

List of Open Elective Subjects

Sr. No	Subject Code	Name of open Elective Subjects	Type of Subject	Subject offered to Program	Semester
1	BOE0661	Introduction To Bio Informatics	Open Elective-I	ALL the Programs Except BT	6
2	BOE0662	Data Structures	Open Elective-I	EC, ME,BT	6
3	BOE0663	Artificial Intelligence	Open Elective-I	ME, BT	6
4	BOE0664	Introduction to DATA Analytics	Open Elective-I	EC, ME,BT	6
5	BOE0665	Soft Skills & Personality Development	Open Elective-I	ALL the Programs	6
6	BOE0666	3-D Printing& Design	Open Elective-I	ALL the Programs Except ME	6
7	BOE0667	Digital Marketing	Open Elective-I	ALL the Programs	6

B.TECH THIRD YEAR (VI SEMESTER)			
Course Code	BOE0661	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	BOE0662	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 et al, “Data Structures and Program Design in C”, Pearson Education. (2007)
5. Berziss, 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
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B.TECH THIRD YEAR (VI SEMESTER)			
Course Code	BOE0663	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 3rd Edition 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	BOE0664	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=PL15FRvx6P0OWTINBS_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	BOE0665	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 understand English 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 to Levels		
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	Demonstrate active 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. <i>Resumes and Interviews: The Art of Winning</i> . Tata McGraw Hill. New Delhi. 2008		
3. Lesikar and Flatley. <i>Basic Business Communication: Skills for Empowering the Internet Generation</i> . 10 th 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, 1 st edition		
7. Technical writing and communication , R S Sharma, V.P. Publication, 1 st edition		
8. Business Communication for Managers by Payal Mehra, Pearson Publication, Delhi.		

B.TECH THIRD YEAR (VI SEMESTER)			
Course Code	BOE0666	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 able to		
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 2 https://youtu.be/Aq6Ea8TBlbs		
UNIT 3 https://youtu.be/Ua7pEn7Rsws		
UNIT 4 https://youtu.be/Zc24aoyQAM8		
UNIT 5 https://youtu.be/htMr1oFE7Zg		

B.TECH THIRD YEAR (VI SEMESTER)								
Course Code		BOE0667			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 building organizational 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. Moutsy Maiti: 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). 2. Ryan, Damian; Understanding Digital Marketing: marketing strategies for engaging the digital generation; Kogan Page (3rd Edition, 2014). 3. Tracy L. Tuten & Michael R. Solomon : Social Media Marketing (Sage Publication)		