JAI HIND COLLEGE
BASANTSING INSTITUTE OF SCIENCE
&
J.T. LALVANI COLLEGE OF COMMERCE
(AUTONOMOUS)
"A" Road, Churchgate, Mumbai - 400 020, India.

Affiliated to
University of Mumbai

Program : B.Voc

Proposed Course : Software Development

Semester V

Credit Based Semester and Grading System (CBCS) with effect from the academic year 2023-24
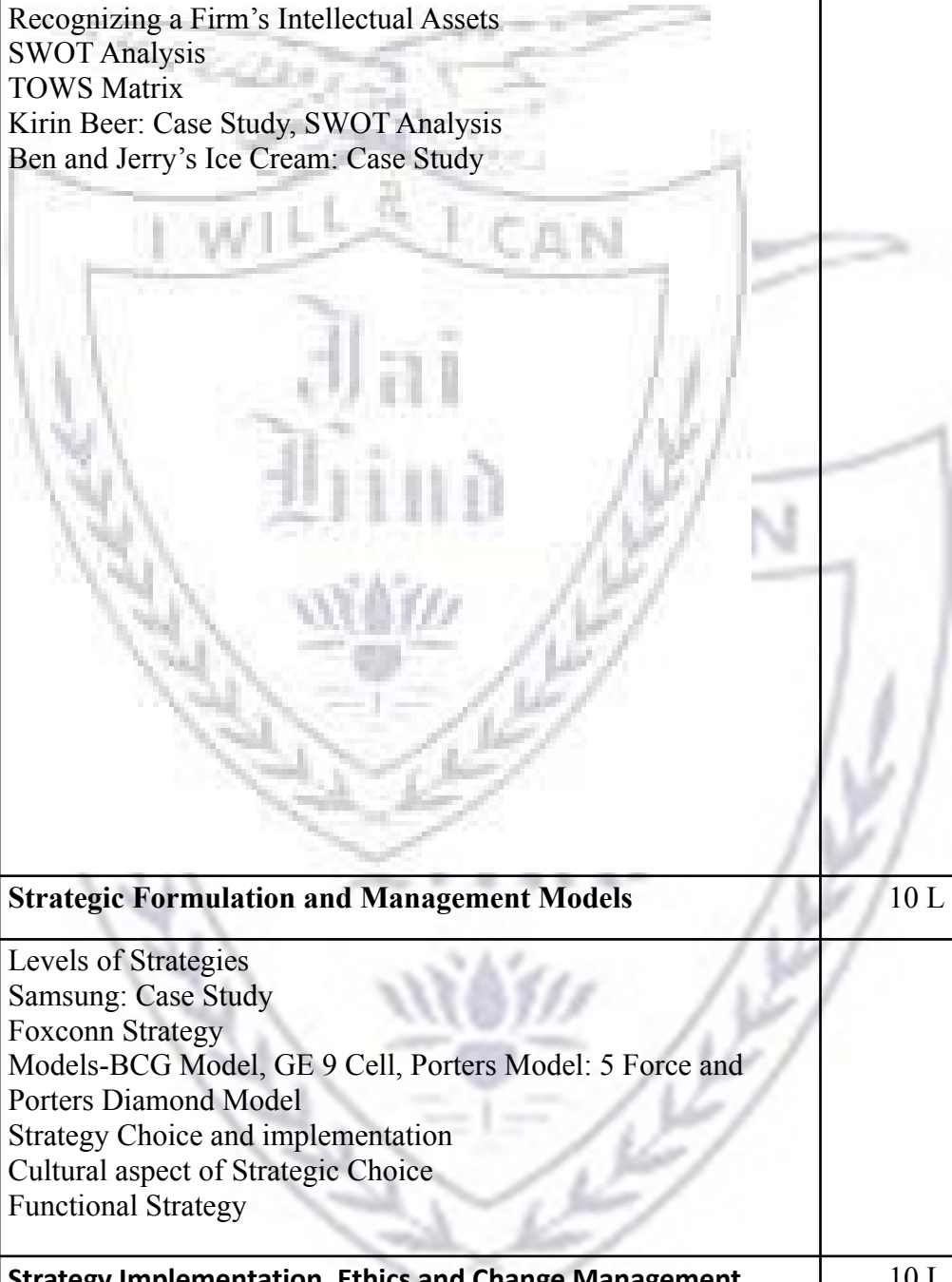
T.Y.BVOC (Software Development)

Academic year 2023-2024

Semester V			
Course Code	**Course Title**	**Credits**	**Lectures /Week**
General Component			
SBSD501	Strategic Management	4	3
SBSD502	Entrepreneurship	4	3
SBSD503	Multimedia-I	4	3
Skill Component			
SBSD504	Cyber Forensics and Investigation	3	3
SBSD505	Artificial Intelligence	3	3
SBSD506	Internet of Things with SDN	3	3
SBSD507	Theory of Computation	3	3
SBSD504PR	Cyber Forensics and Investigation Practical	1.5	3
SBSD505PR	Artificial Intelligence Practical	1.5	3
SBSD506PR	Internet of Things with SDN Practical	1.5	3
SBSD507PR	Project Viva & Voce Practical	1.5	3

Course Code: SBSD501	Course Title: Strategic Management (Credits :04 Lectures/Week:03)	
	Course Description: This course aims to build in students an understanding in how managers employ the formal and informal relationships that exist between firms in an industry, devise solutions to the externally focused questions facing a company, and effectively formulate and implement an organization's key strategies to achieve key result areas. It will enable students to learn various levels of corporate strategies and provoke their critical thinking skills. It will help students to understand the business problems and ways to find solutions, by undertaking strategic management case studies and assignments. **Course Outcome-Students will** □ Develop critical thinking approach by understanding concepts in Strategic Management □ Get to understand strategy formulation, implementation, monitoring and evaluation □ Build up problem solving skills and understand brand building through use of strategic decisions □ Develop capabilities of the students to analyze industry projects/cases and develop strategic solutions	
UNIT I	**Introduction to Strategic Management**	**10 lectures**
	Strategic Thinking, Strategic Management, Strategic Planning (Concepts and Scope) Characteristics of Strategic Decision Vision, Mission, Objectives, Goals and Strategy: Mutual Relationships Approaches to Strategic Decision Making The Strategic Management Process Strategic Management -Merits and demerits	

UNIT II	Environment Scanning and Analysis	10 L
	Need for Environmental Scanning and Analysis External and Internal Environment of the Firm Recognizing a Firm's Intellectual Assets SWOT Analysis TOWS Matrix Kirin Beer: Case Study, SWOT Analysis Ben and Jerry's Ice Cream: Case Study	
UNIT III	Strategic Formulation and Management Models	10 L
	Levels of Strategies Samsung: Case Study Foxconn Strategy Models-BCG Model, GE 9 Cell, Porters Model: 5 Force and Porters Diamond Model Strategy Choice and implementation Cultural aspect of Strategic Choice Functional Strategy	
UNIT IV	Strategy Implementation, Ethics and Change Management	10 L
	Project implementation Control Procedures Resource allocation Corporate Ethos Culture and Ethics Management of Change Organizational Creativity and Innovation Process	
References:		

1. Fred R. David, (13th Ed). *Strategic Management: Concepts & Cases*. New Jersey: Prentice Hall International.

2. Dr. Kazmi, Azhar.(2008) *Business Policy & Strategic Management*. Mumbai : Tata McGrawHill.

3. Pearce II, John A & Robinson Jr, Richard B. (2015). *Strategic Management*. Delhi: A.I.T.B.S.Publishers.

4. Upendra Kachru. (2005). *Strategic Management Concepts and Cases*. New Delhi: Excel Publications.

5. Ansoff H. Igor. (1992). *Implanting Strategic Management*, Englewood Cliffs. New Jersey, Prentice Hall of India.

6. Glueck, William F. (1988). *Strategic Management and Business Policy*, New York McGraw Hill.

7. Thomson & Strickland. (2001). *Strategic Management Concept and Cases* — Tata McGraw Hill
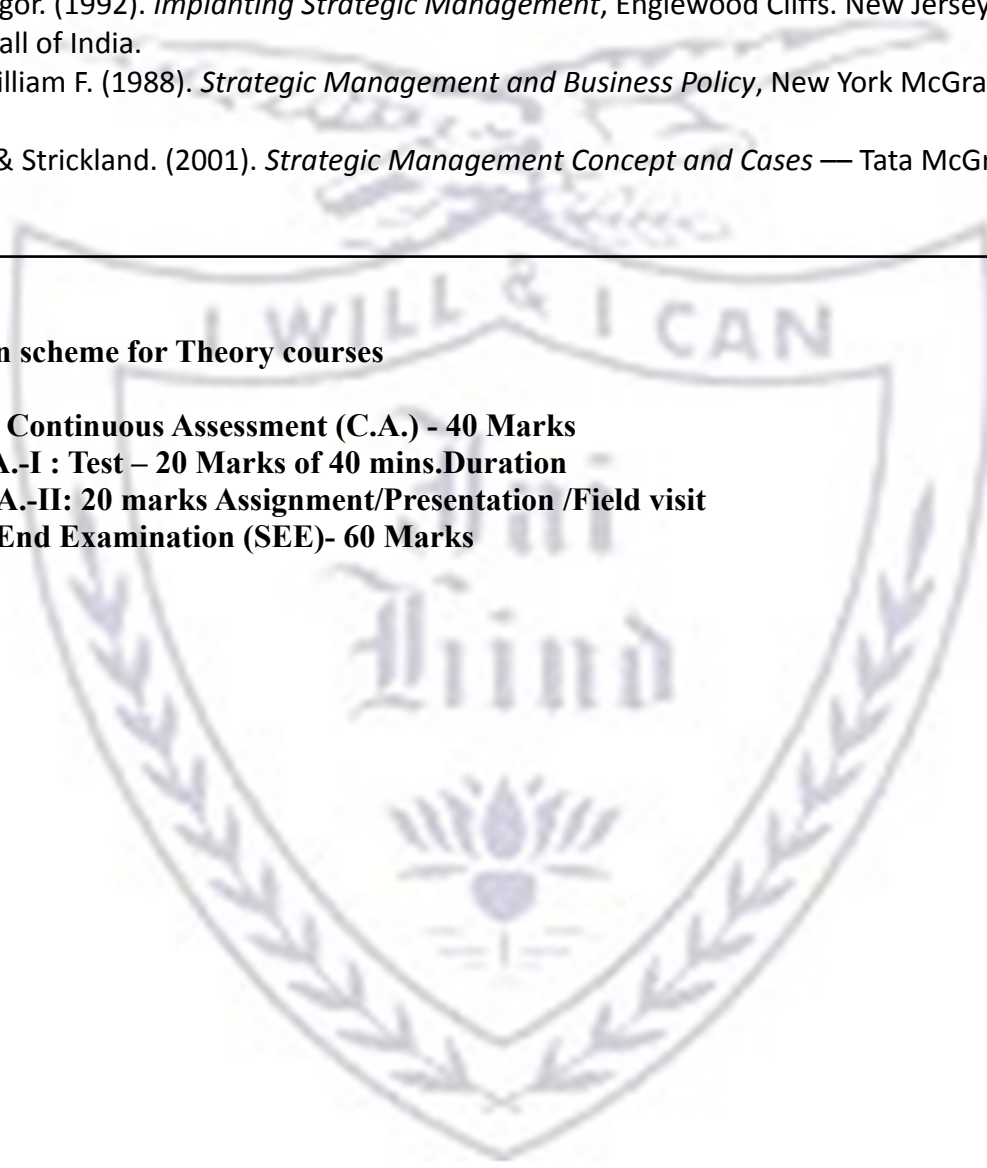
A. Evaluation scheme for Theory courses

    I.   Continuous Assessment (C.A.) - 40 Marks
    C.A.-I : Test – 20 Marks of 40 mins.Duration
    C.A.-II: 20 marks Assignment/Presentation /Field visit
B. Semester End Examination (SEE)- 60 Marks

Course Code: SBSD502	Course Title: Entrepreneurship (Credits :04 Lectures/Week:03)	
Objectives	**Teaches students to think outside the box and nurtures unconventional talents and skills** **It creates opportunity, ensures social justice, in stills confidence and stimulates the economy** **To understand the steps and processes in the process of becoming and entrepreneur**	
Outcomes:	**This course aims to promote and develop entrepreneurship. It teaches how to conduct research and provide consultancy for entrepreneurship development, analyses the entrepreneurial growth in India and various success stories and how to develop an idea.**	
	THEORY	**(45 lectures)**
Unit – I	**Introduction: The Entrepreneur**	**10 lectures**
	Need and Importance of Entrepreneurship Role of Entrepreneurship in Economic Development Process of Entrepreneurship Development Attributes, Characteristics of a Successful Entrepreneur and required Entrepreneurial Competencies Entrepreneurial Scenario in India Case histories of Successful Entrepreneurs Social Entrepreneurship in India Concept and development of Start ups	
Unit – II	**Idea Generation, Feasibility Analysis and Role of Innovation in Business**	**10 lectures**
	Idea Generation and Opportunity Assessment, Defining a Business Idea and Tools for Generating Business Idea Screening of Business Idea – Macro screening & Micro screening Market Survey and SWOT Analysis Guidelines for Preparing a Business Plan Feasibility Analysis: Technical Feasibility of Products and Services Marketing Feasibility: Marketing Methods, Pricing Policy and Distribution Channels Estimating and Financing funds requirement Schemes offered by various commercial banks and financial institutions like IDBI, ICICI, SIDBI, SFCs Venture Capital Funding Role of Innovations in Entrepreneurship Licensing and Patents	

Unit – III	**Entrepreneurial Venture and Marketing (Project Based)**	**10 lectures**
	Marketing Institutions and Assistance Business Model Canvas New trends in entrepreneurship & E-entrepreneurship Role of e- commerce and M commerce Ethical Considerations Life cycle of an Entrepreneurial Venture Role of Entrepreneur during Various Transition Stages Dynamics of Small Business Environment Causes for failure & success factors for small business	
Unit – IV	**Entrepreneurships in Tourism**	**10 lectures**
	What is Software Entrepreneurship Opportunities of Entrepreneurship in IT Sector (Overview) The Software Entrepreneurship Process ● Getting Ideas ● Developing the Software ● Testing the Software ● Deploying the Software ● Releasing the Software ● Testing the Idea ● Marketing the Product or Service ● Monetizing the Product or Service Software Entrepreneur Start ups in India (Case Studies) Objectives of Software Policy in India	
References:	1. Kumar, Arya. (2012). *Entrepreneurship*, Delhi: Pearson. 2. Poornima M.CH. (2009). *Entrepreneurship Development –Small Business Enterprises*, Delhi: Pearson. 3. Michael H. Morris, ET. al. (2011). *Entrepreneurship and Innovation*, New Delhi: Cen gage Learning. 4. Anil Kumar, S., ET.al. (2011). *Entrepreneurship Development*, New Delhi: New Age International Publishers. 5. Bedi, Kanishka. (2009). *Management and Entrepreneurship*, Delhi: Oxford University Press.	

A. Evaluation scheme for Theory courses
  I. Continuous Assessment (C.A.) - 40 Marks
     C.A.-I : Test – 20 Marks of 40 mins. Duration
     C.A.-II: 20 marks Assignment/Presentation /Field visit

B. Semester End Examination (SEE)- 60 Marks

Course Code: SBSD503	Course Title: Multimedia-I (Credits :04 Lectures/Week:03)	
Objectives:	To Understand And Create And Design & Animation For Print And Digital Media.	
Outcomes:	Layout Designs, Digital Illustration, Colour Theory, Typography, Image Manipulation, Branding, Packaging And Advertising, Pre-Press, The Design Of Symbols And Logos & Corporate Stationery And Multimedia Project Management With Sound And Video Editing Techniques.	
	THEORY	**(45 lectures)**
Unit I	**Photoshop Topics** ● Theory and difference between Raster & Vector, Layout etc ● Navigating the Workspace ● Working with Documents ● Image Modes & Colour Selection ● Selections techniques ● Layers and Different Masking techniques ● Image editing and Working with Type tool ● Painting & Brush Tools ● Saving & exporting in different formats	**15 L**
Unit II	**CorelDraw Topics** ● Theory Color, Branding, Principles of Design etc. ● Importance & Use of various Drawing tools ● Understanding of Different Text and Alignment option ● Importance & Usage various Interactive tool ● How to create logo & its importance ● To create new Shapes with Different Shaping Options ● Difference between Duplicate & Clone , Blending tool ● Use of Transformation & other tools	**10 L**
Unit III	**Adobe Flash** ● Drawing Toolbar introduction ● Timeline Introduction ● Introduction to Different Symbols, Library etc. ● Use of different drawing tools & Layers ● Introduction to Classic Animation ● Introduction to Shape Animation ● Introduction to Frame by Frame Animation ● Introduction to Masking Techniques in Flash etc. ● Creating Gif Animation and export options	**10 L**
Unit IV	**Sony Sound Forge** ● Technical concepts and theory of sound ● Introduction to different Audio formats ● Digitization and Resampling of Sound, ● Editing, Mixing, Recording of WAV audio	**10 L**

	● Converting sound into different formats for presentation	
Textbook:	1. CORELDRAW X4 FOR SIMPLE STEPS **2.** CORELDRAW X4 THE OFFICIAL GUIDE BY GARY DAVID BOUTON PRAKHAR COMPLETE COURSE FOR DTP	

Evaluation Scheme

Evaluation scheme for Theory courses

I. Continuous Assessment (C.A.) - 40 Marks

  (i) C.A.-I : Test – 20 Marks of 40 mins. duration

  (ii) C.A.-II : Project- 20 Marks

II. Semester End Examination (SEE)- 60 Marks

Course Code :SBSD504	Course Title: Cyber Forensics and Investigation (Credits :03 Lectures/Week:03)	
	Objectives: ● Understand the usage of correct tools for forensic investigations. ● Find vulnerabilities and security loopholes that facilitate attackers. ● Understand the techniques and strategies utilized by attackers to avert prosecution, and overcome them. ● Estimate the potential impact of a malicious activity on the victim and assess the intent of the offender. ● To recover, analyze and present computer-based material in such a way that is usable as evidence in a court of law. **Outcomes:** ● Learn the issues of Data Acquisition and Data Recovery ● Conduct digital investigations that conform to accepted professional standards and are based on the investigative process: identification, preservation, examination, analysis, and reporting ● Work collaboratively with clients, management, and/or law enforcement to advance digital investigations or protect the security of digital resources ● Determine the process of conducting investigation using methods of windows, network, mobile, memory and cloud. ● Develop report findings after investigation.	
	THEORY	**(60 Lectures)**
Unit I	**Introduction to IT laws & Cyber Crimes:** Cyber Crime, IT Act Offences and its Penalties under IT Act 2000. **Incident response:** What constitutes an incident?, What is Incident Response?,The Incident Response Process. **Computer Forensics:** Understanding Computer Forensics, Preparing for Computer Investigations, Understanding Computer Investigations - Taking a Systematic Approach, Procedures for Corporate High-Tech Investigations, Understanding Data Recovery Workstations and Software, Conducting an Investigation, Completing the Case.	**15 L**
Unit II	**Windows Forensics:** **Collecting Volatile Data:-**Locard's Exchange Principle, Order of Volatility When to Perform Live Response, What Data to Collect:-System Time **Logged-on Users:-**PsLoggedOn, Net Sessions, LogonSessions Open Files, Network Information (Cached NetBIOS Name Table), Network **Connections**:-Netstat **Process Information:-**Tlist, Tasklist, PsList, ListDLLs, Handle **Process-to-Port Mapping:-**Netstat, Fport, Tcpvcon,Process Memory	**15 L**

	Network Status :-Ipconfig, PromiscDetect and Promqry, Clipboard Contents, Service/Driver Information, Command History, Mapped Drives, Share. **Nonvolatile Information:-** **Registry Setting:-**ClearPageFileAtShutdown, DisableLastAccess, Autoruns Logs, Devices and Other Information, A Word about Picking Your Tools, **Live-Response Methodologies:-**Local Response Methodology, Remote Response Methodology, The Hybrid Approach **Data Analysis**:-Introduction, Examples,Agile Analysis,Expanding the Scope, Reaction, Prevention Summary,Solutions Fast Track Windows Memory Analysis, Registry Analysis,File Analysis,Executable File Analysis,Rootkits and Rootkit Detectiones and Other Information, A Word about Picking Your Tools	
Unit III	**Network Forensics:** Introduction, Protocols, Capturing packets – Tcpdump/Tshark, wireshark, taps, port spanning, ARP spoofing, passive Scanning. Packet analysis with wireshark – packet decoding, filtering, statistics, following streams, gathering files. Network miner. Attacks: Denial of service Attacks – SYN floods, malformed packets, UDP floods, Amplification attacks, distributed attacks, backscatter. Vulnerability exploits, insider threats, evasion, application Attacks. Preparing for attacks – Netflow, Logging, Antivirus, Incident response preparation, security information and event management. **Mobile Forensics:** Cellular device concepts - basics, networks, operating systems, Apps. What evidence can you get from a mobile device - Cell phone records, photos and videos, GPS records, Evidence from Apps, what you should look for, device status. Seizing Evidence from a phone - Imaging a phone, windows 8 phone, iPhone, Android Forensics, Embedded devices	**15 L**
Unit IV	**Cloud Storage Forensics:** Introduction**,** Cloud Storage Forensic Framework, Google Drive: Forensic Analysis of Cloud Storage Data Remnants. **E-mail investigations:** Exploring the role of email in investigations, exploring the role of client and server in email, investigating email crimes and violations, understanding email servers, using specialized email forensic tools.	**15 L**

	Report writing: Understanding the Importance of Reports, Guidelines for Writing Reports, Generating Report Findings with Forensics Software Tools.	

References books:-

1) Guide to computer forensics and investigations, Fourth edition by Bill Nelson, Amelia Phillips, Christopher Steuart, Course Technology.

2) Messier Ric Network forensics 2017 Wiley

3) Certified Cyber Forensics Professional Certification by Chuck Easttom , Mc Graw Hill publication.

4) Windows Forensic Analysis DVD Toolkit, Second Edition by Harlan Carvey & Eoghan Casey.

5) Cloud Storage Forensics by Darren Quick, Ben Martini and Kim-Kwang Raymond Choo , 2014.

6) Incident Response & Computer Forensics, Third Edition by Jason T. Luttgens and Matthew Pepe , McGraw Hill Publication.

7) Cyber Law Simplified, Vivek Sood, TMH Education

8) Computer Forensics, Computer Crime Investigation by John R,Vacca, Firewall Media, New Delhi.

9) Computer Forensics and Investigations by Nelson, Phillips Enfinger, Steuart, CENGAGE Learning.

Evaluation Scheme

Evaluation scheme for Theory courses

I. Continuous Assessment (C.A.) - 40 Marks

  (i) C.A.-I : Test – 20 Marks of 40 mins. duration

  (ii) C.A.-II : Case Study- 20 Marks

II. Semester End Examination (SEE)- 60 Marks

Course Code: SBSD505	Course Title: Artificial Intelligence (Credits : 03 Lectures/Week: 03)	
	Objectives: ☐ Understanding what is AI ☐ Various search methods ☐ Use various knowledge representation methods ☐ Understanding NLP ☐ Use Prolog Programming language using predicate logic ☐ Understanding of the basic areas of Soft Computing including Artificial Neural Networks and Fuzzy Logic. **Outcomes:** **Upon the successful completion of the course students should be able to:** ☐ Explain what constitutes "AI" and how to identify systems with AI ☐ Explain how AI enables capabilities that are beyond conventional technology. ☐ Understand NLP and Prolog ☐ Comprehend the fuzzy logic and the concept of fuzziness involved in various systems ☐ To understand the fundamental theory and concepts of neural networks	
Unit I	**Introduction:** What is Artificial Intelligence? Foundations of AI, history, the state of art AI today. Intelligent Agents: agents and environment, good behavior, nature of environment, the structure of agents **Solving Problems by Searching:** Problem solving agents, examples problems, searching for solutions, uninformed search, informed search strategies, heuristic functions. **Game Playing:** Overview, MiniMax, Alpha-Beta Cut-off, Goal Stack Planning,	15 L
Unit II	**Knowledge Representation:** Overview, Types of Knowledge Representations, Approaches To Knowledge Representation. Using Predicate Logic: Representation Simple Facts In Logic, Computable Functions And Predicates, The First Order Predicate Logic, Resolution in Predicate Logic, Unification. Forward Versus Backward Reasoning. **Weak Slot-and-Filler Structures:** Semantic Nets, Frames. **Strong Slot-and-Filler Structures:** Conceptual Dependency, Scripts	15 L

Unit III	**Understanding:** What is understanding? What makes it hard? As constraint Satisfaction **Natural Language Processing**: Introduction to NLP: What is NLP? Why NLP is Difficult? History of NLP, Advantages of NLP, Disadvantages of NLP, Components of NLP, Applications of NLP, How to build an NLP pipeline? Phases of NLP, Syntactic Processing, Semantic Analysis,Discourse And Pragmatic Processing, Spell Checking, NLP APIs, NLP Libraries. Implementing Natural Language Processing With Python's NLTK Package	15 L
Unit IV	**Fuzzy Systems:** Fuzzy Set theory, Fuzzy versus Crisp set, Fuzzy Relation, Fuzzification, Minmax Composition, Defuzzification Method, Fuzzy Logic, Fuzzy Rule based systems, Predicate logic, Fuzzy Decision Making, Fuzzy Control Systems, Fuzzy Classification. **Neural Networks:** What is Neural Network, Learning rules and various activation functions, Single layer Perceptrons , Back Propagation networks, Architecture of Backpropagation(BP) Networks, Backpropagation Learning	15 L

Textbook:

1. Artificial Intelligence: A Modern Approach, Stuart Russel, Peter Norvig, PHI

2. R1 George F. Luger Artificial Intelligence: Structures and Strategies for Complex Problem Solving, Fourth Edition, Pearson, 2002.

3. A First Course in Artificial Intelligence, Deepak Khemani,TMH

4. Artificial Intelligence: A Rational Approach, Rahul Deva, Shroffpublishers

5. "Artificial Intelligence" -By Elaine Rich And Kevin Knight (2nd Edition) Tata Mcgraw-Hill

6. Natural Language Processing with Python – Analyzing Text with the Natural Language Toolkit,Steven Bird, Ewan Klein, and Edward Loper

7. Artificial Intelligence and Soft computing- Behavioral and cognitive Modeling, of Human brains, Amit Konar, CRC Press LLC

8. S. Rajsekaran & G.A. Vijayalakshmi Pai, "Neural Networks,Fuzzy Logic and Genetic Algorithm:Synthesis and Applications" Prentice Hall of India.

9. Siman Haykin,"Neural Networks"Prentice Hall of India

Evaluation Scheme

Evaluation scheme for Theory courses

I. Continuous Assessment (C.A.) - 40 Marks

  (i) C.A.-I : Test – 20 Marks of 40 mins. duration

(ii) C.A.-II : Case Study- 20 Marks

II. Semester End Examination (SEE)- 60 Marks

Course Code: SBSD506	Course Title: **Internet of Things with SDN (Credits :03 Lectures/Week:03)**	
	Objectives: ● To learn about SoC architectures; Learn how Raspberry Pi. Learn to program RaspberryPi. ● Implementation of internet of Things and Protocols. **Outcomes:** ● Enable learners to understand System on Chip Architectures. ● Introduction and preparing Raspberry Pi with hardware and installation. ● Learn physical interfaces and electronics of Raspberry Pi and program them using practical's ● Learn how to make consumer grade IoT safe and secure with proper use of protocols.	
	THEORY	**(60 Lectures)**
Unit I	**Introduction and system Architecture** - What Is IoT?, IoT Impact, Convergence of IT and OT , IoT Challenges, Comparing IoT Architectures, A Simplified IoT Architecture, The Core IoT Functional Stack, IoT Data Management and Compute Stack, Sensors, Actuators, Sensor Networks, Communications Criteria,IoT Service as a Platform.	**15 L**
Unit II	**Introduction to Raspberry Pi:** Introduction to Raspberry Pi, Raspberry Pi Hardware, Preparing your raspberry Pi. Raspberry Pi Boot: Learn how this small SoC boots without BIOS. Configuring boot sequences and hardware. **Programming Raspberry Pi Raspberry Pi and Linux:** About Raspbian, Linux Commands, Configuring Raspberry Pi with Linux Commands Programming interfaces: Introduction to Node.js, Python. Raspberry Pi Interfaces: UART, GPIO, I2C, SPI Useful Implementations: Cross Compilation, Pulse Width Modulation, SPI for Camera.	**15 L**
Unit III	**IoT Data Link Layer and Network Layer Protocols:** PHY/MAC Layer(3GPP MTC, IEEE 802.11, IEEE 802.15), Wireless HART,Z- Wave, Bluetooth Low Energy, Zigbee Smart Energy DASH7 Network Layer:IPv4, IPv6, 6LoWPAN, 6TiSCH,ND, DHCP, ICMP, RPL, CORPL, CARP Transport layer protocols : Transport Layer (TCP, MPTCP, UDP, DCCP, SCTP)-(TLS, DTLS) Session layer: Session Layer-HTTP, CoAP, XMPP, AMQP, MQTT Service layer protocols: Service Layer - oneM2M, ETSI M2M, OMA, BBFs **Prototyping Embedded Devices:** Electronics, Sensors, Actuators, Scaling Up the Electronics, Embedded Computing Basics, Microcontrollers, System-on-Chips, Choosing Your Platform, Arduino, developing on the Arduino, Some Notes on the Hardware, Openness, Raspberry Pi, Cases and Extension Boards, Developing on the Raspberry Pi, Some Notes on the Hardware, Openness.	**15 L**
Unit IV	**Cloud Computing - Internet of Things - Types of Network and Internet Traffic - Demand:** Big Data, Cloud Computing, and Mobile Traffic - Requirements: QoS and QoE - Routing Congestion Control - SDN and NFV - Modern Networking Elements **Network Requirements -** The SDN Approach - SDN- and NFV-Related Standards - SDN Data Plane - OpenFlow Logical Network Device - OpenFlow Protocol – SDN	**15 L**
	Textbook: 1. Designing the Internet of Things Adrian McEwen, Hakim Cassimally WILEY First 2014 2. Internet of Things – Architecture and Design Raj Kamal McGraw Hill First 2017	

3. Learning Internet of Things, Peter Waher, PacktPublishing(2015)
4. Mastering the Raspberry Pi, Warren Gay,Apress(2014)
5. "Foundations of Modern Networking: SDN, NFV, QoE, IoT, and Cloud" William Stallings Publisher: Addison-Wesley 2015 ISBN: 9780134175393
6. SDN and NFV Simplified: A Visual Guide to Understanding Software Defined Networks and Network Function Virtualization 1st Edition by Jim Doherty
7. Stackowiak, R., Licht, A., Mantha, V., Nagode, L.," Big Data and The Internet of Things Enterprise Information Architecture for A New Age", Apress, 2015.
8. Dr. John Bates , "Thingalytics - Smart Big Data Analytics for the Internet of Things", john Bates, 2015

Evaluation Scheme

[A] Evaluation scheme for Theory courses

   I.   **Continuous Assessment (C.A.) - 40 Marks**

   i.   **C.A.-I: Test – 20 Marks of 40 mins.Duration**

   ii. **C.A.-II:Mini-Project-20 Marks**

II. Semester End Examination (SEE)- 60 Marks

Course Code : SBSD507	Course Title: Theory of Computation(Credits :03 Lectures/Week:3)

	Objectives:	
	- To give an overview of the theoretical foundations of computer science from the perspective of formal languages - To illustrate finite state machines to solve problems in computing - To explain the hierarchy of problems arising in the computer sciences. - To familiarize Regular grammars, context free grammar. **Outcomes:** Upon the completion of the course students will be able to: - To use basic concepts of formal languages of finite automata techniques. - To Design Finite Automata's for different Regular Expressions and Languages. - To Construct context free grammar for various languages. - To solve various problems of applying normal form techniques, push down automata and Turing Machines	
	THEORY	**(60 Lectures)**
Unit-1	**FINITE AUTOMATA:** Introduction, Deterministic Finite Automata (DFA) -Formal definition, simpler notations (state transition diagram, transition table), language of a DFA. Nondeterministic Finite Automata (NFA)- Definition of NFA, language of an NFA, Equivalence of Deterministic and Nondeterministic Finite Automata, Applications of Finite Automata, Finite Automata with Epsilon Transitions, Eliminating Epsilon transitions, Minimization of Deterministic Finite Automata, Finite automata with output (Moore and Mealy machines) and Inter conversion.	**15 L**
Unit-2	**REGULAR EXPRESSIONS:** Introduction, Identities of Regular Expressions, Finite Automata and Regular Expressions- Converting from DFA's to Regular Expressions, Converting Regular Expressions to Automata, applications of Regular Expressions. **REGULAR GRAMMARS:** Definition, regular grammars and FA, FA for regular grammar, Regular grammar for FA. Proving languages to be non-regular -Pumping lemma, applications, and Closure properties of regular languages.	**15 L**
Unit-3	**CONTEXT FREE GRAMMAR:** Derivation Trees, Sentential Forms, Rightmost and Leftmost derivations of Strings. Ambiguity in CFG's, Minimization of CFG's, CNF, GNF, Pumping Lemma for CFL's, Enumeration of Properties of CFL (Proof's omitted). **PUSHDOWN AUTOMATA:** Definition, Model, Acceptance of CFL, Acceptance by Final State and Acceptance by Empty stack and its Equivalence, Equivalence of CFG and PDA.	**15 L**

Unit-4	**TURING MACHINES:** Formal definition and behavior, Languages of a TM, TM as acceptors and TM as a computer of integer functions, Types of TMs. **RECURSIVE AND RECURSIVELY ENUMERABLE LANGUAGES:** Properties of recursive and recursively enumerable languages, Universal Turing machine, The Halting problem, Undecidable problems about TMs. Context sensitive language and linear bounded automata (LBA), Chomsky hierarchy, Decidability, Post's correspondence problem (PCP), undecidability of PCP.	**15 L**

Textbook:

1. John E. Hopcroft, Rajeev Motwani, Jeffrey D. Ullman, Introduction to Automata Theory, Languages of Computation , 3rd Edition, Prentice Hall, ISBN: 0321455363.

2. Linz P, An Introduction to Formal Language s and Automata , Narosa Publishing House Pvt. Ltd., New Delhi, ISBN: 9788173197819.

3. Michael Sipser, Introduction to Theory of Computation , Cengage Learning India Private Limited, Indian Edition, ISBN: 8131505138.

4. H.R. Lewis and C.H. Papadimitriou, Elements o f T h e o r y o f C o m p u t a ti o n , 2nd Edition, Prentice Hall, ISBN: 0132624788.

5. J. E. Savage, Models of Computation, Exploring the Power of Computing , Addison Wesley, 1998, Available at http://cs.brown.edu/~jes/book/.

6. Martin J.C, Introduction to Languages and Theo ry of Computation , Tata McGraw Hill, 3rd Edition, ISBN: 9780070660489.

Reference Book:

1. K. L. P Mishra, N. Chandrashekaran (2003), Theory of Computer Science-Automata Languages and Computation, 2nd edition, Prentice Hall of India, India.

Evaluation Scheme

[A] Evaluation scheme for Theory courses

   I.   **Continuous Assessment (C.A.) - 40 Marks**

   i.   **C.A.-I: Test – 20 Marks of 40 mins.Duration**

   ii. C.A.-II:Assignment-20 Marks

II. Semester End Examination (SEE)- 60 Marks

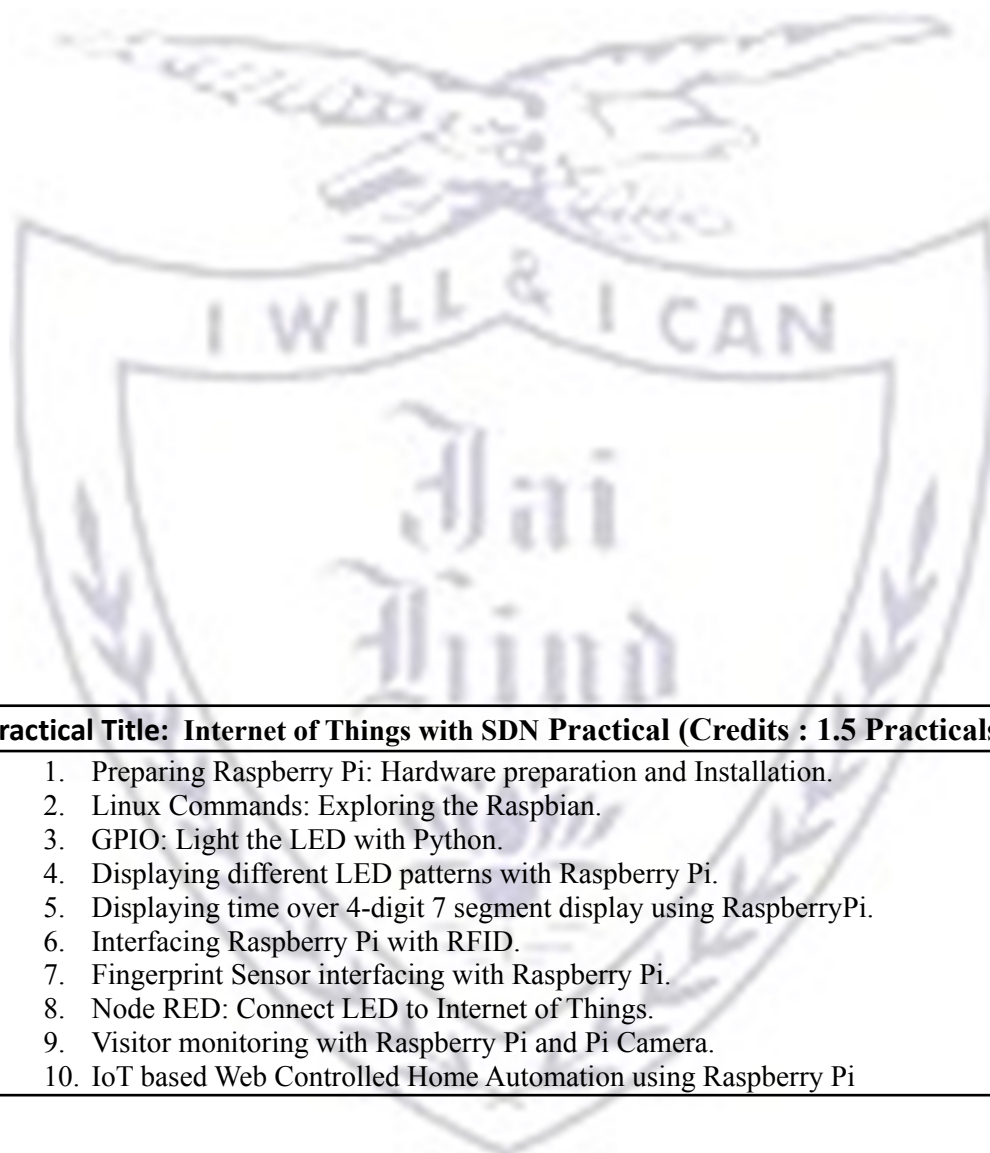| Course Code: SBSD504PR	Practical Title: Cyber Forensics and Investigation Practical (Credits :1.5 Practicals/Week: 01)
	1. Installation and Introduction to kali linux. 2. To use digital storage media in kali linux for a. attaching and mounting media storage devices. a. access for copying files. 2. Study to use forensic image acquisition and burning tools in kali linux. 3. To use cloning tools (guymager) to perform disk cloning in kali linux. 4. Study of different types of hashing tools. a. sumtools/hashing tools a. Study of rahash2 tools a. Study of hashdeep tools. 2. How to Extract Exchangeable image file format (EXIF) Data from Image Files using Exifreader Software 3. Practical using FTK Imager to recover files. 4. Comparison of two Files for forensics investigation by Compare IT software 5. Find Last Connected USB on your system (USB Forensics) 6. Practical using Wireshark and Network Miner tool (Network Forensic Tools) 7. Practical using Dumpzilla Package Description(Browser Forensic Tool) 8. a. Study the steps for hiding and extract any text file behind an image file/ Audio file using Command Prompt.(Windows) b. Practical based on steganography using steghide (Kali Linux) 0. Collect Email Evidence in Victim PC 1. Practical based on Report Writing: "Report the Investigation"

Evaluation Scheme

[B] Evaluation scheme for Practical courses-50 Marks

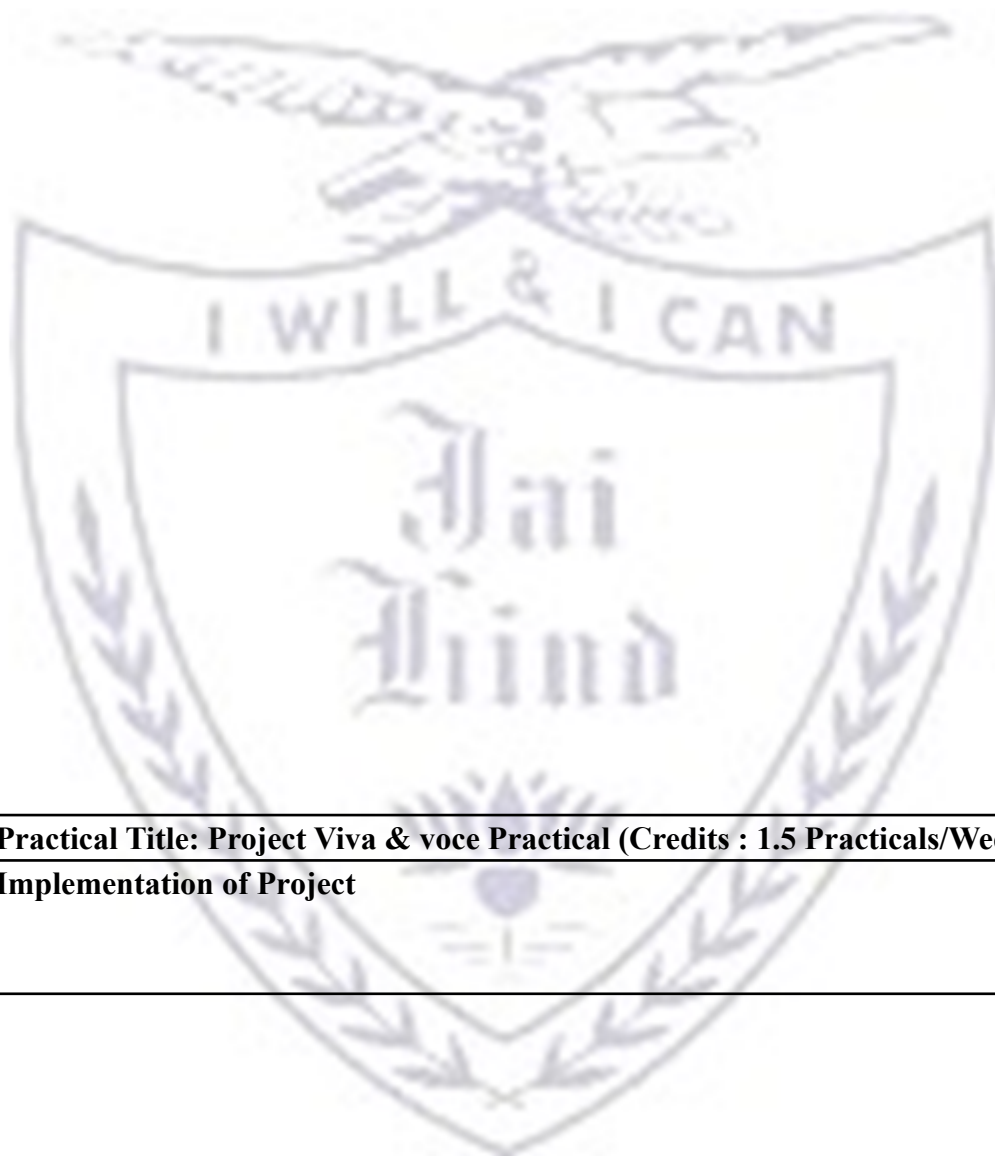| Course: SBSD505PR	**Practical Title: Artificial Intelligence Practical(Credits : 1.5 Practicals /Week: 01)**

	1. (a) Write a program to implement depth first search algorithm.
	
	  (b) Write a program to implement breadth first search algorithm.
	
	2. a) Write a program to simulate 4-Queen / N-Queen Problem.
	
	  (b)Write a program to solve tower of Hanoi Problem.
	
	3. (a) Write a program to implement A*algorithm.
	
	  (b) Design the simulation of tic –tac –toe game using min-max algorithm.
	
	4. (a) Write a program to implement alpha beta search.
	
	  (b) Write a program to implement Goal Stack Planning.
	
	5. (a) Solve constraint satisfaction problem
	
	  b) Write the Conceptual Dependency for following statements.
	
	      (a) John gives Mary a book
	
	      (b) John gave Mary the book yesterday
	
	6. a) Using the NLTK tool perform stemming and lemmatization
	
	  b) Count word Frequency
	
	  c) Perform Tokenizing and Language Detection
	
	7.Neural Network: Create a perceptron with appropriate no. of inputs and outputs. Train it using fixed increment learning algorithm until no change in weights is required. Output the final weights.
	
	8.Fuzzy: a) Introduction to Fundamental of Fuzzy Logic and Basic Operations. Implement Union, Intersection, Complement and Difference operations on fuzzy sets. Also create fuzzy relation by Cartesian product of any two fuzzy sets and perform max min composition on any two fuzzy relations.
	
	b) Solve Air Conditioner Controller using MATLAB Fuzzy logic toolbox

Evaluation Scheme

[B] Evaluation scheme for Practical courses-50 Marks

Course: SBSD506PR	Practical Title: Internet of Things with SDN Practical (Credits : 1.5 Practicals/Week:01)
	1. Preparing Raspberry Pi: Hardware preparation and Installation. 2. Linux Commands: Exploring the Raspbian. 3. GPIO: Light the LED with Python. 4. Displaying different LED patterns with Raspberry Pi. 5. Displaying time over 4-digit 7 segment display using RaspberryPi. 6. Interfacing Raspberry Pi with RFID. 7. Fingerprint Sensor interfacing with Raspberry Pi. 8. Node RED: Connect LED to Internet of Things. 9. Visitor monitoring with Raspberry Pi and Pi Camera. 10. IoT based Web Controlled Home Automation using Raspberry Pi

Evaluation Scheme
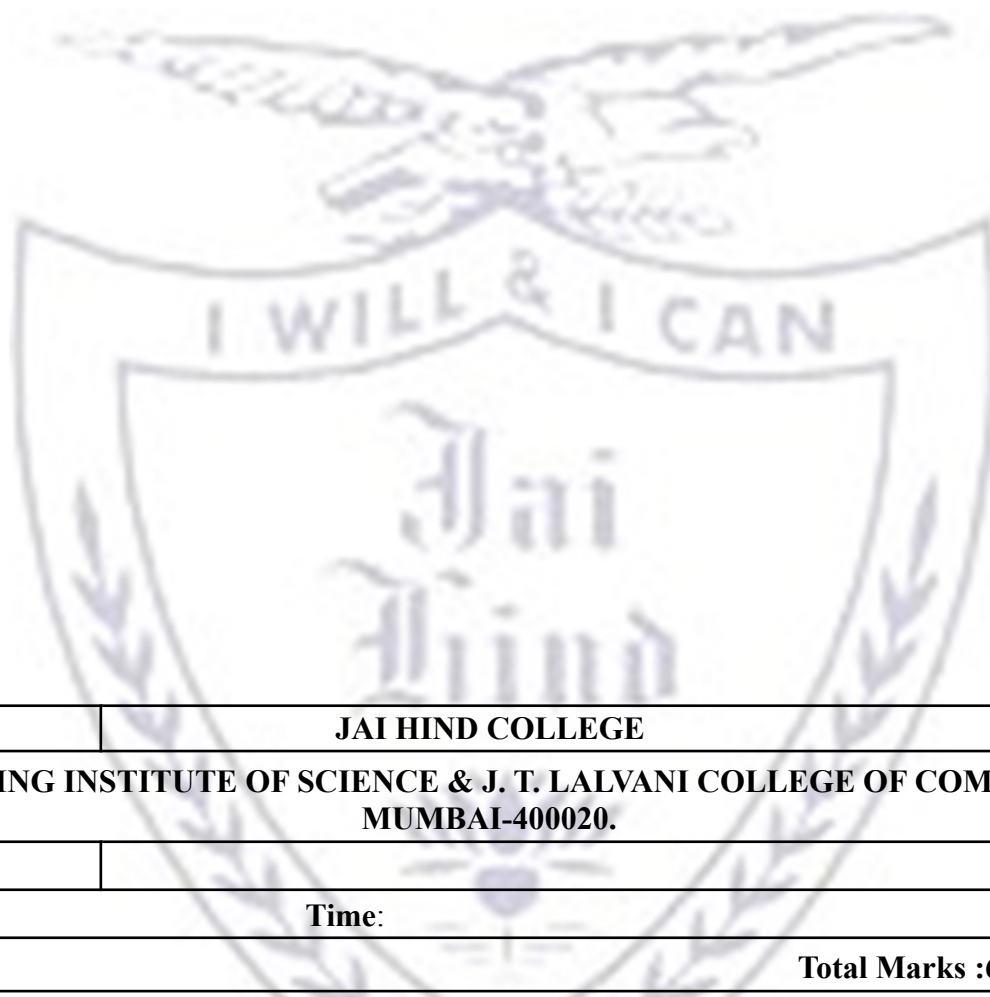
[B] Evaluation scheme for Practical courses-50 Marks

Course: SBSD507PR	Practical Title: Project Viva & voce Practical (Credits : 1.5 Practicals/Week: 01)
	Implementation of Project

[B] Evaluation scheme for Project

I. Project Implementation (50 Marks)

	JAI HIND COLLEGE
	BASANTSING INSTITUTE OF SCIENCE & J. T. LALVANI COLLEGE OF COMMERCE. MUMBAI-400020.
Class: Paper-	
Subject:	**Time**:
Day & Date:	**Total Marks :60**
PLEASE READ CAREFULLY THE WARNING PRINTED ON THE ANSWER BOOK IN CONNECTION WITH THE USE TO UNFAIR MEANS.	
General Instructions:-	1. All questions are Compulsory
	2. Numbers to the right indicate maximum marks
	3. Answers to the sub-questions of the same question must be written together.
	4. Each question carries 5 marks.

Q1)	Answer two of the following questions (Based on Unit 1)	(10 marks)
1)		(5)

2)		(5)
3)		(5)
4)		(5)
Q2)	**Answer <u>two</u> of the following questions (Based on Unit 2)**	**(10 marks)**
1)		(5)
2)		(5)
3)		(5)
4)		(5)
Q3)	**Answer <u>two</u> of the following questions (Based on Unit 3)**	**(10 marks)**
1)		(5)
2)		(5)
3)		(5)
4)		(5)
Q4)	**Answer <u>two</u> of the following questions (Based on Unit 4)**	**(10 marks)**
1)		(5)
2)		(5)
3)		(5)
4)		(5)
	......P.T.O	

Q5)	**Answer <u>four</u> of the following questions (Based on all units)**	**(20 marks)**
1)		(5)
2)		(5)
3)		(5)
4)		(5)
5)		(5)
6)		(5)
7)		(5)
8)		(5)

I WILL & I CAN

Jai
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