

DAYANANDA SAGAR ACADEMY OF TECHNOLOGY & MANAGEMENT

(An Autonomous Institute under VTU)



CURRICULUM

Scheme and Syllabus III to IV Semester

Outcome Based Education

(Academic Year 2024-2025)

DEPARTMENT OF CSE IN IOT, CYBER SECURITY INCLUDING BLOCKCHAIN

3rd & 4th Semester B.E

ABOUT THE INSTITUTE

Dayananda Sagar Academy of Technology and Management- DSATM was established in 2011 with 5 UG Programmes and 1 PG Program, currently there are 10UG courses, BArch course, and 2 PG courses the programmes are approved by All India Council for Technical Education (AICTE) New Delhi, Affiliated to Visvesvaraya Technological University (VTU), Belagavi and DSATM is an autonomous institute from 2023-2024,(10 years),with NAAC A+ Grade,5 courses NBA Accredited.

The Dayananda Sagar Institutions is one of pioneer institutions in India and abroad with six decades of excellence in Academic and Research. The newer campuses were necessary to accommodate the growing need of the technology and innovation.

DSATM nurtures the students in academic, research, sports, cultural and extracurricular activities.

- Creating an academic environment to nurture and develop competent entrepreneurs, leaders and professionals who are socially sensitive and environmentally conscious.
- Integration of Outcome Based Education and cognitive teaching and learning strategies to enhance learning effectiveness.
- Developing necessary infrastructure to cater to the changing needs of Business and Society.
- Optimum utilization of the infrastructure and resources to achieve excellence in all areas of relevance.
- Adopting learning beyond curriculum through outbound activities and creative assignments.
- Imparting contemporary and emerging techno-managerial skills to keep pace with the changing global trends.
- Facilitating greater Industry-Institute Interaction for skill development and employability enhancement.
- Establishing systems and processes to facilitate research, innovation and entrepreneurship for holistic development of students.
- Implementation of Quality Assurance System in all Institutional processes.

VISION OF THE INSTITUTE

To strive at creating the institution a centre of highest calibre of learning, so as to create an overall intellectual atmosphere with each deriving strength from the other to be the best of engineers, scientists with management & design skills.

MISSION OF THE INSTITUTE

- To serve its region, state, the nation and globally by preparing students to make meaningful contributions in an increasing complex global society challenge.
- To encourage, reflection on and evaluation of emerging needs and priorities with state-of-the-art infrastructure at institution.
- To support research and services establishing enhancements in technical, economic, human and cultural development.
- To establish interdisciplinary centre of excellence, supporting/ promoting student's implementation.
- To increase the number of Doctorate holders to promote research culture on campus.
- To establish IIPC, IPR, EDC, innovation cells with functional MOU's supporting student's quality growth.

QUALITY POLICY

Dayananda Sagar Academy of Technology and Management aims at achieving academic excellence through continuous improvement in all spheres of Technical and Management education. In pursuit of excellence cutting – edge and contemporary skills are imparted to the utmost satisfaction of the students and the concerned stakeholders.

ABOUT THE DEPARTMENT

Year of Establishment: 2022

Intake of the Department = 60

In today's world everything is connected to the Internet for ease of access, to monitor and control the devices across the globe. This provides an opportunity to automate different task and move all the communicating devices to be communicated through Internet. IoT is the most important technology for 21st century and it connects the device from home to industry, device to device or human to device. The various industry which uses IoT are Manufacturing, Automotive, Transportation and Logistics, Retail, Public Sector, Health Care, Agriculture.

The general safety across all industry is the requirement of securing these devices and its network. To secure the data generated due to communication between the devices, device to humans, and personal information are in demand. Cyber Security courses aim to equip the students with the knowledge and skills required to defend your data, devices, and personal information from the attacker. This course provides a wide variety of opportunity in IT sector and in other manufacturing and production industries.

As all devices are connected to Internet, the data generated is very huge. The data need to be accessed from the storage securely and should be available for access to the authorized users, the Blockchain provides this flexibility. Blockchain is a distributed ledger, in this system it records the information in such a way that it is impossible to change, hack or cheat the system.

VISION OF THE DEPARTMENT

To be frontier to provide the center of Excellence in the field of IoT, Cybersecurity and Blockchain.

MISSION OF THE DEPARTMENT:

M1: To Provide Cutting-edge technology to the students to develop and innovate in IoT & Cybersecurity, including Blockchain which proves to be an essential part for any organization.

M2: To impart value based technical education of global standards

M3: To inculcate the entrepreneurship, technical knowledge and lifelong learning in theory and practice of Computer Science and Engineering in IoT & Cyber security including Blockchain.

M4: To strengthen the alumni and industrial association for development of students leading to technical and socio-economic growth.

PROGRAM EDUCATION OBJECTIVES (PEO'S):

PEO1: Employability: Having a successful professional career in Industry, Government, Academia, and Defense as an innovative engineer in a team.

PEO2: Higher Education: capable to pursue higher studies/research in the field of Engineering and other allied industries.

PEO3: Entrepreneurship: prepared for a successful career by meeting ever increasing demands required by Computer Science and Engineering profession and enable them to become an entrepreneur.

PEO4: Ethical: cultivated professional and ethical attitudes with effective communication skills, teamwork and multidisciplinary approach related to engineering issues.

PROGRAM OUTCOMES (PO's)

Engineering Graduates will be able to:

1. **Engineering knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
2. **Problem analysis:** Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
3. **Design/development of solutions:** Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
4. **Conduct investigations of complex problems:** Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
5. **Modern tool usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.
6. **The engineer and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
7. **Environment and sustainability:** Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

8. **Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
9. **Individual and team work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
10. **Communication:** Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
11. **Project management and finance:** Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
12. **Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PROGRAM SPECIFIC OUTCOMES (PSO's):

PSO1: **Practices of Computing:** Connect learning from Core and Disciplinary/Interdisciplinary courses of CSE (IoT & Cybersecurity including Blockchain Technology) to assimilate Technological advancements in the field for analyzing and designing subsystem processes to arrive at the solution to real world problems.

PSO2: **Knowledge in the domain specific:** Acquire software skills pertinent to Research and industry practices in the field of CSE (IoT & Cybersecurity including Blockchain Technology); along with the soft skills like persistence, proper judgment through projects and industrial interactions.



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Approved by **AICTE**
Accredited by **NAAC** with **A+** Grade
6 Programs Accredited by **NBA**
(CSE, ISE, ECE, EEE, MECH, CV)

PROPOSED UG CREDIT STRUCTURE IN ALIGNMENT WITH VTU

Sl. No.	Semester	No. of Credits
1	1 st Semester	20
2	2 nd Semester	20
3	3 rd Semester	21
4	4 th Semester	21
5	5 th Semester	22
6	6 th Semester	22
7	7 th Semester	20
8	8 th Semester	14
Total		160

PROPOSED UG SCHEME

Sl. No	Course Category	BOS	TD	Teaching Hours/Week					Credits
				Lecture	Tutorial	Practical	Project	Total	
				L	T	P	S	(Hrs/week)	
1	BSC	MAT	MAT	3	0	0	0	3	3
2	IPCC-1	CSE	CSE	3	0	2	0	5	4
3	IPCC-2	CSE	CSE	3	0	2	0	5	4
4	PCC-1	CSE	CSE	3	0	0	0	3	3
5	PCC-2	CSE	CSE	3	0	0	0	3	3
6	PBL	CSE	CSE	0	0	2	2	4	2
7	AEC	CSE	CSE	0	0	2	0	2	1
8	SCR	CSE	CSE	0	0	2	0	2	1
9	NCMC	NSS / YOGA / PED							
10	AICTE Activity Points								
								Total	21

Percentage of Mapping– Theory & Practical - Scheme & Syllabus- 3rd & 4th Sem

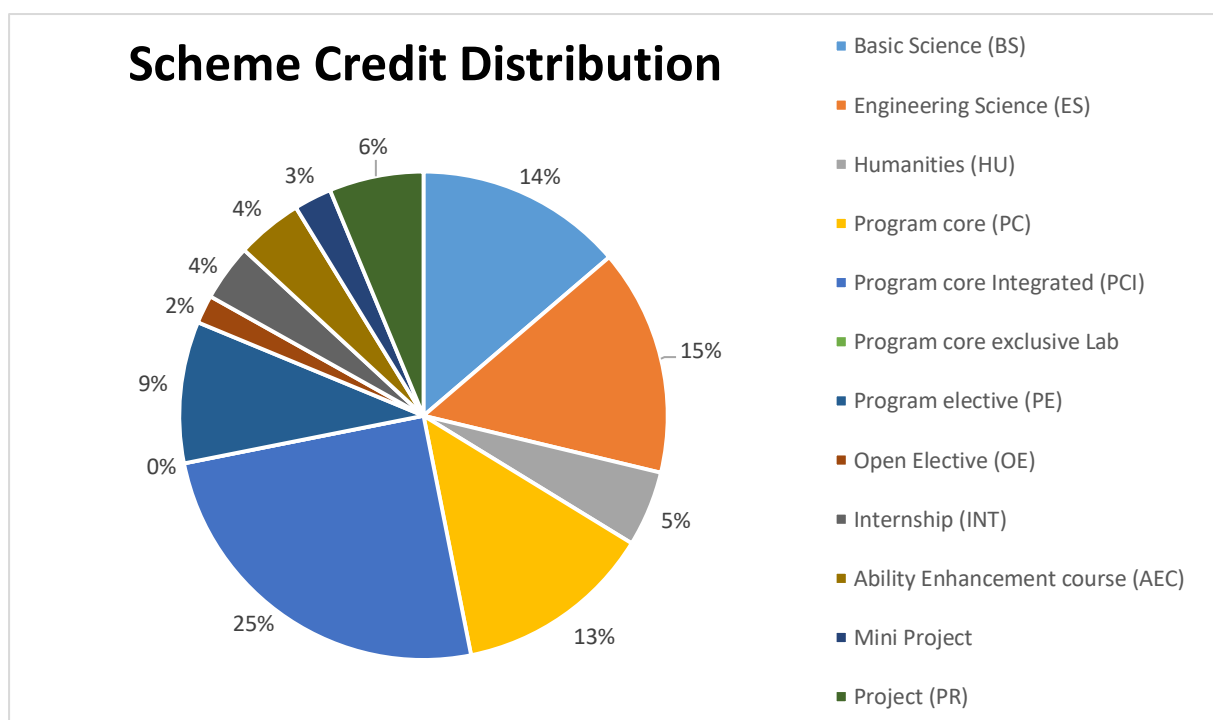
3rd Sem & 4th Sem

Sl. No	Course Category	Component			
		Theory	Practical	Outreach	YOGA/SPORTS
1	BSC	100%	--	--	--
2	IPCC-1	60%	40%	--	--
3	IPCC-2	60%	40%	--	--
4	PCC-1	100%	--	--	--
5	PCC-2	100%	--	--	--
6	PBL	--	100%	--	--
7	AEC	--	100%	--	--
8	SCR	--	--	100%	--
9	NCMC	--	--	--	100%
Total Percentage		53%	47%	13%	13%

Scheme Distribution

Department of CSE in IoT, Cyber security including Blockchain

Course Component	Credits	% of Credits
Basic Science (BS)	22	14
Engineering Science (ES)	24	15
Humanities (HU)	8	5
Program core (PC)	21	13
Program core Integrated (PCI)	40	25
Program core exclusive Lab	0	0
Program elective (PE)	15	9
Open Elective (OE)	3	2
Internship (INT)	6	4
Ability Enhancement course (AEC)	7	4
Mini Project (MPR)	4	3
Project (PR)	10	6
Total	160	100



SEMESTER WISE CREDIT BREAKDOWN FOR B.E. DEGREE CURRICULUM

BATCH 2023-2027

Course Category	Semester								Total Credits
	1 st	2 nd	3 rd	4 th	5 th	6 th	7 th	8 th	
Basic Sciences (BSC)			3	3					6
Engineering Sciences (ESC)			0	0					0
Humanities, Social Sciences and Management (HSMC)			0	0					0
Ability Enhancement Course (AEC)			1	1					2
Universal Human Values (UHV)			0	1					1
Professional Core Courses (PCC)			6	6					12
Integrated Professional core Course (IPCC)			8	8					16
Professional Elective Course (PEC)			0	0					0
Institutional Open Elective Courses (IOE)			0	0					0
Internship (INT)			0	0					0
Mini Project / Project Work (PW)			2	2					4
Social Connect & Responsibility (SCR)			1	0					1
Non-credit Mandatory Courses (NCMC)			0	0					0
Total Credits			21	21					42



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Scheme of Teaching and Examinations – 2024 Outcome Based Education (OBE) and Choice Based Credit System (CBCS) (Effective from 2024-25)

3rd SEMESTER: Computer Science Engineering in IoT, Cyber security including Blockchain

Sl. No	Course Code	Course Title	Course Category	BOS	TD	Teaching Hours/Week					Credits	Examination				
						Lecture	Tutorial	Practical	Project	Total		SEE Duration (Hrs)	CIE Marks	SEE Marks	Total Marks	
						L	T	P	S							
1	BMATB301	Mathematics	BSC	MAT	MAT	3	0	0	0	3	3	03	50	50	100	
2	BIC302	Computer Networks	IPCC	CSE-ICB	CSE-ICB	3	0	2	0	5	4	03	50	50	100	
3	BIC303	Data Structures and Applications	IPCC	CSE-ICB	CSE-ICB	3	0	2	0	5	4	03	50	50	100	
4	BIC304	Operating System	PCC	CSE-ICB	CSE-ICB	3	0	0	0	3	3	03	50	50	100	
5	BIC305	Oops with Java	PCC	CSE-ICB	CSE-ICB	3	0	0	0	3	3	03	50	50	100	
6	BIC306	Cloud Security for smart devices	PBL	CSE-ICB	CSE-ICB	0	0	2	2	4	2	03	50	50	100	
7	BIC307	Basic Linux for Hackers	AEC	CSE-ICB	CSE-ICB	0	0	2	0	2	1	03	50	50	100	
8	BSCK308	SCR	SCR	CSE-ICB	CSE-ICB	0	0	2	0	2	1	03	100	0	100	
9	BNSK309	National Service Scheme	NCCM	-	-	0	0	0	0	0	0	0	100	0	100	
AICTE Activity Points Mandatory						Total					27	21	24	550	350	900

4th SEMESTER: Computer Science Engineering in IoT, Cyber security including Blockchain

Sl. No	Course Code	Course Title	Course Category	BOS	TD	Teaching Hours/Week					Credits	Examination			
						Lecture	Tutorial	Practical	Project	Total		SEE Duration (Hrs)	CIE Marks	SEE Marks	Total Marks
						L	T	P	S						
1	BMATD401	Number Theory	BSC	MAT	MAT	3	1	0	0	4	3	03	50	50	100
2	BIC402	Network Defense & Security	PCC	CSE-ICB	CSE-ICB	3	0	0	0	5	3	03	50	50	100
3	BIC403	Analysis and Design of Algorithms	IPCC	CSE-ICB	CSE-ICB	3	0	2	0	5	4	03	50	50	100
4	BIC404	Database Management System	IPCC	CSE-ICB	CSE-ICB	3	0	2	0	3	4	03	50	50	100
5	BIC405	Microcontroller and Embedded Systems	PCC	CSE-ICB	CSE-ICB	3	0	0	0	3	3	03	50	50	100
6	BIC406	Network Security using Generative AI	PBL	CSE-ICB	CSE-ICB	0	0	2	0	2	2	03	50	50	100
7	BIC407	Microcontroller & Embedded Systems	AEC	CSE-ICB	CSE-ICB	0	0	2	0	2	1	03	50	50	100
8	BUHK408	Universal Human Values	UHV	CSE-ICB	CE	2	0	0	0	2	1	1.5	50	50	50
9	BNSK409 BPEK409 BYOK409	National Service Scheme Physical Education Yoga	NCMC	-	-	0	0	0	0	0	0	0	100	0	100
AICTE Activity Points Mandatory						Total				25	21	24	500	400	900

IPCC: Integrated Professional Core Course,

PCC: Professional Core Course

PBL: Project Based Learning

AEC: Ability Enhancement Course,

NCMC: Non-Credit Mandatory Course

L: Lecture,

T: Tutorial,

P: Practical

S= SDA: Skill Development Activity,

CIE: Continuous Internal Evaluation,

SEE: Semester End Evaluation.

Integrated Professional Core Course (IPCC): Refers to Integrated Professional Core Course Theory Integrated with practical's of the same course. Credit for IPCC can be 04 and its Teaching Learning hours (L: T: P) can be considered as (3: 0: 2) or (2: 2: 2). The theory part of the IPCC shall be evaluated both by CIE and SEE. The practical part shall be evaluated by only CIE (no SEE). However, questions from the practical part of IPCC shall be included in the SEE question paper.

Non-Credit Mandatory Course (NCMC) - National Service Scheme /Physical Education/Yoga: All students have to register for any one of the courses namely National Service Scheme (NSS), Physical Education (PE) (Sports and Athletics), and Yoga (YOG) with the concerned coordinator of the course during the first week of III semesters. Activities shall be carried out between III semester to the VI semester (for 4 semesters). Successful completion of the registered course and requisite CIE score is mandatory for the award of the degree. The events shall be appropriately scheduled by the colleges and the same shall be reflected in the calendar prepared for the NSS, PE, and Yoga activities. These courses shall not be considered for vertical progression as well as for the calculation of SGPA and CGPA, but completion of the course is mandatory for the award of degree.

Newly introduced subjects in the syllabus

		3rd Semester	4th Semester
1.	List of Existing Elective Courses	-----	-----
2.	List of New Existing Elective Courses	-----	-----
3.	List of New Industry Aligned Course	Cloud Security for smart devices (PBL)	Network Security (PBL)

Percentage of Change in the Syllabus

3 rd Semester						
Sl. No	Course Code	Course Name	Topics Added	Topics removed	Revised in %	Justification
1	BIC303 (IPCC)	Data Structures and Applications	<ul style="list-style-type: none"> ➤ Queue and Applications, ➤ Linked lists and Applications ➤ Trees and Applications, ➤ Hashing Techniques 	<ul style="list-style-type: none"> ➤ Introduction to Algorithms ➤ Brute force Approaches ➤ Divide and Conquer ➤ Greedy Method ➤ Dynamic Programming ➤ Branch and Bound 	40%	<p>To Fill the gap of Advance data structures and to achieve full coverage.</p> <p>A new subject, Analysis and Design of Algorithms, has been introduced in the 4th semester</p>
2	BIC305 (PCC)	Object Oriented Programming with JAVA		Laboratory experiments have been removed, and the subject has been designated as a PCC (Professional Core Course).	30%	The subject has been moved from the 4th semester to the 3rd semester and added in place of Digital Design and Computer Organization
3	BIC306 (PBL)	Cloud Security for smart devices	New Course			

4th Semester

Sl.No	Course Code	Course Name	Topics Added	Topics removed	Revised in %	Justification
1	BIC403 (IPCC)	Analysis and Design of Algorithms	<p>M-1: Space and Time complexity</p> <p>M-2: Selection problem, Closest pair of points, Solving Recurrence Equations.</p> <p>M-3: Array Representation of Binary Tree, Binary search trees, Heap Tree and Heap Sort, AVL Tree, B Trees, B+ trees, Red Black Trees.</p> <p>Hashing: Open Hashing (Separate Chaining), Closed Hashing (Open Addressing).</p> <p>M-4: 0/1 Knapsack problems, Matrix Multiplication Chains, All pair's shortest paths. Optimization problems, Fractional Knapsack problem, Topological sorting, Single-Source Shortest paths.</p> <p>M-5: Polynomial Time and verification, P and NP Problems, NP-Completeness and Reducibility, NP-Hard problems, Backtracking (Max clique and Travelling salesperson), Branch-and-Bound (0/1 Knapsack problem, Max clique and Travelling salesperson).</p>		25%	Students will learn more concepts related to problem-solving purpose added all these topics
2	BIC404 (IPCC)	Database Management System	<ul style="list-style-type: none"> ➤ Data Definition Languages (DDL) commands ➤ Data Manipulation Language (DML) ➤ Lab Experiments Introduced 		20%	
3	BIC406(PBL)	Network Security	New Course			

3rd SEMESTER

BASIC SCIENCE



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Semester	:	3rd Semester		
Course Title	:	Mathematics		
Course Code	:	BMATD301		
Course Type (Theory/ Practical/ Integrated)	:	Theory		
Course Category	:	BSC		
Stream	:	Common to CSE & Allied branches	CIE	50 Marks
Teaching hour/week (L:T:P:S)	:	3:1:0:0	SEE	50 Marks
Total Hours	:	40 Hrs	SEE Duration	3 Hours
Credits:	:	3		

Course Learning Objectives: Students will be taught

Sl.No	Course Objectives
1	Acquire basic knowledge of Mathematical concepts for understanding engineering problems
2	Use concepts of linear algebra, Discrete Mathematics and Game Theory in solving problems
3	Analyze problems using concepts of Linear algebra, Discrete Mathematics and Game Theory
4	Use MATLAB to obtain solutions of various mathematical problems

Teaching-Learning Process Pedagogy

(General Instructions):

These are sample Strategies; which teachers can use to accelerate the attainment of the various course outcomes.

1. Lecture method (L) does not mean only the traditional lecture method, but a different type of teaching method may be adopted to develop the outcomes.
2. Show Video/animation films to explain the infrastructures and the mechanism involved in the principle.
3. Encourage collaborative (Group) Learning in the class.
4. Ask at least three HOT (Higher-order Thinking) questions in the class, which promotes critical thinking.
5. Adopt Problem Based Learning (PBL), which fosters students' Analytical skills, develop thinking skills such as the ability to evaluate, generalize, and analyze information rather than simply recall it.
6. Topics will be introduced in multiple representations.
7. Show the different ways to solve the same problem and encourage the students to come up with their own creative ways to solve them.
8. Discuss how every concept can be applied to the real world - and when that's possible, it helps improve the students' understanding.
9. Individual teachers can devise innovative pedagogy to improve teaching-learning.



DSATM

**Scheme of Teaching and Examinations for BE Programme 2023 Outcome Based Education and Choice Based Credit System (CBCS)
(Effective from the Academic Year 2024-25)**

COURSE SYLLABUS

Module No.	Contents of the Module	Hours
1	MODULE-I: Statistics Introduction, Curve fitting (Least squares method), Fitting of a straight line, Fitting of a second degree parabola, Fitting of curves of the form $y=ab^x$, $y=ae^{bx}$, $y=ax^b$, Correlation and Correlation coefficient r , Regression lines, Rank Correlation.	8
Pedagogy	Chalk and board, group discussion, ppt, videos	
2	MODULE – II: Probability Distribution Review of basic probability theory. Random variables (discrete and continuous), probability mass and density functions. Mathematical expectation, mean and variance. Binomial, Poisson, normal and Exponential distributions.	8
Pedagogy	Chalk and board, group discussion, ppt, videos	
3	MODULE-III: Sampling Theory Introduction, sampling distribution, standard error, testing of hypothesis, central limit theorem, levels of significance, test of significance, confidence limits, student's 't' distribution, Chi-square distribution as a test of goodness of fit, F-Distribution.	8
Pedagogy	Chalk and board, group discussion, ppt, videos	
4	MODULE-IV: ANOVA The ANOVA technique, basic principle of ANOVA, one-way ANOVA, Two-way ANOVA, Latin-square Design	8
Pedagogy	Chalk and board, group discussion, ppt, videos	
5	MODULE-V: Fundamentals of logic Basic connectives and truth tables, logical equivalence-laws of logic, predicates, Quantifiers, logical equivalence involving Quantifiers, logical implication-rules of inference, proofs of theorems.	8
Pedagogy	Chalk and board, group discussion, ppt, videos	

Text Books	
Books (Title of the Book/Name of the author/Name of the publisher/Edition and Year)	
1	Erwin Kreyzig, "Advanced Engineering Mathematics", 10th Edition, Wiley Publications, 2018.
2	B. S. Grewal "Higher Engineering Mathematics", Khanna publishers, 44th Ed., 2021
3	Fundamentals of Statistics by Srijob Bhushan, ISBN: 9789355428752, 9355428758

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

CO	Course Outcomes	RBT Level	Level Indicator
CO1	Understand the basic concepts of probability, statistics, sampling theory, ANOVA and logic	Remember, Understand	L1, L2
CO2	Apply techniques of probability, statistics, sampling theory, ANOVA and logic to solve Engineering Problems	Apply	L3
CO3	Analyze Engineering problems using probability, statistics, sampling theory, ANOVA and logic	Analyze	L4
CO4	Investigate problems arising in real life using the overall knowledge acquired	Evaluate	L5

Mapping of Course Outcomes to Program Outcomes:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CO2	3	--	--	--	--	--	--	--	--	--	--	--	--	--
CO3	--	3	--	--	--	--	--	--	--	--	--	--	--	--
CO4	--	--	--	2	--	--	--	--	1	1	--	--	--	--

Weblinks and Video Lectures (e-Resources)	
1	https://tinyurl.com/43fve5na
2	https://rb.gy/csqq72
3	https://tinyurl.com/y7e8mx5z

**INTEGRATED
PROFESSIONAL CORE
COURSE (IPCC)**



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Semester	:	3rd Semester		
Course Title	:	Computer Networks		
Course Code	:	BIC302		
Course Type (Theory/Practical/Project/Integrated)	:	Integrated		
Category	:	IPCC		
Stream	:	CSE-ICB	CIE	: 50
Teaching hours/ week (L: T:P:S)	:	3-0-2-0	SEE	: 50
Total Hours	:	40 hours Theory + 20 hours Practical	SEE Duration	: 3 hours
Credits	:	4		

Course Learning Objectives: Students will be able to:

Sl. No	Course Objectives
1	Understand basic concepts, OSI reference model, services and role of each layer of OSI model and TCP/IP, networks devices and transmission media, Analog and digital data transmission
2	Learn the channel allocation, framing, error and flow control techniques.
3	Work with various functions of Network Layer i.e. Logical addressing, subnetting & Routing Mechanism.
4	Differentiate the Transport Layer function i.e. Port addressing, Connection Management, Error control and Flow control mechanism.
5	Acquire knowledge about different protocols used at application layer i.e. HTTP, SNMP, SMTP, FTP, TELNET

Teaching-Learning Process Pedagogical

Initiatives:

Some sample strategies to accelerate the attainment of various course outcomes are listed below:

- Adopt different teaching methods to attain the course outcomes.
- Include videos to demonstrate various concepts in C and C++.
- Encourage collaborative (Group) Learning to encourage team building.
- Ask at least three **HOTS (Higher-order Thinking Skills)** module-wise questions to promote critical thinking.
- Adopt **Problem-Based Learning (PBL)**, which fosters students' analytical skills, and develops thinking skills such as evaluating, generalizing, and analyzing information rather than simply recalling it.
- Show different ways to solve a problem and encourage the students to come up with creative and optimal solutions.
- Discuss various case studies to map with real-world scenarios and improve the understanding.
- Devise innovative pedagogy to improve **Teaching-Learning Process (TLP)**.



Scheme of Teaching and Examinations for BE Programme 2023 Outcome Based Education and Choice Based Credit System (CBCS) (Effective from the Academic Year 2024-25)

DSATM

COURSE CURRICULUM

Module No.	Topics	Hours
1	Introduction: overview of the internet, protocol layering, internet history, standards and administration, application layer: introduction, client-server paradigm, standard client-server applications, peer-to-peer paradigm, socket interface programming Text book 1: chapter 1, 2	8
Pedagogy	QUIZ	
2	Transport Layer: Introduction, Transport-Layer Protocols, User Datagram Protocol (UDP), Transmission Control Protocol (TCP) Text book 1: Chapter 3	8
Pedagogy	Demonstration of the SOCK program, UDP, FTP and TFTP, TCP	
3	Network Layer: Introduction, Network-Layer Protocols, Unicast Routing, Multicast Routing, Next Generation Ip Text Book 1: Chapter 4	8
Pedagogy	Demonstration of Static Routing, RIP, OSPF, ICMP, Mixed Bridge/Router experiment	
4	Data-Link Layer: Wired Networks: Introduction, Data Link Control (DLC), Multiple Access Protocols (MAC), Link-Layer Addressing, Wired Lans: Ethernet Protocol, Other Wired Networks, Connecting Devices Text Book 1: Chapter 5	8
Pedagogy	Simulation of Configuration of Bridges/Routers, Simple Bridge Experiment, Spanning Tree algorithm	
5	Physical Layer and Transmission Media: Data and Signals, Digital Transmission, Analog Transmission, Bandwidth Utilization, Transmission Media Text book 1: chapter 6	8
Pedagogy	Demonstration of the different types of Network cables and practically implement the cross- wired cable and straight through cable using clamping tool. Install and configure Network Devices: HUB, Switch and Routers.	
	<p style="text-align: center;">Pedagogical Initiatives (Not limited to):</p> <ul style="list-style-type: none">● Think Pair and Share (Blended Learning): provides an opportunity for students to learn from one another.● Problem Solving: encourages cognitive thinking and enables creative problem solving● Poster Presentation: allows students to represent the concepts visually in order to understand the topics easily.● Case studies: maps different domains in real time applications Demonstration: exhibits the implementation process	

List of Programs:

Sl. No.	Experiments/Programs	CO's
1	Study of different types of Network cables and Practically implement the cross-wired cable and straight through cable using clamping tool.	5
2	Install and Configure Wired NIC and transfer files between systems in LAN and Wireless LAN.	5
3	Install and configure Network Devices: HUB, Switch and Routers.	4
4	Implement the RIP using C Language	3
5	Implement the OSPF using C language	3
6	Implement the ICMP using C language	2
7	Implement the TCP using C language	2
8	Implement the UDP using C language	2
9	Perform the file transfer using FTP	1
10	Perform the remote system Login using rlogin	1
Note : Open Ended Questions to be framed by incharge faculty		

Text Books

Sl. No.	Title of the Book/Name of the author/Name of the publisher/Edition and Year
1	Computer Networks: A Top-Down Approach Behrouz A. Forouzan and Firouz Mosharraf

Reference Books

1	Andrew Tanenbaum "Computer Networks", Prentice Hall. 3. William Stallings, "Data and Computer Communication", Pearson.
2	Kurose and Ross, "Computer Networking- A Top-Down Approach", Pearson
3	W. A. Shay, "Understanding Communications and Networks", Cengage Learning.
4	D. Comer, "Computer Networks and Internets", Pearson

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

CO	Course Outcomes	RBT Level	RBT Level Indicator
CO1	Explain basic concepts, OSI reference model, services and role of each layer of OSI model and TCP/IP, networks devices and transmission media, Analog	L2	UNDERSTAND
CO2	Apply channel allocation, framing, error and flow control techniques.	L3	APPLY
CO3	Describe the functions of Network Layer i.e. Logical addressing, subnetting & Routing Mechanism.	L3	APPLY
CO4	Explain the different Transport Layer function i.e. Port addressing, Connection Management, Error control and Flow control mechanism.	L3	APPLY
CO5	Explain the different protocols used at application layer i.e. HTTP, SNMP, SMTP, FTP, TELNET	L3	APPLY

Mapping of Course Outcomes to Program Outcomes:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3		3							3	3	
CO2	3	3	3		3							3	3	
CO3	3	3	3		3							3	3	
CO4	3	3	3		3							3	3	
CO5	3	3	3		3							3	3	

Weblinks and Video Lectures (e-Resources)

1	https://www.my-mooc.com/en/video/tcp-ip-model-explained-tcp-ip-model-animation-tcp-ip-protocol-suite-tcp-ip-layers-%20techterms/
2	https://www.linkedin.com/posts/telecomhall_easily-explained-amazing-animation-of-the-activity-7145485146522132480-kdsT
3	https://www.youtube.com/watch?v=bj-Yfakjllc&list=PLIFyRwBY_4bRLmKfP1KnZA6rZbRHtmXi



Dayananda Sagar Academy of Technology & Management

(Autonomous Institute under VTU)

Semester	:	3 rd Semester		
Course Title	:	DATA STRUCTURES AND APPLICATIONS		
Course Code	:	BIC303		
Course Type (Theory/Practical/Project/Integrated)	:	Integrated		
Category	:	IPCC		
Stream	:	CSE-ICB	CIE	: 50
Teaching hours/ week (L: T:P:S)	:	3-0-2-0	SEE	: 50
Total Hours	:	40 hours Theory + 20 hours Practical	SEE Duration	: 3 hours
Credits	:	4		

Course Learning Objectives: Students will be able to:

Sl. No	Course Objectives
1	Explain the fundamentals of data structures and their applications essential for implementing solutions to problems.
2	Analyze Linear Data Structures: Stack, Queues, Lists
3	Illustrate representation of data structures: Stack, Queues, Linked Lists, Trees and Graphs.
4	Design and Develop Solutions to problems using Arrays, Structures, Stack, Queues, Linked Lists, and Explore usage of Trees and Graph for application development and Apply the Hashing techniques in mapping key value pairs.
5	Assess appropriate data structure during program development/Problem Solving Application.

Teaching-Learning Process Pedagogical Initiatives:

Some sample strategies to accelerate the attainment of various course outcomes are listed below:

- Adopt different teaching methods to attain the course outcomes.
- Include videos to demonstrate various concepts in C and C++.
- Encourage collaborative (Group) Learning to encourage team building.
- Ask at least three **HOTS (Higher-order Thinking Skills)** module-wise questions to promote critical thinking.
- Adopt **Problem-Based Learning (PBL)**, which fosters students' analytical skills, and develops thinking skills such as evaluating, generalizing, and analyzing information rather than simply recalling it.
- Show different ways to solve a problem and encourage the students to come up with creative and optimal solutions.
- Discuss various case studies to map with real-world scenarios and improve the understanding.
- Devise innovative pedagogy to improve **Teaching-Learning Process (TLP)**.



DSATM

**Scheme of Teaching and Examinations for BE Programme 2023 Outcome Based Education and Choice Based Credit System (CBCS)
(Effective from the Academic Year 2024-25)**

COURSE CURRICULUM

Module No.	Topics	Hours
1	INTRODUCTION TO DATA STRUCTURES: Data Structures, Classifications (Primitive & Non-Primitive), Data structure Operations (Traversing, inserting, deleting, searching, and sorting). ARRAYS and STRUCTURES: Review of Arrays, Structures: Array of structures Self-Referential Structures Arrays, Dynamic Allocated Arrays, Structures and Unions.	8 Hours
Pedagogy	Think Pair and Share (Blended Learning)	
2	Stacks: Definition, Stack Operations, Array Representation of Stacks, Stacks using Dynamic Arrays. Stacks ADT operations: Push, Pop and Peek operations; Queue and Applications: Infix to Postfix conversion Definition, Array Representation of Queues, Queue Operations, Circular Queues, Queues and Circular queues using Dynamic arrays, Dequeues, Priority Queues. Priority Queues and their Representation, Input/Output Restricted Queues, DEQUE. Application of Queues.	8 Hours
Pedagogy	Problem Solving	
3	LINKED LISTS AND THEIR APPLICATIONS: Definition, classification of linked lists. Representation of different types of linked lists in Memory, Insertion, Deletion, Searching, Sorting, and Concatenation Operations on Singly linked list, Doubly Linked lists, Circular linked lists. Applications of Linked lists – Polynomials, Sparse matrix representation.	8 Hours
Pedagogy	Quiz	
4	TREES AND THEIR APPLICATIONS: Terminologies, Binary Trees, Properties of Binary trees, Array and linked Representation of Binary Trees, Binary Tree Traversals - Inorder, postorder, preorder; Threaded binary trees, Binary Search Trees – Definition, Insertion, Deletion, Traversal, and Searching operation on Binary search tree. Application of Trees-Evaluation of Expression.	8 Hours
Pedagogy	Poster Presentation	
5	Trees 2: AVL tree, Red-black tree, Splay tree, B-tree. Graphs: Definitions, Terminologies, Matrix and Adjacency List Representation of Graphs, Traversal methods: Breadth First Search and Depth FirstSearch.	8 Hours

	Hashing Techniques: Hash Table organizations, Hash function, Static and Dynamic Hashing. Address calculation techniques, Common hashing functions, Collision resolution techniques, open addressing, closed addressing, separate chaining, Linear probing, Quadratic probing, double hashing.	
Pedagogy	Demonstration	
	Pedagogical Initiatives (Not limited to): <ul style="list-style-type: none"> • Think Pair and Share (Blended Learning): provides an opportunity for students to learn from one another • Problem Solving: encourages cognitive thinking and enables creative problem solving • Poster Presentation: allows students to represent the concepts visually in order to understand the topics easily. • Case studies: maps different domains in real time applications • Demonstration: exhibits the implementation process 	

List of Programs:

Sl. No.	Experiments/Programs	COs
1	Develop a Program in C for the following: a) Declare a calendar as an array of 7 elements (A dynamically Created array) to represent 7 days of a week. Each Element of the array is a structure having three fields. The first field is the name of the Day (A dynamically allocated String), The second field is the date of the Day (A integer), the third field is the description of the activity for a particular day (A dynamically allocated String). b) Write functions create (), read () and display (); to create the calendar, to read the data from the keyboard and to print weeks activity details report on screen.	
2	Develop a menu driven Program in C for the following operations on STACK of Integers (Array Implementation of Stack with maximum size MAX) a) Push an Element on to Stack b) Pop an Element from Stack c) Demonstrate how Stack can be used to check Palindrome d) Demonstrate Overflow and Underflow situations on Stack e) Display the status of Stack f) Exit Support the program with appropriate functions for each of the above operations	
3	Develop a Program in C for converting an Infix Expression to Postfix Expression. Program should support for both parenthesized and free parenthesized. Expressions with the operators: +, -, *, /, % (Remainder), ^ (Power) and alphanumeric operands.	
4	Develop a Program in C for the following Stack Applications a) Evaluation of Suffix expression with single digit operands and operators: +, -, *, /, %, ^ b) Solving Tower of Hanoi problem with n disks	

5	<p>Develop a menu driven Program in C for the following operations on QUEUE of Characters (Array Implementation of Queue with maximum size MAX)</p> <ol style="list-style-type: none"> Insert an Element on to QUEUE Delete an Element from QUEUE Demonstrate Overflow and Underflow situations on QUEUE Display the status of Circular QUEUE Exit Support the program with appropriate functions for each of the above operations. 	
6	<p>Develop a menu driven Program in C for the following operations on Singly Linked List (SLL) of Student Data with the fields: USN, Name, Programme, Sem, PhNo</p> <ol style="list-style-type: none"> Create a SLL of N Students Data by using front insertion. Display the status of SLL and count the number of nodes in it Perform Insertion / Deletion at End of SLL Perform Insertion / Deletion at Front of SLL (Demonstration of stack) <p>Exit</p>	
7	<p>Develop a menu driven Program in C for the following operations on Doubly Linked List (DLL) of Employee Data with the fields: SSN, Name, Dept, Designation, Sal, PhNo</p> <ol style="list-style-type: none"> Create a DLL of N Employees Data by using end insertion. Display the status of DLL and count the number of nodes in it Perform Insertion and Deletion at End of DLL Perform Insertion and Deletion at Front of DLL Demonstrate how this DLL can be used as Double Ended Queue. Exit 	
8	<p>Design, Develop and Implement a menu driven Program in C for the following operations on Binary Search Tree (BST) of Integers</p> <ol style="list-style-type: none"> Create a BST of N Integers Traverse the BST in Inorder, Preorder and Post Order 	
Open ended Programs		
1	<p>Develop a Program in C for the following operations on Graph(G) of Cities</p> <ol style="list-style-type: none"> Create a Graph of N cities using Adjacency Matrix. Print all the nodes reachable from a given starting node in a digraph using DFS/BFS method 	
2	<p>Develop a Program in C for the following operations on Singly Circular Linked List (SCLL) with header nodes</p> <ol style="list-style-type: none"> Represent and Evaluate a Polynomial $P(x,y,z) = 6x^2y^2z - 4yz^5 + 3x^3yz + 2xy^5z - 2xyz^3$ Find the sum of two polynomials POLY1(x,y,z) and POLY2(x,y,z) and store the result in POLYSUM(x,y,z) <p>Support the program with appropriate functions for each of the above operations</p>	
3	<p>Write a C program to implement Multiple stacks, Multiple Queues using arrays and linked Lists</p>	

Text Books

Sl. No.	Title of the Book/Name of the author/Name of the publisher/Edition and Year
1	Ellis Horowitz and Sartaj Sahni, Fundamentals of Data Structures in C, 2nd Ed, Universities Press, 2014.
2	Seymour Lipschutz, Data Structures Schaum's Outlines, Revised 1st Ed, McGraw Hill, 2014.

Reference Books

1	Reema Thareja, Data Structures using C, 3rd Ed, Oxford press, 2012.
2	Debasis Samanta, Classic Data Structures, (2e), PHI Learning Pvt. Ltd., India, 2010
3	Gilberg and Forouzan, Data Structures: A Pseudo-code approach with C, 2nd Ed, Cengage Learning, 2014.

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

CO	Course Outcomes	RBT Level	RBT Level Indicator
CO1	Understand and remember the basic concepts of data structures and their applications.	R & U	Level-1 & Level-2
CO2	Apply stack and queues in solving problems, and solve real world problems using concepts like queues and stacks.	A	Level-3
CO3	Analyze linear and non-linear data structures concepts and its real-world applications.	An	Level-4
CO4	Investigate the methods of problem solving related to trees and graphs to model and solve the real-world problem.	E	Level-5
CO5	Design and demonstrate the concepts of hashing techniques and resolve collisions during mapping of key value pairs and choose the appropriate data structure for solving real world problems.	C	Level-6

Mapping of Course Outcomes to Program Outcomes:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	2	3									2		2
CO2	2	2	3		2									2
CO3	2	2	3		2							2	2	
CO4	2	2	3									2		
CO5	2	2	3										2	2

Weblinks and Video Lectures (e-Resources)

1	http://elearning.vtu.ac.in/econtent/courses/video/CSE/06CS35.html
2	https://nptel.ac.in/courses/106/105/106105171/
3	http://www.nptelvideos.in/2012/11/data-structures-and-algorithms.html
4	http://elearning.vtu.ac.in/econtent/courses/video/CSE/06CS35.html
5	https://nptel.ac.in/courses/106/105/106105171/
6	http://www.nptelvideos.in/2012/11/data-structures-and-algorithms.html
7	https://www.youtube.com/watch?v=3Xo6P_V-qns&t=201s
8	https://ds2-iiith.vlabs.ac.in/exp/selection-sort/index.html
9	https://nptel.ac.in/courses/106/102/106102064/
10	https://ds1-iiith.vlabs.ac.in/exp/stacks-queues/index.html
11	https://ds1-iiith.vlabs.ac.in/exp/linked-list/basics/overview.html
12	https://ds1-iiith.vlabs.ac.in/List%20of%20experiments.html
13	https://ds1-iiith.vlabs.ac.in/exp/tree-traversal/index.html
14	https://ds1-iiith.vlabs.ac.in/exp/tree-traversal/depth-first-traversal/dft-practice.html
15	https://infyspringboard.onwingspan.com/web/en/app/toc/lex_auth_013501595428077568125_59/overview

**PROFESSIONAL CORE
COURSE (PCC)**



Dayananda Sagar Academy of Technology & Management

(Autonomous Institute under VTU)

Semester	:	III			
Course Title	:	Operating Systems			
Course Code	:	BIC304			
Course Type (Theory/ Practical/ Integrated)	:	Theory			
Category	:	PCC			
Stream	:	CSE-ICB	CIE	:	50
Teaching hours/ week (L:T:P:S)	:	3:0:0:0	SEE	:	50
Total Hours	:	40 Hours of Theory	SEE	:	3 Hours
Credits	:	03	Duration		

Course Learning Objectives: Students will be able to:

Sl. No	Course Objectives
1	To demonstrate the need for OS and different types of OS
2	To discuss suitable techniques for management of different resources
3	To demonstrate different APIs/Commands related to processor, memory, storage and file system management

Teaching-Learning Process Pedagogical

Initiatives:

Some sample strategies to accelerate the attainment of various course outcomes are listed below:

- Adopt different teaching methods to attain the course outcomes.
- Include videos to demonstrate various concepts in C.
- Encourage collaborative (Group) Learning to encourage team building.
- Ask at least three **HOTS (Higher-order Thinking Skills)** module-wise questions to promote critical thinking.
- Adopt **Problem-Based Learning (PBL)**, which fosters students' analytical skills, and develops thinking skills such as evaluating, generalizing, and analyzing information rather than simply recalling it.
- Show different ways to solve a problem and encourage the students to come up with creative and optimal solutions.
- Discuss various case studies to map with real-world scenarios and improve the understanding.
- Devise innovative pedagogy to improve **Teaching-Learning Process (TLP)**.



Scheme of Teaching and Examinations for BE Programme -2024-25 Outcome

Based Education and Choice Based Credit System (CBCS)

(Effective from the Academic Year 2024-25)

DSATM

COURSE CURRICULUM

Module No.	Topics	Hours
1	<p>Introduction to operating systems: Introduction; System structures: What operating systems do;</p> <p>Computer System organization: Computer-System Organization - Interrupts, Storage Structure, I/O Structure, Computer System architecture - Computer-System Architecture, Single-Processor Systems, Multiprocessor Systems, Clustered Systems; Operating System operations: Operating-System Operations - Multiprogramming and Multitasking, Dual-Mode and Multimode Operation, Timer; Process management - Process Management; Memory management - Memory Management; Storage management - Mass-Storage Management; Protection and Security - Security and Protection; Virtual machines; Virtualization; Distributed system - Distributed Systems</p> <p>Operating System Services: Operating-System Services, User - Operating System interface, User and Operating-System Interface, Command Interpreters, Graphical User Interface, Touch-Screen Interface, Choice of Interface, System Calls, Example, Application Programming Interface, Types of System Calls, Process Control, File Management, Device Management, Information Maintenance, Communication, Operating-System Design and Implementation, Design Goals, Mechanisms and Policies, Operating-System Structure, Monolithic Structure, Layered Approach, Microkernels, Building and Booting an Operating System, System Boot</p> <p>Text Book 1: Chapter – 1</p>	8 Hours
Pedagogy	Think Pair and Share	
2	<p>Processes: Process Concept, The Process, Process State, Process Control Block, Threads, Process Scheduling, Scheduling Queues, CPU Scheduling, Context Switch, Operations on Processes, Process Creation, Process Termination, Interprocess Communication, IPC in Shared-Memory Systems, IPC in Message-Passing Systems, Naming, Synchronization, Buffering</p> <p>Threads & Concurrency: Overview, Motivation, Benefits, Multicore Programming, Programming Challenges, Types of Parallelism, Multithreading Models, Many-to-One Model, One-to-One Model, Many-to-Many Model</p> <p>CPU Scheduling: Basic Concepts, CPU-I/O Burst Cycle, CPU Scheduler, Preemptive and Non-preemptive Scheduling, Dispatcher, Scheduling Criteria, Scheduling Criteria,</p>	8 Hours

	Scheduling Algorithms, First-Come, First-Served Scheduling, Shortest-Job-First Scheduling, Round-Robin Scheduling, Priority Scheduling Text Book 1: Chapter – 3	
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Pedagogy	Problem Solving	
3	<p>Process Synchronization/Synchronization Tools: Background, The Critical-Section Problem, Peterson’s Solution, Hardware Support for Synchronization, Memory Barriers, Hardware Instructions, Atomic Variables, Mutex Locks, Semaphores, Semaphore Usage, Liveliness, Deadlock, Priority Inversion</p> <p>Classical problems of synchronization: The Bounded-Buffer Problem, The Readers–Writers Problem</p> <p>Deadlocks: System Model, Deadlock in Multithreaded Applications, Livelock, Deadlock Characterization, Necessary Conditions, Resource-Allocation Graph, Methods for Handling Deadlocks, Deadlock Prevention, Mutual Exclusion, Hold and Wait, No Preemption, Circular Wait, Deadlock Avoidance, Safe State, Resource-Allocation-Graph Algorithm, Banker’s Algorithm, Deadlock Detection, Single Instance of Each Resource Type, Several Instances of a Resource Type, Detection-Algorithm Usage, Recovery from Deadlock, Process and Thread Termination, Resource Preemption</p> <p>Text Book :1 Chapter – 6</p>	8 Hours
Pedagogy	Think Pair and Share	

4	<p>Main Memory: Background, Basic Hardware, Address Binding, Logical versus Physical Address Space, Contiguous Memory Allocation, Memory Mapping and Protection, Memory Allocation, Fragmentation, Paging, Basic Method, Hardware Support, Protection, Shared Pages, Swapping, Standard Swapping</p> <p>Virtual Memory: Background, Demand Paging, Basic Concepts, Free-Frame List, Performance of Demand Paging, Page Replacement, Basic Page Replacement, FIFO Page Replacement, Optimal Page Replacement, LRU Page Replacement, LRU-Approximation Page Replacement, Thrashing, Cause of Thrashing, Other Considerations, Pre-paging, Page Size</p> <p>Text Book 1: Chapter -8</p>	8 Hours
Pedagogy	Think Pair and Share	

5	<p>Mass-Storage Structure: Overview of Mass-Storage Structure, Hard Disk Drives, Nonvolatile Memory Devices, Overview of Nonvolatile Memory Devices, Secondary Storage Connection Methods, Address Mapping, HDD Scheduling, FCFS Scheduling, SCAN Scheduling, C-SCAN Scheduling, Selection of a Disk-Scheduling Algorithm</p> <p>File-System Interface: File Concept, File Attributes, File Operations, File Types, File Structure, Internal File Structure, Access Methods, Sequential Access, Direct Access, Directory Structure, Single-Level Directory, Two-Level Directory, Tree-Structured Directories, Protection, Types of Access, Access Control</p> <p>File-System Implementation: File-System Structure, Directory Implementation, Linear List, Hash Table, Allocation Methods, Contiguous Allocation, Linked Allocation, Indexed Allocation, Performance</p> <p>File-System Internals: File Systems, File-System Mounting, Partitions and Mounting, File Sharing, Multiple Users</p> <p>Text Book 1: Chapter – 10</p>	8 Hours
Pedagogy	Case Studies	
	<p>Pedagogical Initiatives (Not limited to):</p> <ul style="list-style-type: none"> ● Think Pair and Share (Blended Learning): provides an opportunity for students to learn from one another ● Problem Solving: encourages cognitive thinking and enables creative problem solving ● Poster Presentation: allows students to represent the concepts visually in order to understand the topics easily. ● Case studies: maps different domains in real time applications ● Demonstration: exhibits the implementation process 	

Text Books	
Sl. No.	Title of the Book/Name of the author/Name of the publisher/Edition and Year
1	Abraham Silberschatz, Peter Baer Galvin, Greg Gagne, Operating System Principles 8th edition, Wiley-India, 2015
Reference Books	
1	Ann McHoes Ida M Fylnn, Understanding Operating System, Cengage Learning, 6th Edition.
2	D.M Dhamdhere, Operating Systems: A Concept Based Approach 3rd Ed, McGraw- Hill, 2013.
3	P.C.P. Bhatt, An Introduction to Operating Systems: Concepts and Practice 4th Edition, PHI (EEE), 2014.
4	William Stallings Operating Systems: Internals and Design Principles, 6th Edition, Pearson.

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

CO	Course Outcomes	RBT Level	RBT Level Indicator
CO1	Explain the structure and functionality of operating system.	L2	Understand
CO2	Apply appropriate CPU scheduling algorithms for the given problem.	L3	Apply
CO3	Analyse the various techniques for process synchronization and deadlock handling.	L4	Analyze
CO4	Apply the various techniques for memory management.	L3	Apply
CO5	Apply the methodologies used in secondary storage management strategies.	L3	Apply
CO6	Develop the solutions for the given problems using the operating system	L3	Apply

Mapping of Course Outcomes to Program Outcomes:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1													3	
CO2	3												3	
CO3		3											3	
CO4	3												3	
CO5	3												3	
CO6			3	3	3								3	

Weblinks and Video Lectures (e-Resources)

1	https://youtu.be/mXw9ruZaxzQ
2	https://youtu.be/vBURTt97EkA
3	https://www.youtube.com/watch?v=783KABtuE4&list=PLIemF3uozcAKTgsCij82voMK3TMR0YE_f
4	4. https://www.youtube.com/watch?v=3-ITLMMeeXY&list=PL3pGy4HtqwD0n7bQfHjPnsWzkeRn6mkO



Dayananda Sagar Academy of Technology & Management
(Autonomous Institute under VTU)

Semester	:	3 rd Semester			
Course Title	:	Object Oriented Programming with JAVA			
Course Code	:	BIC305			
Course Type (Theory/Practical/Project/Integrated)	:	Theory			
Category	:	PCC			
Stream	:	CSE-ICB	CIE	:	50
Teaching hours/ week (L:T:P:S)	:	3-0-0-0	SEE	:	50
Total Hours	:	40 Hours	SEE	:	3 hours
Credits	:	3	Duration	:	

Course Learning Objectives: Students will be able to

Sl. No	Course Objectives
1	
2	
3	

Teaching-Learning Process Pedagogical Initiatives:

Some sample strategies to accelerate the attainment of various course outcomes are listed below:

- i. Adopt different teaching methods to attain the course outcomes.
- ii. Include videos to demonstrate various concepts in C.
- iii. Encourage collaborative (Group) Learning to encourage team building.
- iv. Ask at least three **HOTS (Higher-order Thinking Skills)** module-wise questions to promote critical thinking.
- v. Adopt **Problem-Based Learning (PBL)**, which fosters students' analytical skills, and develops thinking skills such as evaluating, generalizing, and analyzing information rather than simply recalling it.
- vi. Show different ways to solve a problem and encourage the students to come up with creative and optimal solutions.
- vii. Discuss various case studies to map with real-world scenarios and improve the understanding.
- viii. Devise innovative pedagogy to improve **Teaching-Learning Process (TLP)**.



Scheme of Teaching and Examinations for BE Programme 2023
Outcome Based Education and Choice Based Credit System (CBCS)
DSATM (Effective from the Academic Year 2024-25)

COURSE CURRICULUM

Module No.	Topics	Hours
1	An Overview of Java: Object-Oriented Programming, A First Simple Program, A Second Short Program, Two Control Statements, Using Blocks of Code, Lexical Issues, The Java Class Libraries, Data Types, Variables, and Arrays: Java Is a Strongly Typed Language, The Primitive Types, Integers, Floating-Point Types, Characters, Booleans, A Closer Look at Literals, Variables, Type Conversion and Casting, Automatic Type Promotion in Expressions, Arrays, A Few Words About Strings. Text book 1: Ch 2, Ch 3	8
Pedagogy	Blended Learning:	
2	Operators: Arithmetic Operators, The Bitwise Operators, Relational Operators, Boolean Logical Operators, The Assignment Operator, The ? Operator, Operator Precedence, Using Parentheses, Control Statements: Java's Selection Statements, Iteration Statements, Jump Statements. Text book 1: Ch 4, Ch 5	8
Pedagogy	Demo:	
3	Introducing Classes: Class Fundamentals, Declaring Objects, Assigning Object Reference Variables, Introducing Methods, Constructors, The this Keyword, Garbage Collection, The finalize() Method, A Stack Class, A Closer Look at Methods and Classes: Overloading Methods, Using Objects as Parameters, A Closer Look at Argument Passing, Returning Objects, Recursion, Introducing Access Control, Understanding static, Introducing final, Arrays Revisited Text book 1: Ch 6, Ch 7 (7.1-7.9)	8
Pedagogy	Poster Presentation:	
4	Inheritance: Inheritance, Using super, Creating a Multilevel Hierarchy, When Constructors Are Called, Method Overriding, Dynamic Method Dispatch, Using Abstract Classes, Using final with Inheritance, The Object Class. Text book 1: Ch 8.	8
Pedagogy	Group Discussion:	
5	Packages and Interfaces: Packages, Access Protection, Importing Packages, Interfaces, Exception Handling: Exception-Handling Fundamentals, Exception Types, Uncaught Exceptions, Using try and catch, Multiple catch Clauses, Nested try Statements, throw, throws, finally, Java's Built-in Exceptions, Creating Your Own Exception Subclasses,	8

	Chained Exceptions, Using Exceptions. Text book 1: Ch 9, Ch 10	
Pedagogy	Case Study:	
	Pedagogical Initiatives (Not limited to): <ul style="list-style-type: none"> • Think Pair and Share (Blended Learning): provides an opportunity for students to learn from one another • Problem Solving: encourages cognitive thinking and enables creative problem solving • Poster Presentation: allows students to represent the concepts visually in order to understand the topics easily. • Case studies: maps different domains in real time applications • Demonstration: exhibits the implementation process 	

Text Books	
Sl. No.	Title of the Book/Name of the author/Name of the publisher/Edition and Year
1	Ellis Horowitz, Sartaj Sahni and Susan Anderson-Freed, Fundamentals of Data Structures in C, 2nd Ed, Universities Press, 2014
2	Introduction to the Design and Analysis of Algorithms, By Anany Levitin, 3rd Edition (Indian), 2017, Pearson
Reference Books	
1	Seymour Lipschutz, Data Structures Schaum's Outlines, Revised 1 st Ed, McGraw Hill, 2014.
2	Gilberg & Forouzan, Data Structures: A Pseudo-code approach with C, 2 nd Ed, Cengage Learning, 2014.
3	Computer Algorithms/C++, Ellis Horowitz, SatrajSahni and Rajasekaran, 2nd Edition, 2014, Universities Press.
4	Introduction to Algorithms, Thomas H. Cormen, Charles E. Leiserson, Ronal L. Rivest, Clifford Stein, 3rd Edition, PHI.

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

CO	Course Outcomes	RBT Level	RBT Indicator
CO1	Explain different data structures and their applications	L2	Understand
CO2	Apply the knowledge to solve Arrays, Stacks, Queue, Linked List, and Tree data structures related problems	L3	Apply
CO3	Apply various problem solving methodologies such as brute force, divide and conquer, greedy, decrease and conquer, dynamic programming and	L3	Apply
CO4	Analyze the efficiency of algorithm design approaches in a problem specific manner in terms of space and time complexity.	L4	Analyze
CO5	Develop solutions to problems by experimenting the various Algorithm techniques using relevant Data Structures.	L3	Apply

Mapping of Course Outcomes to Program Outcomes:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PS01	PS02
CO1													3	
CO2	3												3	3
CO3	3												3	3
CO4		3											3	
CO5			3	3	3								3	

Weblinks and Video Lectures (e-Resources)	
1	https://www.youtube.com/watch?v=elrMbAQSU34
2	https://www.youtube.com/watch?v=A1uqgEz3hB0
3	https://onlinecourses.nptel.ac.in/noc24_cs43/preview

**PROJECT BASED
LEARNING (PBL)**

Subject Identified for Project Based Learning

Semester	3
Subject Identified for PBL	Cloud Security for smart devices
Prerequisite	Computer Networks and security
Justification for the selected subject	Useful in implementing the projects and industry applications.
List of possible projects	This course is engaged by industry experts with projects assigned by them.

Signature of the Guide

Signature of HOD



Dayananda Sagar Academy of Technology & Management

(Autonomous Institute under VTU)

Semester	:	3 rd Semester		
Course Title	:	Cloud Security for smart devices		
Course Code	:	BIC306		
Course Type (Theory/Practical/Project/Integrated)	:	Project		
Category	:	PBL		
Stream	:	CSE-ICB	CIE	: 50
Teaching hours/ week (L:T:P:S)	:	0:0:2:2	SEE	: 50
Total Hours	:	30 hours – Theory + Project	SEE Duration	: 3 Hours Project Evaluation
Credits	:	2		

Course Learning Objectives: Students will be able to:

Sl. No	Course Objectives
1	To learn primitive constructs Cloud Service
2	To understand different platforms of cloud computing
3	To gain knowledge on Amazon Web services

Teaching-Learning Process Pedagogical Initiatives:

Initiatives:

Some sample strategies to accelerate the attainment of various course outcomes are listed below:

- Adopt different teaching methods to attain the course outcomes.
- Include videos to demonstrate various concepts in C.
- Encourage collaborative (Group) Learning to encourage team building.
- Ask at least three **HOTS (Higher-order Thinking Skills)** module-wise questions to promote critical thinking.
- Adopt **Problem-Based Learning (PBL)**, which fosters students' analytical skills, and develops thinking skills such as evaluating, generalizing, and analyzing information rather than simply recalling it.
- Show different ways to solve a problem and encourage the students to come up with creative and optimal solutions.
- Discuss various case studies to map with real-world scenarios and improve the understanding.
- Devise innovative pedagogy to improve **Teaching-Learning Process (TLP)**.



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COURSE CURRICULUM

Sl No.	Project Title
1	Real-time temperature tracking for smart homes or greenhouses
2	Control a light bulb from a web dashboard
3	To Send an alert if movement is detected in a room
4	Display air quality data (CO2, PM2.5) from a sensor in a cloud dashboard.
5	Monitor and automate irrigation based on soil moisture and weather data
6	Real-time GPS tracking for delivery vehicles or pets
7	Monitor power usage from smart plugs or meters.
8	Use Alexa to control IoT devices like fan, lights
9	Collect data from simulated industrial machines (RPM, vibration, temp).
10	Alexa Smart Home Skill
	Pedagogical Initiatives (Not limited to): <ul style="list-style-type: none">● Think Pair and Share (Blended Learning): provides an opportunity for students to learn from one another● Problem Solving: encourages cognitive thinking and enables creative problem solving● Poster Presentation: allows students to represent the concepts visually in order to understand the topics easily.● Case studies: maps different domains in real time applications● Demonstration: exhibits the implementation process

Weblinks	
Sl. No.	Title of the Book/Name of the author/Name of the publisher/Edition and Year
1	https://developer.amazon.com/en-US/docs/alexa/smarthome/steps-to-build-a-smart-home-skill.html
2	https://cloud.arduino.cc/
3	https://cloud.google.com/architecture/connected-devices/iot-platform-product-architecture
4	https://www.arm.com/glossary/iot-cloud

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

**ABILITY ENHANCEMENT
COURSE (AEC)**



Dayananda Sagar Academy of Technology & Management

(Autonomous Institute under VTU)

Semester	:	3 rd Semester		
Course Title	:	Basic Linux for Hackers		
Course Code	:	BIC307		
Course Type (Theory/Practical/Project/ Integrated)	:	Practical - Experiential Learning		
Category	:	AEC		
Stream	:	CSE-ICB	CIE	: 50
Teaching hours/ week (L:T:P:S)	:	0:0:2:0	SEE	: 50
Total Hours	:	15 Hours	SEE	: 3 Hours
Credits	:	01	Duration	

Course Learning Objectives: Students will be able to:

Sl. No	Course Objectives
1	Gain a comprehensive understanding of the Linux operating system, including its architecture, file system structure, and basic commands.
2	Develop proficiency in using the Linux command line interface (CLI) for navigation, file management, and system administration tasks.
3	Understand basic security concepts and how to implement security measures such as user permissions, encryption, and access control lists.
4	Acquire skills in shell scripting using Bash to automate tasks, streamline workflows, and perform basic penetration testing tasks.

Teaching-Learning Process Pedagogical

Initiatives:

Some sample strategies to accelerate the attainment of various course outcomes are listed below:

- Adopt different teaching methods to attain the course outcomes.
- Include videos to demonstrate various concepts in R-Lang.
- Encourage collaborative (Group) Learning to encourage team building.
- Ask at least three **HOTS (Higher-order Thinking Skills)** module-wise questions to promote critical thinking.
- Adopt **Problem-Based Learning (PBL)**, which fosters students' analytical skills, and develops thinking skills such as evaluating, generalizing, and analyzing information rather than simply recalling it.
- Show different ways to solve a problem and encourage the students to come up with creative and optimal solutions.
- Discuss various case studies to map with real-world scenarios and improve the understanding.
- Devise innovative pedagogy to improve **Teaching-Learning Process (TLP)**.



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COURSE CURRICULUM

Module No.	Topics	Hours
1	<p>Getting started with Basics: A tour of Kali, Basic commands in Linux, Finding Stuff, Modifying Files and Directories.</p> <p>Text Manipulation: Viewing Files, Filtering Text with grep, using sed to find and replace, a) Viewing files with more and less.</p>	3 Hours
Pedagogy	Think Pair and Share (Blended Learning): provides an opportunity for students to learn from one another	
2	<p>Analyzing and Managing Networks: Analyzing networks with ifconfig, Checking wireless network devices with ifconfig, changing your network information, Manipulating the DNS.</p> <p>Adding and Removing Software: Using apt to handle software, Adding repositories to your sources. list file, Using a GUI-based installer</p>	3 Hours
Pedagogy	Project based, Problem Based, Building Models, Model Development	
3	<p>Controlling File and Directory Permissions: Different types of users, granting permissions, Checking and changing permissions, Setting more secure default permissions with masks, Special permissions.</p> <p>Managing User Environment Variables: Viewing and modifying environment variables, Changing your shell prompt, changing your PATH, Creating a user-defined variable.</p>	3 Hours
Pedagogy	Problem Solving: encourages cognitive thinking and enables creative problem solving	
4	<p>Bash Scripting: A crash course in Bash, Your first script, Your very first hacker script, Common built-in bash commands.</p> <p>File system and Storage Device Management: The Device directory / dev, Mounting and Unmounting, Monitoring filesystems.</p>	3 Hours
Pedagogy	Demonstration: exhibits the implementation process Project based, Problem Based, Building Models, Design and Programming Contest, Certification, Concept Map (Collage presentation/poster presentation), Case studies, Think-Pair-Share, Flipped classroom	
5	<p>The Logging System: The syslog logging daemon, automatically cleaning up logs and log rotate, Remaining Stealthy. Using and Abusing Services: Starting, stopping and restarting services, Creating an HTTP web server with Apache web server, OpenSSH and the</p> <p>Raspberry Spy Pi, Extracting information from MySQL / MariaDB</p>	3 Hours

Pedagogical Initiatives (Not limited to):

- **Think Pair and Share (Blended Learning):** provides an opportunity for students to learn from one another
- **Problem Solving:** encourages cognitive thinking and enables creative problem solving
- **Poster Presentation:** allows students to represent the concepts visually in order to understand the topics easily.
- **Case studies:** maps different domains in real time applications
- **Demonstration:** exhibits the implementation process

Text Books

Sl. No.	Title of the Book/Name of the author/Name of the publisher/Edition and Year
1	Linux Basics For Hackers, Getting Started With Networking, Scripting, and Security in Kali, William Pollock, 2019, ISBN-10: 1-59327-855-1 ISBN-13: 978-1-59327-855-7.
2	https://github.com/yeahhub/Hacking-Security-Ebooks/blob/master/README.md

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

CO	Course Outcomes	RBT Level	RBT Level Indicator
CO1	Understanding of the Linux operating system, including its file system, shell basics, and essential commands.	L2	Understand
CO2	Demonstrate by executing commands efficiently and understanding their output.	L3	Apply
CO3	Work on concepts on Linux, including configuration, troubleshooting, and basic network security principles.	L3	Apply
CO4	Engagement in hands-on labs and projects to reinforce theoretical concepts and develop practical skills.	L3	Apply

Mapping of Course Outcomes to Program Outcomes:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2		3		3									2
CO2	2		3		3									2
CO3	2		3		3									2
CO4	2		3		3									2

Weblinks and Video Lectures (e-Resources)

1. https://users.php.ufl.edu/rlp176/Courses/PHC6089/R_notes/intro.html
2. https://cran.r-project.org/web/packages/explore/vignettes/explore_mtcars.html
3. https://www.w3schools.com/r/r_stat_data_set.asp
4. <https://rpubs.com/BillB/217355>
5. http://www.tutorialspoint.com/r/r_tutorial.pdf
6. <https://cran.r-project.org/doc/manuals/r-release/R-intro.pdf>

**SOCIAL CONNECT
&
RESPONSIBILITY (SCR)**



Dayananda Sagar Academy of Technology & Management

(Autonomous Institute under VTU)

Semester	:	3 rd Semester		
Course Title	:	Social Connect & Responsibility		
Course Code	:	BSCK308		
Course Type (Theory/Practical/Project/Integrated)	:	Practical		
Category	:	SCR		
Stream	:	CSE-ICB	CIE	: 100
Teaching hours/ week (L:T:P:S)	:	0:0:2:0	SEE	: ---
Total Hours	:	15 Hours	SEE	: 3 Hours
Credits	:	1	Duration	

Course Learning Objectives: Students will be able to:

Sl. No	Course Objectives
1	Provide a formal platform for students to communicate and connect to the surrounding.
2	create a responsible connection with the society.
3	Understand the community in general in which they work.
4	Identify the needs and problems of the community and involve them in problem –solving.
5	Develop among themselves a sense of social & civic responsibility & utilize their knowledge in finding practical solutions to individual and community problems.
6	Develop competence required for group-living and sharing of responsibilities & gain skills in mobilizing community participation to acquire leadership qualities and democratic attitudes

Teaching-Learning Process

General Instructions - Pedagogy:

These are sample Strategies, which teachers can use to accelerate the attainment of the various course outcomes.

- In addition to the traditional lecture method, different types of innovative teaching methods may be adopted so that the activities will develop students' theoretical and applied social and cultural skills.
- State the need for activities and its present relevance in the society and Provide real-life examples.
- Support and guide the students for self-planned activities.
- You will also be responsible for assigning homework, grading assignments and quizzes, and documenting students' progress in real activities in the field.
- Encourage the students for group work to improve their creative and analytical skills



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COURSE CURRICULUM

Contents:

The course is mainly activity-based that will offer a set of activities for the student that enables them to connect with fellow human beings, nature, society, and the world at large.

The course will engage students for interactive sessions, open mic, reading group, storytelling sessions, and semester-long activities conducted by faculty mentors.

In the following a set of activities planned for the course have been listed:

Module No.	Topics	Hours
1	Part I: Plantation and adoption of a tree: Plantation of a tree that will be adopted for four years by a group of BE / B. Tech students. (ONE STUDENT ONE TREE) They will also make an excerpt either as a documentary or a photo blog describing the plant's origin, its usage in daily life, its appearance in folklore and literature - – Objectives, Visit, case study, report, outcomes.	3 Hours
Pedagogy		
2	Part II: Heritage walk and crafts corner: Heritage tour, knowing the history and culture of the city, connecting to people around through their history, knowing the city and its craftsman, photo blog and documentary on evolution and practice of various craft forms - – Objectives, Visit, case study, report, outcomes.	3 Hours
Pedagogy		
3	Part III: Organic farming and waste management: Usefulness of organic farming, wet waste management in neighboring villages, and implementation in the campus – objectives, Visit, case study, report, outcomes.	3 Hours
Pedagogy		
4	Part IV: Water conservation: Knowing the present practices in the surrounding villages and implementation in the campus, documentary or photoblog presenting the current practices – Objectives, Visit, case study, report, outcomes.	3 Hours

Pedagogy		
5	Part V: Food walk: City's culinary practices, food lore, and indigenous materials of the region used in cooking – Objectives, Visit, case study, report, outcomes.	3 Hours
	Pedagogical Initiatives (Not limited to): <ul style="list-style-type: none"> ● Think Pair and Share (Blended Learning): provides an opportunity for students to learn from one another ● Problem Solving: encourages cognitive thinking and enables creative problem solving ● Poster Presentation: allows students to represent the concepts visually in order to understand the topics easily. ● Case studies: maps different domains in real time applications ● Demonstration: exhibits the implementation process 	

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

CO	Course Outcomes	RBT Level	RBT Level Indicator
CO1	Communicate and connect to the surrounding.		
CO2	Create a responsible connection with the society.		
CO3	Involve in the community in general in which they work.		
CO4	Notice the needs and problems of the community and involve them in problem –		
CO5	Develop among themselves a sense of social & civic responsibility & utilize their knowledge		

Mapping of Course Outcomes to Program Outcomes:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
C01														
C02														
C03														
C04														
C05														

Activities:

Jamming session, open mic, and poetry: Platform to connect to others. Share the stories with others. Share the experience of Social Connect. Exhibit the talent like playing instruments, singing, one-act play, art-painting, and fine art.

PEDAGOGY:

The pedagogy will include interactive lectures, inspiring guest talks, field visits, social immersion, and a course project. Applying and synthesizing information from these sources to define the social problem to address and take up the solution as the course project, with your group. Social immersion with NGOs/social sections will be a key part of the course. Will all lead to the course project that will address the needs of the social sector?

COURSE TOPICS:

The course will introduce social context and various players in the social space, and present approaches to discovering and understanding social needs. Social immersion and inspiring conversational will culminate in developing an actual, idea for problem-based intervention, based on an in-depth understanding of a key social problem.

Duration:

A total of 40 - 50 hrs engagement per semester is required for the 3rd semester of the B.E. /B.Tech. program. The students will be divided into groups. Each group will be handled by faculty mentor. Faculty mentor will design the activities (particularly Jamming sessions open mic, and poetry) Faculty mentors has to design the evaluation system as per guidelines of scheme & syllabus.



Dayananda Sagar Academy of Technology & Management

Affiliated to VTU

Approved by AICTE

Accredited by NAAC with A+ Grade 6

Programs Accredited by NBA (CSE, ISE, ECE, EEE, MECH, CV)

Course - Skills Mapping Table

3 rd Semester					
Sl. No	Name of the Course	Course Code	Course Type	Course Category	Skills attained by the students
1	Data Structures and Applications	BIC303	Integrated	IPCC	<ul style="list-style-type: none">➤ System Programming,➤ Organizing data structure➤ Information retrieval➤ Developing data structure applications
2	Object Oriented Programming using Java	BIC305	Project	PCC	<ul style="list-style-type: none">➤ Object oriented programming concepts.➤ Application design
4	Cloud Security for smart devices	BIC306	Practical Experiential learning	PBL	<ul style="list-style-type: none">➤ Data Analysis➤ Model development➤ Project implementation

4th SEMESTER

BASIC SCIENCE (BSC)



Dayananda Sagar Academy of Technology & Management

(Autonomous Institute under VTU)

Semester	:	4th Semester			
Course Title	:	Number Theory			
Course Code	:	BMATD401			
Course Type (Theory/ Practical/ Integrated)	:	Theory			
Course Category	:	ASC			
Stream	:	Common to CSE & Allied branches	CIE	:	50 Marks
Teaching hour/week (L:T:P:S)	:	2:2:0:0	SEE	:	50 Marks
Total Hours	:	40 Hrs	SEE Duration	:	3 Hours
Credits:	:	3			

Course Learning Objectives: Students will be taught

SI.No	Course Objectives
1	Acquire basic knowledge of Mathematical concepts for understanding engineering problems
2	Use concepts of statistics and probability in solving problems
3	Analyze problems using concepts of statistics and probability
4	Use MATLAB to obtain solutions of various mathematical problems.

Teaching-Learning Process

Pedagogy (General Instructions):

These are sample Strategies; which teachers can use to accelerate the attainment of the various course outcomes.

1. Lecture method (L) does not mean only the traditional lecture method, but a different type of teaching method may be adopted to develop the outcomes.
2. Show Video/animation films to explain the infrastructures and the mechanism involved in the principle.
3. Encourage collaborative (Group) Learning in the class.
4. Ask at least three HOT (Higher-order Thinking) questions in the class, which promotes critical thinking.
5. Adopt Problem Based Learning (PBL), which fosters students' Analytical skills, develop thinking skills such as the ability to evaluate, generalize, and analyze information rather than simply recall it.
6. Topics will be introduced in multiple representations.
7. Show the different ways to solve the same problem and encourage the students to come up with their own creative ways to solve them.

8. Discuss how every concept can be applied to the real world - and when that's possible, it helps improve the students' understanding.

9. Individual teachers can device innovative pedagogy to improve teaching-learning.



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COURSE SYLLABUS

Module No.	Contents of the Module	Hours
1	Divisibility, basic definitions and properties, Arithmetical functions: Examples, properties and their rate of growth, congruence, linear congruence and basic properties of congruence, linear Diophantine equation, Chinese remainder theorem.	8
Pedagogy	Chalk and board, group discussion, ppt, videos	
2	Fermat's theorem, Wilson's theorem, Euler's Phi-function/ Euler's Totient function and Euler's theorem (Statement of the theorems only), RSA Algorithm in cryptography. Random Numbers: Introduction, Properties and application, generation of pseudo random numbers, test of randomness by Kolmogorav Smirnov test	8
Pedagogy	Chalk and board, group discussion, ppt, videos	
3	Primitive roots and Indices: Order of an integer modulo n, Primitive roots for primes, Euler's Criterion (without proof), Quadratic reciprocity law and properties: The legendre symbol(Problems on properties), Gauss lemma, Jacobi symbol and problems, The theory of Indices, Quadratic congruences with composite moduli.	8
Pedagogy	Chalk and board, group discussion, ppt, videos	
4	Numbers of special form: Perfect numbers; Mersenne Primes and Amicable numbers; Fermat's numbers; Fibonacci numbers, Pythagorean triple, Finite continued fractions.	8
Pedagogy	Chalk and board, group discussion, ppt, videos	
5	Partitions: Basic properties, Representation of integers as sums of squares: sums of two squares, sums of more than two squares, Elliptic curves: rational points on curves- Unit Circle, Elliptic curves modulo 'p' prime.	8
Pedagogy	Chalk and board, group discussion, ppt, videos	

Reference Books

Text Books (Title of the Book/Name of the author/Name of the publisher/Edition and Year)

1	David M. Burton, "Elementary Number Theory", Mc.Graw-Hill, 7th edition, 2007.
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2	Averill. M Law, "Simulation Modelling & Analysis", Mc.Graw Hill, 5th edition, 2013.
3	I.Niven, "An Introduction to the Theory of Numbers", John Wiley & Sons.5 th edition, 2012
4	NealKoblitz, "A Course in Number Theory and Cryptography", Springer-Verlag, 2nd edition, 1994.

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

CO	Course Outcomes	RBT Level	Level Indicator
CO1	Understand the basic concepts of Arithmetical functions, congruence quadratic reciprocity, random number generations, partitions and elliptic curves.	Remember, Understand	L1, L2
CO2	Apply techniques of Arithmetical functions, congruence quadratic reciprocity, random number generations, partitions and elliptic curves to solve Engineering Problems	Apply	L3
CO3	Analyze Engineering problems using Arithmetical functions, congruence quadratic reciprocity, random number generations, partitions and elliptic curves.	Analyse	L4
CO4	Investigate problems arising in real life using the overall knowledge acquired	Evaluate	L5

Mapping of Course Outcomes to Program Outcomes:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CO2	3	--	--	--	--	--	--	--	--	--	--	--	--	--
CO3	--	2	--	--	--	--	--	--	--	--	--	--	--	--
CO4	--	--	1	2	1	1	--	--	1	1	--	--	--	--

Weblinks and Video Lectures (e-Resources)

1	http://nptel.ac.in/courses.php?disciplineID=111
2	http://www.class-central.com/subject/math(MOOCs)
3	http://academicearth.org/
4	VTU e-Shikshana Program

**PROFESSIONAL CORE
COURSE (PCC)**



Dayananda Sagar Academy of Technology & Management

(Autonomous Institute under VTU)

Semester	:	4 th Semester			
Course Title	:	Network Defense & Security			
Course Code	:	BIC402			
Course Type (Theory/ Practical/ Integrated)	:	Theory			
Category	:	PCC			
Stream	:	CSE-ICB		CIE	: 50
Teaching hours/ week (L:T:P:S)	:	3:0:0:0		SEE	: 50
Total Hours	:	40 Hours of Theory		SEE	: 3 Hours
Credits	:	3		Duration	

Course Learning Objectives: Students will be able to:

Sl. No	Course Objectives
1	Work on most common dangers to networks including session hacking, virus attacks, Trojan horses, denial of service, and buffer overflow.
2	Describe how firewalls work and the requirements of single machine, small office, network, and enterprise firewalls.
3	Describe how intrusion-detection systems work in prevention, detection and the need of encryption
4	Demonstrate VPN solutions and OS hardening
5	Write the security policies and assessing system security

Teaching-Learning Process

Pedagogical Initiatives:

Some sample strategies to accelerate the attainment of various course outcomes are listed below:

- Adopt different teaching methods to attain the course outcomes.
- Include videos to demonstrate various concepts in C.
- Encourage collaborative (Group) Learning to encourage team building.
- Ask at least three **HOTS (Higher-order Thinking Skills)** module-wise questions to promote critical thinking.
- Adopt **Problem-Based Learning (PBL)**, which fosters students' analytical skills, and develops thinking skills such as evaluating, generalizing, and analyzing information rather than simply recalling it.
- Show different ways to solve a problem and encourage the students to come up with creative and optimal solutions.
- Discuss various case studies to map with real-world scenarios and improve the understanding.
- Devise innovative pedagogy to improve **Teaching-Learning Process (TLP)**.



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COURSE CURRICULUM

Module No.	Topics	Hours
1	Introduction to Network Security: a) Basics of networks & OSI model (defense perspective), b) Threat modelling & attack classification, c) Security terminology & threat assessment, d) Active attack defense: <ul style="list-style-type: none">• DoS mitigation• Buffer overflow protection• IP spoofing defense• Session hijacking prevention• Malware (virus/trojan) blocking Text Book1: Chapter 1,2	8 Hours
Pedagogy	Quiz	
2	Defensive Infrastructure (Firewalls): a) Firewall concepts & architecture, b) Types: <ul style="list-style-type: none">• Host-based firewall• SOHO firewall• Enterprise firewall c) Proxy servers & traffic filtering d) Practical implementation: <ul style="list-style-type: none">• Windows firewall• Linux firewall e) Firewall deployment strategies Text Book1: Chapter 3,4	8 Hours
Pedagogy	Demonstration	

3	<p>Detection & Cryptographic Defense:</p> <p>a) Intrusion Detection Systems (IDS):</p> <ul style="list-style-type: none"> • Signature vs anomaly detection • IDS architecture & deployment <p>b) Honeypots (deception defense)</p> <p>c) Encryption (defensive use):</p> <ul style="list-style-type: none"> • Modern cryptography basics • Digital signatures & certificates • Password attacks & countermeasures • Steganography & steganalysis • Intro to quantum cryptography <p>Text Book1: Chapter 5,6</p>	8 Hours
Pedagogy	Demonstration	
4	<p>Network Security Architecture:</p> <p>a) VPNs:</p> <ul style="list-style-type: none"> • IPsec, SSL/TLS • Secure tunneling <p>b) Secure system configuration:</p> <ul style="list-style-type: none"> • OS hardening (Windows/Linux) • Patch management • Browser security <p>Text Book1: Chapter 7,8</p>	8 Hours
Pedagogy	Demonstration	
5	<p>Governance, Policy & Risk Security:</p> <p>a) Security policies:</p> <ul style="list-style-type: none"> • User policies • Admin policies • Access control • Development policies <p>b) Security assessment:</p> <ul style="list-style-type: none"> • Risk analysis • Vulnerability assessment • Network probing • McCumber Cube 	8 Hours

	<ul style="list-style-type: none"> • Security documentation 	
	Text Book1: Chapter 11,12	
	Pedagogical Initiatives (Not limited to): <ul style="list-style-type: none"> • Think Pair and Share (Blended Learning): provides an opportunity for students to learn from one another • Problem Solving: encourages cognitive thinking and enables creative problem solving • Poster Presentation: allows students to represent the concepts visually in order to understand the topics easily. • Case studies: maps different domains in real time applications • Demonstration: exhibits the implementation process 	

Text Books	
Sl. No.	Title of the Book/Name of the author/Name of the publisher/Edition and Year
1	Network Defense and Countermeasures Principles and Practices Third Edition Chuck Easttom
Reference Books	
1	Guide to Network Defense and Countermeasures by Dawn Weaver (Author), Dean Farwood (Author), Randy Weaver (Author)
2	Network Defense by Randy Weaver, Thomson Press (India) Ltd
3	Cryptography and Network Security – Stallings (Author)
4	Network Security Essentials – Stallings (Author)

**INTEGRATED
PROFESSIONAL CORE
COURSE (IPCC)**



Dayananda Sagar Academy of Technology & Management
(Autonomous Institute under VTU)

Semester	:	4 th Semester		
Course Title	:	Analysis & Design of Algorithms		
Course Code	:	BIC403		
Course Type (Theory/Practical/Project/Integrated)	:	Integrated		
Category	:	IPCC		
Stream	:	CSE-ICB	CIE	: 50
Teaching hours/ week (L:T:P:S)	:	3:0:2:0	SEE	: 50
Total Hours	:	40 Hours of Theory + 20 Hours of Practical	SEE Duration	: 3 Hours
Credits	:	4		

Course Learning Objectives: Students will be able to:

Sl. No	Course Objectives
1	To learn the methods for analyzing algorithms and evaluating their performance.
2	To demonstrate the efficiency of algorithms using asymptotic notations.
3	To solve problems using various algorithm design methods, including brute force,
4	To get knowledge on various algorithm design methods
5	To Learn programming in backtracking, and branch and bound concepts.

Teaching-Learning Process

Pedagogical Initiatives:

Some sample strategies to accelerate the attainment of various course outcomes are listed below:

Adopt different teaching methods to attain the course outcomes.

Include videos to demonstrate various concepts in C.

Encourage collaborative (Group) Learning to encourage team building.

Ask at least three **HOTS (Higher-order Thinking Skills)** module-wise questions to promote critical thinking.

Adopt **Problem-Based Learning (PBL)**, which fosters students' analytical skills, and develops thinking skills such as evaluating, generalizing, and analyzing information rather than simply recalling it.

Show different ways to solve a problem and encourage the students to come up with creative and optimal solutions.

Discuss various case studies to map with real-world scenarios and improve the understanding.

Devise innovative pedagogy to improve **Teaching-Learning Process (TLP)**.



DSATM

**Scheme of Teaching and Examinations for BE Programme 2023
Outcome Based Education and Choice Based Credit System (CBCS)
(Effective from the Academic Year 2026-27)**

COURSE CURRICULUM

Module No.	Topics	Hours
1	INTRODUCTION: What is an Algorithm? Fundamentals of Algorithmic Problem Solving. FUNDAMENTALS OF THE ANALYSIS OF ALGORITHM EFFICIENCY: Analysis Framework, Space and Time complexity, Asymptotic Notations and Basic Efficiency Classes, Mathematical Analysis of Non recursive Algorithms, Mathematical Analysis of Recursive Algorithms. BRUTE FORCE APPROACHES: Selection Sort and Bubble Sort, Sequential Search and Brute Force String Matching.	8
Pedagogy	Demonstration	
2	BRUTE FORCE APPROACHES (contd.): Exhaustive Search (Travelling Salesman problem and Knapsack Problem). DECREASE-AND-CONQUER: Insertion Sort, Topological Sorting. DIVIDE AND CONQUER: Merge Sort, Quick Sort, Binary Tree Traversals, Multiplication of Large Integers and Strassen's Matrix Multiplication, Selection problem, Closest pair of points, Solving Recurrence Equations.	8
Pedagogy	Problem Solving	
3	TRANSFORM-AND-CONQUER: Array Representation of Binary Tree, Binary search trees, Heap Tree and Heap Sort, AVL Tree, B Trees, B+ trees, Red Black Trees. SPACE-TIME TRADEOFFS: Sorting by Counting: Comparison counting sort, Input Enhancement in String Matching: Horspool's Algorithm. Hashing: Open Hashing (Separate Chaining), Closed Hashing (Open Addressing).	8
Pedagogy	Case study Assignment	
4	DYNAMIC PROGRAMMING: Basic Examples, 0/1 Knapsack problems and Memory Functions, Matrix Multiplication Chains, All pair's shortest paths, Warshall's and Floyd's Algorithms. THE GREEDY METHOD: Prim's Algorithm, Kruskal's Algorithm, Dijkstra's Algorithm, Huffman Trees and Codes, Optimization problems, Fractional Knapsack problem, Topological sorting, Single-Source Shortest paths.	8
Pedagogy	Poster Presentation	
5	LIMITATIONS OF ALGORITHMIC POWER: Decision Trees, Polynomial Time and verification, P and NP Problems, NP-Completeness and Reducibility, NP-Hard problems. COPING WITH LIMITATIONS OF ALGORITHMIC POWER: Backtracking (n-Queens problem, Subset-sum problem, Max clique and Travelling salesperson), Branch-and-Bound	8

	(0/1 Knapsack problem, Max clique and Travelling salesperson), Approximation algorithms for NP-Hard problems (Knapsack problem).	
	Pedagogical Initiatives (Not limited to): <ul style="list-style-type: none"> • Think Pair and Share (Blended Learning): provides an opportunity for students to learn from one another • Problem Solving: encourages cognitive thinking and enables creative problem solving • Poster Presentation: allows students to represent the concepts visually in order to understand the topics easily. • Case studies: maps different domains in real time applications • Demonstration: exhibits the implementation process 	

List of Programs:

Sl. No.	Experiments/Programs	COs
1	Design and implement C/C++ Program to sort a given set of n integer elements using Selection Sort method and compute its time complexity. Run the program for varied values of n > 5000 and record the time taken to sort. Plot a graph of the time taken versus n. The elements can be read from a file or can be generated using the random number generator.	CO1
2	Design and implement C/C++ Program to sort a given set of n integer elements using Quick Sort method and compute its time complexity. Run the program for varied values of n > 5000 and record the time taken to sort. Plot a graph of the time taken versus n. The elements can be read from a file or can be generated using the random number generator.	CO3
3	Design and implement C/C++ Program to sort a given set of n integer elements using Merge Sort method and compute its time complexity. Run the program for varied values of n > 5000, and record the time taken to sort. Plot a graph of the time taken versus n. The elements can be read from a file or can be generated using the random number generator	CO3
4	a. Design and implement C/C++ Program to find Minimum Cost Spanning Tree of a given connected undirected graph using Kruskal's algorithm. b. Design and implement C/C++ Program to find Minimum Cost Spanning Tree of a given connected undirected graph using Prim's algorithm.	CO4
5	a. Design and implement C/C++ Program to solve All-Pairs Shortest Paths problem using Floyd's algorithm. b. Design and implement C/C++ Program to find the transitive closure using Warshal's algorithm.	CO4
6	a. Design and implement C/C++ Program to find shortest paths from a given vertex in a weighted connected graph to other vertices using Dijkstra's algorithm. b. Write a Program to perform the following and find the time complexity using step count method: 1. Finding a path in the graph 2. Finding a cycle in the graph 3. Check whether the	CO4

	given graph is connected or not.	
7	Design and implement C/C++ Program to obtain the Topological ordering of vertices in a given digraph.	CO1
8	a. Design and implement C/C++ Program to solve 0/1 Knapsack problem using Dynamic Programming method. b. Design and implement C/C++ Program to solve discrete Knapsack and continuous Knapsack problems using greedy approximation method.	CO4
9	a. Design and implement C/C++ Program to find a subset of a given set $S = \{s_1, s_2, \dots, s_n\}$ of n positive integers whose sum is equal to a given positive integer d . b. Program to find the maximum element of an array using divide and conquer technique. Write a Program to multiply two matrices using Strassen's method and analyze the time complexity.	CO1
10	a. Design and implement C/C++ Program for N Queen's problem using Backtracking b. Implement N-Queens problem using branch and bound technique and compare the efficiency of the both.	CO3
Open ended Programs		
1	a. Write a C++ program to implement Minimum Heap Sort algorithms and display its time complexity value. b. Write a C++ program to design and implement Matrix Chain Multiplication and display space complexity of the above logic for different sample values.	CO1
2	a. A vertex cover of an undirected graph $G = (V, E)$ is a subset V' of set V such that if (u, v) is an edge of G , then either $u \in V'$ or $v \in V'$ (or both). The size of a vertex cover is the number of vertices in it. Write a program to find a vertex cover of minimum size in a given undirected graph. b. Write a program to implement travelling sales person's problem in polynomial time approximate using minimum spanning tree. c. Write a program to determine the minimum number of colors needed to color a planar graph $G = (V, E)$.	CO1
3	a. Write a program to implement container loading problem using Max-Heap branch and bound technique. b. Implement Travelling Sales Person problem using branch and bound technique. Use proper bounding functions.	CO4

Text Books

Sl. No.	Title of the Book/Name of the author/Name of the publisher/Edition and Year
1	Introduction to the Design and Analysis of Algorithms, By Anany Levitin, 3rd Edition (Indian), 2017, Pearson.
2	T.H. Cormen, C.E. Leiserson, R.L. Rivest, C. Stein, <i>Introduction to Algorithms (3e)</i> , Prentice-Hall India, 2009.

Weblinks and Video Lectures (e-Resources)	
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1	Design and Analysis of Algorithms: https://nptel.ac.in/courses/106/101/106101060/
2	A. Levitin "Introduction to the Design & Analysis of Algorithms," 3rd ed., Ch. 3 ©2012 Pearson Education, Inc. Upper Saddle River, NJ. All Rights Reserved. - ppt download (slideplayer.com)



Dayananda Sagar Academy of Technology & Management

(Autonomous Institute under VTU)

Semester	:	4 th Semester		
Course Title	:	Database Management system		
Course Code	:	BIC404		
Course Type (Theory/Practical/Project/Integrated)	:	Integrated		
Category	:	IPCC		
Stream	:	CSE-ICB	CIE	: 50
Teaching hours/ week (L:T:P:S)	:	3.:0:2:0	SEE	: 50
Total Hours	:	40 Hours of Theory + 20 Hours practical	SEE Duration	: 3 Hours
Credits	:	4		

Course Learning Objectives: Students will be able to:

Sl. No	Course Objectives
1	Understand the fundamental of data base management systems.
2	Apply and create the database design models- ER and Relational model.
3	Analyze and create database and Design queries using SQL.
4	Apply and analyze the normalization techniques to design good database.
5	Analyze the various non-relational / NoSQL database.

Teaching-Learning Process

Pedagogical Initiatives:

Some sample strategies to accelerate the attainment of various course outcomes are listed below:

Adopt different teaching methods to attain the course outcomes.

Include videos to demonstrate various concepts in C.

Encourage collaborative (Group) Learning to encourage team building.

Ask at least three **HOTS (Higher-order Thinking Skills)** module-wise questions to promote critical thinking.

Adopt **Problem-Based Learning (PBL)**, which fosters students' analytical skills, and develops thinking skills such as evaluating, generalizing, and analyzing information rather than simply recalling it.

Show different ways to solve a problem and encourage the students to come up with creative and optimal solutions.

Discuss various case studies to map with real-world scenarios and improve the understanding.

Devise innovative pedagogy to improve **Teaching-Learning Process (TLP)**.



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**Scheme of Teaching and Examinations for BE Programme 2023
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COURSE CURRICULUM

Module No.	Topics	Hours
1	Introduction, Data modules: Database Architectures: Introduction, Characteristics of database approach, Advantages of using the DBMS approaches, History of database applications. Data Models and Architecture: Data Models, Schemas and Instances. Two schema architecture, three schema architecture and data independence, database language and interfaces.	8 hrs
Pedagogy	Think Pair and Share	
2	Conceptual Data. Module, Relational Model and Relational Algebra: Entity type, Entity sets and structural constraints Weak entity types, ER diagrams, Specialization and Generalization Relational Model: Relational Model concepts, constrains and relational database schemas, Update operations, transactions, and dealing with constraints violations. Relation Algebra: unary, binary relational operations, additional relational operations, Examples of Queries in Relational Algebra, relational database design using ER to Relational mapping.	8 hrs
Pedagogy	Problem Solving	
3	SQL, Advanced SQL, NOSQL, Triggers: SQL data definition, data type, Schema change statements in SQL, specifying constraints in SQL, retrieval queries in SQL, INSERT, DELETE And UPDATE statements in SQL. Advanced SQL: More complex SQL retrieval queries, Specifying constraints as assertions and action triggers, views in SQL.	8 hrs
Pedagogy	Problem Solving	
4	Normalization: Introduction to Normalization using Functional and Multivalued. Dependencies: Informal design guidelines for relation schema, Functional Dependencies, Normal Forms based on Primary Keys, Second and Third Normal Forms, Boyce-Codd Normal Form. NOSQL: Introduction to NOSQL, The CAP Theorem, Document –based SQL system and MongoDB, NOSQL key value stores, column –based or wide column NOSQL system, Graph Database.	8 hrs
Pedagogy	Problem Solving	
5	Transaction control and concurrency control: Introduction to transaction processing, Transaction and system concepts, Desirable properties of transaction, characterizing schedules based on recoverability, transaction support in SQL.	8hrs

	Concurrency Control: Two-phase locking techniques for concurrency control, concurrency control based on timestamp ordering, Multi version concurrency control techniques, validation concurrency control technique, Granularity of Data itemed and Multiple Granularity Locking.	
Pedagogy	Case studies	
	Pedagogical Initiatives (Not limited to): <ul style="list-style-type: none"> • Think Pair and Share (Blended Learning): provides an opportunity for students to learn from one another • Problem Solving: encourages cognitive thinking and enables creative problem solving • Case studies: maps different domains in real time applications • Demonstration: exhibits the implementation process 	

List of Programs:

Sl. No.	Experiments/Programs	CO's
1	DATA DEFINITION LANGUAGES (DDL) COMMANDS Of Base Tables and Views - To study and execute the DDL commands in RDBMS. DDL commands: *CREATE *ALTER *DROP *RENAME *TRUNCATE	CO2
2	DATA MANIPULATION LANGUAGE (DML) OF BASE TABLES AND VIEWS- To study DML commands in RDBMS. DML COMMANDS: *INSERT *UPDATE *DELETE *SELECT	CO2
3	Design an ER diagram for a real-world system and convert it into relational tables. Task: <ul style="list-style-type: none"> i. Choose a system (e.g., Library / Hospital / Online Shopping) ii. Identify: <ul style="list-style-type: none"> a. Entities b. Attributes c. Relationships d. Constraints (cardinality, participation) iii. Draw ER diagram iv. Convert ER model into relational schema v. Implement tables using SQL (CREATE statements) 	CO2
4	Using the tables "DEPARTMENTS" and "EMPLOYEES" perform the following queries Display the employee details, departments that the departments are same in both the emp and dept. Display the employee name and Department name by implementing a left outer join. Display the employee name and Department name by implementing a right outer join. Display the details of those who draw the salary greater than the average salary.	CO3

5	Perform normalization on a given relation up to BCNF. Task: Given a relation with functional dependencies Identify: Candidate keys Partial dependencies Transitive dependencies Convert: 1NF → 2NF → 3NF → BCNF Create normalized tables in SQL	
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Text Books

Sl. No.	Title of the Book/Name of the author/Name of the publisher/Edition and Year
1	Fundamentals of Database systems, Ramwz Elmasri and Shamkant B. Navathe, 7 th Edition, 2017, pearson.
2	Database management system, Ramakrishna and Gehreke, 3 rd edition ,2014, MCGraw hill.

Reference Books

1	Database system concepts sixth Edition MCGraw hill
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Course Outcomes: At the end of the course, the student will be able to:

CO	Course Outcomes	RBT Level	RBT Level Indicator
CO1	Understand the fundamental of database management systems	1	U
CO2	Apply the database design models- ER and Relational model.	2	Ap
CO3	Analyze the database and Design queries using SQL.	3	An
CO4	Apply the normalization techniques to design good database.	2	Ap
CO5	Analyse the various non-relational / NoSQL database.	3	An

Mapping of Course Outcomes to Program Outcomes:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
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CO1	2		2		3								2	2
CO2	2		2		3								2	2
CO3	2		2		3								2	2
CO4	2		2		3								2	2
CO5	2		2		3								2	2

Weblinks and Video Lectures (e-Resources)	
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1	https://www.freecodecamp.org/news/sql-and-databases-full-course/
2	https://www.tutorialspoint.com/dbms/index.htm

**PROFESSIONAL CORE
COURSE (PCC)**



Dayananda Sagar Academy of Technology & Management

(Autonomous Institute under VTU)

Semester	:	4th		
Course Title	:	Microcontroller and Embedded Systems		
Course Code	:	BIC405		
Course Type (Theory/ Practical/ Integrated)	:	Theory		
Category	:	PCC		
Stream	:	CSE-ICB	CIE	: 50 Marks
Teaching hours/ week (L:T:P:S)	:	3:0:0:0	SEE	: 50 Marks
Total Hours	:	40	SEE	: 3 Hours
Credits	:	03	Duration	

Course Learning Objectives: Students will be able to:

Sl. No	Course Objectives
1	Understand the architectural features and instruction set of 32 bit ARM microcontrollers
2	Apply instructions of assembly language for programming ARM
3	Interpret the basic hardware components and their selection method based on the characteristics and attributes of an embedded system
4	Explain the need of real time operating system for embedded system applications
5	Develop/test/Conduct the experiments on an ARM7TDMI/LPC2148 evaluation board using Embedded 'C' and Keil Vision tool/Compiler

Teaching-Learning Process

Pedagogical Initiatives:

Some sample strategies to accelerate the attainment of various course outcomes are listed below:

- Adopt different teaching methods to attain the course outcomes.
- Include videos to demonstrate various concepts in C.
- Encourage collaborative (Group) Learning to encourage team building.
- Ask at least three HOTS (Higher-order Thinking Skills) module-wise questions to promote critical thinking.
- Adopt Problem-Based Learning (PBL), which fosters students' analytical skills, and develops thinking skills such as evaluating, generalizing, and analyzing information rather than simply recalling it.
- Show different ways to solve a problem and encourage the students to come up with creative and optimal solutions.
- Discuss various case studies to map with real-world scenarios and improve the understanding.
- Devise innovative pedagogy to improve Teaching-Learning Process (TLP).



Scheme of Teaching and Examinations for BE Programme 2023
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COURSE CURRICULUM

Module No.	Topics	Hours
1	Microprocessors versus Microcontrollers, ARM Embedded Systems: The RISC design philosophy, The ARM Design Philosophy, Embedded System Hardware, Embedded System Software, ARM Processor Fundamentals: Registers, Current Program Status Register, Pipeline, Exceptions, Interrupts, and the Vector Table , Core Extensions. Text book 1: Chapter 1 - 1.1 to 1.4, Chapter 2 - 2.1 to 2.5 RBT: L1, L2	8 Hours
Pedagogy	Presentation	
2	Introduction to the ARM Instruction Set : Data Processing Instructions , Branch Instruction, Software Interrupt Instructions, Program Status Register Instructions, Coprocessor Instructions, Loading Constants Text book 1: Chapter 3:Sections 3.1 to 3.6 (Excluding 3.5.2),RBT:L1, L2	8 Hours
Pedagogy	Think Pair and Share	
3	Introduction to the Thumb Instruction Set : Thumb Register Usage, ARM-Thumb Interworking , Other Branch Instructions, Data Processing Instructions, Single-Register Load-Store Instructions, Multiple-Register Load-Store Instructions, Stack Instructions Text book 1: Chapter 4:Sections 4.1 to 4.7 (Excluding 3.5.2), RBT:L1, L2	8 Hours
Pedagogy	Jigsaw Classroom	
4	Data Acquiring, Organizing, Processing and Analytics: Introduction, Data Acquiring and Storage, Organizing the Data, Transactions, Business Processes, Integration and Enterprise Systems, Analytics, Knowledge Acquiring, Managing and Storing Processes Business Models and Processes Using IoT: Introduction, Business Models and Business Model Innovation, Value Creation in the Internet of Things, Business Model Scenarios for Internet of Things. Text Book 1: Chapter 5,11	8 Hours
Pedagogy	Flipped Classroom	

5	Embedded System Design Concepts: Characteristics and Quality Attributes of Embedded Systems, Operational quality attributes, non-operational quality attributes, Embedded Systems-Application and Domain specific, Hardware Software Co-Design and Program Modelling. Text book 2: Chapter-3, Chapter-4, Chapter-7 (Sections 7.1, 7.2 only), RBT: L1, L2	8 Hours
Pedagogy	Think Pair and Share	

Text Books :	
Sl. No.	Title of the Book/Name of the author/Name of the publisher/Edition and Year
1	Andrew N Sloss, Dominic Symes and Chris Wright, ARM system developers guide, Elsevier, Morgan Kaufman publishers, 2008.
2	Shibu K V, "Introduction to Embedded Systems", Tata McGraw Hill Education, Private Limited, 2nd Edition..
Reference Books :	
1	Ragunandan..G.H, Microcontroller (ARM) and Embedded System, Cengage learning Publication,2019
2	The Insider's Guide to the ARM7 Based Microcontrollers, Hitex Ltd.,1st edition, 2005.
3	Steve Furber, ARM System-on-Chip Architecture, Second Edition, Pearson, 2015
4	Raj Kamal, Embedded System, Tata McGraw-Hill Publishers, 2nd Edition, 2008.
5	Web links and Video Lectures (e-Resources): http://www.digimat.in/nptel/courses/video/106105193/L01.html http://www.digimat.in/nptel/courses/video/106105159/L01.html http://www.digimat.in/nptel/courses/video/106105036/L01.html

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

CO	Course Outcomes	RBT Level	RBT Level Indicator
CO1	Understand the architectural features and instruction set of the ARM microcontroller	L2	Understand
CO2	Apply assembly language programming techniques using ARM instruction sets to solve problems.	L3	Apply
CO3	Demonstrate the interfacing of I/O devices with ARM microcontrollers..	L3	Apply
CO4	Analyze the selection and characteristics of basic hardware components in embedded systems.	L4	Analyze
CO5	Develop embedded system solutions through hardware/software co-design using Embedded C and Keil.	L5	Evaluate

Mapping of Course Outcomes to Program Outcomes:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1															
CO2	3												2		
CO3			3										2		
CO4		3											2		
CO5				2	2				2	2			2		

Weblinks and Video Lectures (eResources)

1	VTU eShikshana : https://www.youtube.com/watch?v=df2Toz3VWwc video number 1 to 15
2	https://www.coursera.org/courses/digitalcircuits
3	https://nptel.ac.in/courses/digitalelectroniccircuits

**PROJECT BASED
LEARNING (PBL)**

Subject Identified for Project Based Learning

Semester	4
Subject Identified for PBL	Generative AI for Network Security
Prerequisite	Network defence and network communication
Justification for the selected subject	To build practical skills in cybersecurity by integrating Generative AI with basic network security tools , enabling students to detect threats, analyze traffic, and automate security responses.
List of possible projects	<ul style="list-style-type: none">• AI based Log Analyzer for Suspicious Activity Detection• Chatbot for Cybersecurity Awareness (Phishing Detection)• AI powered Simple Intrusion Detection System• Automated Firewall Rule Generator using AI• Network Traffic Classification using Machine Learning• AI based Password Strength Analyzer

Signature of the Guide

Signature of HOD



Dayananda Sagar Academy of Technology & Management

(Autonomous Institute under VTU)

Semester	:	4 th Semester			
Course Title	:	Network Security using Generative AI			
Course Code	:	BIC406			
Course Type (Theory/Practical/Project/Integrated)	:	Project			
Category	:	PBL			
Stream	:	CSEICB		CIE	: 50
Teaching hours/ week (L: T:P:S)	:	0:0:2:2		SEE	: 50
Total Hours	:	30 Hours Theory + Project		SEE Duration	: 3 Hours
Credits	:	2			

Course Learning Objectives: Students will be able to:

Sl. No	Course Objectives
1	Design simple Albased tools for network monitoring
2	Understand basics of Generative AI in cybersecurity
3	Apply security concepts using Albased automation

Pedagogical Initiatives:

Some sample strategies to accelerate the attainment of various course outcomes are listed below:

- Adopt different teaching methods to attain the course outcomes.
- Include videos to demonstrate various concepts in Data Science.
- Encourage collaborative (Group) Learning to encourage team building.
- Ask at least three **HOTS (Higherorder Thinking Skills)** modulewise questions to promote critical thinking.
- Adopt **ProblemBased Learning (PBL)**, which fosters students' analytical skills, and develops thinking skills such as evaluating, generalizing, and analyzing information rather than simply recalling it.
- Show different ways to solve a problem and encourage the students to come up with creative and optimal solutions.
- Discuss various case studies to map with realworld scenarios and improve the understanding.
- Devise innovative pedagogy to improve **TeachingLearning Process (TLP)**.



Scheme of Teaching and Examinations for BE Programme 2023
Outcome Based Education and Choice Based Credit System (CBCS)
(Effective from the Academic Year 202627)

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COURSE CURRICULUM

Sl No.	Title	COs
1	Simple Albased Log Analyzer (detect suspicious login patterns)	CO1
2	AI Chatbot for Phishing Detection	CO2
3	Password Strength Checker using AI	CO2
4	Basic Network Traffic Analyzer using Python	CO3
5	Mini Intrusion Detection System (rulebased + AI)	CO3
6	Auto Firewall Rule Generator using AI prompts	CO3

Pedagogical Initiatives (Not limited to):

- **Think Pair and Share (Blended Learning):** provides an opportunity for students to learn from one another
- **Problem Solving:** encourages cognitive thinking and enables creative problem solving
- **Poster Presentation:** allows students to represent the concepts visually in order to understand the topics easily.
- **Case studies:** maps different domains in real time applications
- **Live Demonstration:** exhibits the implementation process

Text Books

Sl. No.	Title of the Book/Name of the author/Name of the publisher/Edition and Year
1	Cryptography and Network Security: Principles and Practice, William Stallings, ISBN (7th Ed): 9789332575271 (India edition)
2	"Network Security Essentials: Applications and Standards" by William Stallings, ISBN (Indian Edition, 4th): 9788131762579

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

CO	Course Outcomes	RBT Level	RBT Level Indicator
CO1	Apply AI role in network security	L2	Apply
CO2	Analyze security threats using AI tools	L3	Analyze
CO3	Build simple AIbased security solutions	L5	Create

Mapping of Course Outcomes to Program Outcomes:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3				3								3	3
CO2	3				3								3	3
CO3	3				3								3	3

Weblinks and Video Lectures (eResources)

1	https://tryhackme.com/
2	https://www.cybrary.it/
3	https://owasp.org/
4	https://www.geeksforgeeks.org/computernetworktutorials/
	https://www.kali.org/docs/

**ABILITY ENHANCEMENT
COURSE (AEC)**



Dayananda Sagar Academy of Technology & Management

(Autonomous Institute under VTU)

Semester	:	4 th Semester
Course Title	:	Microcontroller & Embedded Systems
Course Code	:	BIC407
Course Type (Theory/ Practical/ Integrated/ Project)	:	Practical Experiential Learning
Category	:	AEC
Stream	:	CSEICB
		CIE : 50
Teaching hours/ week (L:T:P:S)	:	0:0:2:0
		SEE : 50
Total Hours	:	20 Hours
		SEE : 3 hours
Credits	:	1
		Duration

Course Learning Objectives: Students will be able to:

Sl. No	Course Objectives
1	Learn working with basic boards and identify the sensor and acuter
2	Learn to work with advance boards

Teaching Learning Process

Pedagogical Initiatives:

Some sample strategies to accelerate the attainment of various course outcomes are listed below:

Adopt different teaching methods to attain the course outcomes.

Include videos to demonstrate various concepts in C.

Encourage collaborative (Group) Learning to encourage team building.

Ask at least three **HOTS (Higherorder Thinking Skills)** modulewise questions to promote critical thinking.

Adopt **ProblemBased Learning (PBL)**, which fosters students' analytical skills, and develops thinking skills such as evaluating, generalizing, and analyzing information rather than simply recalling it.

Show different ways to solve a problem and encourage the students to come up with creative and optimal solutions.

Discuss various case studies to map with realworld scenarios and improve the understanding.

Devise innovative pedagogy to improve **Teaching Learning Process (TLP)**.



Scheme of Teaching and Examinations for BE Programme 2023
Outcome Based Education and Choice Based Credit System (CBCS)
(Effective from the Academic Year 202627)

DSATM

COURSE CURRICULUM

Experiment List

Week No.	Experiment No.	Experiments to be covered	Course Outcomes
	1	Write a program to add two 32bit numbers	CO2
	2	Write a program to find the sum of first 10 integer numbers	CO2
	3	Write a program to find the square of a number (1 to 10) using lookup table.	CO2
	4	Write a program to find factorial of a number.	CO2
	5	Write a program to find the largest/smallest number in an array of 32 numbers.	CO2
	6	Write a program to multiply two 16 bit binary numbers	CO2
	7	Display "Hello World" message using Internal UART.	CO2
	8	Interface a Stepper motor and rotate it in clockwise and anticlockwise direction	CO3
	9	Write a program to add an array of 16 bit numbers and store the 32 bit result in internal RAM	CO2
	10	Display the Hex digits 0 to F on a 7segment LED interface, with an appropriate delay in between	CO3

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

CO	Course Outcomes
CO1	Understand the architectural features and instruction set of 32 bit ARM microcontrollers
CO2	Apply assembly language programming techniques using ARM instruction sets to Solve problems.
CO3	Demonstrate the interfacing of I/O devices with ARM microcontrollers..
CO4	Analyze the selection and characteristics of basic hardware components in Embedded systems.
CO5	Develop embedded system solutions through hardware/software codesign using Embedded C and Keil.

**UNIVERSAL HUMAN
VALUES (UHV)**



Dayananda Sagar Academy of Technology & Management

(Autonomous Institute under VTU)

Semester	:	4 th Semester		
Course Title	:	Universal Human Values		
Course Code	:	BUHK408		
Course Type (Theory/Practical/Project/Integrated)	:	Theory		
Category	:	UHV		
Stream	:	All Branches	CIE	: 50
Teaching hours/ week (L:T:P:S)	:	0:2:0:0	SEE	: 50
Total Hours	:	15 Hours	SEE	: 1.5 Hours
Credits	:	1	Duration	

Course Learning Objectives: Students will be able to:

Sl. No	Course Objectives
1	To help the students appreciate the essential complementarity between 'VALUES' and 'SKILLS' to ensure sustained happiness and prosperity which are the core aspirations of all human beings.
2	To facilitate the development of a Holistic perspective among students towards life and profession as well as towards happiness and prosperity based on a correct understanding of the Human reality and the rest of existence. Such a holistic perspective forms the basis of Universal Human Values and movement towards valuebased living in a natural way
3	To highlight plausible implications of such a Holistic understanding in terms of ethical human conduct, trustful and mutually fulfilling human behaviour and mutually enriching interaction with Nature.
4	This course is intended to provide a muchneeded orientation input in value education to the young enquiring minds.

TeachingLearning Process

General Instructions:

These are sample Strategies, which teachers can use to accelerate the attainment of the various course outcomes.

- The methodology of this course is explorational and thus universally adaptable. It involves a systematic and rational study of the human being visàvis the rest of existence.
- In addition to the traditional lecture method, different types of innovative teaching methods may be adopted so that the activities will develop students' theoretical and applied skills.
- State the need for UHV activities and its present relevance in the society and provide reallife examples.
- Support and guide the students for selfstudy activities.
- You will also be responsible for assigning homework, grading assignments and quizzes, and documenting students' progress in real activities in the field.
- This process of selfexploration takes the form of a dialogue between the teacher and the students to begin with, and then to continue within the student in every activity, leading to continuous selfevolution.
- Encourage the students for group work to improve their creative and analytical skills.



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COURSE CURRICULUM

Contents:

Module No.	Topics	Hours
1	Introduction to Value Education Right Understanding, Relationship and Physical Facility (Holistic Development and the Role of Education) Understanding Value Education, Selfexploration as the Process for Value Education, Continuous Happiness and Prosperity – the Basic Human Aspirations, Happiness and Prosperity – Current Scenario, Method to Fulfil the Basic Human Aspirations	3 Hours
Pedagogy		
2	Harmony in the Human Being: Understanding Human being as the Coexistence of the Self and the Body, distinguishing between the Needs of the Self and the Body, The Body as an Instrument of the Self, Understanding Harmony in the Self, Harmony of the Self with the Body, Programme to ensure selfregulation and Health	3 Hours
Pedagogy		
3	Harmony in the Family and Society: Harmony in the Family – the Basic Unit of Human Interaction, 'Trust' – the Foundational Value in Relationship, 'Respect' – as the Right Evaluation, Other Feelings, Justice in Humanto Human Relationship, Understanding Harmony in the Society, Vision for the Universal Human Order	3 Hours
Pedagogy		
4	Harmony in the Nature/Existence: Understanding Harmony in the Nature, Interconnectedness, selfregulation and Mutual Fulfilment among the Four Orders of Nature, Realizing Existence as Coexistence at All Levels, The Holistic Perception of Harmony in Existence	3 Hours
Pedagogy		
5	Implications of the Holistic Understanding – a Look at Professional Ethics: Natural Acceptance of Human Values, Definitiveness of (Ethical) Human Conduct, A Basis for Humanistic Education, Humanistic Constitution and Universal Human Order, Competence in Professional Ethics Holistic Technologies, Production Systems and Management Models Typical Case Studies, Strategies for Transition towards Valuebased Life and Profession	3 Hours
	Pedagogical Initiatives (Not limited to): <ul style="list-style-type: none"> • Think Pair and Share (Blended Learning): provides an opportunity for students to learn from one another • Problem Solving: encourages cognitive thinking and enables creative problem solving • Poster Presentation: allows students to represent the concepts visually in order to understand the topics easily. • Case studies: maps different domains in real time applications • Demonstration: exhibits the implementation process 	

Text Books	
Sl. No.	Title of the Book/Name of the author/Name of the publisher/Edition and Year
1	The Textbook A Foundation Course in Human Values and Professional Ethics, R R Gaur, R Asthana, G P Bagaria, 2nd Revised Edition, Excel Books, New Delhi, 2019. ISBN 978 9387034 471
2	The Teacher's Manual for A Foundation Course in Human Values and Professional Ethics, R R Gaur, R Asthana, G
Reference Books	
1	Jeevan Vidya: Ek Parichaya, A Nagaraj, Jeevan Vidya Prakashan, Amar kantik, 1999.
2	. Human Values, A.N. Tripathi, New Age Intl. Publishers, New Delhi, 2004

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

At the end of the course, students are expected to become more aware of themselves, and their surroundings (family, society, nature);

- They would become more responsible in life, and in handling problems with sustainable solutions, while keeping human relationships and human nature in mind.
- They would have better critical ability.
- They would also become sensitive to their commitment towards what they have understood (human values, human relationship and human society).
- It is hoped that they would be able to apply what they have learnt to their own self in different daytoday settings in real life, at least a beginning would be made in this direction.

Web links and Video Lectures (eResources):

Value Education websites

<https://www.uhv.org.in/uhvii>

<http://uhv.ac.in>

<http://www.uptu.ac.in>

<http://www.storyofstuff.com>

https://www.youtube.com/channel/UCQxWr5QB_eZUnwxSwxXEKQw

https://fdpsi.aicteindia.org/8dayUHV_download.php

<https://www.youtube.com/watch?v=8ovkLRYXijE>

<https://www.youtube.com/watch?v=OgdNx0X923I>

<https://www.youtube.com/watch?v=nGRcbRpvGoU>

<https://www.youtube.com/watch?v=sDxGXOgYEKM>



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Affiliated to **VTU**
Approved by **AICTE**
Accredited by **NAAC** with **A+** Grade
6 Programs Accredited by **NBA**
(CSE, ISE, ECE, EEE, MECH, CV)

Course Skills Mapping Table

4th Semester					
Sl. No.	Name of the Course	Course Code	Course Type	Course Category	Skills attained by the students
1	Analysis and Design of Algorithms	BIC403	Integrated	IPCC	<ul style="list-style-type: none">➤ Algorithm design➤ Measuring algorithm complexity➤ Analysis of various algorithms
2	Database Management System	BIC404	Integrated	IPCC	<ul style="list-style-type: none">➤ Acquire NoSQL database skills➤ Web development applications➤ Realtime database creation
3	Network Security Using Generative AI	BIC406	Project	PBL	<ul style="list-style-type: none">➤ Advance Security algorithms➤ Advanced tools usage
4	Microcontroller & Embedded Systems	BIC407	Practical Experiential learning	AEC	<ul style="list-style-type: none">➤ 32 Bit ARM Controllers➤ Basic Microcontrollers➤ Embedded System Applications