Assam University, Silchar

Four Year Undergraduate Programme

Implemented under NEP 2020

Effective from the Academic Year 2023-24

Syllabus of Bachelor of Vocation (B. Voc.)Information Technology
(4th Year)

Approved in the 99th meeting of the Academic Council on 22.05.2025 vide Resolution No AC:99:05-25:5

Programme Specific Outcome

On successful completion of the FYUG B.Voc. (Information Technology) Programme, students will be able to:

1. Acquire various skills in the field of Information Technology. This includes skills related to various office automation tools like MS Office, PowerPoint, MS Excel, etc., and their applications.
2. Gain knowledge about the fundamentals of computer systems and their working. Further students will be able to develop programming skills with programming languages C, JAVA, Python, etc. by actually designing programs in concerned laboratories.
3. Learn about digital electronics, computer networking, operating systems, and related areas both theoretically and with practice by performing rigorous experiments in the laboratories.
4. Design, develop, and implement data structures and algorithms for problem-solving in various domains by virtue of training in the laboratories.
5. Learn scripting and web development tools like PHP, JavaScript, etc., and apply these to design and develop real-world tools.
6. Equip themselves with the knowledge of financial accountancy and develop expertise in software like Tally.
7. Get exposure to the modern concepts of computing like Artificial Intelligence, Cyber Security, Animation, E-Commerce, and various Internet Technologies as part of this Programme.
8. Get training in soft skills, languages, and management through various allied courses.
9. Get industrial exposure in the field of information technology through an internship with industry.
10. Seek employment in various jobs in the Government sector as well as IT and related industries and perform various roles related to software development,testing, and maintenance.

Table 1: Semester wise list of B. Voc. (Information Technology) DSC Course

Semester	Course Code	Title of The Course	Credits	L-T-P
I	BVIT-DSC-101	Fundamentals of Computer Systems	2	2-0-0
	BVIT-DSC-102	Office Tools and Applications	2	2-0-0
II	BVIT-DSC-151	Computer Network	2	2-0-0
	BVIT-DSC-152	(A) Introduction to Digital Electronics	2	2-0-0
		(B) Digital Electronics Laboratory	2	0-0-4
III	BVIT-DSC-201	Data Structure	4	4-0-0
	BVIT-DSC-202	Database Management System	3	3-0-0
IV	BVIT-DSC-251	Java Programming	3	3-0-0
	BVIT-DSC-252	Operating System	3	3-0-0
	BVIT-DSC-253	Operating System Laboratory	4	0-0-8
V	BVIT-DSC-301	Java Script	2	2-0-0
	BVIT-DSC-302	Graphic Design and Applications	2	2-0-0
	BVIT-DSC-303	(A) Java Script Laboratory	2	0-0-4
		(B) Graphic Design and Application Laboratory	2	0-0-4
VI	BVIT-DSC-351	Web Development with PHP	3	3-0-0
	BVIT-DSC-352	Introduction to Artificial Intelligence Frameworks	2	2-0-0
	BVIT-DSC-353	Internet Technologies	3	3-0-0
	BVIT-DSC-354	(A) Web Development with PHP Laboratory	4	0-0-8
		(B) Artificial Intelligence Tools Laboratory	4	0-0-8
VII	BVIT-DSC-401	(A) Digital Marketing	2	2-0-0
		(B) Digital Marketing Laboratory	3	0-0-6
	BVIT-DSC-402	(A) Animation and Visual Effects	2	2-0-0
		(B) Animation and Visual Effects Laboratory	3	0-0-6
	BVIT-DSC-403	Cyber Security	2	2-0-0
	BVIT-DSC-404	Mobile Application Development Laboratory	3	0-0-6
VIII	BVIT-DSC-451	Design and Analysis of Computer Algorithms	4	4-0-0

Table 2: Semester wise list of B. Voc. (Information Technology) DSM Course

Semester	Subject	Course Code	Title of The Course	Credits	L-T-P
I	BVOC-DSM-1	BVIT-DSM-101	(A) Programming Skills using C	2	2-0-0
			(B) Programming Skills using C Laboratory	3	0-0-6
II	BVOC-DSM-2	BVIT-DSM-151	Computer Network Laboratory	3	0-0-6
III	BVOC-DSM-1	BVIT-DSM-201	Database Management System Laboratory	4	0-0-8
IV	BVOC-DSM-1	BVIT-DSM-251	Java Programming Laboratory	4	0-0-8
	BVOC-DSM-2	BVIT-DSM-252	(A) E-Commerce	2	2-0-0
			(B) E-CommerceLaboratory	2	0-0-4
V	BVOC-DSM-1	BVIT-DSM-301	(A) Python Programming	2	2-0-0
			(B) Python Programming Laboratory	4	0-0-8
	BVOC-DSM-2	BVIT-DSM-302	(A) Financial Accounting and Tally	2	2-0-0
			(B) Financial Accounting and Tally Laboratory	2	0-0-4
VI	BVOC-DSM-2	BVIT-DSM-351	Internet Technologies Laboratory	4	0-0-8
VII	BVOC-DSM-1	BVIT-DSM-401	(A) Software Engineering	2	2-0-0
			(B) Software Engineering Laboratory	3	0-0-6
VIII	BVOC-DSM-2	BVIT-DSM-451	Multimedia	4	4-0-0

Table 3: Semester wise list of B. Voc. (Information Technology) SEC Course

Semester	Course Code	Title of The Course	Credits	L-T-P
I	BVIT-SEC-101	Office Tools and Applications Laboratory	3	0-0-6
II	BVIT-SEC-151	OS Installation, Internet, hardware Assembling Laboratory	3	0-0-6
III	BVIT-SEC-201	Data Structure Laboratory	4	0-0-8
IV	-	-	-	
V	BVIT-SEC-301	Internship with Industry/ Community Engagement/ Field Study	2	0-0-4
VI	-	-	-	
VII	-	-	-	
VIII	BVIT-SEC-451	Project	12	0-0-24

Table 4: Semester wise list of B. Voc. (Information Technology) IDC Course

Semester	Course Code	Title of The Course	Credits	L-T-P
I	BVIT-IDC-101	Fundamentals of Information Technology	3	3-0-0
II	BVIT-IDC-151	Introduction to Web Technology	3	3-0-0
III	BVIT-IDC-201	Cyber Security	3	3-0-0

***** NOTE:

- Mathematics maybe chosen as an IDC paper
- Evaluation method and marks distribution for combined paper i.e. Theory +Practical shall be as follows:

  Theory: End Semester Examination - 35 Marks, Internal Test - 15 Marks Practical:

  End Semester Examination - 35 Marks, Internal Test - 15 Marks
- For 2 credit paper, marks distribution shall be as follows:

  End Semester Examination - 35 Marks, Internal Test - 15 Marks
- For papers of 35 and 50 marks, the end semester examination shall be of 2 hoursduration.

Syllabi of B. Voc. (Information Technology) DSC Courses

Semester : VII
Course Type : DSC
Course Code : BVIT-DSC-401 (A)
Name of the Course : Digital Marketing

Learning level	**:**	**Advanced Course**
Credits	**:**	**2**
Contact Hours	**:**	**2 Hours per week**
Total Marks	**:**	**50**
End Semester Marks	**:**	**35 (Pass Marks: 14)**
Internal Marks	**:**	**15 (Pass Marks: 6)**
End Semester Exam Time	**:**	**2 hours**

Course Objectives: *The course objective is to*

1. Provide a solid foundation in the basics of digital marketing
2. Teach learners how to develop and execute a comprehensive digital marketing strategy.
3. Foster creativity and innovation, encouraging students to create compelling visuals, videos, and written content and developing unique marketing campaigns that stand out in a crowded digital landscape.
4. Keep learners updated with the latest trends and best practices, ensuring they remain competitive in the field.
5. Enhance career prospects

UNIT-I

Introduction to Digital Marketing: Overview of digital marketing, Evolution of digital marketing, Importance and benefits of digital marketing, Digital marketing channels and platforms. **Digital Marketing Strategy and Planning:** Developing a digital marketing strategy, Setting goals and objectives, Budgeting and resource allocation

UNIT-II

Campaign planning and execution, Monitoring and adjusting digital marketing campaigns **Social Media Marketing:** Overview of social media marketing, social media platforms and their features, Creating and optimizing social media profiles, Social media content strategy, Social media advertising and analytics

UNIT-III

Email Marketing: Introduction to email marketing, Building an email list, Creating effective email campaigns, Email automation and segmentation, Email marketing metrics and analytics Content Marketing: Understanding content marketing, Content strategy and planning.

UNIT-IV

Content creation and distribution, Content promotion and amplification, Content marketing metrics and analytics. **Mobile Marketing:** Mobile marketing overview, Mobile advertising strategies, Mobile app marketing, Location-based marketing, Mobile marketing analytics

UNIT-V

Analytics and Reporting: Importance of analytics in digital marketing, setting up web analytics tools (e.g., Google Analytics), Tracking and measuring key performance indicators (KPIs), Conversion tracking and optimization, Reporting and data visualization.

Course Outcomes: *Upon successful completion of the course, the students will be able to*

1. *Understand the fundamental concepts and principles of digital marketing.*
2. *Develop practical skills to implement various digital marketing strategies and techniques.*
3. *Analyze and evaluate the effectiveness of digital marketing campaigns.*
4. *Apply critical thinking and problem-solving skills to real-world digital marketing scenarios.*
5. *Create comprehensive digital marketing plans and strategies.*

Text Books:

1. **Digital Marketing** by S.Gupta, McGraw-Hill (3rd Edition, 2022).
2. **Understanding Digital Marketing: Marketing Strategies for Engaging the Digital Generation** by Damian Ryan, Kogan Page (4th illustrated edition, 2017)

Reference books:

1. **Digital Marketing Strategy: An Integrated Approach to Online Marketing** by Simon Kingsnorth, Kogan Page (3rd illustrated Edition, 2022).
2. **Mobile Marketing: How Mobile Technology is Revolutionizing Marketing, Communications and Advertising** by Daniel Rowles, Kogan page(2nd Edition, 2017)
3. **Email Marketing Rules: How to Wear a White Hat, Shoot Straight, and Win Hearts** by Chad White and Jay Baer, Createspace Independent Pub (2013)
4. **Web Analytics 2.0: The Art of Online Accountability and Science of Customer Centricity** by Avinash Kaushik, Sybex (1st Edition, 2009)

Semester	**:**	**VII**
Course Type	**:**	**DSC**
Course Code	**:**	**BVIT-DSC-401 (B)**
Name of the Course	**:**	**Digital Marketing Laboratory**
Learning level	**:**	**Advanced Course**
Credits	**:**	**3**
Contact Hours	**:**	**6 Hours per week**
Total Marks	**:**	**100**
End Semester Marks	**:**	**70 (Pass Marks: 28)**
Internal Marks	**:**	**30 (Pass Marks: 12)**
End Semester Exam Time	**:**	**3 hours**

Course Objectives: *The course objective is to*

1. Enhance creativity and innovation in the field of digital marketing.
2. Education that combines theoretical knowledge with practical skills, strategic thinking, creativity, and up-to-date industry insights.

Following are some programming tasks for laboratory programming assignments but the assignments are not limited to these only.

1 Digital Marketing Implementation in Business Scenario.

2 Create the Digital Marketing Webpage.

3 Conducting the Search Engine Optimization and Search Engine Marketing.

4 Using Google Analytics to analyze website performance.

5 Creating Promotional banners through Canva.

6 Facebook Promotion using banners.

7 Creating YouTube Channel for Marketing.

8 Twitter Marketing.

9 Instagram Marketing.

10 Email Marketing.

11 Digital Marketing Final Analysis and Report.

Course Outcomes: *Upon successful completion of the course, the students will be able to*

1. *Create digital marketing webpage.*
2. *Develop practical skills to implement various digital marketing strategies and techniques.*
3. *Use facebook promotion using banners*

4. *Apply critical thinking and problem-solving skills to real-world digital marketing scenarios.*
5. *Use and implement Instagram and email marketing strategies.*

Semester	**:**	**VII**
Course Type	**:**	**DSC**
Course Code	**:**	**BVIT-DSC-402 (A)**
Name of the Course	**:**	**Animation and Visual Effects**
Learning level	**:**	**Advanced Course**
Credits	**:**	**2**
Contact Hours	**:**	**2 Hours per week**
Total Marks	**:**	**50**
End Semester Marks	**:**	**35 (Pass Marks: 14)**
Internal Marks	**:**	**15 (Pass Marks: 6)**
End Semester Exam Time	**:**	**2 hours**

Course Objectives: *The course objective is to*

1. Provides students with a comprehensive understanding of animation and its techniques.
2. Provides students an in-depth exploration of the foundational principles and techniques used in digital compositing.
3. Provides students with a solid knowledge about 2D animation.
4. Provides students a theoretical knowledge about media ethics and copy right law

UNIT I

Introduction: Animation, uses of animation: Cartoons, simulations, scientific visualization, analysis, understanding, teaching, Techniques of animation, Different types of animation: 2Danimation, 3D animation, Stop Motion animation, sand animation, pixilation, paint on glass animation, clay animation, puppet animation, object animation, Cut out animation, Digital Painting, Different painting styles: Landscape, portrait, still-life - Creating depth in digital paintings. Introduction of painting software (Tools and techniques).

UNIT II

Principles of Animation: Squash and stretch, anticipation, staging, straight ahead and pose to pose, follow through and overlapping action, slow in and slow out, arc, secondary action, timing, exaggeration, solid drawing. Character development: Model sheet, Composition and drawing, Traditional 2D production workbook, editorial, Layout, scene planning and scanning, Scene planning checklist, blue sketch and clean up layout, clean up animation, visual effects, BG painting, animation checking, Ink and paint, final checking, compositing/ film output.

UNIT III

2D animation: Use of light boards for animation, use of peg bars for registration, Use of key frames in animation, in-betweens, working on details with line strokes for smooth flow of animation. Introduction to compositing: Overview of composting in film and animation, Importance of compositing in visual storytelling, Difference between visual effects and special effects, Depth and perspective in compositing, Composting software

UNIT IV

Introduction to Storyboard, Types of Storyboard, Storyboard in Pre- Production, Benefits of Production, Artist and the Storyboard, Components and Principles of Storyboard, Drawing Thumbnail Storyboard, Sketching Perspective, Adding reality with Perspective, Final Storyboard art and theme, Storyboard Coloring.

UNIT V

Media Ethics and Copyright Law: Media ethics, Role and importance of Business Ethics and Values in Business, Ethics Impact on Business Policy and Business strategy, Role of bodies like Competition Commission of India, Media Law, Copyright and Intellectual Property IPR & copyright laws, Copyright Agreements: Short-Term vs. Long-Term Agreements, Media Law and Infringements: Menace of piracy and remedies to counter piracy, Statutory and non-statutory bodies formed to fight piracy.

Course Outcomes: *Upon successful completion of the course, the students will be able to*

1. Develop the skill of using Animation Equipments and tools
2. Develop Basics of Animation Principles
3. Build Skill of creating Animation
4. Create Character Animation

Text Books:

1. **Animation for Beginners** by Morr Meroz (Author), Bloop Animation Studios LLC; 2nd ed. edition (20 October 2021)
2. **The Encyclopaedia of Animation Techniques:** Richard Taylor 1999 2.
3. **How to Write for Animation**: Jeffrey Scott 2003

Reference Books:

1. **Writing for Animation, Comics and Games**: Christy Marx 2003
2. **How to Draw Animation - Learn the Art of Animation from Character Design to Storyboards and Layouts**: Christopher Hart 1997
3. **The Art of the Storyboard - Storyboarding for Film, TV, and Animation**: John Hart 2007
4. **Acting Using a Pencil: How To Plan an Animation Film:** Vineeth V 2022
5. **Don Bluth's Art of Storyboard**: Don Bluth 2004

Semester	**:**	**VII**
Course Type	**:**	**DSC**
Course Code	**:**	**BVIT-DSC-402 (B)**
Name of the Course	**:**	**Animation and Visual Effects Laboratory**
Learning level	**:**	**Advanced Course**
Credits	**:**	**3**
Contact Hours	**:**	**6 Hours per week**
Total Marks	**:**	**100**
End Semester Marks	**:**	**70 (Pass Marks: 28)**
Internal Marks	**:**	**30 (Pass Marks: 12)**
End Semester Exam Time	**:**	**3 hours**

Course Objectives: *The course objective is to*

1. Provides students with a practical knowledge of animation and its techniques.
2. Provides students an in-depth exploration of the techniques used in digital compositing.
3. Provides students with a practical knowledge about 2D animation.

Following are some programming tasks for laboratory programming assignments but the assignments are not limited to these only.

1. Working with camera for the shoot
2. Applying camera for frame to frame shoot
3. Use of color scheme for characters and sets
4. Application of cut out character creation
5. Animation using cut out character
6. Use of software for compositing the frames
7. Use of Key Frames in animation
8. Application of adding up extra details and poses
9. Application Pencil test for animation check
10. Editing of Animation after pencil test
11. Importing scanned images into the software through layers
12. Checking timing in software to achieve smooth animation
13. Creating a Basic animation using effects and Pre-sets
14. Animating text
15. Working with shape Layers

Course Outcomes: *Upon successful completion of the course, the students will be able to*

1. *Apply camera for frame to frame shoot*

2. *Use color scheme for characters and sets*
3. *Create animation using cut out character*
4. *Use key frames in animation*
5. Develop the skill of using Animation Equipments and tools
6. Create Character Animation

Semester	**:**	**VII**
Course Type	**:**	**DSC**
Course Code	**:**	**BVIT-DSC-403**
Name of the Course	**:**	**Cyber Security**
Learning level	**:**	**Advanced Course**
Credits	**:**	**2**
Contact Hours	**:**	**2 Hours per week**
Total Marks	**:**	**50**
End Semester Marks	**:**	**35 (Pass Marks: 14)**
Internal Marks	**:**	**15 (Pass Marks: 6)**
End Semester Exam Time	**:**	**2 hours**

Course Objectives: *The course objective is to*

1. Learn the foundations of Cyber security and threat landscape.
2. To equip students with the technical knowledge and skills needed to protect and defend against cyber threats.
3. To develop skills in students that can help them plan, implement, and monitor cyber security mechanisms to ensure the protection of information technology assets.
4. To expose students to governance, regulatory, legal, economic, environmental, social and ethical contexts of cyber security.
5. To expose students to responsible use of online social media networks.
6. To systematically educate the necessity to understand the impact of cyber crimes and threats with solutions in a global and societal context.
7. To select suitable ethical principles and commit to professional responsibilities and human values and contribute value and wealth for the benefit of the society.

UNIT I

Introduction to Cyber Security– Defining Cyberspace, Architecture of cyberspace, Communication and web technology, Internet infrastructure for data transfer and governance, Internet society, Regulation of cyberspace, Concept of cyber security, Issues and challenges of cyber security.

UNIT II

Cyber Crime and Cyber Law- Classification of cyber crimes, Common cyber crimes- cyber crime targeting computers and mobiles, cyber crime against women and children, financial frauds, social engineering attacks, malware and ransomware attacks, zero day and zero click attacks, Cybercriminals modus-operandi , Reporting of cyber crimes, Remedial and mitigation measures, Legal perspective of cyber crime, IT Act 2000 and its amendments,

Cyber crime and offences, Organisations dealing with Cyber crime and Cyber security in India.

UNIT III

Social Media Overview and Security- Introduction to Social networks, Types of Social media, Social media platforms, Social media monitoring, Hashtag, Viral content, Social media marketing, Social media privacy, Challenges, opportunities and pitfalls in online social network, Security issues related to social media, Flagging and reporting of inappropriate content, Laws regarding posting of inappropriate content, Best practices for the use of Social media.

UNIT IV

E-Commerce and Digital Payments- Definition of E- Commerce, Elements of E-Commerce security, E-Commerce threats, E-Commerce security best practices, Introduction to digital payments, Components of digital payment and stake holders, Modes of digital payments- Banking Cards, Unified Payment Interface (UPI), e- Wallets, Unstructured Supplementary Service Data (USSD), Aadhar enabled payments, Digital payments related common frauds and preventive measures. RBI guidelines on digital payments and customer protection in unauthorised banking transactions. Relevant provisions of Payament Settlement Act-2007

UNIT V

Digital Devices Security, Tools and Technologies for Cyber Security- End Point device and Mobile phone security, Password policy, Security patch management, Data backup, Downloading and management of third party software, Device security policy, Cyber Security best practices, Significance of host firewall and Ant-virus, Management of host firewall and Anti-virus, Wi-Fi security, Configuration of basic security policy and permissions.

Course Learning Outcomes: *After successful completion of the course, the students will be able to*

1. *Understand the cyber security threat landscape.*
2. *Develop a deeper understanding and familiarity with various types of cyber attacks, cyber crimes, vulnerabilities and remedies thereto.*
3. *Analyse and evaluate existing legal framework and laws on cyber security.*
4. *Analyse and evaluate the digital payment system security and remedial measures against digital payment frauds.*
5. *Analyse and evaluate the importance of personal data its privacy and security.*
6. *Analyse and evaluate the security aspects of social media platforms and ethical aspects associated with use of social media.*

Text Books:

1. **Cyber Crime Impact in the New Millennium**, by R. C Mishra , Auther Press. Edition 2010.
2. **Cyber Security Understanding Cyber Crimes, Computer Forensics and Legal Perspectives** by Sumit Belapure and Nina Godbole, Wiley India Pvt. Ltd. (1st Edition, 2011).
3. **Security in the Digital Age: Social Media Security Threats and Vulnerabilities** by Henry A. Oliver, Create Space Independent Publishing Platform. (Pearson, 13th November, 2001).
4. **Cyber Laws: Intellectual Property & E-Commerce Security** by Kumar K, Dominant Publishers.

Reference Books:

1. **Electronic Commerce** by Elias M. Awad, Prentice Hall of India Pvt Ltd.
2. **Cyber Laws: Intellectual Property & E-Commerce Security** by Kumar K, Dominant Publishers.
3. **Network Security Bible**, Eric Cole, Ronald Krutz, James W. Conley, 2nd Edition, Wiley India Pvt. Ltd.
4. **Fundamentals of Network Security** by E. Maiwald, McGraw Hill.

Semester	**:**	**VII**
Course Type	**:**	**DSC**
Course Code	**:**	**BVIT-DSC-404**
Name of the Course	**:**	**Mobile Application Development Laboratory**
Learning level	**:**	**Advanced Course**
Credits	**:**	**3**
Contact Hours	**:**	**6 Hours per week**
Total Marks	**:**	**100**
End Semester Marks	**:**	**70 (Pass Marks: 28)**
Internal Marks	**:**	**30 (Pass Marks: 12)**
End Semester Exam Time	**:**	**3 hours**

Course Objectives: *The course objective is to*

1. Provides students with a practical knowledge development of mobile application.
2. Provides students an exploration of the Flutter Software and Dart program

Following are some programming tasks for laboratory programming assignments but the assignments are not limited to these only.

1. Flutter Introduction: Knowing Flutter Architecture and Lifecycle
2. Basic Dart Program
3. Create your First functional App. Build your own Tip Calculator App
4. Creating your own E-commerce and Wallpaper App UI
5. Creating your own Whatsapp and Facebook App UI
6. Creating your own complete To Do App managing data in app local DB
7. Create a complete Quiz App managing Category wise and Difficulty wise Ques, Options with Correct Answer and Markings and presenting the same with UI managing High scores
8. Build your First Responsive and Adaptive App UI which can run on different sizes of all platforms.(ex. make WhatsApp app responsive and adaptive)
9. Manage Dark theme and light theme in your Apps using Provider(ex. make netflix app handle Light and Dark theme)
10. Build Complete News and Weather app handling API endpoints and their response with API exception handling
11. Build a complete Chat app Managing Users, Chat, read status, unread count, new message, bookmarks, profile picture
12. Complete your own OTT Netflix App managing videos on Firebase and Handling the videos with video player.
13. Integrating Ads in all the above Applications

Course Learning Outcomes: *After successful completion of the course, the students will be able to:*

1. *Develop functional mobile application*
2. *Create E-commerce Mobile application based User Interface*
3. *Create responsive and adaptive mobile App User Interface*
4. *Integrate ads in mobile application*

Semester	**:**	**VIII**
Course Type	**:**	**DSC**
Course Code	**:**	**BVIT-DSC-451**
Name of the Course	**:**	**Design and Analysis of Computer Algorithms**
Learning level	**:**	**Advanced Course**
Credits	**:**	**4**
Contact Hours	**:**	**4 Hours per week**
Total Marks	**:**	**100**
End Semester Marks	**:**	**70 (Pass Marks: 28)**
Internal Marks	**:**	**30 (Pass Marks: 12)**
End Semester Exam Time	**:**	**3 hours**

Course Objectives: *The course objective is to*

1. *Learn fundamental techniques for designing efficient algorithms, including divide and conquer, greedy methods, dynamic programming, and backtracking*
2. *Analyzing Algorithm Efficiency using asymptotic notation (Big O, Omega, Theta)*
3. *Study graph algorithms such as BFS, DFS, shortest path and minimum spanning tree (Kruskal, Prim).*
4. *Understand P vs NP problems, reducibility, and heuristic approaches for solving complex problems.*

UNIT-I

Introduction: Writing Structured programs, Analyzing Algorithms, Stacks and Queues, Trees, Heaps and Heap sort, Graphs, Hashing.

UNIT-II

Divide and Conquer: The general concept, Binary Search, Finding the maximum and minimum, Merge sort, Quick sort, Selection sort, Strassen's matrix manipulation, Greedy methods, Minimum spanning trees.

UNIT-III

Dynamic Programming: The General method, Multi stage graphs, All pairs shortest paths, Optimal binary search trees, Reliability design, The Travelling sales person Problem, Flow shop scheduling.

UNIT-IV

Basic search and traversal techniques: The techniques, Code generation, AND/OR graphs, Game trees, Biconnected components, Depth first search and Breadth first search

UNIT-V

Backtracking: the Queens problems, Introduction to NP- Hard and NP- Complete problems.

Course Learning Outcomes*: After successful completion of the course, the students will be able to*

1. *Analyze Algorithm Efficiency i.e. evaluate the time and space complexity of algorithms using asymptotic notations (Big O, Ω, Θ) and differentiate between worst-case, best-case, and average-case complexities.*
2. *Apply Algorithmic Design Techniques*
3. *Develop algorithms using techniques such as divide and conquer, greedy algorithms, dynamic programming, backtracking, and branch & bound.*
4. *Identify the appropriate algorithmic approach for solving different types of problems.*
5. *Understand NP-Completeness and Computational Complexity i.e. distinguishes between P, NP, NP-complete, and NP-hard problems.*

Text Books:

1. S. Sahni, and Horowitz, Rajasekaran, **Computer Algorithm**, 7th Edition, Galgotia Publications, 2010
2. Horowitz and Sahni, **Fundamentals of Computer Algorithm**, 6th Edition, Galgotia Publications, 2012
3. Aho, Hopcroft and Ullman, **Design and Analysis of Computer Algorithm**, 3rd Edition, Addison-Wesley, 2014.
4. S. E Goodman and S. T Hedet, **Introduction to the Design and Analysis of Algorithm**, 4th Edition, 2009.

Reference Books:

1. S.K Basu, **Design Methods and Analysis of Algorithms**, 2nd Edition, PHI, 2005.
2. Gilles Brassard and Paul Brantley, **Algorithmic theory and Practices**, 3rd Edition, PHI, 2007.
3. Knuth, **Fundamental Algorithms, The Art of Computer Programming**, Vol-1, 3rd Edition, Addison-Wesley, 1997.
4. S. Sahni, **Analysis of Algorithms through C++,** 4th Edition, Tata McGraw Hill, 2009.

Syllabi of B. Voc. (Information Technology) DSM Courses

Semester	**:**	**VII**
Course Type	**:**	**DSM**
Course Code	**:**	**BVIT-DSM-401 (A)**
Name of the Course	**:**	**Software Engineering**
Learning level	**:**	**Advanced Course**
Credits	**:**	**2**
Contact Hours	**:**	**2 Hours per week**
Total Marks	**:**	**50**
End Semester Marks	**:**	**35 (Pass Marks: 14)**
Internal Marks	**:**	**15 (Pass Marks: 6)**
End Semester Exam Time	**:**	**2 hours**

Course Objectives: *The course objective is to*

1. *Learn fundamental techniques for designing efficient algorithms, including divide and conquer, greedy methods, dynamic programming, and backtracking*
2. Provide knowledge of basic SW engineering methods and practices.
3. Provide a general understanding of software process models such as the waterfall and evolutionary models.
4. Understanding of software requirements and the SRS documents.
5. Understanding of approaches to verification and validation including static analysis, and reviews.
6. Understanding of software testing approaches such as unit testing and integration testing.
7. Understanding of software evolution and related issues such as version management.
8. Understanding on quality control and how to ensure good quality software.

UNIT I

Introduction : Characteristics of Software, Product and Process, Need for Software Process, Characteristics of a Software Process, Software Development Life Cycle Model: Waterfall Model, Prototyping, iterative development, Spiral Model, time-boxing model; Comparison of different Life Cycle Models, Project Estimation Techniques,

UNIT II

Software Requirements Analysis and Definition: Software Requirements, Overview of SA/SD Methodology, Requirements Specification: Need for SRS, Characteristics of an SRS, Components of an SRS, Planning a project, effort estimation, COCOMO model, risk management-assessment, control

UNIT III

Function oriented design: Problem partitioning, abstraction, modularity, Top down and Bottom-up Strategies, coupling, cohesion, design notations-structure charts, structured design, Data Flow Diagrams, Developing the DFD Model of a system, Transform and Transaction flow. Object-oriented design concepts, Object Oriented Design using UML, design walkthroughs, critical design review, consistency checkers..

Unit IV

Testing and Strategies: Software Testing fundamentals, Test Case Design, White box, Black Box testing, Control Structure testing, approaches to testing, Unit Testing, integration testing, Validation testing, system testing

UNIT V

Quality Assurance and Reliability: SQA- software Quality Assurance, Software Reliability, SQA Plan, ISO9000 and SEI standards for software, Software Configuration Management (SCM), Baselines, scan process, Version control, change control, SCM audits.

Course Learning Outcomes*: After successful completion of the course, the students will be able to*

1. Apply software engineering principles and techniques.
2. Develop, maintain and evaluate large-scale software systems.
3. Produce efficient, reliable, robust and cost-effective software solutions.
4. Perform independent research and analysis.
5. Manage time, processes and resources effectively by prioritising competing demands to achieve personal and team goals
6. understand and meet ethical standards and legal responsibilities.

Text Books:

1. **Fundamentals of Software Engineering** by Rajib mall (author), PHI Learning (5th Edition, 2018)
2. **Software Engineering: A Practitioner's Approach** By Roger Pressman (Author), Bruce Maxim (Author), Mcgraw Hill (9th Edition, 2023)
3. **Integrated Approach to Software Engineering** by Pankaj Jalote, Narosa Publishing (3rd Edition, 2019).

Reference Books:

1. **Software Engineering at Google: Lessons Learned from Programming Over Time** (Grayscale Indian Edition), by Titus Winters (Author), Hyrum Wright (Author), Tom Manshreck (Author), Shroff/O'Reill, (2020)
2. **Modern Software Engineering: An Engineering Discipline for Software in the Age of Agile Development and Continuous Delivery** by David Farley (Author), Addison-Wesley Professional (2021)

Semester	**:**	**VII**
Course Type	**:**	**DSM**
Course Code	**:**	**BVIT-DSM-401 (B)**
Name of the Course	**:**	**Software Engineering Laboratory**

Learning level	**:**	**Advanced Course**
Credits	**:**	**3**
Contact Hours	**:**	**6 Hours per week**
Total Marks	**:**	**100**
End Semester Marks	**:**	**70 (Pass Marks: 28)**
Internal Marks	**:**	**30 (Pass Marks: 12)**
End Semester Exam Time	**:**	**3 hours**

Course Objectives: *The course objective is to*

1. Provide the idea of decomposing the given problem into Analysis, Desing, Implementation, Testing and Maintenance phases.
2. Provide an idea of using various process models in the software industry according to given circumstances.
3. Gain the knowledge of how Analysis, Design, Implementation, Testing and Maintenance processes are conducted in a software project.

Following are some programming tasks for laboratory programming assignments but the assignments are not limited to these only.

1. Write programs in C Language to demonstrate the working of the do...while constructs and to understand the working of do while with different range of values and test cases.
2. Write programs in C Language to demonstrate the working of the while….do constructs and to understand the working of while--do with different range of values and test cases
3. Write programs in C Language to demonstrate the working of the if…else constructs and to understand the working of if…else with different range of values and test cases
4. Write programs in C Language to demonstrate the working of the switch constructs and to understand the working of switch with different range of values and test cases
5. Write programs in C Language to demonstrate the working of the for constructs and to understand the working of for with different range of values and test cases
6. A program written in c language for matrix multiplication fails ―Introspect the causes for its failure and write down the possible reasons for its failure. Objective: Understand the failures of matrix Multiplication.
7. Design, develop, code and run the program in any suitable language to implement the Quick sort algorithm. Determine the basis paths and using them derive different test cases, execute these test cases and discuss the test results.
8. Design, develop a code and run the program in any suitable language to implement the binary search algorithm. Determine the basis paths and using them derive different test cases execute these test cases and discuss the test results.
9. Design and develop a program in a language of your choice to solve the triangle problem defined as follows :
   - Accept three integers which are supposed to be the three sides of triangle and determine if the three values represent an equilateral triangle, isosceles triangle, scalene triangle, or they do not form a triangle at all.
   - Derive test cases for your program based on equivalence class partitioning , execute the test cases and discuss the results. (Equivalence class partitioning program)

Course Learning Outcomes*: After successful completion of the course, the students will be able to*

1. Decompose the given project in various phases of a lifecycle.
2. Choose appropriate process model depending on the user requirements.
3. Perform various life cycle activities like Analysis, Design, Implementation, Testing and Maintenance.
4. Apply the knowledge, techniques, and skills in the development of a software product.

Semester	**:**	**VII**
Course Type	**:**	**DSM**

Course Code	**:**	**BVIT-DSM-451**
Name of the Course	**:**	**Multimedia**
Learning level	**:**	**Advanced Course**
Credits	**:**	**4**
Contact Hours	**:**	**4 Hours per week**
Total Marks	**:**	**100**
End Semester Marks	**:**	**70 (Pass Marks: 28)**
Internal Marks	**:**	**30 (Pass Marks: 12)**
End Semester Exam Time	**:**	**3 hours**

Course Objectives: *The course objective is to*

1. Understand fundamental principles of multimedia.
2. Learn about image, graphics and image compression techniques.
3. Understand the basics animation, graphics, and interactive media applications.
4. Learn techniques for recording, editing, and enhancing audio and video content.

UNIT I

Introduction: Multimedia definition, Main properties of Multimedia, traditional data stream characteristics, data stream characteristics for continuous media; Sound/ Audio: Basic sound concepts, MIDI, elements of speech, Speech generation, speech analysis, speech transmission.

UNIT II

Images and Graphics: Digital Image Representation, Image format, Image Synthesis, Image Transmission; Video and Animation: basic concepts, Television: Conventional System, High definition system, Computer based animation, Animation languages, method of controlling animation, display of animation, Transmission of Animation

UNIT III

Data Compression: storage space, coding requirements, source, Entropy and hybrid encoding, basic compression techniques, Lossy sequential DCT-based Mode, expanded Lossy DCT-based Mode, Lossless Mode, H .261, MPEG; Computer Technology: Communication Architeture, Hybrid system, digital System

UNIT IV

Multimedia Operating System: Real time and Multimedia, Resource management, Real time process management in conventional Operating system, Real time processing requirements, Real time scheduling, Earliest deadline First Algorithm, Rate Monotonic Algorithm, Pre-emptive vs non-preemptive task scheduling, scheduling of continuous media task

UNIT V

Synchronization: Basic synchronization issues, Intra and inter-object synchronization, Live and synthetic Synchronization, Lip Synchronization requirements, Pointer Synchronization requirements, Elementary media synchronization, Multimedia synchronization specification methods, interval-based specification, Axes-based specification, control flow-based specification.

Course Learning Outcomes*: After successful completion of the course, the students will be able to*

1. *Demonstrate an understanding of multimedia principles, concepts, and applications.*
2. *Identify and explain different multimedia elements (text, images, audio, video, animation, and interactivity).*
3. *Understand the impact of multimedia in various industries such as advertising, education, entertainment, and web development*.

Text Books:

1. **Multimedia: Computing Communications & Applications** by Steinmetz (Author), Pearson Education India (2002)
2. **Principles of Multimedia** by Ranjan Parekh (Author), McGraw Hill Education (2017)

Reference Books:

1. **Multimedia Systems(Siggraph Series)** by John Buford (Author), Addison-Wesley (1994)
2. **Virtual Reality Systems** by John Vince, Pearson Education India (1995)

Syllabi of B. Voc. (Information Technology) SEC Courses

Semester	**:**	**VIII**
Course Type	**:**	**SEC**
Course Code	**:**	**BVIT-SEC-451**
Name of the Course	**:**	**Project**
Learning level	**:**	**Advanced Course**
Credits	**:**	**12**
Contact Hours	**:**	**24 Hours per week**
Total Marks	**:**	**300**
End Semester Marks	**:**	**210 (Pass Marks: 84)**
Internal Marks	**:**	**90 (Pass Marks: 36)**

- ✓ The project in the final semester shall be done on a topic relevant to industry / application development etc. and shall be demonstrated through seminar presentation, preparation and submission of project report for final evaluation and assessment through external examiner(s).