPATI SAMBHAJINAGAR.

NAAC- 'A +' Grade

CIRCULAR NO.SU/Engg./College/NEP/83/2025

It is hereby inform to all concerned that, the syllabi prepared by the Board of Studies and recommended by the Dean, Faculty of Science & Technology, *Academic Council at its meeting held on 09 May 2025 has been accepted* the following Syllabi and Second Year Open Elective Basket for B. E. & B. Tech. under the Faculty of Science & Technology as per Norms of National Education Policy – 2020 as appended herewith.

Sr.No.	Syllabi
1.	Second Year B. E./B. Tech. Civil Engineering
2.	Second Year B.E./B.Tech. Mechanical Engineering
3.	Second Year B. E./B. Tech. Information Technology
4.	Second Year B. E./B. Tech. Electronics & Telecommunication Engineering/ Electronics Engineering /Electronics & Communication Engineering.
5.	Second Year B. E./B. Tech. Electrical and Electronics Engineering/ Electrical Engineering/ Electrical, Electronics and Power
6.	Second Year B. E./B. Tech. Computer Science and Engineering/ Computer Science/Computer Engineering
7.	Second Year B. E./B. Tech. Artificial Intelligence/ Artificial Intelligence and Machine Learning / Artificial Intelligence and Data Science

This is effective from the Academic Year 2025-26 and onwards.

All concerned are requested to note the contents of this circular and bring the notice to the students, teachers and staff for their information and necessary action.

University Campus,
Chhatrapati Sambhajinagar
- 431 004.
REF.NO.SU/NEP/2025/ 956 - 61)
Date:- 29/ 05/ 2025.

* * * * *

Deputy Registrar,
Syllabus Section

Copy forwarded and necessary action to :-

1] **The Principal of all Affiliated Colleges,** Dr. Babasaheb Ambedkar Marathwada University

2] The Director, University Network & Information Centre, UNIC, Dr.Babasaheb Ambedkar Marathwada University with a request to upload this Circular on University Website

3] The Director, Board of Examinations & Evaluation, Dr. Babasaheb Ambedkar Marathwada University, Chhatrapati Sambhajinagar.

Copy to :-

1] PA to the Hon'ble Vice-Chancellor,

2] PA to the Pro. Vice-Chancellor,

3] PA to the Registrar,
Dr. Babasaheb Ambedkar Marathwada University, Chhatrapati Sambhajinagar.

JD*29052025/   -=**=-

Dr. BabasahebAmbedkarMarathwada University
ChhatrapatiSambhajinagar- 431001

Four Year UG Engineering / Technology Programme
(B.E. / B. Tech)

Structure and Syllabus of 2nd Year
B.E./B.Tech.
(Computer Science and Engineering/ Computer Science/Computer Engineering)

(AS PER NEP-2020)

Effective from 2025-26

Dr. B.S. Shivoirne

(Dr. R. R. Deshmukh)

HEAD OF DEPARTMENT
Computer Science & Engine
MIT, Aurangabad

HOD
MCA Department
Govt. College of Engg. Aurangabad

FACULTY OF SCIENCEAND TECHNOLOGY
SyllabusStructurew.e.f.2025-26 (As Per NEP-2020)
Semester–III

Sr. No.	Course Category	Course Code	Course Title	Contact Hours per week		Credits		Scheme of Examination		
				Theory	Practical	Theory	Practical	CIA	SEE	Total
1	Program Core Course (PCC)	PCCT-1	Data Structures	3	----	3	----	40	60	100
		PCCP-1	Lab. Data Structures		2		1	20	30	50
		PCCT-2	OOP using JAVA	2	----	2	----	20	30	50
		PCCP-2	Lab. OOP using JAVA	---	2	--	1	20	30	50
		PCCT-3	Discrete Mathematics	2	----	2	----	20	30	50
		PCCP-3	Lab. Python Programming	---	2	--	1	20	30	50
2	Multidisciplinary Minor (MDM)	MDMT-1	Student will have to choose any one course from the Basket of minor	2		2		20	30	50
3	Open Elective (OE)to be chosen compulsorily from the faculty other than Major Discipline	OET-1	Student will have to choose any one course from the Basket of OE	2	----	2	----	20	30	50
		OET-2	Student will have to choose any one course from the Basket of OE	2	----	2	----	20	30	50
4	Entrepreneurship/ Economics/ Management Courses		Theory-7 One Theory course form the following Basket 1) Engineering Economics 2) Entrepreneur Development 3) Industrial Management	2	----	2	----	20	30	50
5	Value Education Course (VEC)	VECT-1	Theory-8 (Universal Human Values/ Environmental Studies)	2	---	2	--	20	30	50
6	Comm. Engg. Project/Field Project(FP)	FP-1	Field Project	----	4	----	2	20	30	50
				17	10	17	5	260	390	650

Option 2 : Student can choose option 2 to get B.E./B.TechHonors with Multidisciplinary Minor (above structure + following additional Honors degree course

| 7 | One additional Couse from core program for Honors Degree | HT-1 | Computer Architecture and Organization | 3 | ---- | 3 | ---- | 40 | 60 | 100 |

Please note that the course listed under Sr. No. 8 is optional and specifically designed for students pursuing a Bachelor's Degree Honors with Multidisciplinary Minor. Only those students who have secured a minimum of 7.5 CGPA (equivalent to 75% marks) in their first year will be eligible to opt for this option

| 9 | One additional Minor Couse (for Double Minor) | DMT-1 | Programming Languages | 3 | ---- | 3 | ---- | 40 | 60 | 100 |

Please note that the courses listed under Sr. No. 9 is optional and specifically designed for students pursuing a Bachelor's Degree with Double Minor. Only those students who have secured a minimum of 7.5 CGPA (equivalent to 75% marks) in their first year will be eligible to opt for this option.

Exit Option: Students may choose to exit the program at the end of the second year and be awarded an UG Diploma in the Mechanical Engineering, provided they have earned additional 8 credits through skill-based vocational courses, internships, or mini project undertaken during the summer vacation, after second year.

FACULTY OF SCIENCEAND TECHNOLOGY
SyllabusStructurew.e.f.2025-26 (As Per NEP-2020)
Semester–III

Sr. No.	Course Category	Course Code	Course Title	Contact Hours per week		Credits		Scheme of Examination		
				Theory	Practical	Theory	Practical	CIA	SEE	Total
1	Program Core Course (PCC)	PCCT-1	Data Structures	3	----	3	----	40	60	100
		PCCP-1	Lab. Data Structures		2		1	20	30	50
		PCCT-2	OOP using JAVA	2	----	2	----	20	30	50
		PCCP-2	Lab. OOP using JAVA	---	2	--	1	20	30	50
		PCCT-3	Discrete Mathematics	2	----	2	----	20	30	50
		PCCP-3	Lab. Python Programming	---	2	--	1	20	30	50
2	Multidisciplinary Minor (MDM)	MDMT-1	Student will have to choose any one course from the Basket of minor	2	----	2	----	20	30	50
3	Open Elective (OE)to be chosen compulsorily from the faculty other than Major Discipline	OET-1	Student will have to choose any one course from the Basket of OE	2	----	2	----	20	30	50
		OET-2	Student will have to choose any one course from the Basket of OE	2	----	2	----	20	30	50
4	Entrepreneurship/ Economics/ Management Courses		Theory-7 One Theory course form the following Basket 1) Engineering Economics 2) Entrepreneur Development 3) Industrial Management	2	----	2	----	20	30	50
5	Value Education Course (VEC)	VECT-1	Theory-8 (Universal Human Values/ Environmental Studies)	2	---	2	--	20	30	50
6	Comm. Engg. Project/Field Project(FP)	FP-1	Field Project	----	4	----	2	20	30	50
				17	10	17	5	260	390	650

Option 2 : Student can choose option 2 to get B.E./B.TechHonors with Multidisciplinary Minor (above structure + following additional Honors degree course

| 7 | One additional Couse from core program for Honors Degree | HT-1 | Computer Architecture and Organization | 3 | ---- | 3 | ---- | 40 | 60 | 100 |

Please note that the course listed under Sr. No. 8 is optional and specifically designed for students pursuing a Bachelor's Degree Honors with Multidisciplinary Minor. Only those students who have secured a minimum of 7.5 CGPA (equivalent to 75% marks) in their first year will be eligible to opt for this option

| 9 | One additional Minor Couse (for Double Minor) | DMT-1 | Programming Languages | 3 | ---- | 3 | ---- | 40 | 60 | 100 |

Please note that the courses listed under Sr. No. 9 is optional and specifically designed for students pursuing a Bachelor's Degree with Double Minor. Only those students who have secured a minimum of 7.5 CGPA (equivalent to 75% marks) in their first year will be eligible to opt for this option.

Exit Option: Students may choose to exit the program at the end of the second year and be awarded an UG Diploma in the Mechanical Engineering, provided they have earned additional 8 credits through skill-based vocational courses, internships, or mini project undertaken during the summer vacation, after second year.

Semester–IV

Sr. No.	Course Category	Course Code	Course Title	Contact Hours per week		Credits		Scheme of Examination		
				Theory	Practical	Theory	Practical	CIA	SEE	Total
1	Program Core Course(PCC)	PCCT-1	Operating System	3	-----	3	-----	40	60	100
		PCCP-1	Lab Operating System		2		1	20	30	50
		PCCT-2	Probability and Statistics	2	----	2	-----	20	30	50
		PCCP-2	Lab Probability and Statistics	---	2	--	1	20	30	50
		PCCT-3	Computer Network	2	-----	2	-----	20	30	50
		PCCP-3	LabComputer Network	---	2	--	1	20	30	50
2	(MDM) Multidisciplinary Minor	MDMT-2	Student will have to choose any one course from the Basket of Minor	2	-----	2	-----	20	30	50
3	(OE)to be chosen compulsorily from the faculty other than Major Discipline Open Elective	OET-3	Student will have to choose any one course from the Basket of OE	2	-----	2	-----	20	30	50
4	Vocational and Skill Enhancement Course (VSEC)	VSECP-2	(Programme specific Skills) Web Technologies	--	4	--	2	20	30	50
5	Ability Enhancement Course (AEC)	AEC-2	Theory-6 Modern Indian Languages (Marathi, Hindi, Sanskrit, Urdu, Pali, Arabic)	2	-----	2	-----	20	30	50
6	Economics/ Management Courses/ Entrepreneurship		Theory-7 One Theory course form the following Basket 1) Engineering Economics 2) EntrepreneuripDevelopment 3) Industrial Management	2	-----	2	-----	20	30	50
7	Value Education Course (VEC)	VECT-2	Theory-8 (Universal Human Values/ Environmental Studies)	2	---	2	--	20	30	50
				17	10	17	5	260	390	650

Option 2 : Student can choose option 2 to get B.E./B.TechHonors with Multidisciplinary Minor (above structure + following additional Honors degree course)

| 7 | One additional Course from core program for Honors Degree | HT-2 | Compiler Construction | 3 | ---- | 3 | ---- | 40 | 60 | 100 |

Please note that the course listed under Sr. No. 7 is optional and specifically designed for students pursuing a Bachelor's Degree Honors with Multidisciplinary Minor. Only those students who have secured a minimum of 7.5 CGPA (equivalent to 75% marks) in their first year will be eligible to opt for this option

Option 3 : Student can choose option 3 to get B.E./B.Tech with Double Minor (Option 1 structure + following additional Double Minor course)

| 8 | One additional Minor Course (for Double Minor) | DMT-2 | Object Oriented Programming | 3 | ---- | 3 | ---- | 40 | 60 | 100 |

Please note that the courses listed under Sr. No. 8 is optional and specifically designed for students pursuing a Bachelor's Degree with Double Minor. Only those students who have secured a minimum of 7.5 CGPA (equivalent to 75% marks) in their first year will be eligible to opt for this option.

List of Courses offered for MDM

Excluding CS / CSE/ IT/ AI / AIDS / AIML & Similar branches

Semester	Courses offered
III MDMT-1	Data Structures
IV MDMT-2	Computer Algorithms

Syllabus of 3rd Semester of
B.E./B.Tech (Computer Science and Engineering/ Computer Science/Computer Engineering)

<table>
<tr><td colspan="3" align="center">**Course Code :PCCT-1**
(Semester III)
Course Title : Data Structures</td></tr>
</table>

Total Credits : 3	**Total Contact Hours :** 03 Hrs/week ; 45 Hrs / Semester :III	
Maximum Marks : 100		

Learning Objectives of the Course:

i) To understand and implement fundamental data structures such as arrays, stacks, queues, linked lists, trees, and graphs.
ii) To analyze the performance of various data structures.
iii) To apply suitable data structures for problem solving in software development.

Course Outcomes (COs) :

After completion of the course, students will be able to -

i) Understand basic data structures and asymptotic notations.
ii) Apply data structures to algorithmically design efficient computer programs that will cope with the complexity of actual applications.
iii) Design and implementation of data structures
iv) Analyze data structures using asymptotic analysis.
v) Develop algorithms for sorting and searching problems.

ModuleNo.	Topics / actual contents of the syllabus	Contact Hours
I	**A. Introduction Data structure(7Hrs)** Data structures, data structure operations, abstract data types (ADT), Arrays, Structures, pointers, dynamic memory management, asymptotic notations– Big-Oh, Theta, Omega. Stacks - Primitive operations in stack, array representation of stacks, linked representation of stacks, Application of stacks, example-infix, postfix and prefix. **B. Queues and Link List(8 Hrs)** linked representation of queues, queue as ADT, circular queues, deques, priority queues, applications of queues. Linked lists – Linked lists, representation of linked list in memory, traversing a linked list, searching a linked list, insertion, deletion, header linked list, circularly linked list, doubly linked lists, buddy systems.	15Hrs
II	**A. Trees(8Hrs)-** Binary trees, representing binary tree in memory, traversing binary trees, header nodes, threaded binary trees, binary search trees, searching and inserting in binary search tree, deleting from a binary search tree, applications of trees. **B. Sorting(7Hrs)-:** bubble sort, merge sort, quick sort, radix sort, insertion sort, selection sort, heap sort, Performance analysis and comparison of all sorting methods.	15Hrs

III	A. **Searching and Hashing algorithms(7Hrs)-:.** Search algorithms – Sequential Search, Ordered lists, binary search, Searching using Hashing, Hash tables, Hash functions, Some examples of hash functions. Collision resolution methods, complexity analysis of searching methods. B. **Graphs(8Hrs)** – graph theory terminology, sequential representation of graphs; adjacency matrix, path matrix, graph traversal – DFS, BFS, Warshall's algorithm, Dijkstra's Algorithm; shortest path, linked representation of graph, operations on graph, topological sorting, spanning trees: Prim's and Kruskal's algorithm	15Hrs

TextBooks(If Any):

1.Aaron M. Tanenbaum, "Data Structures using C and C++"

2.E. Horowitz, S. Sahni, S.Anderson-freed, "Fundamentals of Data Structures in C", Second Edition, University Press, ISBN 978-81-7371-605-8

Reference Books:

1. Mark Allen Weiss, *Data Structures and Algorithm Analysis in C*, Pearson Education.
2. Robert Lafore, *Data Structures and Algorithms in C++*, Sams Publishing.

Course Code: PCCP-1
(Semester III)
Course Title: Lab. Data Structures

Total Credits: 1   **Practical:** 2 Hrs/week ; **30 Hrs** / Semester

Maximum Marks : 50

Learning Objectives of the Course:

i)   To teach the student to write programs in C and to solve the problems.

ii) Implement the data Structures using C language

Course Outcomes (COs) :
After completion of the course, students will be able to -
   CO 1 Implement data structures like stacks, queues, linked lists etc. using array and dynamic
   variables and compare these methods.
   CO 2 Implement complex data structures like trees & graphs in High level language.
   CO 3 Implement searching & sorting methods.

Topics / actual contents of the syllabus	Contact Hours
1 Write a program for implementation of Stack.	
2 Write a program for implementation of Queue.	
3 Write a program for Singly Linked List.	
4 Write a program for Creation of Binary Tree and operations on it.	
5 Write a program for Creation of Binary Threaded Tree.	
6 Write a program for Depth First search and Breadth First search.	
7 Write a program for Bubble Sort.	**30 Hrs**
8 Write a program for Merge Sort.	
9 Write a program for Heap Sort.	
10 Write a program for Insertion Sort	
11 Write a program for Binary Search to search an element in the given sequence.	

Students should undertake at least 08 to 10 experiments during the semester from above list

<table>
<tr><td colspan="3" align="center">Course Code :PCCT-2
(Semester III)
Course Title : OOP using JAVA</td></tr>
</table>

Total Credits : 2 **Maximum Marks :** 50	**Total Contact Hours :** 02Hrs/week ; 30 Hrs / Semester	

Learning Objectives of the Course:

i) To learn object oriented concept in Java
ii) To study inheritance, polymorphism concept.
iii) To understand the exception and multithreading.

Course Outcomes (COs) :

After completion of the course, students will be able to -

i) **CO1** Describe the fundamental concepts of Java, including OOP principles, JVM architecture, and basic syntax structures like variables, data types, and control statements.
ii) **CO2** Apply object-oriented programming concepts such as classes, objects, constructors, overloading, and access modifiers in Java.
iii) **CO3** Implement inheritance, abstract classes, and method overriding to promote code reuse and polymorphic behavior in Java programs.
iv) **CO4** Design and implement programs using interfaces and packages for modular and extensible software development.
v) **CO5** Handle errors and exceptions effectively using Java's exception handling mechanisms to build robust programs.
vi) **CO6** Demonstrate the use of multithreading to develop concurrent programs in Java, managing thread lifecycle and synchronization.

ModuleNo.	Topics / actual contents of the syllabus	Contact Hours
I	**A.Introduction to OOP and Java(4 Hrs)** Futures of java, difference between procedural oriented and approach oriented, Java Virtual Machine, Data types, Variables, Operators, Control Statements, String & Array in Java. **B.OOP in Java (6 Hrs)** Class fundamental, introducing method, declaring object, accessing class members, method overloading, constructor, constructor overloading, static member, access modifiers, this references, introducing final.	10 Hrs
II	**C. Inheritance(5 Hrs)** Inheritance in java, super and sub-classes, defining subclass, type of inheritance method overloading, using super, finalizers,abstract class and method, visibility control, using final with inheritance. **D. Interfaces & Packages (5Hrs)** Interface in Java, Defining interfaces, Extending & Implementing Interfaces, Polymorphism, Packages:	10 Hrs

		Defining a Packages, Class Path Variable, Creation of Package, Importing Packages	
III		C. **Exceptional Handling (6 Hrs)**Exceptional Handling fundamentals, Java Built in exceptions, Try Catch & Finally, Throws, Throws Keywords, User defined Exception D. **Multi-Threading (4Hrs)**Definition of Threads, States of Threads, Common Threads method,Creation of Threads, Creation of Multiple Threads, Thread priorities, Synchronization	**10 Hrs**

TextBooks(If Any):

1. Richard L. Halterman, *"Object-Oriented Programming in Java"*, 1st Edition, Southern Adventist University, 2011...

2.Kathy Sierra, Bert Bates, *"Head First Java"*, 2nd Edition, O'Reilly Media, 2005.

3. Paul Deitel, Harvey Deitel, *"Java: How to Program"*, 10th Edition, Pearson   Education, 2015.

ReferenceBooks:

3. Kathy Sierra, Bert Bates , " *Head First Java* ", 2nd Edition , O'Reilly Media
4. Herbert Schildt, *"Java: A Beginner's Guide"*, 8th Edition, McGraw-Hill Education
5. Bruce Eckel , *"Thinking in Java"*, 4th Edition, Prentice Hall
6. Joshua Bloch,, *"Effective Java"*, 3rd Edition, Addison-Wesley
7. Herbert Schildt, *"Java: The Complete Reference"*, 12th Edition, McGraw-Hill Education
8. Robert C. Martin, *"Clean Code: A Handbook of Agile Software Craftsmanship"*, 1st Edition, Prentice Hall
9. Eric Freeman, Elisabeth Robson, *"Head First Design Patterns"*, 2nd Edition(2020), O'Reilly Media

Course Code: PCCP-2
(Semester III)
Course: Lab. : OOP Using JAVA

Credits: 1   **Practical: 2 Hrs/week ; 30 Hrs / Semester**
Maximum Marks : 50

Learning Objectives of the Course:

i)   To teach the student to write programs in JAVA and to solve the problems.

ii) Implement the Object Oriented Program using JAVA language

Course Outcomes (COs) :
After completion of the course, students will be able to -
1. Implement basic Java programs using variables, data types, operators, arrays, and strings
2. Apply object-oriented programming concepts such as classes, objects, methods, and constructors
3. Demonstrate constructor overloading and method overloading in Java.
4. Illustrate inheritance (single and multilevel) and use of keywords like `this`, `super`, and `final`.
5. Implement access control, encapsulation, and use of static members in Java classes.

Topics / actual contents of the syllabus	Contact Hours
1. Write a program that input word & a sentence. Find the given word in sentence entered.	
2. Write a program to store Five student's marks along with roll number in an array. Display marks of particular roll number.	
3. Write a stack to Push Numbers, pop numbers and also to check stack empty or full.(use OOP's concepts and Constructor Overloading to assign default size of stack of 5 or user can change the stack size while creating object)	
4. Create a class, Bank of Account, with fields account number, account Holder Name, Balance and internal Rate and a method deposit() that adds an amount to the balance.	
5. Write a program to demonstrate use of 1D and 2D arrays and String operations	**30 Hrs**
6. Write a Java program to demonstrate use of data types, variables, and operators	
7. Implement a class with methods and object creation, access members	
8. Write a Java program to demonstrate method overloading	
9. Implement constructor and constructor overloading in Java	
10. Demonstrate the use of static data and methods, and the `this` keyword	
11. Create a program to demonstrate use of access modifiers and the `final` keyword	
12. Implement single and multilevel inheritance using classes	

13.Demonstrate the use of super keyword and call super class constructor	
14.Implement and use Java Interfaces with `implements` and `extends`	
15.Create and use user-defined packages and `import` them in another class	
16.Demonstrate polymorphism using method overriding	
17.Write a program to handle built-in exceptions using `try`, `catch`, `finally`	
18.Create a program with user-defined exceptions	
19.Demonstrate thread synchronization using `synchronized` method	
20.Mini project combining OOP, Exception Handling, Threads, and Packages	
Students should undertake at least 08 to 10 experiments during the semester from above list	

Course Code: PCCT-3
(Semester III)
Course Title : Discrete Mathematics

Total Credits : 02

Total Contact Hours : 2 Hrs/week 30 Hrs / Semester

Maximum Marks : 50

Learning Objectives of the Course:

1. To develop a strong foundation in set theory, logic, relations, and functions, enabling students to model and analyze mathematical structures.
2. To apply combinatorial principles, recurrence relations, and generating functions in solving counting and algorithmic problems.
3. To understand and analyze graphs and trees, and apply related algorithms in solving real-world and computational problems.
4. To explore fundamental algebraic structures such as groups, rings, and fields, and understand their relevance in computer science and engineering applications.

Course Outcomes (COs) :

After completion of the course, students will be able to -

  I.   CO1: Apply the concepts of set theory, logic, and functions to model and solve mathematical problems.
  II. CO2: Use combinatorial techniques, recurrence relations, and generating functions to analyze and solve counting and algorithm-based problems.
  III. CO3: Analyze graphs and trees, and apply relevant algorithms to solve the problems.
  IV. CO4: Understand and apply fundamental algebraic structures such as groups, rings, and fields in mathematical and computational contexts.

Module No.	Topics / actual contents of the syllabus	Contact Hours
I	**Set Theory**: Basic concepts of set theory, Operations on Sets, the power set. Finite, infinite and uncountable infinite sets, Cardinality of finite sets, principle of inclusion and exclusion. **Introduction to Logic**. Propositional Logic, Truth tables, Predicates and Quantifiers, Propositional equivalence, Mathematical Proofs. Infinite sets, well-ordering. Mathematical Induction. **Relations**: Ordered pairs and n-tuples, Product Sets and Partitions, Relations and Digraphs, Matrix of Relation, Properties of Relations, Equivalence Relations & Partitions, Manipulation of Relations, Composition of Relations, Transitive Closure of a relation, Partial order relation, Partially ordered set, HasseDiagrams. **Functions**: Definition, Composition of functions, Types of Functions, Invertible Function, Pigeonhole Principle with Simple Applications.	10 Hrs
II	**Counting Principles** The Basics of Counting, rule of Sum and Product, Permutations and Combinations, Binomial Coefficients and Identities, Generalized	10 Hrs

	Permutations and Combinations, Algorithms for generating Permutations and Combinations. **Discrete numeric functions and generating function:** Introduction, manipulation of numeric functions, Asymtotic-behaviour of numeric functions, generating function. **Recurrence Relations and Recursive Algorithms:** Introduction, recurrence relations, linear recurrence relations with constant coefficients, homogeneous solutions, particular solutions, total solution. Solution by the method of generating functions.	
III	**Graph:** Basic terminology, multi-graph and weighted graphs, path and circuits, short path in weighted graphs- Dijkstra algorithm. Eulerian path and circuits, Hamiltonian path and circuits. Factors of a graph, planer graph, graph coloring. **Trees:** Trees, rooted trees, path lengths in rooted trees, pre-fixed codes, spanning trees and cut sets. **Algebraic Structures** The structure of algebra, Algebraic Systems, semigroups, Monoids, Groups, Homomorphism and Normal Subgroups, Rings, Integral Domains and Fields.	10 Hrs

TextBooks(If Any):

1. C. L. Liu and D. P. Mohapatra, "Elements of Discrete Mathematics", 3rd Edition, Tata McGraw-Hill, 2008.
2. Peter J. Cameron, "Combinatorics: Topics, Techniques, Algorithms", Cambridge University Press, 1994.
3. Ronald Graham, Donald Knuth, and Oren Patashnik, "Concrete Mathematics: A Foundation for Computer Science", 2nd Edition, Addison–Wesley, 1994.
4. NarsinghDeo, "Graph Theory with Applications to Engineering and Computer Science", Prentice-Hall, 1974.
5. N. Biggs, "Discrete Mathematics", 3rd Edition, Oxford University Press, 2002.

ReferenceBooks:

10. Kenneth H. Rosen, "Discrete Mathematics and Its Applications", 7th Edition, Tata McGraw-Hill, 2011.

Course Code: PCCP-3

<table>
<tr><td colspan="2" style="text-align:center">Course Code: PCCP-3
(Semester III)</td></tr>
<tr><td colspan="2">Course Code :   Lab: Python Programming</td></tr>
<tr><td>Total Credits : 01
Maximum Marks : 50</td><td>Total Contact Hours : 2 Hrs/week ; 30 Hrs / Semester</td></tr>
</table>

Learning Objectives of the Course:

1. To provide hands-on experience in Python programming.
2. To develop problem-solving skills using Python.
3. To implement algorithms using functions, loops, and data structures in Python
4. To understand the use of modules, file handling, and exception handling

Course Outcomes (COs) :

After completion of the course, students will be able to -

1. Write basic Python scripts using variables, operators, and input/output.
2. Use control structures such as loops and conditional statements.
3. Create functions and use built-in and user-defined modules.
4. Work with strings, lists, tuples, dictionaries, and sets.
5. Handle files and exceptions in Python programs.

Topics / actual contents of the syllabus	Contact Hours
1. Basics of Python: Variables, Data Types, and Operators 2. Control Structures: if, if-else, nested if-else 3. Loops: for and while loops with examples 4. Functions: Built-in functions and user-defined functions 5. Recursion and Lambda functions 6. Working with Strings 7. Lists, Tuples, and Dictionaries 8. Sets and their operations 9. File Handling: Read and write operations 10. Exception Handling in Python	**30 Hrs**

Students should undertake at least 08 to 10 experiments during the semester from above list

Course Code :MDMT-1
(Semester - III)
Course Title : Data Structures
(This course will be available for the students from other discipline and Computer Science and Engineering/ Computer Science Engineering students will choose minor course from other discipline   )

Total Credits : 2

Maximum Marks : 50   Total Contact Hours : 02Hrs/week ;   30Hrs / Semester

Learning Objectives of the Course:

- To understand and implement fundamental data structures such as arrays, stacks, queues, linked lists, trees, and graphs.
- To analyze the performance of various data structures.
- To apply suitable data structures for problem solving in software development.

Course Outcomes (COs) :

After completion of the course, students will be able to -

- Understand basic data structures and asymptotic notations.
- Apply data structures to algorithmically design efficient computer programs that will cope with the complexity of actual applications.
- Design and implementation of data structures
- Analyze data structures using asymptotic analysis.
- Develop algorithms for sorting and searching problems.

ModuleNo.	Topics / actual contents of the syllabus	Contact Hours
I	**C. Introduction Data structure**Data structures, data structure operations, abstract data types (ADT), Arrays, Structures, pointers, dynamic memory management, asymptotic notations– Big-Oh, Theta, Omega. Stacks - Primitive operations in stack, array representation of stacks, linked representation of stacks, Application of stacks, example- infix, postfix and prefix. **D. Queues and Link List**linked representation of queues, queue as ADT, circular queues, deques, priority queues, applications of queues. Linked lists – Linked lists, representation of linked list in memory, traversing a linked list, searching a linked list, insertion, deletion, header linked list, circularly linked list, doubly linked lists, buddy systems.	10Hrs
II	**E. Trees)**- Binary trees, representing binary tree in memory, traversing binary trees, header nodes, threaded binary trees, binary search trees, searching and inserting in binary search tree, deleting from a binary search tree, applications of trees. **F. Sorting)**-: bubble sort, merge sort, quick sort, radix sort, insertion sort, selection sort, heap sort, Performance analysis and comparison of all sorting methods.	10Hrs
III	E. **Searching and Hashing algorithms**(Search algorithms – Sequential	10Hrs

| | Search, Ordered lists, binary search, Searching using Hashing, Hash tables, Hash functions, Some examples of hash functions. Collision resolution methods, complexity analysis of searching methods.

F. **Graphs**– graph theory terminology, sequential representation of graphs; adjacency matrix, path matrix, graph traversal – DFS, BFS, Warshall's algorithm, Dijkstra's Algorithm; shortest path, linked representation of graph, operations on graph, topological sorting, spanning trees: Prim's and Kruskal's algorithm | |

TextBooks(If Any):

1.Aaron M. Tanenbaum, "Data Structures using C and C++"

2.E. Horowitz, S. Sahni, S.Anderson-freed, "Fundamentals of Data Structures in C", Second Edition, University Press, ISBN 978-81-7371-605-8

Reference Books:

11. Mark Allen Weiss, *Data Structures and Algorithm Analysis in C*, Pearson Education.

12. Robert Lafore, *Data Structures and Algorithms in C++*, Sams Publishing.

Entrepreneurship/Economics/Management Courses

Students will have to choose any one theory course form the following Basket. Any One course in 3rd semester and another course in 4th semester

1)   Engineering Economics (EEM-I)

2)   Entrepreneurship Development (EEM-II)

3)   Industrial Management (EEM-III)

Course Code: EEM-I	
(Semester III)	
Course Title: Engineering Economics	

Total Credits: 2
Maximum Marks: 50   **Total Contact Hours:** 2 Hrs/week ; 30 Hrs / Semester

Learning Objectives of the Course:
1. Understand the Time Value of Money
2. Evaluate Engineering Alternatives
3. Analyze Public Sector Projects
4. Understand and Apply Depreciation and Taxation
5. Perform Break-even and Sensitivity Analysis
6. Understand Cost Concepts for Decision-Making

Course Outcomes (COs) :
After completion of the course, students will be able to -
1. To evaluate Time Value of Money
2. To enable students to perform economic comparisons between different projects or assets
3. To introduce benefit-cost analysis for evaluating the economic feasibility of projects
4. To apply break-even analysis using both linear and non-linear models
5. To develop skills in cost estimation, cost control, cost reduction, and identify relevant costs for decision-making.

Unit No.	Topics / actual contents of the syllabus	Contact Hours
I	**Time value of money:** Simple and compound interest, Time value equivalence, Compound interest factors, Cash flow diagrams, Calculation, Calculation of time –value equivalences. Present worth comparisons, Comparisons of assets with equal, unequal and infite lives, comparison of deferred investments, Future worth comparison, payback period comparison.	10 Hrs
II	Use and situations for equivalent annual worth comparison, Comparison of assets of equal and unequal life. Rate of return, Internal rate of return, comparison of IIR with other methods, IRR misconceptions. Analysis of public Projects: Benefit/ Cost analysis, quantification of project, cost and benefits, benefit/ cost applications, Cost effectiveness analysis.	10 Hrs
III	**Depreciation**, Computing depreciation charges, after tax economic comparison, Break-even analysis; linear and non-linear models. Sensitivity analysis: single and multiple parameter sensitivity. **Fixed and variable cost,** Product and Process Costing, Standard Costing, Cost estimation, Relevant Cost for decision making, Cost estimation, Cost control and Cost reduction Techniques.	10 Hrs

Reference Books:
1. Riggs, J.L., Dedworth, Bedworth, D.B., Randhawa, S.U., "Engineering Economics", Vol. 1, Latest Edition, McGraw Hill International, 1996.
2. James L. Riggs, David D. Bedworth, Sabah U. Randhawa, "Economics for Engineers", Vol. 1, 4th Edition, McGraw-Hill, 2004.
3. Donald Newnan, Ted Eschembach, Jerome Lavelle, "Engineering Economic Analysis", Vol. 1, 8th Edition, Oxford University Press, 2012.
4. John A. White, Kenneth E. Case, David B. Pratt, "Principles of Engineering Economic

Analysis", Vol. 1, 6th Edition, John Wiley, 2010.
5. R. Paneerseelvam, "Engineering Economics", Vol. 1, 2nd Edition, PHI, 2008.
6. Michael R. Lindeburg, "Engineering Economics Analysis", Vol. 1, Latest Edition, Professional Publications, 1993.
7. V. Mote, S. Paul, G. Gupta, "Managerial Economics", Vol. 1, Latest Edition, Tata McGraw Hill, 2004.

Course Code: EEM-II
(Semester III)
Course Title: Entrepreneurship Development

Total Credits: 2

Maximum Marks: 50   **Total Contact Hours:** 2 Hrs/week ; 30 Hrs / Semester

Learning Objectives of the Course:
1. Understand the fundamentals of entrepreneurship and its significance in engineering.
2. Identify business opportunities and develop innovative ideas.
3. Create a basic business plan and understand key entrepreneurial strategies.

Course Outcomes (COs) :

After completion of the course, students will be able to -
1. Explain the concept of entrepreneurship and its importance in the modern economy.
2. Identify and evaluate business opportunities in engineering and technology sectors.
3. Develop a comprehensive business plan including financial, operational, and marketing strategies.
4. Assess the challenges and risks in entrepreneurship and develop strategies to mitigate them.
5. Demonstrate entrepreneurial thinking through case studies, projects, and presentations.

Unit No.	Topics / actual contents of the syllabus	Contact Hours
I	**Introduction to Entrepreneurship** Definition, meaning, and characteristics of an entrepreneur, Evolution of entrepreneurship Types of entrepreneurs, Role of entrepreneurship in economic development, Key traits of successful entrepreneurs.	10 Hrs
II	**Opportunity Recognition and Idea Generation** Identifying business opportunities, Creativity and innovation in entrepreneurship, Techniques for idea generation, Feasibility analysis (technical, market, financial).	10 Hrs
III	**Business Planning** Components of a business plan, Business models and strategy formulation, Legal requirements for starting a business, Intellectual Property Rights (IPR) and patents.	10 Hrs

Reference Books:
1. C.B. Gupta, Srinivasan, "Entrepreneurship Development", Vol. 1, Latest Edition, Sultan Chand & Sons, 2020.
2. Donald F. Kuratko, "Entrepreneurship: Theory, Process, Practice", Vol. 1, Latest Edition, Cengage, Eric Ries, "The Lean Startup", Vol. 1, Latest Edition, Anonymous, 2011.
3. Alexander Osterwalder, Yves Pigneu, "Business Model Generation", Vol. 1, Latest Edition, Wiley, 2011.
4. Peter F. Drucker, "Innovation and Entrepreneurship", Vol. 1, Latest Edition, Taylor & Francis, 2014.

<table>
<tr><td colspan="3">

Course Code: EEM-III
(Semester III)
Course Title: Industrial Management

</td></tr>
</table>

Total Credits: 2		
Maximum Marks: 50	**Total Contact Hours:** 2 Hrs/week ; 30 Hrs / Semester	

Learning Objectives of the Course:
1. To understand concept of management, administration, Organization, Industrials Laws.

Course Outcomes (COs) :
After completion of the course, students will be able to -
1. Understand the fundamental principles of management.
2. Describe different forms of business organizations and organizational structures.
3. Apply theoretical knowledge to real-world management and organizational challenges.
4. Analyze the impact of organizational, environmental factors.
5. Explain the role of economics in management decision-making.

Unit No.	Topics / actual contents of the syllabus	Contact Hours
I	**Introduction to Management:** Managing and Manager, organizations and need for management, the managing process, types of managers, the challenge of management, the evolution of Management theory. **Management in the 21st century:** The importance of organizational and natural environment, elements of direct action environment, managing multiple stock holder relationship, elements of the indirect action environment, Natural Environment management 2000 and beyond, social responsibility and ethics, globalization. Evaluation of case studies related to above concept.	10 Hrs
II	**Business Organization** Forms of business organization, individual proprietorship, joint stock company, co-operative enterprise, co-operative enterprise and public sector undertakings. Organization structure in industries, Line organization, functional organization, line and staff organization, committee organization, project organization matrix organization. **Nature and Significance of Economics.** Science, engineering and technology, their relationship with economic development. Basic economic concepts, human wants economic goods, utility value, price cost, wealth and capital. Demand supply, elasticity of demand and supply. Concept of profit and revenues.	10 Hrs
III	**Accidents and safety** Classification of accidents, according to nature of industries; i.e. fatal, temporary, according to event and place. Causes of accidents , psychological, and other industrial hazards. Effects of accidents. Accident-prone workers, accident to be taken incase of accidents with machines, electric shock, road accident fires and erection and construction accidents **Personnel Management:**	10 Hrs

	Man power, sources of recruitment, selection and training, job evaluation, performance appraisal, wages and incentives, self and time management.	

Reference Books:
1. James A. F., "Management", Vol. 1, 6th Edition, PHI.
2. Claude S. George, Jr., "Management for Business and Industry", Vol. 1, Revised Edition, Prentice-Hall of India Private Limited.
3. McConnell, Gupta, "Economics: Principles, Problems, and Policies", Vol. 1, 18th Edition, The McGraw-Hill.
4. T.R. Banga, S.C. Sharma, "Industrial Organisation and Engineering Economics", Vol. 1, Latest Edition, Khanna Publishers, Jan-2006.
5. O.P. Khanna, "Industrial Engineering & Management", Vol. 1, Latest Edition, Dhanpat Rai Publication, Jan-2018.

Value Education Courses (VEC)

Students will have to choose any one theory course form the following Basket. Any One course in 3rd semester and another course in 4th semester

1)   Universal Human Values (VECT-I)

2)   Environmental Students (VECT-II)

Course Code: VECT-1 (Semester III/ IV) Course Title: Universal Human Values	
Total Credits: 2	
Maximum Marks: 50	**Total Contact Hours:** 2 Hrs/week ; 30 Hrs / Semester

Learning Objectives of the Course:
1. To appreciate the essential complementarities between 'VALUES' and 'SKILLS' to ensure sustained happiness and prosperity, which are the core aspirations of all human beings,
2. To facilitate the development to a holistic perspective among students to lead their Personal and professional lives in an ethical way.
3. To highlight plausible implications of such a holistic understanding in terms of ethical human conduct, trustful and mutually fulfilling human behaviour, and mutually enriching interaction with nature.

Course Outcomes (COs) :
After completion of the course, students will be able to -
1. Define key terms related to human values.
2. Explain the concept of happiness as related to right understanding and relationship.
3. Apply the principles of right understanding in their daily interactions.
4. Analyze the impact of their values on their behaviour and decisions.

Unit No.	Topics / actual contents of the syllabus	Contact Hours
I	**Introduction to Value Education and Harmony in the Human Being** • Understanding Value Education • Self-exploration as the Process for Value Education • Continuous Happiness and Prosperity - the Basic Human Aspirations and their fulfillment • Right Understanding, Relationship and Physical Facility • Happiness and Prosperity - Current Scenario • Method to Fulfill the Basic Human Aspirations • Harmony in the Human Being • Understanding Human being as the Co-existence of the Self and the Body • Distinguishing between the Needs of the Self and the Body • the Body as an instrument of the Self • Understanding Harmony in the Self • Harmony of the Self with the Body	10 Hrs

	• Programme to ensure self-regulation and Health.		
II	**HarmonyintheFamily and Society** • Harmony in the Family - the Basic Unit of Human Interaction "Trust' - the Foundational Value in Relationship • 'Respect' - as the Right Evaluation Values in Human-to-Human Relationship • Harmony in the Society • Other Feelings, Justice in Human-to-Human Relationship • Understanding Harmony in the Society • Vision for the Universal Human Order	10 Hrs	
III	**Harmony in the Nature (Existence) and Implications of the Holistic Understanding** • Understanding Harmony in the Nature • Interconnectedness, self-regulation, and Mutual Fulfillment among the Four Order of Nature • Realizing Existence as Co-existence at All Levels • The Holistic Perception of Harmony. Implications of the Holistic Understanding - a Look at Professional Ethics • Basis for Universal Human Values • Definitiveness of (Ethical) Human Conduct • Professional Ethics in the light of Right Understanding • A Basis for Humanistic Education, Humanistic Constitution and Universal Human Order • Holistic Technologies, Production Systems and Management Models, Typical Case Studies Strategies for Transition towards Value-based Life and Profession.	10 Hrs	

Reference Books:

1. P.L. Dhar, R.R. Gaur, "Science and Humanism", Vol. 1, 1st Edition, Commonwealth Publishers.
2. Nagaraj, "Jeevan Vidya: EkPariehaya", Vol. 1, Latest Edition, Jeevan VidyaPrakashan, Amarkantak, 1999.
3. A.N. Tripathy, "Human Values", Vol. 1, Latest Edition, New Age International Publishers, 2003.
4. E.G. Seebauer, Robert L. Berry, "Fundamentals of Ethics for Scientists & Engineers", Vol. 1, 1st Edition, Oxford University Press.
5. M. Govindrajan, S. Natrajan, V.S. Senthil Kumar, "Engineering Ethics and Human Values", Vol. 1, 1st Edition, Prentice Hall of India Ltd.
6. B.P. Banerjee, "Foundations of Ethics and Management", Vol. 1, Latest Edition, Excel Books, 2005.
7. B.L. Bajpai, "Indian Ethos and Modern Management", Vol. 1, Reprinted Edition, New Royal Book Co., Lucknow, 2008.

E-resources:

1. http://madhyasth-darshan.info/postulations/knowledge/knowledge-of-humane-conduct/
2. https://www.youtube.com/channel/UCQxWr5QB_eZUnwxSwxXEkQw
3. https://youtu.be/OgdNx0X9231
4. https://fdp-si.aicte-india.org/UHV-II%20Practice%20Sessions.php
5. https:/lfdp-si.aicte-india.org/download.php#1/

<table>
<tr><td colspan="3" align="center">**Course Code: VECT-I**
Course: Environmental Studies
(Semester III/ IV)</td></tr>
</table>

Total Credits: 2

Contact Hours Theory: 02 Hrs./week,   **Total Contact Hours:** 30 hrs

Maximum Marks: 50

Prerequisites:

Understanding of the Concept of Environment

Learning Objectives of the Course:
1. To study the environment and ecosystems.
2. To study different types of natural resources.
3. Knowledge and concept of biodiversity and its conservation.
4. Basic knowledge and concept of causes, effects, and control of different types of Environmental pollution.
5. To study population growth and its impact on the environment

Course Outcomes (COs) :

After completion of the course, students will be able to -
- Define key environmental terms and concepts (e.g., ecosystem, biodiversity, pollution).
- Explain the causes and effects of major environmental problems.
- Apply environmental principles to analyze real-world scenarios.
- Differentiate between various types of pollution and their impacts.

Unit No.	Topics / actual contents of the syllabus	Contact Hours
I	**Introduction to environmental studies and natural resources:** Definition, scope and Importance and need for public awareness. Natural resources: Forest resources: Use and over-exploitation, deforestation. Timber extraction. Water resources: Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dam's benefits and problems. Mineral resources: Use and exploitation, environmental effects of extracting and using Mineral resources Food, energy, and land resources: Food resources: world food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems water logging, salinity. Energy resources: Growing energy needs, renewable and non-renewable energy sources, and use of alternate energy sources. Land resources: Land as a resource, land degradation, man-induced landslides, soil erosion, and desertification.	10 Hrs
II	**Ecosystems and Biodiversity and its conservation** **Ecosystems:** Concept of an ecosystem. Structure and function of an ecosystem. Producers, consumers, and decomposers. Energy flow in the ecosystem. Ecological succession. Food chains, food webs, and ecological pyramids. Introduction, types, characteristic features, structure, and function of the following ecosystems: Forest ecosystem, Grassland ecosystem, Desert ecosystem, and Aquatic ecosystems (ponds, streams, lakes, rivers, Oceans, estuaries) **Biodiversity and its conservation:** Introduction Definition: genetic, species, and Ecosystem diversity. Bio geographical classification of India. Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts. Endangered and endemic species of India Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity	10 Hrs
III	**Environmental Pollution and Social issues and the Environment** Environmental Pollution: Definition, Cause, effects, and control measures of Air pollution,	10 Hrs

Water pollution, Soil pollution, Marine pollution, Noise pollution, Thermal pollution, nuclear hazards, Role of an individual in the prevention of pollution.

Social issues and the Environment: From Unsustainable to sustainable development Urban problems related to energy. Climate change, global warming, acid rain, ozone layer depletion Environment Protection Act. Public awareness.

Reference Books:

1. Agarwal K.C., "Environmental Biology", Vol. 1, Latest Edition, Nidi Puhl Ltd., Bikaner, 2001.
2. Bharucha Erach, "The Biodiversity of India", Vol. 1, First Edition, Mapin Publishing Pvt. Ltd., Ahmedabad.
3. Heywood V.H., Waston, "Global Biodiversity Assessment", Vol. 1, Latest Edition, Cambridge University Press, 1995.
4. Jadhav H., Bhosale V.M., "Environmental Protection and Laws", Vol. 1, First Edition, Himalaya Publishing House, Delhi.
5. Odum E.P., "Fundamentals of Ecology", Vol. 1, First Edition, W.B. Saunders Co., USA.
6. Miller T.G. Jr., "Environmental Science", Vol. 1, First Edition, Wadsworth Publishing Co.

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<tr><td colspan="2">
<div align="center">
Course Code: FP-I
(Semester III)
Course Title: Field Project
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</td></tr>
</table>

Total Credits: 2

Maximum Marks: 50   **Total Contact Hours:** 4 Hrs/week ;   60 Hrs / Semester

Prerequisites: Basic knowledge of Computer Science engineering principles, exposure to technical writing and research methods

Learning Objectives of the Course:
1. To enable students to identify a relevant Computer Science engineering problem.
2. To conduct a comprehensive literature survey using authentic research sources.
3. To formulate a well-defined problem statement.
4. To understand and define project objectives, scope, methodology, and expected outcomes.
5. To develop a strategic plan and timeline for execution in field project.

Course Outcomes (COs) :

After completion of the course, students will be able to -
1. Identify a relevant and feasible Computer Science engineering problem through field interaction, experimentation, or simulation.
2. Conduct a comprehensive literature review to establish the state of the art in the chosen domain.
3. Formulate a clear and specific problem statement with well-defined objectives and scope.
4. Choose appropriate tools and methodologies suited to the project requirements.
5. Develop a comprehensive project execution plan including resource allocation and risk mitigation.
6. Prepare and present effective interim and final project reports, demonstrating clarity of thought and technical writing skills.

Unit No.	Topics / actual contents of the syllabus	Contact Hours
I	**Introduction to Engineering Research** Nature and scope of research in mechanical engineering Types of projects (Experimental, Computational, Design-based, Review, Industrial)Case studies of past projects **Identifying the Problem Statement** How to select a relevant and feasible problem Techniques for problem identification (e.g., field visits, industry interaction, lab experimentation, simulation need)Problem relevance and innovation **Literature Survey** Understanding scholarly sources (journals, conference proceedings, patents)How to read, analyze, and summarize research papers Using databases: Google Scholar, ScienceDirect, IEEE Xplore, ASME Digital LibraryTools: Reference managers (Zotero, Mendeley)	20 Hrs
II	**Problem Statement Formulation** Structuring a strong and specific problem statement Defining objectives and scope Identifying research gaps Setting measurable goals and expected outcomes **Strategy & Methodology Planning** Overview of research and design methodologies (experimental, analytical, simulation) Tool selection and planning, Resource planning: Materials, lab access, software, Risk assessment and	20 Hrs

		mitigation strategies	
III		**Project Planning & Timeline Development** Work breakdown structure (WBS) Gantt chart preparation Milestones and deliverables Roles and responsibilities in team projects **Interim Reviews and Final Reporting** Presentation of problem statement, literature review, and methodology Interim report preparation Peer and faculty feedback	**20 Hrs**

Deliverables:
- Problem Identification Report
- Literature Review Summary
- Finalized Problem Statement with Objectives and Scope
- Methodology and Strategy Document
- Timeline (Gantt Chart or similar)
- Final Project Phase-I Report and Presentation

Honors Degree Course

Please note that this course   is optional and specifically designed for students pursuing a Bachelor's Degree   Honors with Multidisciplinary Minor. Only those students who have secured a minimum of 7.5 CGPA (equivalent to 75% marks) in their first year will be eligible to opt for this option

Course Code: HT-1

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Course Code: HT-1

(Semester III)

Course Title: Computer Architecture and Organization

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Total Credits: 3

Maximum Marks: 100   **Total Contact Hours:** 3 Hrs/week ;   **45Hrs / Semester**

Prerequisites: Basic knowledge of Digital Logic Circuits.
Understanding of Binary Number Systems and Logic Gates

Learning Objectives of the Course:

- To understand the structure, function, and characteristics of computer systems.
- To study the organization of basic components and their interactions.
- To analyze CPU, memory, and I/O architectures and their performance.

Course Outcomes (COs) :

- CO1 -Understand the basics of computer architecture and organization.

- CO2 -Analyze the design and functioning of CPU, control unit, and instruction set.

- CO3 -Explain memory hierarchy, cache organization, and virtual memory concepts.

- CO4 -Describe input/output systems and bus structures.

- CO5 -Evaluate performance factors and modern architectural trends.

7.

Unit No.	Topics / actual contents of the syllabus	Contact Hours
I	**Basic Computer Organization and Instruction Set Architecture** - Introduction to Computer Organization and Architecture - Functional Units, Basic Operational Concepts - Instruction Set Architecture: Types of Instructions (Data Transfer, Arithmetic, Logical, Branch) - Instruction Cycle: Fetch, Decode, Execute - Addressing Modes: Immediate, Direct, Indirect, Indexed, Register Addressing)	15Hrs
II	**Central Processing Unit (CPU) and Control Unit** - CPU Design: Hardwired vs Microprogrammed Control - ALU Design: Arithmetic and Logical Operations - Control Unit Organization - Pipelining Concepts: Basic pipeline processing, pipeline hazards - RISC vs CISC Architectures (Comparison)	15Hrs
III	**Memory Organization and I/O Systems** - Memory Hierarchy: Registers, Cache, Main Memory, Secondary Storage - Cache Memory: Mapping Techniques (Direct, Associative, Set-Associative) - Virtual Memory: Paging and Segmentation - I/O Organization: Interrupts, DMA, I/O Interfaces (Programmed I/O, Interrupt-Driven I/O) - Buses and Bus Architectures (PCI, USB)	15Hrs

Textbooks / Reference Books :

1 Computer Organization and Architecture: Designing for Performance William Stallings Pearson Latest

2 Computer Architecture and Organization John P. Hayes McGraw Hill Latest

3 Computer Organization Carl Hamacher, ZvonkoVranesic, SafwatZaky McGraw Hill Latest

4 Structured Computer Organization Andrew S. Tanenbaum Pearson

5 Computer System Architecture M. Morris Mano Pearson Latest

Double Minor Course

Please note that this course is optional and specifically designed for students pursuing a Bachelor's Degree with Double Minor. Only those students who have secured a minimum of 7.5 CGPA (equivalent to 75% marks) in their first year will be eligible to opt for this option.

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Course Code: DMT-I
(Semester III)
Course Title: Programming Languages
(This course will be available for the students from other discipline and Computer Science Engineering / Computer Science students will choose double minor course from other discipline)

</div>

Total Credits: 3
Maximum Marks: 100   **Total Contact Hours:** 3 Hrs/week ;   **45Hrs / Semester**

- **Prerequisites:** Good knowledge of any programming language (C, C++, Java). Familiarity with data structures and control statements.

Learning Objectives of the Course:
- Study the evolution, features, and paradigms of programming languages.
- Understand language design concepts: syntax, semantics, control structures, and data types.
- Explore major programming paradigms: procedural, object-oriented, functional, and logical programming.

Course Outcomes (COs) :
CO1 Understand the evolution and concepts behind programming languages
CO2 Analyze language syntax, semantics, binding, and data types
CO3 Describe different programming paradigms and their significance
CO4 Compare and contrast languages based on control structures and paradigms
CO5 Apply language principles to select appropriate languages for specific problems

Unit No.	Topics / actual contents of the syllabus	Contact Hours
I	**Introduction to Programming Languages** - History and Evolution of Programming Languages - Criteria for Language Design (Readability, Writability, Reliability) - Overview of Programming Domains (Scientific, Business, AI, Systems Programming) - Syntax and Semantics: Language Structure, Grammar, Parsing Techniques (BNF, Parse Trees) - Names, Binding, Scope, Lifetime of Variables	15Hrs
II	**Language Constructs and Data Types** - Data Types: Primitive, Composite, Abstract Types, Type Checking, Type Conversion - Control Flow: Conditional Statements, Loops, Recursion, Exception Handling - Subprograms: Procedures, Functions, Parameter Passing Methods (by value, reference, name) - Storage Management: Static, Stack-based, Heap-based Storage - Concepts of Concurrency: Threads, Synchronization Basics	15Hrs
III	**Programming Paradigms and Comparative Study** - Procedural Programming Concepts (C, Pascal) - Object-Oriented Programming (Classes, Inheritance, Polymorphism – Java/C++) - Functional Programming (Higher-Order Functions, Lambda Calculus, Example: LISP, Haskell) - Logic Programming (Facts, Rules, Queries – PROLOG Basics) - Comparative Evaluation: C vs Java vs Python vs Prolog vs LISP	15Hrs

Textbooks / Reference Books

1 Concepts of Programming Languages Robert W. Sebesta Pearson Education Latest

2 Programming Language Pragmatics Michael L. Scott Morgan Kaufmann Latest

3 Programming Languages: Design and Implementation Terrence W. Pratt, Marvin V. Zelkowitz

Syllabus of 4th Semester of
B.E./B.Tech (Computer Science and Engineering/ Computer Science/Computer Engineering)

4 Foundations of Programming Languages Kent D. Lee Springer Latest

5 Programming Languages: Principles and Paradigms Allen B. Tucker, Robert E. Noonan

<table>
<tr><td colspan="3" align="center">Course Code: PCCT 1
(Semester IV)
Course Title: Operating System</td></tr>
<tr><td colspan="3">Total Credits: 3
Maximum Marks: 100   Total Contact Hours: 3 Hrs/week ;   45Hrs / Semester</td></tr>
</table>

Prerequisites: Operating System
Learning Objectives of the Course:
1. Understanding of data structures
2. Knowledge of basic computer and hardware components
3. Programming skills in C

Course Outcomes (COs) :
CO1 Differentiate between multiprocessing, multiprogramming and multitasking
CO2 Differentiate between program, process and threads
CO3 Apply segmentation and paging techniques
CO4 Compare file naming system in Windows and Linux
CO5 Comparing structure of file in various OS

Unit No.	Topics / actual contents of the syllabus	Contact Hours
I	Operating System as an extended machine, OS as a resource manager. History of **operating system**: Generations- batch system, multiprogramming, time sharing,multitasking, distributed, handheld computer system, embedded OS, real time OS and smartOS. Computer hardware review. OS concepts, Operating system structure: monolithic, layered systems, microkernel, client server models,virtual machines, exokernels, mainframe OS. System calls.Comparison of Linux, Windows, **Processes:** Process Model, Process creation/termination, Hierarchies, process states (two state,five state), Implementation of process. THREAD: process and thread, thread functionality,user level and kernel level threads. Interprocess Communication: race condition, critical regions, mutual exclusion with busywaiting, sleep and wakeup, Producer consumer problem, semaphore, message passing,MonitorsClassical IPC Problem: Dining philosopher problems, Readers and writers' problems.	15Hrs
II	**Files:** File Naming, File Types, Access, File operations, Directories: Types, Operations. File System Implementation: Layout, Implementation Files and directories. File system management: Disk space management, File system consistency.Comparison of Linux and windows file systems **Memory management** Memory management strategies: Basic Hardware, Address binding, Logical vs PhysicalAddress space, Swapping, contiguous memory allocation.Memory partitioning: fixed, dynamic partitioning, buddy system reallocation, fragmentation.Managing free memory: memory management with bitmap, linked list. Virtual memory: demand paging, page replacement algorithms- options, FIFO, LRU,allocations of frames, thrashing and working set models. Paging: Basic method, hardware support, structure of page table. Segmentation: Basic method, hardware	15Hrs

		Device management: Principles of I/O hardware: I/O device controllers, Principles of I/O software. I/O software layers Disk: disk hardware-magnetic disk, RAID, CDs, DVDs, Disk formatting, disk schedulingalgorithms, clocks	
III		Deadlock: Introduction to deadlocks: Resources- Types and resource acquisition. Conditions for resourcedeadlock, Deadlock Modelling. Deadlock detection and recovery with one resource and multiple resources.Deadlock avoidance:- Resource trajectories, safe & unsafe states, bankers algorithm for single and multiple resources, Deadlock Prevention. Case study: Linux OS and Android OS	15Hrs

Textbooks / Reference Books

		Sr. No.	Title	Author	Publication	Edition	
Textbooks / Reference Books		1.	*Modern Operating System*	Andrew S. Tanenbaum	Prentice Hall Publication	3rd edition	
		2.	Operating Systems Concepts	Peter Galvin	John Wiley sons	8th Edition	

	Faculty of Science & Technology	
	Syllabus of S. Y. B.E .(Computer Science, Computer Science and Engineering) (Semester IV)	

<table>
<tr><td colspan="3">Course Code: PCCP-1
(Semester IV)
Course: Lab. Operating System</td></tr>
<tr><td colspan="3">Total Credits : 01   Total Contact Hours : 2 Hrs/week ;   30 Hrs / Semester
Maximum Marks : 50</td></tr>
<tr><td>Objectives</td><td colspan="2">1. To study Linux OS

2. Implement different concepts of OS</td></tr>
<tr><td>List Of Experiments</td><td>1.Study of Basic Linux commands
2. Illustration of shell scripts
3. Write a program in C to implement FCFS
4.Write a program in C to implement Semaphore
5. Write a program in C for file handling
6. Write a program in C for Banker's algorithm
7 Write a program in C to implement paging technique of memory management
8. Write a program in C to implement disk scheduling algorithm
9. Write a program in C to implement producer consumer problem
10. Study of Linux OS and Android OS</td><td>30Hrs</td></tr>
</table>

	Course Code: PCCT-2 **(Semester IV)** **Course Title: Probability and Statistics**		
Total Credits: 2 **Maximum Marks:** 50		**Total Contact Hours:** 2 Hrs/week ;	**30Hrs / Semester**

- **Prerequisites:** Simplifying expressions, solving equations and inequalities

.

Learning Objectives of the Course:

1. To develop basic of statistics, probability and random variables.

2. The primary objective of this course is to provide mathematical background and sufficient experience so that the student can read, write, and understand sentences in the language of probability theory, as well as solve probabilistic problems in engineering and applied science .

Course Outcomes (COs) :

CO1: Develop a strong understanding of fundamental probability concepts and standard probability distributions that model real-life phenomena.

CO2: Grasp the basic principles of one-dimensional and two-dimensional random variables and apply these concepts to solve engineering problems.

CO3: Apply the theory of random processes to various engineering disciplines for modeling and analysis.

CO4: Use the concepts of correlation functions and spectral densities in practical applications.

CO5: Gain exposure to multiple types of distribution functions and build skills in handling multivariable situations; analyze the response of linear time-invariant (LTI) systems to random inputs

Unit No.	Topics / actual contents of the syllabus	Contact Hours
I	**Probability Theory** Definition of probability: classical, empirical and axiomatic approach of probability, Addition theorem of probability, Multiplication theorem of probability, Bayes' theorem of inverse probability, Properties of probabilities with proofs, Examples **Random Variable and Mathematical Expectation** Random variables, Probability distributions, Probability mass function, Probability density function, Mathematical expectation, Join and marginal probability distributions, Properties of expectation and variance with proofs. Theoretical Probability Distributions : Binomial distribution, Poisson distribution, Normal distribution, Fitting of binomial distributions, Properties of binomial, Poisson and normal distributions, Relation between binomial and normal distributions, Relation between Poisson and normal distributions, Importance of normal distribution, Examples.	10Hrs
II	**Correlation** Introduction, Types of correlation, Correlation and causation, Methods of studying correlation, Karl Pearson's correlation coefficient, Spearman's rank correlation, Coefficient, Properties of Karl Pearson's correlation coefficient and Spearman's rank correlation coefficient, Probable errors **Linear Regression Analysis** Introduction, Linear and non-linear regression, Lines of regression, Derivation of regression lines of y on x and x on y, Angle between the regression lines, Coefficients of regression, Theorems on regression coefficient, Properties of regression coefficient.	10Hrs

III	**Estimation** Estimation, Large Sample Estimation of a Population Mean, Small Sample Estimation of a Population Mean, Large Sample Estimation of a Population Proportion, Sample Size Considerations **Hypothesis** Testing Hypotheses, The Elements of Hypothesis Testing, Large Sample Tests for a Population Mean, The Observed Significance of a Test, Small Sample Tests for a Population Mean, Large Sample Tests for a Population Proportion	10Hrs

TextBooks(If Any):

1. S. C. Gupta, Fundamentals of Statistics, Himalaya Publishing House, 7th Revied and Enlarged Edition, 2016.

ReferenceBooks:

1. G. V. Kumbhojkar, Probability and Random Processes, C. Jamnadas and Co., 14th Edition, 2010.

2. Erwin Kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.

3. G. Haribaskaran, Probability, Queuing Theory and Reliability Engineering, Laxmi Publications,2nd Edition, 2009.

4. Murray Spiegel, John Schiller, R. ALU Srinivasan, Probability and Statistics, Schaum's Outlines,4th Edition, 2013.

	Course Code: PCCP-2 **(Semester IV)** **Course: Lab. Probability and Statistics**	
Total Credits : 01 **Maximum Marks : 50**	**Total Contact Hours :** 2 Hrs/week ;	**30 Hrs / Semester**

| | **Learning Objectives of the Course:**

1.To reinforce theoretical concepts of probability and statistics through practical applications.
2.To familiarize students with statistical computing tools such as Python, R, or spreadsheet software.
3.To develop skills in data analysis, interpretation, and simulation relevant to engineering and research.
Course Outcomes (COs):
After completion of the course, students will be able to:
CO1: Apply statistical methods for data analysis and interpretation. CO2: Perform simulations of probability distributions and random processes. CO3: Use computational tools to solve problems involving correlation, regression, and hypothesis testing. CO4: Fit real-life data to theoretical probability models and draw inferences. CO5: Apply statistical reasoning in decision-making based on data analysis. 1. | |
| **List Of**

Experiments | 1. Basic Data Analysis using Python/R/Excel
Mean, median, mode, standard deviation, variance
2. Simulation of Probability Distributions
Uniform, Binomial, Poisson, Normal (plotting PDFs and CDFs)
3. Verification of Addition and Multiplication Theorems of Probability
4. Random Variable Analysis
Discrete vs continuous; PMF and PDF visualization
5. Joint Probability Distribution and Marginal Distributions
6.Correlation Analysis
Pearson and Spearman methods with interpretation
7. Linear Regression
Fitting and interpreting regression lines
8. Hypothesis Testing
Z-test and t-test (single mean and difference of means)
9. Estimation Techniques
Point and interval estimation of population mean 10Case Study / Mini Project | **30Hrs** |

<table>
<tr><td colspan="4" align="center">**Course Code: PCCT-3**
(Semester IV)
Course Title: Computer Network</td></tr>
<tr><td colspan="4">**Total Credits:** 2
Maximum Marks: 50   **Total Contact Hours:**2 Hrs/week ;   **30Hrs / Semester**</td></tr>
</table>

Prerequisites: Computer Network
Learning Objectives of the Course:
    1. To introduce fundamental concepts and models in computer networking.
    2. To understand layered architecture and protocols at each layer.
    3. To design and analyze network addressing and routing strategies.
4. To explore modern network tools and simulations for real-time understanding
Course Outcomes (COs) :
CO1 Explain the basic concepts, architectures, and types of computer networks
CO2 Compare and contrast OSI and TCP/IP models and analyze layer-wise operations
CO3 Apply IP addressing, subnetting, and routing algorithms in network design
CO4 Evaluate transport and application layer protocols for data communication
CO5 Use simulation tools (e.g., Packet Tracer) to configure and troubleshoot networks

Unit No.	Topics / actual contents of the syllabus	Contact Hours
I	**Introduction to Networks:** Definition, types (LAN, WAN, MAN), topology, protocols, standards, network devices.**(6Hrs)** **Layered Architecture:** OSI and TCP/IP models – functions of each layer.**(4Hrs)**	10Hrs
II	**Data Link Layer:** Framing, error control, CRC, flow control, MAC – ALOHA, CSMA/CD, Ethernet.**(5Hrs)** **Network Layer:** IPv4/IPv6 addressing, subnetting, CIDR, routing algorithms (RIP, OSPF, Link State, Distance Vector).**(5Hrs)**	10Hrs
III	**Transport Layer:** TCP, UDP, congestion and flow control, socket programming basics.**(5Hrs)** **Application Layer & Security:** DNS, HTTP, FTP, SMTP; Basics of encryption, firewalls, IDS.**(5Hrs)**	10Hrs

	Sr. No.	Title	Author	Publication	Edition
Textbooks / Reference Books	1.	*Data Communications and Networking,* McGraw-Hill	Behrouz A. Forouzan	McGraw-Hill Education	**Fifth Edition** (2012)
	2.	*Computer Networks,* Pearson	Andrew S. Tanenbaum	Pearson Education	**Fifth Edition** (2010)

		3.	*Computer Networking: A Top-Down Approach,* Pearson	James Kurose & Keith Ross	Pearson Education	**Seventh Edition** (2017)
		4.	*Computer Networks: A Systems Approach*	Larry L. Peterson & Bruce S. Davie	Morgan Kaufmann (an imprint of Elsevier)	**Fifth Edition** (2011)

Faculty of Science & Technology Syllabus of S. Y. B.E.(Computer Science, Computer Science and Engineering) (Semester IV)		
Course Code: PCCP-3 **(Semester IV)** **Course: Lab. Computer Network**		
Total Credits : 01 Maximum Marks : 50	Total Contact Hours : 2 Hrs/week ;	30 Hrs / Semester
	1. To study Network 2. Implement different concepts of Computer Network	
List Of Experiments	**Sr. No. Lab Experiments** 1 Study and classification of LAN, WAN, and MAN. 2 Network topology design and cable creation (straight/crossover). 3 IP addressing and subnetting. 4 Configuration of routers and switches using Packet Tracer. 5 Implementation of static routing and RIP. 6 Use of ping and traceroute commands for network testing. 7 TCP/UDP packet analysis using Wireshark. 8 Simulation of DHCP, DNS, HTTP in Packet Tracer. 9 File transfer simulation using FTP. 10 Mini project: Design and troubleshoot a small office network.	**30Hrs**

Course Code: MDMT-2
(Semester IV)
Course Title: Computer Algorithms
(This course will be available for the students from other discipline and Computer Science and Engineering/ Computer Science Engineering students will choose minor course from other discipline)

Total Credits: 2
Maximum Marks: 50   **Total Contact Hours:** 2 Hrs/week ;   **30Hrs / Semester**

Prerequisites: Computer Network
Learning Objectives of the Course:
- 1Good understanding of Data Structures (Stacks, Queues, Trees, Graphs).
- Programming skills in C/C++/Python.

Course Outcomes (COs) :
CO1 Analyze the complexity (time and space) of algorithms
CO2 Apply divide-and-conquer strategy for solving problems
CO3 Apply greedy strategy to solve optimization problems
CO4 Develop solutions using dynamic programming approach
CO5 Understand and analyze basic graph algorithms.

Unit No.	Topics / actual contents of the syllabus	Contact Hours
I	**Introduction to Algorithms and Complexity Analysis** - Algorithm Definition, Characteristics - Performance Analysis: Space Complexity, Time Complexity - Asymptotic Notations: Big-O, Omega, Theta - Recurrences and Solving Recurrences (Substitution method, Recursion-tree method)	10Hrs
II	**Divide and Conquer and Greedy Method** - Divide and Conquer: Binary Search, Merge Sort, Quick Sort - Greedy Algorithms: Activity Selection Problem, Fractional Knapsack, Huffman Encoding - Properties of Greedy Algorithms (Greedy Choice Property, Optimal Substructure)	10Hrs
III	**Dynamic Programming and Graph Algorithms** - Dynamic Programming: Matrix Chain Multiplication, 0/1 Knapsack, Longest Common Subsequence (LCS) - Basic Graph Algorithms: Breadth-First Search (BFS), Depth-First Search (DFS) - Introduction to Minimum Spanning Trees (Kruskal's Algorithm Basics)	10Hrs

Textbooks / Reference Books

Sr. No.	Title	Author	Publisher	Edition
1	Introduction to Algorithms	Cormen, Leiserson, Rivest, Stein	MIT Press	Latest
2	Design and Analysis of Algorithms	S. Sridhar	Oxford University Press	Latest
3	Algorithm Design	Jon Kleinberg, ÉvaTardos	Pearson	Latest
4	Computer Algorithms	Horowitz, Sahni, Rajasekaran	Universities Press	Latest
5	Fundamentals of Computer Algorithms	Ellis Horowitz, SartajSahni	Galgotia Publications	Latest

Course Code:VSECT-2

Course Code:VSECT-2
(Semester IV)
Course Title: Web Technologies (Lab Course)

Total Credits: 2
Maximum Marks: 50   **Total Contact Hours:**4 Hrs/week ;   **60Hrs / Semester**

Prerequisites: Basic Programming Knowledge (C, Python)
Basic Internet Concepts (WWW, Web Browsers)
Learning Objectives of the Course:
- Understand web architecture and protocols.
- Develop static and dynamic websites.
- Learn client-server communication basics and responsive design.

Course Outcomes (COs) :
CO1 Explain web architecture, protocols and basics of Internet
CO2 Develop static web pages using HTML and CSS.
CO3 Create dynamic behavior on web pages using JavaScript.
CO4 Understand basic concepts of server-side scripting and web hosting.
CO5 Apply responsive design principles with modern frameworks

Unit No.	Topics / actual contents of the syllabus	Contact Hours
I	**Introduction to Web Technologies** - Internet Basics, WWW, Web Browsers, Servers, URL, HTTP/HTTPS Protocols - Web Architecture: Client-Server Model **HTML5**: Structure of HTML page, Elements, Attributes, Forms, Tables, Lists, Multimedia elements (audio/video), Semantic Tags (header, footer, article, section)	20Hrs
II	**SS3 and JavaScript Essentials** **CSS3**: Syntax, Selectors, Box Model, Positioning (relative, absolute, fixed), Layouts using Flexbox and Grid, Responsive Design (Media Queries) **JavaScript**: Introduction, Variables, Data types, Operators, Control Structures (if, loops), Functions, Events, Basic DOM Manipulation (GetElementById, InnerHTML)	20Hrs
III	**Advanced Web Concepts and Hosting** - Introduction to Client-side and Server-side Scripting - Overview of Server-side scripting languages (PHP/Node.js) - Web Hosting Basics: Domain Names, Hosting, FTP - Introduction to Front-End Frameworks: Bootstrap Basics (grid system, forms, buttons, navbar) Mini project discussion: Static/Dynamic Web Page Design	20Hrs

Reference Books:

1 HTML and CSS: Design and Build Websites Jon Duckett Wiley Latest

2 Web Technologies AchyutGodbole, AtulKahate McGraw Hill Latest

3 Learning Web Design Jennifer Robbins O'Reilly Latest

Course Code: AEC-2
(Semester IV)
Course: Modern Indian Languages

Total Credits: 2
Maximum Marks: 50   **Total Contact Hours:** 2 Hrs/week ; 30Hrs / Semester

Basket of Modern Indian Languages is available on University Website

Direct link for syllabus:

http://www.bamu.ac.in/Portals/0/nep-common-AEC-course-sem-I-24-25.pdf

Or
Visit
http://www.bamu.ac.in/NEP-Curriculum.aspx#2024

Entrepreneurship/Economics/Management Courses

Students will have to choose any one theory course form the following Basket. Any One course in 3rd semester and another course in 4th semester

1) Engineering Economics (EEM-I)

2) Entrepreneurship Development (EEM-II)

3) Industrial Management (EEM-III)

Course Code: EEM-I **(Semester III/ IV)** **Course: Engineering Economics**	

Total Credits: 2

Maximum Marks: 50	**Total Contact Hours:** 2 Hrs/week ; 30Hrs / Semester

Learning Objectives of the Course:
7. Understand the Time Value of Money
8. Evaluate Engineering Alternatives
9. Analyze Public Sector Projects
10. Understand and Apply Depreciation and Taxation
11. Perform Break-even and Sensitivity Analysis
12. Understand Cost Concepts for Decision-Making

Course Outcomes (COs) :
After completion of the course, students will be able to -
6. To evaluate Time Value of Money
7. To enable students to perform economic comparisons between different projects or assets
8. To introduce benefit-cost analysis for evaluating the economic feasibility of projects
9. To apply break-even analysis using both linear and non-linear models
10. To develop skills in cost estimation, cost control, cost reduction, and identify relevant costs for decision-making.

Unit No.	Topics / actual contents of the syllabus	Contact Hours
I	**Time value of money:** Simple and compound interest, Time value equivalence, Compound interest factors, Cash flow diagrams, Calculation, Calculation of time –value equivalences. Present worth comparisons, Comparisons of assets with equal, unequal and infite lives, comparison of deferred investments, Future worth comparison, payback period comparison.	10 Hrs
II	Use and situations for equivalent annual worth comparison, Comparison of assets of equal and unequal life. Rate of return, Internal rate of return, comparison of IIR with other methods, IRR misconceptions. Analysis of public Projects: Benefit/ Cost analysis, quantification of project, cost and benefits, benefit/ cost applications, Cost effectiveness analysis.	10 Hrs
III	**Depreciation**, Computing depreciation charges, after tax economic comparison, Break-even analysis; linear and non-linear models. Sensitivity analysis: single	10 Hrs

	and multiple parameter sensitivity. **Fixed and variable cost,** Product and Process Costing, Standard Costing, Cost estimation, Relevant Cost for decision making, Cost estimation, Cost control and Cost reduction Techniques.	

Reference Books:

8. Riggs, J.L., Dedworth, Bedworth, D.B., Randhawa, S.U., "Engineering Economics", Vol. 1, Latest Edition, McGraw Hill International, 1996.
9. James L. Riggs, David D. Bedworth, Sabah U. Randhawa, "Economics for Engineers", Vol. 1, 4th Edition, McGraw-Hill, 2004.
10. Donald Newnan, Ted Eschembach, Jerome Lavelle, "Engineering Economic Analysis", Vol. 1, 8th Edition, Oxford University Press, 2012.
11. John A. White, Kenneth E. Case, David B. Pratt, "Principles of Engineering Economic Analysis", Vol. 1, 6th Edition, John Wiley, 2010.
12. R. Paneerseelvam, "Engineering Economics", Vol. 1, 2nd Edition, PHI, 2008.
13. Michael R. Lindeburg, "Engineering Economics Analysis", Vol. 1, Latest Edition, Professional Publications, 1993.
14. V. Mote, S. Paul, G. Gupta, "Managerial Economics", Vol. 1, Latest Edition, Tata McGraw Hill, 2004.

Course Code: EEM-II	
(Semester III/ IV)	

Course: Entrepreneurship Development
Total Credits: 2
Maximum Marks: 50   **Total Contact Hours:**2 Hrs/week ;   30Hrs / Semester

Learning Objectives of the Course:
4. Understand the fundamentals of entrepreneurship and its significance in engineering.
5. Identify business opportunities and develop innovative ideas.
6. Create a basic business plan and understand key entrepreneurial strategies.

Course Outcomes (COs) :
After completion of the course, students will be able to -
6. Explain the concept of entrepreneurship and its importance in the modern economy.
7. Identify and evaluate business opportunities in engineering and technology sectors.
8. Develop a comprehensive business plan including financial, operational, and marketing strategies.
9. Assess the challenges and risks in entrepreneurship and develop strategies to mitigate them.
10. Demonstrate entrepreneurial thinking through case studies, projects, and presentations.

Unit No.	Topics / actual contents of the syllabus	Contact Hours
I	**Introduction to Entrepreneurship** Definition, meaning, and characteristics of an entrepreneur, Evolution of entrepreneurship Types of entrepreneurs, Role of entrepreneurship in economic development, Key traits of successful entrepreneurs.	10 Hrs
II	**Opportunity Recognition and Idea Generation** Identifying business opportunities, Creativity and innovation in entrepreneurship, Techniques for idea generation, Feasibility analysis (technical, market, financial).	10 Hrs
III	**Business Planning** Components of a business plan, Business models and strategy formulation, Legal requirements for starting a business, Intellectual Property Rights (IPR) and patents.	10 Hrs

Reference Books:
5. C.B. Gupta, Srinivasan, "Entrepreneurship Development", Vol. 1, Latest Edition, Sultan Chand & Sons, 2020.
6. Donald F. Kuratko, "Entrepreneurship: Theory, Process, Practice", Vol. 1, Latest Edition, Cengage, Eric Ries, "The Lean Startup", Vol. 1, Latest Edition, Anonymous, 2011.
7. Alexander Osterwalder, Yves Pigneu, "Business Model Generation", Vol. 1, Latest Edition, Wiley, 2011.
8. Peter F. Drucker, "Innovation and Entrepreneurship", Vol. 1, Latest Edition, Taylor & Francis, 2014.

<table>
<tr><td colspan="3" align="center">**Course Code: EEM-III**
(Semester III/ IV)
Course: Industrial management</td></tr>
<tr><td colspan="3">**Total Credits:** 2
Maximum Marks: 50   **Total Contact Hours:** 2 Hrs/week ;   30Hrs / Semester</td></tr>
</table>

Learning Objectives of the Course:
2. To understand concept of management, administration, Organization, Industrials Laws.

Course Outcomes (COs) :
After completion of the course, students will be able to -
6. Understand the fundamental principles of management.
7. Describe different forms of business organizations and organizational structures.
8. Apply theoretical knowledge to real-world management and organizational challenges.
9. Analyze the impact of organizational, environmental factors.
10. Explain the role of economics in management decision-making.

Unit No.	Topics / actual contents of the syllabus	Contact Hours
I	**Introduction to Management:** Managing and Manager, organizations and need for management, the managing process, types of managers, the challenge of management, the evolution of Management theory. **Management in the 21st century:** The importance of organizational and natural environment, elements of direct action environment, managing multiple stock holder relationship, elements of the indirect action environment, Natural Environment management 2000 and beyond, social responsibility and ethics, globalization. Evaluation of case studies related to above concept.	10 Hrs
II	**Business Organization** Forms of business organization, individual proprietorship, joint stock company, co-operative enterprise, co-operative enterprise and public sector undertakings. Organization structure in industries, Line organization, functional organization, line and staff organization, committee organization, project organization matrix organization. **Nature and Significance of Economics.** Science, engineering and technology, their relationship with economic development. Basic economic concepts, human wants economic goods, utility value, price cost, wealth and capital. Demand supply, elasticity of demand and supply. Concept of profit and revenues.	10 Hrs
III	**Accidents and safety** Classification of accidents, according to nature of industries; i.e. fatal, temporary, according to event and place. Causes of accidents , psychological, and other industrial hazards. Effects of accidents. Accident-prone workers, accident to be taken incase of accidents with machines, electric shock, road accident fires and erection and construction accidents **Personnel Management:**	10 Hrs

| | Man power, sources of recruitment, selection and training, job evaluation, performance appraisal, wages and incentives, self and time management. | |

Reference Books:

6. James A. F., "Management", Vol. 1, 6th Edition, PHI.
7. Claude S. George, Jr., "Management for Business and Industry", Vol. 1, Revised Edition, Prentice-Hall of India Private Limited.
8. McConnell, Gupta, "Economics: Principles, Problems, and Policies", Vol. 1, 18th Edition, The McGraw-Hill.
9. T.R. Banga, S.C. Sharma, "Industrial Organisation and Engineering Economics", Vol. 1, Latest Edition, Khanna Publishers, Jan-2006.
10. O.P. Khanna, "Industrial Engineering & Management", Vol. 1, Latest Edition, Dhanpat Rai Publication, Jan-2018.

Value Education Courses (VEC)

Students will have to choose any one theory course form the following Basket. Any One course in 3rd semester and another course in 4th semester

1) Universal Human Values (VECT-I)

2) Environmental Students (VECT-II)

Course Code: VECT-2 **(Semester III/ IV)** **Course: Universal HumanValues**	
Total Credits: 2	
Maximum Marks: 50	**Total Contact Hours:** 2 Hrs/week ; 30Hrs / Semester

Learning Objectives of the Course:
4. To appreciate the essential complementarities between 'VALUES' and 'SKILLS' to ensure sustained happiness and prosperity, which are the core aspirations of all human beings,
5. To facilitate the development to a holistic perspective among students to lead their Personal and professional lives in an ethical way.
6. To highlight plausible implications of such a holistic understanding in terms of ethical human conduct, trustful and mutually fulfilling human behaviour, and mutually enriching interaction with nature.

Course Outcomes (COs) :
After completion of the course, students will be able to -
5. Define key terms related to human values.
6. Explain the concept of happiness as related to right understanding and relationship.
7. Apply the principles of right understanding in their daily interactions.
8. Analyze the impact of their values on their behaviour and decisions.

Unit No.	Topics / actual contents of the syllabus	Contact Hours
I	**Introduction to Value Education and Harmony in the Human Being** • Understanding Value Education • Self-exploration as the Process for Value Education • Continuous Happiness and Prosperity - the Basic Human Aspirations and their fulfillment • Right Understanding, Relationship and Physical Facility • Happiness and Prosperity - Current Scenario • Method to Fulfill the Basic Human Aspirations • Harmony in the Human Being • Understanding Human being as the Co-existence of the Self and the Body • Distinguishing between the Needs of the Self and the Body • the Body as an instrument of the Self • Understanding Harmony in the Self • Harmony of the Self with the Body • Programme to ensure self-regulation and Health.	10 Hrs

	Harmony in the Family and Society	
II	• Harmony in the Family - the Basic Unit of Human Interaction "Trust" - the Foundational Value in Relationship • 'Respect' - as the Right Evaluation Values in Human-to-Human Relationship • Harmony in the Society • Other Feelings, Justice in Human-to-Human Relationship • Understanding Harmony in the Society • Vision for the Universal Human Order	**10 Hrs**
III	**Harmony in the Nature (Existence) and Implications of the Holistic Understanding** • Understanding Harmony in the Nature • Interconnectedness, self-regulation, and Mutual Fulfillment among the Four Order of Nature • Realizing Existence as Co-existence at All Levels • The Holistic Perception of Harmony. Implications of the Holistic Understanding - a Look at Professional Ethics • Basis for Universal Human Values • Definitiveness of (Ethical) Human Conduct • Professional Ethics in the light of Right Understanding • A Basis for Humanistic Education, Humanistic Constitution and Universal Human Order • Holistic Technologies, Production Systems and Management Models, Typical Case Studies Strategies for Transition towards Value-based Life and Profession.	**10 Hrs**

Reference Books:

8. P.L. Dhar, R.R. Gaur, "Science and Humanism", Vol. 1, 1st Edition, Commonwealth Publishers.
9. Nagaraj, "Jeevan Vidya: EkPariehaya", Vol. 1, Latest Edition, Jeevan VidyaPrakashan, Amarkantak, 1999.
10. A.N. Tripathy, "Human Values", Vol. 1, Latest Edition, New Age International Publishers, 2003.
11. E.G. Seebauer, Robert L. Berry, "Fundamentals of Ethics for Scientists & Engineers", Vol. 1, 1st Edition, Oxford University Press.
12. M. Govindrajan, S. Natrajan, V.S. Senthil Kumar, "Engineering Ethics and Human Values", Vol. 1, 1st Edition, Prentice Hall of India Ltd.
13. B.P. Banerjee, "Foundations of Ethics and Management", Vol. 1, Latest Edition, Excel Books, 2005.
14. B.L. Bajpai, "Indian Ethos and Modern Management", Vol. 1, Reprinted Edition, New Royal Book Co., Lucknow, 2008.

E-resources:

6. http://madhyasth-darshan.info/postulations/knowledge/knowledge-of-humane-conduct/
7. https://www.youtube.com/channel/UCQxWr5QB_eZUnwxSwxXEkQw
8. https://youtu.be/OgdNx0X9231
9. https://fdp-si.aicte-india.org/UHV-II%20Practice%20Sessions.php
10. https:/Ifdp-si.aicte-india.org/download.php#1/

	Course Code: VECT-2 **(Semester III/ IV)** **Course: Environmental Studies**	
Total Credits: 2		
Maximum Marks: 50	**Total Contact Hours:** 2 Hrs/week ; 30Hrs / Semester	

Prerequisites:
Understanding of the Concept of Environment
Learning Objectives of the Course:
6. To study the environment and ecosystems.
7. To study different types of natural resources.
8. Knowledge and concept of biodiversity and its conservation.
9. Basic knowledge and concept of causes, effects, and control of different types of Environmental pollution.
10. To study population growth and its impact on the environment

Course Outcomes (COs) :
After completion of the course, students will be able to -
- Define key environmental terms and concepts (e.g., ecosystem, biodiversity, pollution).
- Explain the causes and effects of major environmental problems.
- Apply environmental principles to analyze real-world scenarios.
- Differentiate between various types of pollution and their impacts.

Unit No.	Topics / actual contents of the syllabus	Contact Hours
I	**Introduction to environmental studies and natural resources:** Definition, scope and Importance and need for public awareness. Natural resources: Forest resources: Use and over-exploitation, deforestation. Timber extraction. Water resources: Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dam's benefits and problems. Mineral resources: Use and exploitation, environmental effects of extracting and using Mineral resourcesFood, energy, and land resources: Food resources: world food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems water logging, salinity. Energy resources: Growing energy needs, renewable and non-renewable energy sources, and use of alternate energy sources. Land resources: Land as a resource, land degradation, man-induced landslides, soil erosion, and desertification.	10 Hrs
II	**Ecosystems and Biodiversity and its conservation** **Ecosystems:** Concept of an ecosystem. Structure and function of an ecosystem. Producers, consumers, and decomposers. Energy flow in the ecosystem. Ecological succession. Food chains, food webs, and ecological pyramids. Introduction, types, characteristic features, structure, and function of the following ecosystems: Forest ecosystem, Grassland ecosystem, Desert ecosystem, and Aquatic ecosystems (ponds, streams, lakes, rivers, Oceans, estuaries) **Biodiversity and its conservation:** Introduction Definition: genetic, species, and Ecosystem diversity. Bio geographical classification of India. Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts. Endangered and endemic species of India Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity	10 Hrs

III	**Environmental Pollution and Social issues and the Environment** Environmental Pollution: Definition, Cause, effects, and control measures of Air pollution, Water pollution, Soil pollution, Marine pollution, Noise pollution, Thermal pollution, nuclear hazards, Role of an individual in the prevention of pollution. Social issues and the Environment: From Unsustainable to sustainable development Urban problems related to energy. Climate change, global warming, acid rain, ozone layer depletion Environment Protection Act. Public awareness.	**10 Hrs**

Reference Books:

7. Agarwal K.C., "Environmental Biology", Vol. 1, Latest Edition, Nidi Puhl Ltd., Bikaner, 2001.
8. BharuchaErach, "The Biodiversity of India", Vol. 1, First Edition, Mapin Publishing Pvt. Ltd., Ahmedabad.
9. Heywood V.H., Waston, "Global Biodiversity Assessment", Vol. 1, Latest Edition, Cambridge University Press, 1995.
10. Jadhav H., Bhosale V.M., "Environmental Protection and Laws", Vol. 1, First Edition, Himalaya Publishing House, Delhi.
11. Odum E.P., "Fundamentals of Ecology", Vol. 1, First Edition, W.B. Saunders Co., USA.
12. Miller T.G. Jr., "Environmental Science", Vol. 1, First Edition, Wadsworth Publishing Co.

Honors Degree Course

Please note that this course is optional and specifically designed for students pursuing a Bachelor's Degree Honors with Multidisciplinary Minor. Only those students who have secured a minimum of 7.5 CGPA (equivalent to 75% marks) in their first year will be eligible to opt for this option

	Course Code: HT-2 (Semester IV) Course Title : Compiler Construction		

Course Code: HT-2
(Semester IV)
Course Title : Compiler Construction

Total Credits: 3
Maximum Marks: 100   **Total Contact Hours:** 3 Hrs/week ;   45Hrs / Semester

Prerequisites:
- Good knowledge of Data Structures and Algorithms.
- Basic Programming Concepts (C/C++/Java).

Learning Objectives of the Course:
1. Understand phases of compiler design and construction techniques.
2. Study syntax analysis, parsing, semantic analysis, and code generation.
3. Build awareness about compiler optimization and runtime environments

Course Outcomes (COs) :
After completion of the course, students will be able to -
- Understand the different phases of the compiler and their roles.
- Analyze lexical, syntax, and semantic analysis processes .
- Apply parsing techniques for syntax analysis .
- Understand intermediate code generation, optimization, and target code generation.
- Demonstrate knowledge of runtime environment management and error handling

Unit No.	Topics / actual contents of the syllabus	Contact Hours
I	**Introduction and Lexical Analysis** - Introduction to Compiler: Compiler vs Interpreter - Phases of Compiler: Lexical, Syntax, Semantic, Intermediate Code Generation, Optimization, Code Generation ,Lexical Analysis: Role of Lexical Analyzer, Tokens, Patterns, Lexemes ,Regular Expressions and Finite Automata - Construction of Lexical Analyzers (Lex Tool Basics)	15Hrs
II	**Syntax and Semantic Analysis** - Syntax Analysis: Top-Down and Bottom-Up Parsing - LL(1) Parser: Construction and Parsing Table , LR(0), SLR, LALR Parsing: Introduction and Simple Examples ,Syntax-Directed Definitions, Syntax-Directed Translation, Abstract Syntax Trees (ASTs) and Parse Trees ,Semantic Analysis: Symbol Tables, Type Checking	15Hrs
III	**Intermediate Code Generation and Code Optimization** - Intermediate Representations: Three-Address Code (TAC), Quadruples, Triples , Code Generation Basics: Target Code, Addressing Modes - Code Optimization: Peephole Optimization, Local and Global Optimizations - Runtime Environment: Activation Records, Stack Allocation - Error Detection and Recovery Techniques	15Hrs

Reference Books:

Sr. No.	Title	Author	Publisher
1	Compilers: Principles, Techniques and Tools (Dragon Book)	Alfred V. Aho, Monica S. Lam, Ravi Sethi, Jeffrey D. Ullman	Pearson
2	Principles of Compiler Design	Alfred V. Aho, Jeffrey D. Ullman	Pearson
3	Compiler Construction: Principles and Practice	Kenneth C. Louden	Cengage Learning
4	Modern Compiler Implementation in C	Andrew W. Appel	Cambridge University Press
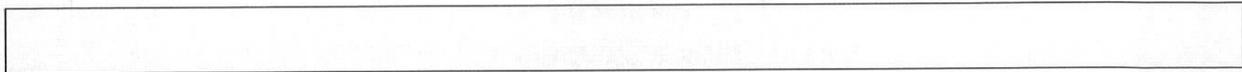
Double Minor Course

Please note that this course is optional and specifically designed for students pursuing a Bachelor's Degree with Double Minor. Only those students who have secured a minimum of 7.5 CGPA (equivalent to 75% marks) in their first year will be eligible to opt for this option.

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Course Code: DMT-2

(Semester - IV)

Course: Object Oriented Programming

</div>

(This course will be available for the students from other discipline and Computer Science Engineering / Computer Science students will choose double minor course from other discipline)

Total Credits: 3

Maximum Marks: 100   **Total Contact Hours:** 3 Hrs/week ; 45Hrs / Semester

Prerequisites:
- Good knowledge of basic programming (C/Python basics).
- Understanding of variables, control structures, functions.

Learning Objectives of the Course:
- Understand Object-Oriented Programming (OOP) concepts, design, and implementation.
- Develop programs using classes, objects, constructors, and destructors.
- Apply object-oriented techniques to solve real-world problems.
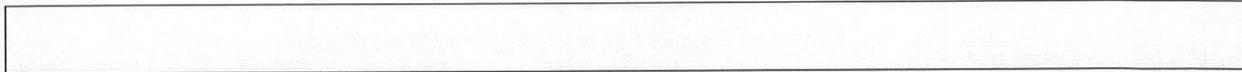
Course Outcomes (COs) :

After completion of the course, students will be able to -
- Explain OOP concepts and their advantages over procedural programming.
- Explain the causes and effects of major environmental problems.
- Implement inheritance, polymorphism, encapsulation, and abstraction.
- Apply concepts of operator overloading, exception handling, and file handling.
- Design object-oriented applications using real-world case studies.

Unit No.	Topics / actual contents of the syllabus	Contact Hours
I	**Introduction to OOP and Classes** - Procedural vs. Object-Oriented Programming ,Principles of OOP: Encapsulation, Abstraction, Inheritance, Polymorphism ,Basics of Classes and Objects , Constructors and Destructors , Access Specifiers (Public, Private, Protected) , Static Members (variables and functions)	15Hrs
II	**Advanced OOP Concepts** - Inheritance: Single, Multiple, Multilevel, Hierarchical, Hybrid - Polymorphism: Compile-time (Function Overloading, Operator Overloading) and Run-time (Virtual Functions) Abstract Classes and Interfaces - Templates (Class and Function Templates) Friend Functions and Friend Classes	15Hrs
III	**OOP Applications and Exception Handling** - Exception Handling: Try, Catch, Throw Mechanisms ,File Handling: Stream Classes, File Read/Write Operations ,Object-Oriented Design Principles: Class Diagrams, Use Case Diagrams (Basic Introduction to UML) Mini Project Development using OOP Concepts (ex: Bank Management, Library System, Student Management)	15Hrs

Reference Books:

1 Object-Oriented Programming with C++ E. Balagurusamy McGraw Hill Latest

2 Object Oriented Programming in C++ Robert Lafore SAMS Publishing Latest

3 The C++ Programming Language Bjarne Stroustrup Addison-Wesley Latest

4 Java: The Complete Reference Herbert Schildt McGraw Hill Latest

DR. BABASAHEB AMBEDKAR MARATHWADA UNIVERSITY, CHHATRAPATI SAMBHAJINAGAR.

NAAC- 'A +' Grade

CIRCULAR NO.SU/Engg./College/NEP/83/2025

It is hereby inform to all concerned that, the syllabi prepared by the Board of Studies and recommended by the Dean, Faculty of Science & Technology, *Academic Council at its meeting held on 09 May 2025 has been accepted* the following Syllabi and Second Year Open Elective Basket for B. E. & B. Tech. under the Faculty of Science & Technology as per Norms of National Education Policy – 2020 as appended herewith.

Sr.No.	Syllabi
1.	Second Year B. E./B. Tech. Civil Engineering
2.	Second Year B.E./B.Tech. Mechanical Engineering
3.	Second Year B. E./B. Tech. Information Technology
4.	Second Year B. E./B. Tech. Electronics & Telecommunication Engineering/Electronics Engineering /Electronics & Communication Engineering.
5.	Second Year B. E./B. Tech. Electrical and Electronics Engineering/ Electrical Engineering/ Electrical, Electronics and Power
6.	Second Year B. E./B. Tech. Computer Science and Engineering/ Computer Science/ Computer Engineering
7.	Second Year B. E./B. Tech. Artificial Intelligence/ Artificial Intelligence and Machine Learning / Artificial Intelligence and Data Science

This is effective from the Academic Year 2025-26 and onwards.

All concerned are requested to note the contents of this circular and bring the notice to the students, teachers and staff for their information and necessary action.

University Campus,
Chhatrapati Sambhajinagar
- 431 004.
REF.NO.SU/NEP/2025/856-61)
Date:- 29/ 05/ 2025.

Deputy Registrar,
Syllabus Section

Copy forwarded and necessary action to :-

1] **The Principal of all Affiliated Colleges,** Dr. Babasaheb Ambedkar Marathwada University

2] The Director, University Network & Information Centre, UNIC, Dr.Babasaheb Ambedkar Marathwada University with a request to upload this Circular on University Website

3] The Director, Board of Examinations & Evaluation, Dr. Babasaheb Ambedkar Marathwada University, Chhatrapati Sambhajinagar.

Copy to :-

1] PA to the Hon'ble Vice-Chancellor,

2] PA to the Pro. Vice-Chancellor,

3] PA to the Registrar, Dr. Babasaheb Ambedkar Marathwada University, Chhatrapati Sambhajinagar.

JD*29052025/-

DR. BABASAHEB AMBEDKAR MARATHWADA UNIVERSITY, CHHATRAPATI SAMBHAJINAGAR

Open Elective Basket

For Second Year B.E./B.Tech.

(Three Year/Four Years(Hons)/Four Years (Hons with Research)

As per NEP -2020

Under the Faculty of Science & Technology

From the Academic Year 2025-26 & Onwards/-

Dr. Babasaheb Ambedkar Marathwada University, Chhatrapati Sambhajinagar

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Faculty of Science and Technology

Open Electives Basket for B.E./B.Tech Second Year

Semester	Options
III- OET-I	1) Economic Environment in India
	2) Introduction to Financial Market
	3) Indian Constitution
	4) Professional Ethics and Cyber Laws
	5) Introduction to Digital Forensics
III- OET-II	1) Financial Institutions, Markets and Regulations
	2) Risk Management and Compliances
	3) Emotional Intelligence
	1) Business Intelligence
	2) Psychology
	3) Finance and Accounting
IV- OET-III	

Course Code: OET-I (Semester III)
1) Economic Environment in India

Total Credits: 2
Contact Hours Theory: 02 Hrs./week, **Total Contact Hours:** 30 hrs
Maximum Marks: 50

Learning Objectives of the Course:
1. To understand the economic environment of India.
2. To explore population-related issues
3. To comprehend industrial development in India
4. To analyze foreign trade dynamics
5. To explore transportation issues
6. To assess the role of government policies

Course Outcomes (COs) :

After completion of the course, students will be able to -
1. Understand key elements of the economic environment and their impact on planning.
2. Explain economic planning, reforms, and the New Economic Policy.
3. Discover population issues, unemployment, agriculture, and welfare policies.
4. Describe industrialization and the role of foreign capital and MNCs.
5. Evaluate India's foreign trade, BOP issues, and EXIM policy.
6. Assess transport infrastructure and Maharashtra's economic development.

Unit No.	Topics / actual contents of the syllabus	Contact Hours
I	Economic Environment-Meaning, Factors Affecting Economic Environment. Economic Planning – Meaning, Importance, Objective and New Economic Policy approach, Major Economic Reforms (Brief) and their Impacts. Population growth and problems in India, Population policy, Unemployment in India. Family Welfare measures and their valuation, Agriculture-significance, new agricultural strategy, types and remedial measure Sources of Agricultural Finance and Land reforms.	10 Hrs
II	Need of industrialization in India, Large- and small-scale industries – Importance and Development Problem, New Industrial Policy and changes Investment of Foreign Capital in India, Multi-National Corporations. Foreign Trade – Characteristics Composition and Direction of Foreign Trade in India Balance of Trade and Balance of payment Causes and Remedies of Unfavorable Balance of Payment: Export promotion, measures, New EXIM Policy.	10 Hrs
III	Problems and Prospects of Rail, Road, Water and Air Transport in India. Maharashtra: A Brief Introduction, Agriculture development, Industrial Development and Transportation Development in Maharashtra.	10 Hrs

Reference Books:
1. Francis Charillian, "Business Environment: Text & Cases", Vol. 1, 27th Edition, Himalaya Publishing House, 2020.
2. Dr. H. L. Ahuja, "Economics Environment of Business", Vol. 1, Latest Edition, S. Chand & Company, 2020.
3. Dutt & Sundram, "Indian Economy", Vol. 1, Latest Edition, S. Chand, 2020.

<table>
<tr><td colspan="2" align="center">**Course Code: OET-I (Semester III)**

2) Introduction to Financial Market</td></tr>
<tr><td colspan="2">**Total Credits:** 2</td></tr>
<tr><td colspan="2">**Contact Hours Theory:** 02 Hrs./week,   **Total Contact Hours:** 30 hrs</td></tr>
<tr><td colspan="2">**Maximum Marks:** 50</td></tr>
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Prerequisite :
1. Basic Knowledge of Market.

Learning Objectives of the Course:
1. Introduce students to the structure and functioning of financial markets.
2. Provide an understanding of financial marketing as a specialized area of marketing.
3. Study the factors influencing consumer behavior in financial services, including psychological, social, and economic factors.
4. Introduce the impact of digital transformation on financial services marketing.
5. Examine strategies that financial institutions (banks, insurance companies, asset management firms) use to market their products and services.

Course Outcomes (COs):

After completion of the course, students will be able to -

1. Understanding the Fundamentals of Financial Markets and Instruments.
2. Apply Marketing Principles to Financial Products and Services.
3. Analyze Consumer Behavior in Financial Services.
4. Develop a Digital Marketing Strategy for Financial Services.

Unit No.	Topics / actual contents of the syllabus	Contact Hours
I	**Business Management :**Concept of Management-Definitions, Characteristics, Management & Administration, Different Concepts, Management by Communication, Management by Systems, Management by Results, Management by Participation, Management by Motivation, MBE, MBO – Functions of management. **Planning :** Meaning, Nature, Definition, significance, Process, Types, Importance, Principles, Steps – Planning and forecasting, Planning and Decision, Making and Planning and Control	10 Hrs
II	**Organizing :**definitions, Principles of Organization, Formal & informal Organizations, Steps, Importance, Organization Development, Problems in Organization, Delegation - Centralization and Decentralization–Span of Control, Types or Forms of Organization - Organizational goals – Determination of Organizational goals and Determinants of Organizational goals	10 Hrs
III	**Directing :**Meaning , Definitions, Nature of Directions, Elements of	10 Hrs

| | Direction, Directing and Other Managerial Activities, Importance of Direction-Orders and Instructions, Supervision, Essentials of Effective Supervision and Principles of Direction.
Leading: Meaning, Functions, Qualities of good leader – Leadership Styles - Motivation-Meaning, Nature Definitions, Benefits, and Modern Theories of Motivation | |

Reference Books:
1. Marketing of Financial Services , V. S. Ramaswamy & S. Namakumari Macmillan India, Edition
2. Principles & Practice of Management Prasad L.M., Sultan Chand & Sons
3. Introduction to Financial Markets: A Global Perspective, M. Jayant R. Ghosh, Springer 1st Edition
4. Financial Markets and Institutions Frederic S. Mishkin & Stanley G. Eakins Pearson 9th Edition
5. Principles of Financial Marketing Martin P. S. S. K. Agrawal McGraw-Hill 1st Edition

Course Code: OET-I (Semester III)

3) Indian Constitution

Total Credits: 2

Contact Hours Theory: 02 Hrs./week,   **Total Contact Hours:** 30 hrs

Maximum Marks: 50

Prerequisite :
1. Basic Knowledge of Indian history.

Learning Objectives of the Course:
1. To provide students with a historical perspective on the making of the Indian Constitution, including the pre-independence constitutional developments and the influence of various British and Indian legal documents.
2. It will explore various aspects of the Indian political and legal system from a historical perspective highlighting the various events that led to the making of the Indian Constitution.
3. To comprehend the **Preamble** of the Indian Constitution, which outlines the objectives of the Constitution, such as justice, liberty, equality, and fraternity?
4. To understand the structure of the **Indian government,** including the **Union Government** (Executive, Legislature, Judiciary) and the **State Governments**, and the distribution of powers between the center and states (federal structure).

Course Outcomes (COs):

After completion of the course, students will be able to -

1. List salient features and characteristics of the constitution of India.
2. Follow fundamental rights and duties as responsible citizen of the country.
1. Analyze major constitutional amendments in the constitution.
4. Follow procedure to cast vote using voter-id.

Unit No.	Topics / actual contents of the syllabus	Contact Hours
I	**Salient Features of the Indian Constitution and Preamble** Meaning of the constitution of India. Historical perspectives of the Constitution of India, Salient features and characteristics of the Constitution of India, Preamble of the Constitution of Indi, Fundamental Rights & Fundamental duties	10 Hrs
II	**Structure and Functioning of Government:** **Union Government** – President, Prime Minister, Council of Ministers, and Parliament (Lok Sabha and Rajya Sabha). **State Government** – Governors, Chief Ministers, State Legislatures. **Judiciary** – Independent Supreme Court, High Courts, and subordinate courts. **Federalism** – Division of powers between the Centre and States (Union, State, Concurrent lists).	10 Hrs
III	**Administration, Amendments, and Emergency Provisions:** Administrative Services – IAS, IPS, and other All India Services. Finance and Trade – Budget, GST, distribution of taxes. Amendment Process (Article 368) – Procedure for changing the	10 Hrs

| | Constitution.
Emergency Provisions – National, State, and Financial emergencies.
Special Provisions – For Jammu & Kashmir (earlier), SC/ST rights, minorities, etc. | |

Reference Books:

1. Constitution of India, Bare Act, Govt. of India.
2. Indian Constitution, Avasti & Maheshwari, Laxmi Narayan Agra.
3. P.M. Bakshi The Constitution of India Universal Law Publishing, New Delhi 15th edition, 2018.
4. D.D. Basu Introduction to Indian Constitution Lexis Nexis Publisher, New Delhi, 2015
5. B. K. Sharma . E. Fitzgera Introduction to Constitution of India ld PHI, New Delhi, 6th edition, 2011.
6. B.L. Fadia The Constitution of India Sahitya Bhawan, Agra, 2017

Course Code: OET-I (Semester III)
4) Professional Ethics and Cyber Laws

Total Credits: 2
Contact Hours Theory: 02 Hrs./week, **Total Contact Hours:** 30 hrs
Maximum Marks: 50

Learning Objectives of the Course:

This course is aimed at to make students familiar with the fundamental concepts of computer ethics, ethical decision making, Cybercrimes and cyber laws. Also it covers fundamental; rights, Intellectual Property Issues in Cyber Space and international perspectives of cyber laws and jurisdiction.

Course Outcomes (COs) :

After completion of the course, students will be able to -

CO1 - Define the fundamental concepts of computer ethics, ethical decision making, cyber crime and cyber law
CO2 - Illustrate computer ethics, ethical decision making, cyber crime and cyber law
CO3 - Identify and classify various cybercrimes with respect to organizational weaknesses.
CO4 - Apply Information to individual role and ethics responsibility towards society.

Unit No.	Topics / actual contents of the syllabus	Contact Hours
I	An Overview of Ethics. Moral v/s Ethics, Why Computer Ethics, Philosophical Ethics: Distinguishing Descriptive and Normative Claims, Ethical Relativism, Utilitarianism, Deontological Theories, Rights, Virtue Ethics, Ethics for IT Professionals and IT Users – Various Scenarios. Foundations of Information Ethics. Ethical Issues Involving Computer Security: Hacking, Hacktivism, and Counter hacking	10 Hrs
II	Ethical Decision Making: Types of ethical choices, Making defensible decisions, Ethical dilemmas, law and ethics. Crime incident Handling Basics: Hacking, cyber activism, Tracking hackers, clues to cybercrime, privacy act, search warrants, common terms, organizational roles, procedure for responding to incidents, reporting procedures, legal considerations Information Technology Act 2000,IT. Scope, jurisdiction, offense and contraventions, powers of police, adjudication. Introduction: Cybercrime and Information Security, Cybercriminals, Classifications of Cybercrimes Cyber offenses How Criminals Plan the Attacks, Social Engineering, Cyberstalking, Cyber cafe and Cybercrimes, Botnets: The Fuel for Cybercrime, Attack Vector, Digital Forgery, Cyber Stalking/Harassment, Cyber Pornography, Identity Theft &Fraud, Cyber terrorism	10 Hrs
III	Fundamental rights and duties in Cyberspace, Right to Privacy, Right to Data Protection, Intellectual Property Issues in Cyber Space: Copyright Law, Patent Law, Trademarks & Domain Names Related issues, right and liabilities of the government and public servant, The judicature.	10 Hrs

	Introduction: Perspectives of Various Stakeholders and Challenges for International Law, Jurisdiction and Attribution of State Responsibility in Cyberspace, Regulation of Cyberspace and Human Rights, Cyber Terrorism, Future Prospects of Public International Law of Cyberspace	

Reference Books:

1. Deborah G Johnson, *Computer Ethics*, Pearson Education Pub., ISBN : 81-7758-593-2
2. Nina Godbole, SunitBelapure, *Cyber Security*, Wiley India, New Delhi
3. Kriangsak Kittichaisaree, *Public International Law of Cyberspace*, 2017
4. Earnest A. Kallman, J.P Grillo, *Ethical Decision making and IT: An Introduction with Cases, McGraw* Hill Pub.
5. Basu, Durga Das, *Introduction to constitution of India*, 2021

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Course Code: OET-I (Semester III)
5) Introduction to Digital Forensics

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Total Credits: 2	
Contact Hours Theory: 02 Hrs./week,	**Total Contact Hours:** 30 hrs
Maximum Marks: 50	

Prerequisite :
1. Knowledge of Basics of Computer, General Cyber Information.

Learning Objectives of the Course:
1. To provide students with a comprehensive understanding of the basic concepts of digital forensics, including its scope, objectives, and importance in modern cyber security and legal contexts.
2. To educate students about the legal framework governing digital forensics and the ethical considerations associated with handling digital evidence.
3. To familiarize students with the various tools and techniques used in digital forensics to acquire, examine, and analyze digital evidence from computers, mobile devices, networks, and cloud systems.
4. To provide students with the skills to properly acquire and preserve digital evidence in a manner that maintains its integrity and admissibility in a court of law.
5. To equip students with the knowledge required to investigate and analyze digital evidence from computers and mobile devices, which are commonly involved in cybercrimes.

Course Outcomes (COs):

After completion of the course, students will be able to -

1. Understand the legal aspects of forensics
2. Analyze Legal and Ethical Considerations in Digital Forensics
3. Utilize Digital Forensic Tools and Techniques
4. Investigate Network-Based Incidents

Unit No.	Topics / actual contents of the syllabus	Contact Hours
I	**Introduction to Digital Forensics:** Definition, scope, and importance of digital forensics History and evolution of digital forensics Legal and ethical issues in digital forensics The role of digital forensics in cybercrime investigation Types of digital forensics: Computer forensics, network forensics, mobile forensics, cloud forensics, etc. Digital evidence: Types and classification, Chain of custody and handling digital evidence, Forensic analysis process: Acquisition, examination, analysis, and reporting	10 Hrs
II	**Legal and Ethical Aspects of Digital Forensics :** Legal Framework for Digital Forensics, Overview of cybercrime laws (e.g., Information Technology Act, 2000 in India, or similar laws in other countries), International legal considerations in digital forensics (e.g., data privacy, cross-border data issues), Legal requirements for digital evidence handling and admissibility in court,	10 Hrs

	Ethical Issues in Digital Forensics : Ethical considerations in the forensic examination of digital evidence, Privacy concerns and ethical dilemmas in digital investigations, Professional ethics and code of conduct for digital forensic professionals	
III	**Digital Forensics Tools and Techniques** : Forensic Tools Overview, Overview of common forensic tools and software (e.g., EnCase, FTK, Autopsy, Sleuth Kit, etc.), Free and open-source tools for digital forensics, Selection of tools based on case needs and evidence types, Techniques for Data Acquisition : Methods of acquiring digital evidence: Live data acquisition vs. dead imaging, Tools and techniques for creating bit-by-bit copies of digital storage media, Handling encrypted data and password-protected devices. Forensic Imaging and Duplication: Creating forensic images (write-blocking techniques, hashing, etc.), Ensuring integrity of data during duplication, Verifying the authenticity of evidence (hashing, checksums, etc.)	**10 Hrs**

Reference Books:

1. "Digital Evidence and Computer Crime: Forensic Science, Computers, and the Internet" Eoghan Casey Academic Press 3rd Edition

2. Guide to Computer Forensics and Investigations" Bill Nelson, Amelia Phillips, Christopher Steuart Cengage Learning 5th Edition

3. "Computer Forensics: Investigating Network Intrusions and Cybercrime" EC-Council EC-Council Press 2nd Edition

4. "Digital Forensics and Incident Response" Jason Luttgens, Matthew Pepe, Kevin Mandia McGraw-Hill Education 1st Edition

	Course Code: OET-II (Semester III)
	1) Financial Institutions, Markets and Regulations
	Total Credits: 2
	Contact Hours Theory: 02 Hrs./week, **Total Contact Hours:** 30 hrs
	Maximum Marks: 50

Learning Objectives of the Course:
1. Understand Indian financial systems and its institutions.
2. Understand functioning of various financial markets and instruments in India

Course Outcomes (COs) :

After completion of the course, students will be able to -
1. Explain the structure and components of the Indian financial system and its institutions.
2. Analyze the functioning of various financial markets and instruments in India.
3. Interpret the regulatory framework governing financial institutions and markets in India.
4. Evaluate recent developments, innovations, and global issues in financial systems.

Unit No.	Topics / actual contents of the syllabus	Contact Hours
I	**Indian Financial System and Institutions.** Introduction to Financial System, Components: Institutions, markets, instruments, and services. Functions and significance in economic development. Banking Institutions role, structure, functions, Cooperative Banks and RRBs. Other Financial Institutions: Mutual Funds: Types, NAV, benefits, Insurance Companies: LIC, GIC, and private players.	10 Hrs
II	**Financial Markets and Instruments.** Money Market, Instruments: Call money, T-bills, Commercial Paper, Certificates of Deposit, Characteristics and participants, Capital Market: Primary Market: IPO process, book building, Secondary Market: Stock exchanges (BSE, NSE), trading mechanism, Market Intermediaries: Merchant bankers, brokers, underwriters, Derivatives Market, Basics of Forwards, Futures, Options – Concepts and differences.	10 Hrs
III	**Financial Regulation and Contemporary Issues** Regulatory Framework in India, RBI, SEBI, IRDAI, PFRDA – Roles and responsibilities, Key Acts: Banking Regulation Act, SEBI Act, FEMA, Global Financial Institutions: IMF, World Bank, BIS – Objectives and impact Financial Crises and Impact, 2008 Global Financial Crisis – Causes and effects on Indian markets. Financial Innovations and FinTech Digital banking, UPI, e-wallets, crypto currencies, regulatory sandbox	10 Hrs

Reference Books:
1. Bhole L.M., Mahakud, "Financial Institutions and Markets", 6th Edition, Tata McGraw Hill.
2. Bharati V. Pathak, "The Indian Financial System", Pearson, 2010.
3. M.Y. Khan, "Indian Financial System: Theory and Practice", Tata McGraw Hill, 2006.
4. Gurusamy S., "Financial Markets and Institutions", TMH.

Course Code: OET-II (Semester III)
2) Risk Management and Compliances

Total Credits: 2

Contact Hours Theory: 02 Hrs./week   **Total Contact Hours:** 30 hrs

Maximum Marks: 50

Prerequisite :
1. Basic Sciences

Learning Objectives of the Course:
1. To provide knowledge of Risk Management.
2. To understand Potential Risks.
3. To study Assess and Prioritize Risks.
4. To Develop Risk Response Strategies.
5. Monitor and Review Risks Continuously & Enhance Decision-Making.

Course Outcomes (COs):

After completion of the course, students will be able to -

1. Students should Identify and Classify Risks
2. Analyze and Evaluate Risk Scenarios
3. Develop Effective Risk Mitigation Strategies in students.
4. Students able to Apply Risk Management Frameworks and Standards.
5. Communicate Risk Information Effectively.

Unit No.	Topics / actual contents of the syllabus	Contact Hours
I	**A) Introduction to Risk Management** Concept and Nature of Risk, Types and Sources of Risk (Strategic, Operational, Financial, Hazard, Reputational), Risk Management Process and Principles Importance and Benefits of Risk Management, Role of Risk Manager **B)Risk Assessment and Analysis** Risk Identification Techniques (Brainstorming, Checklists, Interviews, SWOT),Risk Analysis: Qualitative and Quantitative, Risk Evaluation and Prioritization, Risk Appetite and Tolerance, Tools and Techniques (Risk Matrices, Monte Carlo Simulation, Sensitivity Analysis)	10 Hrs
II	**A) Risk Treatment and Mitigation** Risk Response Strategies (Avoidance, Reduction, Sharing, Acceptance), Designing Risk Mitigation Plans, Implementation of Risk Controls, Cost-Benefit Analysis of Risk Mitigation, Business Continuity and Disaster Recovery Planning. **B. Compliance Management**	10 Hrs

	Concept of Compliance and Corporate Governance, Regulatory Environment and Legal Framework (national & international), Key Compliance Requirements (e.g., GDPR, SOX, HIPAA, ISO Standards), Ethics and Integrity in Compliance, Roles of Compliance Officer	
III	**A)** Risk Monitoring, Reporting, And Framework Risk Monitoring and Review Mechanisms, Risk Reporting and Documentation, Integration of Risk Management with Strategic Planning, Risk Management Frameworks (ISO 31000, COSO ERM, Basel Accords), Case Studies: Risk and Compliance Failures & Successes.	**10 Hrs**
	Reference Books: 1. Risk Management and Financial Institutions John C. Hull, Wiley 5th Edition 2. Principles of Risk Management and Insurance George E. Rejda, Michael McNamara Pearson 14th Edition 3. The Essentials of Risk Management The Essentials of Risk Management Crouhy, Dan Galai, Michel Robert Mark McGraw Hill 2nd Edition	

Course Code: OET-II (Semester III)
3) Emotional Intelligence

Total Credits: 2

Contact Hours Theory: 02 Hrs./week   **Total Contact Hours:** 30 hrs

Maximum Marks: 50

Prerequisite :
1. Basic Sciences

Learning Objectives of the Course:
1. To help students recognize their emotions and understand how feelings influence their thoughts, behavior, and academic performance.
2. To enable students to manage stress, control impulses, and respond to challenges with patience and a positive attitude.
3. To teach students to recognize and respect the emotions and perspectives of others, promoting kindness, inclusion, and teamwork.
4. To help students express themselves clearly and respectfully, resolve conflicts peacefully, and build strong peer relationships.
5. To encourage goal-setting, persistence, and a growth mindset, helping students stay motivated and bounce back from setbacks.

Course Outcomes (COs):

After completion of the course, students will be able to -

1. Demonstrate Self-Awareness.
2. Apply Techniques for Emotional Self-Regulation.
3. Exhibit Empathy and Social Sensitivity.
4. Build and Maintain Healthy Relationships.
5. Develop Motivation and a Growth Mindset.
6. Encourage Responsible Decision-Making.

Unit No.	Topics / actual contents of the syllabus	Contact Hours

I	**A)** Introduction to Emotional Intelligence
	Definition and Historical Background of EI
	
	Components of Emotional Intelligence:
	
	    Self-awareness
	
	    Self-regulation
	
	    Motivation
	
	    Empathy
	
	    Social skills
	
	EI vs IQ: Why Engineers Need Both
	
	Importance of EI in Personal and Professional Life
		10 Hrs

	EI in Academic Success and Employability	
	B)Developing Self-Awareness	
	Understanding Emotions and Emotional Triggers	
	Emotional Self-Assessment Techniques	
	Mindfulness and Reflection Practices	
	Building Self-Confidence and Personal Vision	
	Personality Types and Emotional Tendencies (e.g., MBTI, Big Five)	
II	**A) Managing Emotions and Stress** Techniques for Emotional Regulation and Control Managing Anger, Anxiety, and Frustration Time and Stress Management in Academic Life Resilience and Adaptability in Engineering Challenges Growth Mindset and Self-Motivation **B)Empathy and Social Awareness** Recognizing Others' Emotions and Non-verbal Cues Empathy in Academic Teams and Project Groups Emotional Dynamics in Multicultural Teams Listening Skills and Perspective-Taking Building Inclusive and Respectful Peer Relationships	10 Hrs
III	**A)** Interpersonal Skills and Leadership Communication Skills and Conflict Resolution Giving and Receiving Constructive Feedback Influence and Persuasion in Team Settings Leading with Emotional Intelligence Case Studies: EI in Engineering Teams and Leadership Scenarios **B) Write Emotional Intelligence& present seminar.**	10 Hrs

Reference Books:
1. Emotional Intelligence: Why It Can Matter More Than IQ   Daniel Goleman Bantam Books 10th Edition
2. Working with Emotional Intelligence Daniel Goleman Bantam Books 1st Edition
3. Emotional Intelligence 2.0 Travis Bradberry, Jean Greaves Talent Smart   Revised Edition

Course Code: OET-III (Semester IV)
1) Business Intelligence

Total Credits: 2
Contact Hours Theory: 02 Hrs./week, **Total Contact Hours:** 30 hrs
Maximum Marks: 50

Learning Objectives of the Course:

To expose the students to the basics of business intelligence system with an understanding of modeling aspects behind Business Intelligence.

Course Outcomes (COs) :

After completion of the course, students will be able to -

CO1 - Understand the need for business intelligence its applications
CO2 - Know the business intelligence life cycle and its techniques
CO3 - Explore different tools and techniques for analysis and decision making
CO4 - Discuss modeling and analysis of data

Unit No.	Topics / actual contents of the syllabus	Contact Hours
I	Business Intelligence: Effective and timely decisions – Data, information and knowledge – Role of mathematical models – Business intelligence architectures: Cycle of a business intelligence analysis – Enabling factors in business intelligence projects – Development of a business intelligence system – Ethics and business intelligence. Decision Making, Systems, Modeling: Introduction and Definitions, Models, Phases of the Decision-Making Process, Decision Making: The Intelligence Phase, Decision Making: The Design Phase, Decision Making: The Implementation Phase	10 Hrs
II	Decision Support System: How Decisions Are Supported, Decision Support System Configurations, Decision Support System Characteristics and Capabilities, Decision Support System Classifications, Components of Decision Support Systems. Modeling and Analysis: Management Support Systems Modeling, Structure of Mathematical Models for Decision Support, Certainty, Uncertainty, and Risk Management Support Systems, Mathematical Programming Optimization, Spreadsheet Model, Linear Programming, Multiple Goals, Sensitivity Analysis, What-If Analysis, and Goal Seeking, Decision Analysis with Decision Tables and Decision Trees	10 Hrs
III	Business Intelligence Applications: Digital Marketing models: Google analytics, Search Engine marketing, Email marketing, Social media marketing, Sales force management, Business case studies, Logistic and Production models – Supply chain optimization, Optimization models for logistics planning, Revenue management system, Business Case studies.	10 Hrs

Reference Books:
- ✓ Efraim Turban, Ramesh Sharda, DursunDelen, Decision Support and Business

Intelligence Systems, 9th Edition, Pearson 2013.
- ✓ Carlo VercellisPolitecnico di Milano, Business Intelligence: Data Mining and Optimization for Decision Making, A John Wiley and Sons, Ltd., Publication.
- ✓ Ian Dodson, The Art of Digital Marketing: The Definitive Guide to Creating Strategic, Targeted, and Measurable, Wiley publications
- ✓ Larissa T. Moss, S. Atre, "Business Intelligence Roadmap: The Complete Project Lifecycle of Decision Making", Addison Wesley, 2003.
- ✓ Carlo Vercellis, Business Intelligence: Data Mining and Optimization for Decision Making , Wiley Publications, 2009
- ✓ David Loshin Morgan, Kaufman, Business Intelligence: The Savvy Manager"s Guide, Second, Edition, 2012.

Course Code: OET-III (Semester IV)
2) Psychology

Total Credits: 2
Contact Hours Theory: 02 Hrs./week, **Total Contact Hours:** 30 hrs
Maximum Marks: 50

Learning Objectives of the Course:
  3. Understand Indian financial systems and its institutions.
  4. Understand functioning of various financial markets and instruments in India

Course Outcomes (COs) :
  After completion of the course, students will be able to -
  5. Explain the structure and components of the Indian financial system and its institutions.
  6. Analyze the functioning of various financial markets and instruments in India.
  7. Interpret the regulatory framework governing financial institutions and markets in India.
  8. Evaluate recent developments, innovations, and global issues in financial systems.

Unit No.	Topics / actual contents of the syllabus	Contact Hours
I	Psychology of Health Understanding stress and its various causes. Stress and psychologically-oriented and physically-manifested disorders [Psychosomatic disorders] Manic depressive tendencies, socialization problems, eating disorders. Depression and other related psychological states that are also manifest in the technological/industrial environment. Stress and adjustment : Occupational, social, marital, sexual and environmental aspects. Technology and subjective well-being (SWB)	10 Hrs
II	Community Psychology Concept of community and their implications for community psychology. Community processes and orientations toward change. Examinations of the models; the mental health model; the organizational model; the social action model; the ecological model. Implications for a psychology of the community: the study of community life, interaction strategies; implications for manpower and training; family therapy and the community; crisis intervention; advocacy and community psychology	10 Hrs
III	Psychological Factors in Work Design Approaches to work design. Historical perspective. Human information processing, Natural and man-made environment effect, psychology of work. The living environments, physical features, psychological dimensions of work. Job enrichment, quality of working life. Future of work designs.	10 Hrs

Reference Books:

- ✓ Andrew W. Baum, Jerome E. Singer & Tracey A. Revenson. Handbook of Health Psychology. Lawrence Erlbaum Associates. 2001.
- ✓ Edward P. Sarafino. Health Psychology: Biopsychosocial Interactions. 4th Edition. John Wiley and Sons. 2001.
- ✓ Linda Brannon & Jess Feist. Health Psychology □ An Introduction to Health and Behaviour. 4th Ed. Wadsworth. 1999.
- ✓ Virginia Ann Price. Type-A Behaviour Pattern. A model for Research and Practice. Academic Press. 1982.

Course Code: OET-III (Semester IV)

3) Finance and Accounting

Total Credits : 02
Total Contact Hours : 30 hrs (two Hours / Week)
Maximum Marks : 50 marks

Learning Objectives of the Course:

The course helps the students in getting a specialized knowledge in the area of Accounts, Cost Accounting, Financial Management and Taxation in the field of engineering & entrepreneurship. The teaching methods includes lectures, presentations and case studies.

Course Outcomes (COs) :

✓ Understand and differentiate between cost and financial accounting, study elements and types of costs, and analyze Balance Sheets.

✓ Comprehend fundamentals of accounting &book keeping including their definitions, methods, steps, and basic terminologies.

✓ Attain knowledge on taxation system, understand classifications, tax benefits, exemptions, and various registration and filing processes.

✓ Acquire understanding of finance management, its importance, types, and calculation methods of ROI, and the role of valuer in finance.

Module No.	Topics / actual contents of the syllabus	Contact Hours
I	Introduction To Accounting & Book Keeping: Definition, steps of accounting, objectives & importance of accounting, functions, characteristics & advantages of accounting, limitations of accounting, types of accounts (personal, impersonal), rules of accounting, some basic terminologies (debit, credit, journal entry, ledger, invoice, E-way bills, system of accounting. Book keeping: Definition, objectives, methods of book keeping, Illustration of journal entries.	10 Hrs
II	Cost Accounting & Financial Accounting: meaning, objectives, advantages, differentiation of Cost & financial accounting, elements of cost (material, labor & expenses), types of costs (direct, indirect, fixed, variable, opportunity, controllable, operating, sunk cost), types of cost accounting methods, Break even analysis- meaning, importance, uses, Types of account (trading, manufacturing, profit & loss), Balance sheet-	10 Hrs

	meaning & use, classification of assets & liabilities, tangible assets.		
III	**Taxation:** Meaning, classification, merits & demerits of direct & indirect tax, tax registrations-PAN, TAN, TIN, applicability of tax to individual, proprietor partnership firm, private limited company, listed company, tax benefits, tax exemptions, tax payment & collection systems (TDS, TCS), filing of tax returns. **Finance** Definition, importance/purpose of finance, rate of interest, return on investment (ROI), types of ROI, calculation methods of ROI, examples, types of finance, banking-non banking finance, govt. finance subsidy, capital budgeting, financial management, Role of valuer for finance.	10 Hrs	

Reference Books:

1. Cost accounting principles & practice by S.P. Jain, K.L. Narang, Agrawal, Kalyani publications.
2. Financial accounting by S.P. Jain, K.L. Narang, Agrawal, Kalyani publications.
3. Financial accounting by P.C. Tulsian, Pearson Education (Singapore), published by Dorling Kindersley Delhi.
4. Entrepreneurship development by S. Anilkumar, S.C. Poornima, K. Jayashri, (new age international (P) limited publishers Delhi.