List of Open Elective Subjects

Sr. No	Subject Code	Name of open Elective Subjects	Type of Subject	Subject offered to Program	Semester
1	AOE0661	Introduction To Bio Informatics	Open Elective	ALL the Programs Except BT	6
2	AOE0662	Data Structures	Open Elective	EC, ME,BT	6
3	AOE0663	Artificial Intelligence	Open Elective	ME, BT	6
4	AOE0664	Introduction to DATA Analytics	Open Elective	EC, ME,BT	6
5	AOE0665	Soft Skills & Personality Development	Open Elective	ALL the Programs	6
6	AOE0666	3-D Printing& Design	Open Elective	ALL the Programs Except ME	6
7	AOE0667	Digital Marketing	Open Elective	ALL the Programs	6

B.TECH THIRD YEAR (VI SEMESTER)			
Course Code	**AOE0661**	**L T P**	**Credits**
Course Title	**Introduction to Bioinformatics**	**3 0 0**	**3**

Course objective:

1	To teach the basic concept of Bioinformatics, databases and sequence analysis.	K1
2	To develop understanding of sequence analysis.	K1, K2
3	To provide knowledge of scoring matrix and detection of functional sites etc.	K1, K2
4	To impart knowledge related to phylogenetic analysis.	K2, K3
5	To learn the protein structure prediction and application of bioinformatics in drug designing.	K3, K4

Pre-requisites: Elementary knowledge of Molecular Biology, Mathematics and Computer

Course Contents / Syllabus

UNIT-I	**Introduction to Bioinformatics**	**10h**

Biological databases: Nucleotide databases, Protein databases, Specialized databases; Laboratory data submission and data retrieval; Various file formats for Biomolecular sequences: Genbank, EMBL, FASTA, GCG, MSF, NBRF-PIR etc.; Basic concepts of sequence similarity: identity and homology, definitions of homologues, orthologues, paralogues.

UNIT-II	**Sequence Alignment and Database Searching**	**8h**

Introduction, Evolutionary Basis of Sequence Alignment, Optimal alignment method, Statistical Significance of Alignment. Database searching Artifacts; Database similarity searching: FASTA, BLAST, Various versions of basic BLAST and FASTA; Multiple sequence alignment: progressive method and Iterative method; Applications of pairwise and multiple sequence alignment; Tools for multiple sequence alignment: CLUSTALW and Pileup.

UNIT-III	**Scoring Matrices**	**8h**

Basic concept of a scoring matrix, Similarity and distance matrix, Substitution matrices: Matrices for nucleic acid and proteins sequences, PAM and BLOSUM series, Principles based on which these matrices are derived and Gap Penalty

UNIT-IV	**Phylogenetics**	**8h**

Phylogeny and concepts in molecular evolution; nature of data used in taxonomy and phylogeny; definition and description of Phylogenetic trees and various types of trees; Different methods of Phylogenetic tree construction: UPGMA and Fitch-Margoliash Algorithm; case studies in phylogenetic sequence analysis.

UNIT-V	**Protein structure prediction and drug designing**	**6h**

Protein identification based on composition, Physical properties based onsequence, Motif and pattern, Secondary structure (Statistical method: Chou-Fasman and GOR method, Neural Network and Nearest neighbor method) and folding classes, specialized structure or features, Tertiary structures (Homology Modeling); Structure visualization methods (RASMOL, CHIME etc.); Protein Structure alignment and analysis. Application of bioinformatics in drug discovery and drug designing.

Course outcome: After completion of this course students will be able to

CO 1	Understand concepts and application of Bioinformatics, types of databases, sequence similarity, sequence patterns and profiles.	K1
CO 2	Use sequence alignment techniques, database searching, pairwise and multiple sequence alignment using various tools	K1, K2
CO 3	Understand scoring matrices and its types including PAM, BLOSUM series and matrices for nucleic acid and protein sequences.	K1, K2

CO 4	Apply phylogeny and its concepts in molecular evolution and different methods of Phylogenetic tree construction	K2, K3
CO 5	Understand and apply the protein structure prediction and application of bioinformatics in drug designing	K3, K4
Text books (Atleast 3)		
1	Bioinformatics: Sequence and Genome Analysis, David W Mount, Cold Spring Harbor Laboratory Press	
2	Essential Bioinformatics, JinXiong, Cambridge University Press; 1st edition 2006.	
3	Bioinformatics: methods and applications, S. C. Rastogi, PHI learning; 4th edition, 2013.	
Reference Books (Atleast 3)		
1	Jonathan Pevsner. Bioinformatics and Functional Genomics, 2nd Edition. ISBN: 978-0-470-08585-1	
2	Greg Gibson and Spencer V. Muse. A Primer of Genome Science, Third Edition. ISBN:78-0-87893-309-9	
3	The Dictionary of Genomics, Transcriptomics and Proteomics, Günter Kahl, WilleyVCH,2015	

B.TECH THIRD YEAR (VI SEMESTER)			
Course Code	**AOE0662**	**L T P**	**Credits**
Course Title	**Data Structures**	**3 0 0**	**3**

Course Objectives:

This course focuses on the basic concepts of algorithm analysis, along with implementation of linear and non-linear data structures, hashing and file structures.

Pre-requisites: Basics of C/Python programming, Identifiers, Constants, Operators, Conditional statements, Switch-case statements, Iterative statements, Functions, Structures.

Course Contents / Syllabus

UNIT-I	**Introduction to data structures, Arrays and Linked lists.**	**8 Hours**

Introduction: Basic Terminology, Elementary Data Organization, Built in Data Types in C/python. Algorithm, Efficiency of an Algorithm, Time and Space Complexity, Asymptotic notations: Big Oh, Big Theta and Big Omega, Abstract Data Types (ADT)

Arrays: Single and Multidimensional Arrays, Representation of Arrays: Row Major Order, and Column Major Order, Index Formulae for 1-D,2-D,3-D and n-D Array Application of arrays, Sparse Matrices and their representations.

Linked lists: Array Implementation of Singly Linked Lists, Doubly Linked List, Circularly Linked List, Operations on a Linked List. Insertion, Deletion, Traversal. Polynomial Representation and Addition Subtraction & Multiplications of Single variable.

UNIT-II	**Stacks and Queues**	**8 Hours**

Stacks: Abstract Data Type, Primitive Stack operations: Push & Pop, Array and Linked Implementation of Stack, Application of stack: Prefix and Postfix Expressions, Evaluation of postfix expression, Iteration and Recursion- Principles of recursion, Tail recursion, Removal of recursion Problem solving using iteration and recursion with examples of binary search, Fibonacci numbers, and Hanoi towers. Tradeoffs between iteration and recursion.

Queues: Operations on Queue: Create, Add, Delete, Full and Empty, Circular queues, Dequeue and Priority Queue.

UNIT-III	**Trees**	**8 Hours**

Basic terminology used with Tree, Binary Trees, Binary Tree Representation: Array Representation and Pointer (Linked List) Representation, Binary Search Tree, Strictly Binary Tree, Complete Binary Tree, An Extended Binary Trees. Tree Traversal algorithms: In-order, Pre-order and Post-order. Constructing Binary Tree from given Tree Traversal, Operation of Insertion, Deletion, Searching & Modification of data in Binary Search tree,

Introduction of Binary Heaps, Threaded Binary trees, Traversing Threaded Binary trees, AVL Tree, B-Tree.

UNIT-IV	**Graphs**	**8 Hours**

Graphs: Terminology used with Graph, Data Structure for Graph Representations: Adjacency matrices, Adjacency List. Graph Traversal: Depth First Search and Breadth First Search. Connected Component, Spanning Trees, Minimum Cost Spanning Trees: Prim' s and Kruskal's algorithm. Shortest Path algorithms: Dijkstra Algorithm.

UNIT-V	**Searching, Sorting and File Structure**	**8 Hours**

Searching: Concept of Searching, Sequential search, Index Sequential Search, Binary Search. Concept of Hashing.

Sorting: Insertion Sort, Selection, Bubble Sort, Quick Sort, Merge Sort, Heap Sort and Radix Sort.

File Structure: Concepts of files, records and files, Sequential, Indexed and Random File Organization, indexing structure for index files, multi-Key file organization and Access Methods.

Course outcome: After completion of this course, students will be able to

CO 1	Describe how arrays, linked lists, stacks, queues, trees, and graphs are represented in memory, used by the algorithms and their common applications.	K1, K2
CO 2	Discuss the computational efficiency of the sorting and searching algorithms.	K2
CO 3	Implementation of Trees and Graphs and perform various operations on these data structure.	K3
CO 4	Understanding the concept of recursion, application of recursion and its implementation and removal of recursion.	K4
CO 5	Identify the alternative implementations of data structures with respect to its performance to solve a real-world problem.	K5, K6

Textbooks :

1. Michael T. Goodrich, Roberto Tamassia, Michael H. Goldwasser, "Data Structures and Algorithms in Python (An Indian Adaptation)", Wiley Publication (15 July 2014)
2. Aaron M. Tenenbaum, Yedidyah Langsam and Moshe J. Augenstein, "Data Structures Using C and C++", PHI Learning Private Limited, Delhi India (1 January 2006)
3. Horowitz and Sahani, "Fundamentals of Data Structures", Galgotia Publications Pvt Ltd Delhi India. (12 January 1993)
4. Lipschutz, "Data Structures" Schaum's Outline Series, Tata McGraw-Hill Education (India) Pvt. Ltd. (1 February 2014)

Reference Books:

1. Thareja, "Data Structure Using C" Oxford Higher Education. (13 October 2018)
2. AK Sharma, "Data Structure Using C", Pearson Education India. (1 January 2013)
3. P. S. Deshpandey, "C and Data structure", Wiley Dreamtech Publication. (1 January 2003)
4. R. Kruse etal, "Data Structures and Program Design in C", Pearson Education. (2007)
5. Berztiss, AT: Data structures, Theory and Practice, Academic Press. (2018)
6. Jean Paul Trembley and Paul G. Sorenson, "An Introduction to Data Structures with applications", McGraw Hill.(20 Nov 2007)

NPTEL/ You tube/ Faculty Video Link:

Unit 1	https://nptel.ac.in/courses/106/106/106106127/ https://www.youtube.com/watch?v=zWg7U0OEAoE&list=PLBF3763AF2E1C572F https://nptel.ac.in/courses/106/106/106106127/ https://www.youtube.com/watch?v=g1USSZVWDsY&list=PLBF3763AF2E1C572F&index=2
Unit 2	https://nptel.ac.in/courses/106/106/106106127/
Unit 3	https://nptel.ac.in/courses/106/106/106106127/ https://www.youtube.com/watch?v=tORLeHHtazM&list=PLBF3763AF2E1C572F&index=6 https://www.youtube.com/watch?v=eWeqqVpgNPg&list=PLBF3763AF2E1C572F&index=7
Unit 4	https://nptel.ac.in/courses/106/106/106106127/ https://www.youtube.com/watch?v=9zpSs845wf8&list=PLBF3763AF2E1C572F&index=24 https://www.youtube.com/watch?v=hk5rQs7TQ7E&list=PLBF3763AF2E1C572F&index=25 https://www.youtube.com/watch?v=KW0UvOW0XIo&list=PLBF3763AF2E1C572F&index=5

Unit 5	https://www.youtube.com/watch?v=4OxBvBXon5w&list=PLBF3763AF2E1C572F&index=22 https://www.youtube.com/watch?v=cR4rxllyiCs&list=PLBF3763AF2E1C572F&index=23 https://www.youtube.com/watch?v=BmayUdDaDYM&list=PLBF3763AF2E1C572F&index=4 https://www.youtube.com/watch?v=KW0UvOW0XIo&list=PLBF3763AF2E1C572F&index=5

B.TECH THIRD YEAR (VI SEMESTER)			
Course Code	**AOE0663**	**L T P**	**Credits**
Course Title	**ARTIFICIAL INTELLIGENCE**	**3 0 0**	**3**

Course objective: Introductory knowledge of the historical perspective of AI and its foundations and familiarity with principles of AI toward problem solving inference, perception, knowledge representation, and learning. Acquiring the knowledge of various forms of learning and computation statistics.

Pre-requisites: Basic Knowledge of Transform techniques

Course Contents / Syllabus

UNIT-I	**INTRODUCTION**	**8 Hours**

Introduction to Artificial Intelligence, Historical developments of Artificial Intelligence,Intelligent Agents, Structure of Intelligent Agents, Virtual Agents, Multi-agent systems, Basics of problem-solving: problem representation paradigms, state space, Problem reduction, Constraint satisfaction, Applications of AI

UNIT-II	**SEARCH TECHNIQUES**	**8 Hours**

Searching for solutions, Uninformed Search Strategies: DFS, BFS, adversarial Search, Search for games, minimax, Alpha-Beta pruning, Heuristic Search techniques, Hill Climbing, Best-first search, Means Ends Analysis, Iterative deepening Heuristic Search and A*.

UNIT-III	**LOGIC AND KNOWLEDGE REPRESENTATION**	**8 Hours**

Introduction of Logic, Propositional Logic Concepts, Semantic Tableaux and Resolution in Propositional logic, FOPL, Semantic Tableaux and Resolution in FOPL, Logic Programming in Prolog. Production systems and rules for some AI problems: Water Jug Problem, Missionaries-Cannibals Problem, Salesman Problem. Knowledge representation, semantic nets, partitioned nets, Frames, Common Sense reasoning, and thematic role frames.

UNIT-IV	**EXPERT SYSTEM**	**8 Hours**

Architecture of knowledge-Based Systems, Rule-based systems, Forward and Backward Chaining, Frame-Based systems. Architecture of Expert System, Agents, and Environment,Forward & Backward chaining, Resolution, Probabilistic reasoning, Bayesian Networks, Dempster Shafer Theory.

UNIT-V	**PLANNING & LEARNING**	**8 Hours**

Planning with state Space Search, Conditional Planning, Continuous planning, Multi-Agent Planning, Forms of learning, inductive learning, well-defined learning problems, Designing a Learning System, Case Study: Health Care, E-Commerce, Smart Cities.

Course outcome: After completion of this course students will be able to:

CO 1	After completion of this course students will be able to Understand fundamental understanding of the history of artificial intelligence (AI) and its foundations	K2
CO 2	Apply principles of AI in solutions that require problem solving, inference and perception.	K3
CO 3	Explain strong familiarity with a number of important AI techniques, including in particular intelligent search methods and solutions	K2

CO4	Apply the concepts of knowledge & reasoning of predicate logic and represent knowledge using rules, Probabilistic reasoning	K3
CO 5	Assess/ Evaluate critically the techniques presented and apply them to real-world problems	K5

Text books:

1. Stuart Russell, Peter Norvig, "Artificial Intelligence – A Modern Approach", Pearson Education. Fourth Edition 2021
2. Elaine Rich and Kevin Knight, "Artificial Intelligence", McGraw-Hill 3rdEdition 2010

Reference Books:

1) Patrick Henry Winston, "Artificial Intelligence", Pearson Education Inc., Third edition.
2) Python Machine Learning: Learn Python in a Week and Master It. An Hands-On Introduction to Artificial Intelligence Coding, a Project-Based Guide with Practical Exercises (7 Days Crash Course, Book 2) 2020.
3) Nils J.Nilsson, "Artificial Intelligence - A New Synthesis", Harcourt Asia Pvt. Ltd
4) AI in the Wild: Sustainability in the Age of Artificial Intelligence 2020.
5) Knowledge-Based Systems Techniques and Applications (4-Volume Set).

Links:

Unit 1	https://nptel.ac.in/courses/106/106/106106198/
Unit 2	https://nptel.ac.in/courses/111/107/111107137/
Unit 3	https://nptel.ac.in/courses/106/106/106106202/
Unit 4	https://nptel.ac.in/courses/106/106/106106213/
Unit 5	https://nptel.ac.in/courses/106/105/106105152/

B.TECH THIRD YEAR (VI SEMESTER)			
Course code	**AOE0664**	**L T P**	**Credits**
Course title	**INTRODUCTION OF DATA ANALYTICS**	**3 0 0**	**3**

Course objective: The objective of this course is to understand the fundamental concepts of Data analytics, learn about various types of data formats and its manipulations. It helps students to learn exploratory data analysis and visualization techniques in addition to R/Python/Tableau programming language.

Pre-requisites: Basic Knowledge of Statistics and Probability.

Course Contents / Syllabus

UNIT-I	**INTRODUCTION TO DATA SCIENCE**	**8 Hours**

Introduction to Data Science, Need for Data Science,the 5 V's, Evolution of Data Science, Data Science Lifecycle, types of Data Analysis, Data Science Tools and technologies, Applications of Data Science in various fields

UNIT-II	**DATA HANDLING**	**8 Hours**

Types of Data: structured, semi-structured, unstructured data, Numeric, Categorical, Graphical, High Dimensional Data, Transactional Data, Spatial Data, Social Network Data, standard datasets, Data Classification, Sources of Data, Data manipulation in various formats, import and export data in R/Python.

UNIT-III	**DATA PRE-PROCESSING**	**8 Hours**

Data Cleaning: - missing values, noisy data; Data Transformation: -Normalization, Attribute Selection, Discretization, Hierarchy Generation; Data Reduction: - Attribute Subset Selection, Numerosity and Dimensional Reduction, Exploratory Data Analysis techniques, Concept of data munging and data wrangling, Feature generation and Feature selection algorithms.

UNIT-IV	**DATA VISUALIZATION**	**8 Hours**

Introduction and importance of Data Visualization, Benefits, Idea and tools; Types of Data visualization, Libraries for Data visualization, Data visualization using Python/R, Creating Dashboards & Stories
Tableau: Getting started with Tableau Software, Using Data file formats, connecting your Data to Tableau, creating basic charts (line, bar charts, Tree maps).

UNIT-V	**APPLICATION**	**8 Hours**

Application of Data Science, Data Science and Ethical Issues-Discussion on privacy, security, Ethics-A look back at data science-next generation data scientists.Case Study of Data science-Facebook, uber and Amazon.

Course outcome: After completion of this course students will be able to:

CO 1	Understand the fundamental concepts of data analytics in the areas that plays major role within the realm of data science.	K1
CO 2	Explain and exemplify the most common forms of data and its representations.	K2
CO 3	Understand and apply data pre-processing techniques.	K3

CO4	Illustrate various visualization methods for different types of data sets and application scenarios.	K3
CO 5	Understand application and ethics of Data Science	K3

Textbooks:

1)Glenn J. Myatt, Making sense of Data: A practical Guide to Exploratory Data Analysis and Data Mining, John Wiley Publishers, 2007.

2)Data Analysis and Data Mining, 2nd Edition, John Wiley & Sons Publication, 2014.

Reference Books:

1)Open Data for Sustainable Community: Glocalized Sustainable Development Goals, Neha Sharma, Santanu Ghosh, MonodeepSaha, Springer, 2021.

2)The Data Science Handbook, Field Cady, John Wiley & Sons, Inc, 2017

3)Data Mining Concepts and Techniques, Third Edition, Jiawei Han, Micheline Kamber, Jian Pei, Morgan Kaufmann, 2012.

Links:

Unit 1	https://www.youtube.com/playlist?list=PL15FRvx6P0OWTlNBS_93NHG2hIn9cynVT
Unit 2	https://www.youtube.com/playlist?list=PLLy_2iUCG87DxxkLX4Pc3wCvsF1yAvz0T
Unit 3	https://www.youtube.com/watch?v=lhO3fBiMDag
Unit 4	https://www.youtube.com/watch?v=q4pyaVZjqk0
Unit 5	https://www.youtube.com/playlist?list=PLWPirh4EWFpGXTBu8ldLZGJCUeTMBpJFK

B.TECH THIRD YEAR (VI SEMESTER)			
Course Code	**AOE0665**	L T P	Credit
Course Title	**Soft-Skills and Personality Development**	3 0 0	3

Course objectives:

- To develop oral communication skills in professionals and leaders
- To follow best practices of public speaking in real life
- To revisit technical writing and reading
- To learn to listen actively
- To develop essential corporate soft-skills

Pre-requisites:

- The student must understandEnglish language&communication skills.
- The student must have completed all units from Semester 1 and Semester 4.

Course Content / Syllabus

UNIT-I	**Speaking in Public**	**7 Hours**

- Communicating effectively
- Domain specific terms
- Oral presentations – Individual
- Spontaneous speaking in different professional situations
- Group discussion - brainstorming

UNIT-II	**Effective use of Non-Verbal Communication Skills**	**3 Hours**

- Principles of non-verbal communication
- Appearance & body language: posture, gesture, eye contact, facial expression etc.
- Assertive vs Aggressive Style
- Paralanguage: Intonation, Voice-Modulation, Pacing & Pausing

UNIT-III	**Art of Fearless Interviewing**	**10 Hours**

- Job Interviews
  - Resume/CV based interviews
  - SWOT Analysis
  - Framing objectives
- Interviews in different situations
  - Telephonic interviews
  - Online Interviews
  - Dining Interviews

  Appraisal Interviews & Exit Interviews

UNIT-IV	**Revisiting Technical Writing & Listening Comprehension**	**5 Hours**

- Writing e-mails
- Writing Good News & Bad News Messages
- Developing Active Listening
- Reading/Listening to understand the gist & detailed information

UNIT-V	**Introduction to Soft-Skills**	**5 Hours**

- General etiquette
  - Cubicle etiquette
  - Mobile etiquette
  - Workplace etiquette
- Important aspects of personality
  - Developing a positive attitude

- Time management
- Realising strengths and limitations

Course outcome:

At the end of the course the students will be able toLevels

CO 1	Acquire the skills necessary to deliver effective presentations with clarity and impact.	L3
CO 2	Understand the importance of body language and tone of voice to enhance speaking skills.	L2
CO 3	Apply interview skills to enhance performance during job interviews.	L3
CO 4	Demonstrateactive listening, reading comprehension, and the ability to write clear and well-structured professional documents.	L3
CO 5	Imbibe the important elements of soft-skills.	L5

Reference Books

1. **Personality Development and Soft Skills** by Barun K Mitra, Oxford Univ. Press, 2012, New Delhi.

2. Rizvi, M. Ashraf. *Resumes and Interviews: The Art of Winning.* Tata McGraw Hill. New Delhi. 2008

3. Lesikar and Flatley. *Basic Business Communication: Skills for Empowering the Internet Generation.* 10th Edition. Tata McGraw-Hill.2005.

4. **Practical Communication: Process and Practice** by L U B Pandey; A.I.T.B.S. Publications India Ltd.; Krishan Nagar, 2014, Delhi.

5. **Modern Technical Writing** by Sherman, Theodore A (et.al); Apprentice Hall; New Jersey; USA

6.A Complete Guide to Write Right by Agarwal, Deepa. Scholastic, 1st edition

7. **Technical writing and communication**, R S Sharma, V.P. Publication, 1st edition

8. Business Communication for Managers by PayalMehra, Pearson Publication, Delhi.

B.TECH THIRD YEAR (VI SEMESTER)			
Course Code	**AOE0666**	**L T P**	
Course Title	**3D Printing and Design**	**3 0 0**	
Course objective:			
1	Understand the Fundamentals of various Rapid Prototyping Technologies for Application to various Industrial needs		K1,K2
2	Able to convert part file into STL format & Generating STL file from various Sources and Further Process		K3, K4
3	Able to understand the method of Manufacturing of Liquid Based, Powder Based and Solid Based RP Techniques		K3
4	Understand the Manufacturing procedure of a Prototype using FDM, SLA Techniques		K3
5	Understand the broad aspects of Rapid Prototyping and Interconnected & Interdisciplinary Applications & Techniques		K4, K5

Pre-requisites:
Basic knowledge of manufacturing system and polymers

Course Contents / Syllabus

UNIT-I	Introduction	6 hours

Prototyping Fundamentals, Historical Development, Advantages of RP, Commonly Used Terms, 3D Modeling, 3D Scanning, Data Conversion and Transmission, Checking, Repairing and Preparing (Slicing), Preprocessing, Building, Post Processing,RP Data Formats, Classification of RP Process with Different Aspects, Applications & Limitations

UNIT-II	Liquid Based RP Systems	10 hours

Stereo Lithography Apparatus (SLA): Models and Specifications, Process,Working Principle, Photopolymers, Photo Polymerization, Light Sources, Industrial Applications, Advantages and Disadvantages, case studies, Practical Demonstration. **Solid Ground Curing (SGC):** Models and Specifications, Process, Working, Principle, Industrial Applications, Advantages and Disadvantages. **PolyJet:** Models and Specifications, Process, Working, Principle, Industrial Applications, Advantages and Disadvantages and case studies.

UNIT-III	Solid Based RP Systems	10 hours

Laminated Object Manufacturing (LOM): Models and Specifications, Process, Working Principle, Industrial Applications, Advantages and Disadvantages, Case Studies. **Ultrasonic Consolidation:** Models and Specifications, Process, Working Principle, Industrial Applications, Advantages and Disadvantages, Case Studies. **Fused Deposition Modeling (FDM):** Models and Specifications, Process, Working Principle, Industrial Applications, AdvantagesandDisadvantages,CaseStudies,PracticalDemonstration.SolidBasedRP Systems, Materials and Parameters.

UNIT-IV	Powder Based RP Systems	10 hours

Selective Laser Sintering (SLS): Models and Specifications, Process, Working Principle, Industrial Applications, Advantages and Disadvantages, Case Studies. **Binder Jetting**: Models and Specification, Process, Working Principle, Industrial Applications, Advantages and Disadvantages, Case Studies. **Inkjet Fusion:** Models and Specification, Process,

Working Principle, Industrial Applications, Advantages and Disadvantages, caseStudies.
Powder Materials for Powder Based RP Systems

UNIT-V	Advancement in RP Technology	8 hours

Composite 3D Printing: Models and Specifications, Process, Working Principle, Applications, Advantages and Disadvantages, Case Studies, Materials, Practical Demonstration. **Interdisciplinary Applications:**Biomedical, Dental, Prosthetics, Fashion, Food, Architecture etc. **Industrial trends in RP:** DFRP, Design Applications &Advancement
in Manufacturing, Tooling & Production. Batch Production and Associated Technologies: Vacuum Casting, Thermo Forming etc.

Courseoutcome: **After completion of this course students will be ableto**

CO 1	Understand the fundamentals of Rapid Prototyping Technologies for Engineering Applications	K1,K2
CO 2	Understand the methodology to Manufacture the Products using SLA, SGC, PolyJet and CLIP Technologies and study their Applications , Advantages and Case Studies & Materials	K3, K4
CO 3	Understand the methodology to Manufacture the Products using LOM, Ultrasonic Consolidation and FDM Technologies and study their applications , advantages and case studies &Materials	K3
CO 4	Understand the methodology to Manufacture the Products using SLS, Binder Jetting and InkJet Fusion Technologies and study their Applications , Advantages and Case Studies &Materials	K3
CO 5	Understand the Advancements, Scopes, Design Aspects & Associated Applications & Techniques	K4, K5

Text books and Reference Books

1. Chua C.K., Leong K.F. and LIM C.S Rapid prototyping: Principles an applications,World Scientific publications, 3rdEd., 2010

2. D.T. Pham and S.S. Dimov, "Rapid Manufacturing", Springer, 2001

3. Terry Wohlers, " Wholers Report 2000", Wohlers Associates, 2000

4. Paul F. Jacobs, " Rapid Prototyping and Manufacturing"–, ASME Press, 1996

5. Ian Gibson, Davin Rosen, Brent Stucker "Rapid Prototyping Technologies, Springer, 2nd Ed, 2014

Link: NPTEL/ YouTube/ Faculty Video Link:

UNIT 1 https://youtu.be/9JTRqfNAqhM

UNIT 2https://youtu.be/Aq6Ea8TBIbs

UNIT 3https://youtu.be/Ua7pEn7Rsws

UNIT 4https://youtu.be/Zc24aoyQAM8

UNIT 5https://youtu.be/htMr1oFE7Zg

B.TECH THIRD YEAR (VI SEMESTER)			
Course Code	**AOE0667**	L T P	Credit
Course Title	**Digital Marketing**	3 0 0	3
Course objective:		**Duration: 40 Hours**	
1	Provide understanding of digital and social media marketing practices.		
2	Provide understanding of different social media platforms		
3	Impart learning on various digital channels and how to acquire and engage consumers online.		
4	Provide insights on building organizational competency by way of digital marketing practices and cost considerations.		
5	Develop understanding of the latest digital practices for marketing and promotion.		

Prerequisites: Student must have basic understanding of Marketing and Social media.

Course Contents / Syllabus

UNIT-I	**Introduction to Digital Marketing**	**Hours- 8**

Introduction to Digital Marketing: Concept of Marketing, the new digital world - trends that are driving shifts from traditional marketing practices to digital marketing practices, the modern digital consumer and new consumer's digital journey. Marketing strategies for the digital world-latest practices.

UNIT-II	**Social Media Marketing**	**Hours-8**

Introduction to Blogging, Create a blog post for your project. Include headline, imagery, links and post, Content Planning and writing. Introduction to Face book, Twitter, Google +, LinkedIn, YouTube, Instagram and Pinterest; their channel advertising and campaigns

UNIT-III	**Acquiring & Engaging Users through Digital Channels**	**Hours-8**

Understanding the relationship between content and branding and its impact on sales, search engine marketing, overview of search engine optimization (SEO), mobile marketing, video marketing, and social-media marketing. Marketing gamification, marketing analytic tools to segment, target and position.

UNIT-IV	**Designing Organization for Digital Success**	**Hours-8**

Digital transformation, digital leadership principles, online P.R. and reputation management. ROI of digital strategies, how digital marketing is adding value to business, and evaluating cost effectiveness of digital strategies

UNIT-V	**Digital Innovation and Trends**	**Hours-8**

The contemporary digital revolution, digital transformation framework; security and privatization issues with digital marketing Understanding trends in digital marketing – Indian and global context, online communities and co-creation.

Course outcome: At the end of course, the student will be able to

CO 1	Develop an understanding of digital and social media marketing practices.	Knowledge (K2), Remembering (K1)
CO 2	Develop understanding of the social media platforms	Comprehending (K 3)

CO 3	Acquire the skill to acquire and engage consumers online	Knowledge (K2), Applying (K4)
CO 4	Develop understanding of buildingorganizational competency by way of digital marketing practices and cost considerations	Knowledge (K2), Analyzing (K5)
CO 5	Develop understanding of the latest digital practices for marketing and promotion.	Knowledge (K2), Applying (K4)

Text books

1. MoutsyMaiti: Internet Marketing, Oxford University Press India (June, 2017)
2. Vandana, Ahuja; Digital Marketing, Oxford University Press India (January, 2021).

Reference Books

1. Eric Greenberg, and Kates, Alexander; Strategic Digital Marketing: Top Digital Experts Share the Formula for Tangible Returns on Your Marketing Investment; McGraw-Hill Professional (October, 2013).
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