SHRI VAISHNAV INSTITUTE OF MANAGEMENT & SCIENCE, INDORE

(Autonomous)

Approved by AICTE, New Delhi and Affiliated to DAVV, Indore & RGPV, Bhopal, Madhya Pradesh, India UGC-NAAC Accredited 'A' Grade Institute

ISO 9001:2015 Certified

Syllabus

Bachelor of Science (Computer Science)

[B. Sc. (CS)]

Year I / Semester I

w.e.f. Session 2025-26

Scheme No. 71, Gumasta Nagar, Indore-452009 Madhya Pradesh, Ph. : 0731-2780011, 2789925

Toll Free No. : 1800 233 2601 Website : www.svimi.org E-mail address : svimi@svimi.org

B. Sc. (CS) I Semester (Course Details)				
Session July 2025 – June 2026				
Sr. No.	**Course Type**	**Course Code**	**Subject Name**	**Total Credits**
1	Core Course (Major 1) (C -1)	BSCCS – 101 (T)	Computer System Architecture (Theory)	4
		BSCCS – 101 (T)	Computer System Architecture (Practical)	2
2	Minor 1 (M – 1)	BSCCS – 102 (A)	Basic Calculus and Vector Calculus	4
		BSCCS – 102 (B) (T)	Fundamentals of Mechanics and Matter (Theory)	3
		BSCCS – 102 (B) (P)	Fundamentals of Mechanics and Matter (Practical)	1
3	Multidisciplinary Course (MDC)	BSCCS – 103 (A)	Mechanical Workshop Skill	3
		BSCCS – 103 (B)	Mathematical Logic	3
4	Ability Enhancement Course AEC - 1	AEC – 101	Hindi Bhasha aur Sanskriti	2
5	Skill Enhancement Course SEC – (VOC) – 1)	SEC – 101	Digital Marketing	3
6	Internship/ Apprenticeship/ Project Work/ Community Engagement	PW/AP/CE - 101	Project Work	2
			Total Credits	**20**

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PART-A : Introduction			
Programme : B.Sc.(CS)	**Class : I Year**	**Semester : I**	**Session : July 2025-June2026**
Subject : Computer Application		**Theory / Practical: Theory**	
1.	**Course Code**	**BSCCS-101(T)**	
2.	**Course Title**	**Computer System Architecture (Theory)**	
3.	**Course Type (Core Course/DSE/Minor/MD-ID/SEC/VOC)**	**Major-I (Core Course)**	
4.	**Pre-Requisite (if any)**	**Not Required**	
5.	**Course Objectives**	1. To familiarize students with the number systems, basic logic gates, Boolean algebra and define characteristics of logic families and calculate their parameters. 2. To illustrate the working mechanism of different combinational circuits in the digital system. 3. To analyze the working mechanism of different sequential circuits. 4. To familiarize with the organization and design of memory system, instruction cycles , instructions formats, addressing modes. 5. To introduce students to the concept of Parallelism, Threading, Hardware vs. Micro programmed Control unit, pipelining, Data transfer Schemes, DMA, and Interrupts	
6.	**Course Outcomes (COs)**	On completion of this course, learners will be able to: CO1- Understand the basic structure, operation and characteristics of digital computer. CO2- Understand the working of arithmetic and logic unit as well as the concept of pipelining. CO3- Understand and summarize the hierarchical memory system including cache memories and virtual memory. CO4- Understand the concept and advantages of parallelism, threading, multiprocessors and multi core processors. CO5- Understand and apply concepts of parallelism, threading, control units, pipelining, data transfer schemes, DMA, and interrupts in computer system.	
7.	**Credit Value**	**04**	
8.	**Total Marks**	**Max. Marks: 30+70**	**Min. Passing Marks: 35**

PART-B : Content of the Course		
No. of Lectures per week : 06		
Total No. of Lectures required : 60		
Unit	**Topics**	**No. of Lectures required**
I	**Ancient Indian Contributions to Mathematics & Computation, Pingala's Binary System, Sanskrit Logic in Computing**: The Nyaya and Mimamsa schools of Indian philosophy of formal logic systems. Fundamentals of Digital Electronics: Data Types, Complements, Fixed-Point Representation, Floating-Point Representation, Binary and other Codes, Error Detection Codes. Logic Gates, Boolean Algebra, Map Simplification, Combinational Circuits, Sequential Circuits, simple combinational circuit design problems. Suggested activities for experiential learning: (1) Exploring Vedic numerical techniques (2) Simulating logic gates (3) Verifying logic gates through truth tables	**02**
II	**Circuits**: Adder, Subtractor, Multiplexer, Demultiplexer, Decoders, Encoders, Flip-Flops, Registers, Counters. Basic Computer Organization: Instruction codes, Computer Registers, Computer Instructions, Timing & Control, Instruction Cycles, Memory Reference Instruction, Input - Output & Interrupts, Complete Computer Description & Design of Basic Computer. Logic circuits, computer architecture, and the influence of Indian culture and history on technological advancements. Suggested activities for experiential learning: (1) Designing combinational circuits (2) Circuit Design Workshop: Hands-on session on designing adders and multiplexers. (3) Simulation Activity: Use simulation software to design basic combinational circuits.	**12**

III	**Instructions**: Instruction formats, Addressing modes, Instruction codes, Machine language, Assembly language. Register Transfer and Micro operations: Register Transfer Language, Register Transfer, Bus & Memory Transfer, Arithmetic Micro operations, Logic Micro-operations, Shift Micro-operations. Indian knowledge systems (such as Vedic mathematics, Sanskrit linguistic structures, and historical computing concepts) intersect with modern computational concepts like instruction formats, machine languages, and micro-operations. ancient computational methods, symbolic languages, and systems of transfer and transformation of knowledge. Panini's Ashtadhyayi and Formal Language Structure: Earliest known grammar-based rule system similar to instruction set architecture. Suggested activities for experiential learning: (1) Categorize instructions into different formats and know the relationship between opcodes, operands, and addressing modes, (2) Understand how processors access operands in memory.	12
IV	**Processor and Control Unit**: Hardwired vs. Micro programmed, Control Unit, General Register Organization, Stack Organization, Instruction Format, Data Transfer & Manipulation, Program Control, Introductory concept of RISC, CISC, advantages and disadvantages of both. Pipelining: Concept of pipelining, introduction to pipelined data path and control Handling, Data hazards & Control hazards. Suggested activities for experiential learning: (1) Presentation on CPU pipeline execution. (2) Hardware vs. Microprogrammed Control (3) Debate: Pros and cons of both techniques.	12

V	**I/O Systems and Memory**: Peripheral Devices, I/O Interface, Data Transfer Schemes - Program Control, Interrupt, DMA Transfer, I/O Processor. Memory Hierarchy, Processor vs. Memory Speed, High-Speed Memories, Main memory, Auxiliary memory, Cache Memory, Associative Memory, Interleaving, Virtual Memory, Memory Management. Suggested activities for experiential learning: (1) Research Assignment: Compare manuscript storage methods with modern hierarchical memory. (2) Cache Memory Simulation: Hands-on activity to understand cache memory replacement policies.	12
VI	**Parallelism**: Meaning, types of parallelism, introduction to Instruction level-parallelism, Parallel processing challenges, Applications. Flynn's classification: Introduction to SISD, SIMD, MISD, MIMD Hardware Multithreading: Introduction, types, advantages and applications. Multicore processors: Introduction, advantages, difference from multiprocessor. Parallel Computation in Indian Astronomy: Aryabhata and Bhaskara II's models of planetary motion involve computations similar to parallel processing. Suggested activities for experiential learning: (1) Case study and quiz based on parallel processing, (2) Presentation on CPU pipeline execution	12
VII	**Indian contributions**: Contributions of reputed scientists of Indian origin - Dr. Vinod Dham-Father of Intel Pentium Processor, Dr. Ajay Bhat - Co-Inventor of USB Technology, Dr. Vinod Khosla -Cofounder of Sun Microsystems, Dr. Vijay P Bhatkar-Architect of India's national initiative in supercomputing, and many others. Parallel Computing projects of India - PARAM, ANUPAM, FLOSOLVER, CHIPPS etc., other relevant contributors and contributions. Suggested activities for experiential learning: (1) Research on Indian contributions to computing, (2) Research on supercomputers in India	12

Part – C : Learning Resources

Textbooks, Reference Books, Other Resources

Textbooks:

1. M.Morris Mano, "Computer System Architecture", PHI.
2. William Stalling, "Computer Organization & Architecture", Pearson Education Asia.
3. V. Carl Hamacher, "Computer Organization", TMH
4. Tannenbaum, "Structured Computer Organization", PHI.
5. Vedic Mathematics by Bharati Krishna Tirtha
6. Shukla, K. S. (1976). Aryabhata and His Work.
7. Joseph, G. G. (1991). The Crest of the Peacock: Non-European Roots of Mathematics.
8. Pingree, D. (1978). Mathematical Astronomy in India.
9. Staal, F. (2006). The Science of Language and Logic in India.
10. Kiparsky, P. (2009). Panini as a Formalist.
11. Cardona, G. (1976). Panini: A Survey of Research.
12. Balasubramaniam, R. (2009). Knowledge Management in Ancient India.
13. Rajaraman, V. (2009). Computers and Information Technology.
14. Bhatkar, V. (2016). Supercomputing in India.
15. Narasimhan, R. (1990). India's IT Revolution.

Reference Books:

1. William Stalling, "Computer Organization & Architecture", Pearson Education Asia. 2. V. Carl Hamacher , "Computer Organization", TMH
2. Tannenbaum, "Structured Computer Organization", PHI.
3. Er. Rajiv Chopra, "Computer Architecture", Revised 3rd Edition, S. Chand & Company Pvt. Ltd

Suggestive Digital Platform Web Links:

1. https://epgp.inflibnet.ac.in/Home/ViewSubject?catid=fBYckQKJvP3a/8Vd3L08tQ==
   https://epgp.inflibnet.ac.in/Home/ViewSubject?catid=uUIVj2W71X+8mppilHe0+A==
2. https://www.yout-ube.com/watch?v=4TzMyXmzL8M
3. https://nptel.ac.in/courses/1 06/106/106106166/
4. https://nptel.ac.in/courses/1 06/106/106106134/

Suggested Equivalent Online Courses:

1. *https://nptel.ac.in/courses/106/105/106105163/*
2. *https://nptel.ac.in/courses/106/106/106106166/*
3. *https://nptel.ac.in/courses/106/106/106106134/*

Part D: Assessment and Evaluation

Internal Assessment Continuous Comprehensive Evaluation (CCE)		**Total Marks : 30**
External Assessment **Time :**	**Section (A) : Very Short Questions** **Section (B) : Short Questions** **Section (C) : Long Questions**	**Marks : 70**
Total Marks	**(Internal Assessment + External Assessment) : 100**	
Credit Value	**4**	
Minimum Passing Marks	**35**	

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PART-A : Introduction			
Programme : B.Sc.	**Class : I Year**	**Semester : I**	**Session : July 2025-June2026**
Subject : Computer Application			**Theory / Practical: Practical**
1.	**Course Code**	**BSCCS-101(P)**	
2.	**Course Title**	**Computer System Architecture (Practical)**	
3.	**Course Type (Core Course/DSE/Minor/MD-ID/SEC/VOC)**	**Major-I (Core Course)**	
4.	**Pre-Requisite (if any)**	**Not Required**	
5.	**Course Objectives**	1. To familiarize students with the number systems, basic logic gates, Boolean algebra and define characteristics of logic families and calculate their parameters. 2. To illustrate the working mechanism of different combinational circuits in the digital system. 3. To analyze the working mechanism of different sequential circuits. 4. To illustrate the working mechanism of different combinational circuits in the digital system. 5. To analyze the working mechanism of different sequential circuits	
6.	**Course Outcomes (COs)**	On completion of this course, learners will be able to: CO1- Describe the basic logic and universal gates CO2- Classify the behavior of logic gates using truth tables CO3- Implement Binary-to -Gray, Gray-to -Binary code conversions. CO4- Design half and full adder circuit using basic gates CO5- Design and construct flip flops and verify the excitation tables.	
7.	**Credit Value**	**02**	
8.	**Total Marks**	**Max. Marks: 100**	**Min. Passing Marks: 35**

PART-B : Content of the Course

No. of Lab Practical's per week : 03		
Total No. of Lab required : 30		
	Suggestive list of Practical's	**No. of Labs**
	1. To study basic gates (AND, OR, NOT) and verify their truth tables. 2. To convert a given binary number to Gray code using IC 7486. 3. To study and verify NAND as Universal gate using IC 7400. 4. To study half adder using basic gates and verify its truth table. 5. To study Full Adder using basic gates and verify its truth table. 6. To realize basic gates (AND, OR, NOT) from Universal gates (NAND and NOR). 7. To verify truth table of 4-bit adder using IC 7483. 8. To design and construct RS flip Flop using gates and verifies the truth table. 9. To design and construct JK flip Flop using gates and verifies the truth table. 10. To verify De-Morgan's Theorem.	**30**

Part – C : Learning Resources
Textbooks, Reference Books, Other Resources
Suggested Readings:
Textbooks: 1. M.Morris Mano, "Computer System Architecture", PHI. 2. William Stalling, "Computer Organization & Architecture", Pearson Education Asia. o V. Carl Hamacher, "Computer Organization", TMH 3. Tannenbaum, "Structured Computer Organization", PHI.
Reference Books: 1. William Stalling, "Computer Organization & Architecture", Pearson Education Asia. 2. V. Carl Hamacher , "Computer Organization", TMH 2. Tannenbaum, "Structured Computer Organization", PHI. 3. Er. Rajiv Chopra, "Computer Architecture", Revised 3rd Edition, S. Chand & Company Pvt. Ltd
Suggestive Digital Platform Web Links: 1. https://www.yout-ube.com/watch?v=4TzMyXmzL8M 2. https://nptel.ac.in/courses/106/106/106106166/ 3. https://nptel.ac.in/courses/106/106/106106134/
Suggested Equivalent Online Courses: 1. https://nptel.ac.in/courses/106/105/106105163/ 2. https://nptel.ac.in/courses/106/106/106106166/ 3. https://nptel.ac.in/courses/106/106/106106134/

Part D: Assessment and Evaluation			
Suggested Continuous Evaluation Methods			
Internal Assessment	**Marks**	**External Assessment**	**Marks**
Class Interaction/Quiz	NIL	**Viva Voce Practical (20 Marks)**	**100**
Attendance		**Practical Record File (20 Marks)**	
Assignments (Charts/ Model/ Seminars/ Technology Dissemination/ Excursion/ Lab Visit/ Industrial Visit		**Table Work/ Experiment (60 Marks)**	
		Total Marks : 100	

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PART-A : Introduction		
Programme : B.Sc.	**Class : I Year**	**Semester : I** **Session : July 2025-June2026**
Subject : Mathematics		**Theory / Practical: Theory**
1.	**Course Code**	**BSCCS-102(T)**
2.	**Course Title**	**Basic Calculus & Vector Calculus**
3.	**Course Type (Core Course/DSE/Minor/MD-ID/SEC/VOC)**	**Minor-I**
4.	**Pre-Requisite (if any)**	To study this course, a student must have had the subject Mathematics in class 12th
5.	**Course Objectives**	**After the completion of this course, a student will be able to** 1. Understand the differentiation and integration by Vedic approach. 2. Sketch curves in a plane using its Mathematical properties in the different coordinate systems of reference. 3. Using the derivatives in Optimization, Social sciences, Physics and Life sciences etc. 4. Learn to differentiate vector-valued functions with respect to scalar variables. 5. Develop a strong understanding of the gradient, divergence, and curl as key operators in vector calculus. 6. Develop an intuitive understanding of how the concepts of vector calculus relate to real-world physical phenomena.
6.	**Course Outcomes (COs)**	The course will enable the students to : CO1- Understand the differentiation and integration by Vedic approach. CO2- Sketch curves in a plane using its Mathematical properties in the different coordinate systems of reference. CO3- Using the derivatives in Optimization, Social sciences, Physics and Life sciences etc. CO4- Learn to differentiate vector-valued functions with respect to scalar variables.

		CO5- Develop a strong understanding of the gradient, divergence, and curl as key operators in vector calculus. CO6- Develop an intuitive understanding of how the concepts of vector calculus relate to real-world physical phenomena.	
7.	**Credit Value**	Theory: 4	
8.	**Total Marks**	**Max. Marks: 30+70**	**Min. Passing Marks: 35**

PART-B : Content of the Course		
No. of Lectures per week : 04		
Total No. of Lectures required : 60		
Unit	**Topics**	**No. of Lectures required**
I	**Indian Knowledge System:** 1.1 Contribution of Indian Mathematicians in Calculus 1.1.1 Aryabhata 1.1.2 Madhava 1.1.3 Jyeshthadeva 1.2 Vedic Calculus 1.2.1 Differentiation using Dhvaja Ghata Sūtra 1.2.2 Successive Differentiation using Urdhva–Triyagbhyam Sūtra 1.2.3 Derivative of the division of two polynomials using Urdhva– Triyagbhyam Sūtra 1.2.4 Integration by using Ekādhikena Pūrveṇa Sūtra 1.2.5 Integration based on partial fraction using ParāvartyaYojayet Sūtra 1.2.6 Integration of the product of two functions using Urdhva– Triyagbhyam Sūtra 1.2.7 Vedic Approach to Areasunder Curves	10
II	**Differential Calculus:** 2.1 Successive differentiation 2.1.1 Leibnitz theorem 2.1.2 Maclaurin's series expansion 2.1.3 Taylor's series expansion 2.2 Basic Concepts of Partial Derivative of two and three variables 2.3 Asymptotes 2.3.1 Asymptotes of algebraic curves 2.3.2 Condition for Existence of Asymptotes 2.3.3 Parallel Asymptotes 2.3.4 Asymptotes of polar curves 2.4 Curvature 2.4.1 Formula for radius of Curvature 2.4.2 Curvature at origin 2.4.3 Centre of Curvature	15

III	**Integral Calculus:** 3.1 Integration of transcendental functions 3.2 Reduction formulae 3.3 Definite Integral 3.4 Double and Triple Integral	15
IV	**Vector Calculus:** 4.1 Vector differentiation 4.1.1 Rules of differentiation 4.1.2 Derivatives of Triple Products 4.2 Gradient, Divergence and Curl 4.3 Directional derivatives 4.4 Vector Identities 4.5 Vector Integration	15
Case Study	**Industrial Applications:** 1. Applications of Calculus to solve the problems related to Industries, Business and Economics. 2. Applications of Vector Calculus to solve the problems related to Industries and real world.	05

Part – C : Learning Resources

Textbooks, Reference Books, Other Resources

Suggested Readings:

1. Gorakh Prasad :Differential Calculus, Pothishala Private Ltd., Allahabad,2016.
2. Gorakh Prasad : Integral Calculus, Pothishala Private Ltd., Allahabad, 2015.
3. N. Saranand S. N. Nigam : Introduction toVector Analysis, Pothishala Pvt. Ltd. Allahabad, 1990.

Textbooks:

1. Marvin L. Bittinger, David J. Ellenbogen, Scott J. Surgent : Calculus and its Applications, Pearson, 2011.
2. Absos Ali Shaikh and Sanjib Kumar Jana : Vector Analysis with Applications, Narosa Publishing House, 2009.
3. Gerard G. Emch, R. Sridharan and M. D. Srinivas : Contributions to the History of Indian Mathematics. Hindustan Book Agency, Vol. 3, 2005.
4. Bharati Krsna Tirthaji Maharaja, "Vedic Mathematics", Motilal Banarasidas Publisher, Delhi, 1994.
5. Sneha Amit Vaidya : The Contribution of Vedic Mathematics in Advance Calculus, https://shodhganga.inflibnet.ac.in/, 2019.

Reference Books:

1. N. Piskunov : Differential and Integral Calculus, CBS Publishers, 1996.
2. Murray R. Spiegel : Vector Analysis, Schaum Publishing Company, New York, 2017.
3. Bibhutibhusan Datta and Avadhesh Narayan Singh : History of Hindu Mathematics, Asia Publishing House, 1962.
4. Larry J Goldstein, David I Schneider, David C Lay, Nakhle H Asmar : Calculus and Its Applications, Pearson Education, 2012.

Suggestive Digital Platform Web Links:

1. https://epgp.inflibnet.ac.in
2. https://freevideolectures.com/university/iit-roorkee
3. https://www.eshiksha.mp.gov.in/mpdhe

Suggested Equivalent Online Courses:

1. https://nptel.ac.in/courses/111106146/
2. https://nptel.ac.in/courses/122102004/L02
3. https://nptel.ac.in/courses/111/101/111101080/

Part D: Assessment and Evaluation		
Internal Assessment Continuous Comprehensive Evaluation (CCE)		**Total Marks : 30**
External Assessment **Time :**	**Section (A) :** Very Short Questions **Section (B) :** Short Questions **Section (C) :** Long Questions	**Marks : 70**
Total Marks	**(Internal Assessment + External Assessment) : 100**	
Credit Value	4	
Minimum Passing Marks	35	

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PART-A : Introduction			
Programme : B.Sc.	**Class : I Year**	**Semester : I**	**Session : July 2025-June2026**
Subject : Physics			**Theory / Practical: Theory**
1.	**Course Code**	**BSCCS-102(T)**	
2.	**Course Title**	**Fundamentals of Mechanics and Matter**	
3.	**Course Type (Core Course/DSE/Minor/MD-ID/SEC/VOC)**	**Minor**	
4.	**Pre-Requisite (if any)**	**Not Required**	
5.	**Course Objectives**	1. To analyze Kanad's laws of motion. 2. To understand the contributions of Varahmihira and Vikram Sarabhai to science and the development of mechanics in India. 3. To apply moment of inertia theorems and perform calculations of moment of inertia for different bodies, analyse surface tension, intermolecular forces, apply concepts like capillarity. 4. To analyze fluid dynamics, apply Bernoulli's theorem, and solve problems related to viscosity. **5.** To understand gravitational potential, central forces, reduced mass,and Kepler's laws of planetary motion.	
6.	**Course Outcomes (COs)**	CO1- Students can analyze Kanad's laws of motion. CO2- Students can learn the contributions of Varahmihira and Vikram Sarabhai to science and the development of mechanics in India. CO3- Application of moment of inertia theorems and perform calculations of moment of inertia for different bodies, analyse surface tension, intermolecular forces, apply concepts like capillarity can be studied. CO4- Analyze fluid dynamics, apply Bernoulli's theorem, and solve problems related to viscosity. CO5- Understand gravitational potential, central forces, reduced mass, and Kepler's laws of planetary motion.	
7.	**Credit Value**	**3**	
8.	**Total Marks**	**Max. Marks: 100**	**Min. Passing Marks: 35**

PART-B : Content of the Course		
No. of Lectures per week : 04		
Total No. of Lectures required : 60		
Unit	**Topics**	**No. of Lectures required**
I	**Historical background** 1. Varahmihira's and Vikram Sarabhai's life, their contribution towards science and society. 2. Kanad's three laws of motion, Vaisheshika's theory of elasticity, Concept of surface tension, fluidity and viscosity in ancient Indian text, Bhakaracharya's concept of gravitation, Aryabhatta's calculations of planetary distances. **Activities:** 1. Explain the concept of laws of motion proposed by Maharishi Kanad and conduct a comparative study with Newton's laws of motion. 2. Assign students to research Bhaskaracharya's idea of gravity from his book Siddhanta Shiromani. **Keywords/Tags:** Kanad's laws of motion,Vaisheshika's theory ofelasticity.	**12**
II	**Rigid and deformable body** 1. System of particles and concept of Rigid body, Torque, centre of mass position of the centre of mass, Motion of the centre of mass, Conservation of linear & angular momentum with examples, Single stage rocket, Rotatory motion and concept of moment of inertia, Theorems on moment of inertia. 2. Hook's law, Young's modulus, Bulk modulus, Modulus of rigidity and Poisson's ratio, Possible values of Poisson's ratio, Poisson's ratio of rubber in the laboratory, Torsion of a cylinder, Strain energy of twisted cylinder. 3. Determining modulus of rigidity of a wrre using Torsional pendulum and Maxwell's needle, Searl's method to find Y, Tl and cr of the material of a wire, Bending of beam, Cantilever. **Activities:** 1. Take a rubber strip and stretch it. Observe how its	**12**

	width decreases as the length increases. Use a vernier caliper to measure width reduction and calculate Poisson's ratio. 2. Take a thin wire and suspend weights at one end. Measure elongation using a vernier calipers. Apply the Young's modulus formula to determine its value. **Keywords/Tags,** Young Modulus, Bulk Modulus, Modulus of rigidity, Poisson's ratio	
III	**Surface Tension** 1. Inter-molecular forces and potential energy curve, force of cohesion and adhesion, Surface tension, Explanation of surface tension on the basis of intermolecular forces, Surface energy, Effect of temperature and impurities on surface tension, Daily life application of surface tension. 2. Angle of contact, Expression for the pressure difference between the two sides of a curved liquid surface, Capillarity, determination of surface tension of a liquid - capillary rise method and Jaeger's method. **Activities:** 1. Conduct an analytical study on the usefulness of capillarity and surface tension in daily life. 2. Presentation: Importance of surface tension in daily life with examples. **Keywords/Tags:** Inter-molecular force, Surface tension, Angle of contact, Capillarity.	**12**
IV	**Viscosity** 1. Ideal and viscous fluid, Streamline and turbulent flow, Equation of continuity, Rotational and irrotational flow, Energy of a flowing fluid, Euler's equation of motion of an non-viscous fluid and its physical significance. 2. Bernoulli's theorem and its applications (Velocity of efflux, shapes of wings of airplanes).	**12**

	3. Viscous flow of a fluid and coefficient of viscosity, Flow of liquid through a capillary tube, Poiseuille's formula, Stokes formula. **Activities:** 1. Gently place a dry sewing needle on water without breaking the surface. Observe how it floats due to surface tension. Add a drop of soap and watch the effect of impurities on surface tension. 2. Presentation: Importance of viscosity in daily life with examples. **Keywords /Tags:** Viscosity, Euler's equation, Poiseuille's formula	
V	**Gravitation and Central force** 1. Conservative and non-conservative force field, Conservation of energy in motion under the conservative and non-conservative forces, Motion under Central forces, Conservative characteristics of central forces. 2. The motion of a two-particles system in Central force, Concept of reduced mass, Reduced mass of Positronium and hydrogen, Motion of celestial bodies and derivation of Kepler's laws **Activities:** 1. Tie a ball to a string and swing it in a circular motion. Observe that the force is always directed towards the center (central force). Release the string and see how the ball moves tangentially. 2. Ask students to calculate reduced mass of Hydrogen atom, Positronium. **Keywords/Tags:** Conservative force field, Central force, reduced mass.	**12**

Part – C : Learning Resources
Textbooks, Reference Books, Other Resources
Suggested Readings: 1. Arfken G.B., Weber H.J., Harris F.E., "Mathematical Methods for Physicists", Elsevier, 2013, 7th Edn.. 2. Spiegel M. R., "Vector Analysis: Schaum Outline Series", McGraw Hill Education, 2017. 3. Mathur D. S., "Mechanics", S. Chand, 2012.
Textbooks: 1. Mathur D. S., "Elements of Properties of Matter", Shyamlal Charitable Trust, New Delhi, 2008. 2. Sears and Zeemansky, "University Physics: with Modern Physics". 12th Edition. Hugh D. Young, Roger A. Freedman, Albert Lewis Ford, Pearson Education India. 2008. 3. Say M.G., "Performance and design of AC machines", ELBS Edn. 4. John K.C., "Mechanical workshop practice", PHI Learning Pvt. Ltd, 2010.
Reference Books: 1. Black B. J., "Workshop Processes, Practices and Materials",EditorNewnes. 2005. 2. Smyth Lawrence, Liam Hennessy "New Engineering Technology", The Educational Company of Ireland. The VaiśeşikaSūtra by Rishi Kanada. 3. SubashKak. Kaṇāda, Great Physicist and Sage of Antiquity 4. ŚrīmadBhāgavatam (BhāgavataPurāṇa) - Canto 3, Chapter 11" Calculation of Time, from the Atom".
Suggestive Digital Platform Web Links: https://www.eshiksha.mp.gov.in/mpdhe/LearningManagementSystem, Departmentof higher education, Government of Madhya Pradesh (M.P.).
Suggested Equivalent Online Courses: htt12s://n12tel.ac.in/courses/115/106/115106090/ Mechanics,Heat,OscillationsandWavesbyProf.V..Balakrishnan,DepartmentofPhysics,IndianInstituteofTechnology,.Madras

Part D: Assessment and Evaluation		
Internal Assessment Continuous Comprehensive Evaluation (CCE)		**Total Marks :**
External Assessment **Time :**	**Section (A) :** **Section (B) :** **Section (C) :**	**Marks :**
Total Marks	**(Internal Assessment + External Assessment) :**	
Credit Value		
Minimum Passing Marks		

Part D: Assessment and Evaluation		
Internal Assessment Continuous Comprehensive Evaluation (CCE)		**Total Marks : 30**
External Assessment **Time :**	**Section (A) :** Very Short Questions **Section (B) :** Short Questions **Section (C) :** Long Questions	**Marks : 70**
Total Marks	**(Internal Assessment + External Assessment) : 100**	
Credit Value	4	
Minimum Passing Marks	35	

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PART-A : Introduction			
Programme : B.Sc. (CS)	**Class : I Year**	**Semester: I**	**Session :July-Dec 2025**
Subject :		**Theory / Practical: Theory**	
1.	**Course Code**	**BSCCS-103**	
2.	**Course Title**	**Mechanical Workshop Skill**	
3.	**Course Type (Core Course/DSE/Minor/MD-ID/SEC/VOC)**	**MDC**	
4.	**Pre-Requisite (if any)**	**Not Required**	
5.	**Course Objectives**	1. To understand ancient Indian measuring systems and Kanad's laws of motion 2. To learn modern measurement techniques and unit conversions 3. To understand vector fields and vector differentiation (gradient, divergence, curl) 4. To explore surface tension, viscosity and fluid flow equations (Bernouilli's theorem) 5. To develop practical skills in workshop practices and machine tool operations	
6.	**Course Outcomes (COs)**	CO1- Students can analyze Kanad's laws of motion. CO2- Students can learn the contributions of Varahmihira and Vikram Sarabhai to science and the development of mechanics in India. CO3- Application of moment of inertia theorems and perform calculations of moment of inertia for different bodies, analyse surface tension, intermolecular forces, apply concepts like capillarity can be studied. CO4- Analyze fluid dynamics, apply Bernoulli's theorem, and solve problems related to viscosity. CO5- Understand gravitational potential, central forces, reduced mass, and Kepler's laws of planetary motion.	
7.	**Credit Value**	**3**	
8.	**Total Marks**	**Max. Marks:100**	**Min. Passing Marks: 35**

PART-B : Content of the Course		
No. of Lectures per week : 4		
Total No. of Lectures required : 45		
Unit	**Topics**	**No. of Lectures required**
I	**Historical background and measuring system** 1. Historical background: Ancient Indian units of time as mentioned in the Shrimad Bhagavat Purana, Dongla observatory, Kanad's laws of motion. 2. Measuring system: Measuring units, Conversion to SI and CGS, Familiarization with meter scale, Vernier calipers, Screw gauge and their utility, Measure the dimension of a solid block, Volume of cylindrical beaker/glass, Diameter of a thin wire, Thickness of metal sheet, Use of Sextant to measure height. **Activities**: Number of Lectures (1 Hour Each) 09 III IIII 1. Measure the external diameter of a pen using a Screw gauge. 2. Measure the volume of a metal cylinder using Verniercallipers. **Keywords/Tags**: Ancient time units, Kanad's laws. Verniercallipers, screw gauge.	**9**
II	**Mathematical Tools and Vectors** 1. Plotting of functions, Approximations: Taylor andbinomial series (statements only), Fundamental concepts of Limit, Continuity and Differentiability, Basic Integration Formulas, Integration by parts, Integration by partial fraction, Integration by trigonometric functions. 2. Vector Algebra: Properties of vectors, Scalar product and vector product, Scalar and Vector fields, Vector Differentiation, Gradient of a scalar field and its geometrical interpretation, Divergence and curl of a vector field, Del and Laplacian operators. **Activities**: 1. Ask students to sketch graphs of some trigonometric functions. 2. To compute the limit of the given functions at specific points and determine their continuity using graphical method. **Keywords/Tags**: Plotting functions, Taylor series, gradient,divergence, curl, Laplacian operators.	**9**

III	**Rigid body mechanics and Deformable bodies** 1. Rigid body mechanics: Concept of Rigid body, Torque, center of mass, Conservation of linear & angular momentum, Rotatory motion and concept of moment of inertia, Theorems on moment of inertia: theorem of addition, theorem of perpendicular axis, theorem of parallel axis, application of moment of inertia in daily life. 2. Deformable bodies: Hook's law, Young's modulus. Bulk modulus,Modulus of rigidity and Poisson's ratio.Relationship between variouselastic moduli. **Activities:** 1. Determination of Young's Modulus of a Metallic Bar using the Cantilever method. 2. To determine the Modulus of Rigidity of a metallic wire using a torsion pendulum. **Keywords/Tags:** Rigid body mechanics, torque, Center of mass, moment of inertia theorems, Hooke's law, elastic moduli.	**9**
IV	**Surface Tension and Viscosity** 1. Surface Tension: Inter-molecular forces and potential energy curve, Force of cohesion and adhesion, Surface tension, Explanation of surface tension on the basis of intermolecular forces, Surface energy, Daily life application of surface tension, Angle of contact, Capillarity. 2. Viscosity: Ideal and viscous fluid, Streamline and turbulent flow, Equation of continuity, Bernoulli's theorem (without derivation) and its applications (Velocity of efflux, shapes of wings of airplane, Magnus effect). **Activities:** 1. Determination of surface tension of a liquid by Jaeger's method. 2. Study streamline and turbulent flow by visualizing Flow Using Ink. **Keywords/Tags**: Surface tension, cohesion, adhesion, viscosity,fluid flow, Bernoulli's theorem, Magnus effect.	**9**

V	**Mechanical Skill** 1. Concept of workshop practice, Overview of manufacturing methods: casting, foundry, machining, forming and welding, Types of welding joints and welding defects, Common materials used for manufacturing like steel, copper, iron, metal sheets, composites and alloy, wood. 2. Concept of machine processing, Introduction to common machine tools like lathe, shaper, drilling, milling and surface machines, cutting tools, lubricating oils, cutting of a metal sheet using blade, smoothening of cutting edge of sheet using file, Drilling of holes of different diameter in metal sheet and wooden block, Use of bench vice and tools for fitting.	**9**

Part – C : Learning Resources
Textbooks, Reference Books, Other Resources
Suggested Readings: 4. Arfken G.B., Weber H.J., Harris F.E., "Mathematical Methods for Physicists", Elsevier, 2013, 7th Edn.. 5. Spiegel M. R., "Vector Analysis: Schaum Outline Series", McGraw Hill Education, 2017. 6. Mathur D. S., "Mechanics", S. Chand, 2012.
Textbooks: 5. Mathur D. S., "Elements of Properties of Matter", Shyamlal Charitable Trust, New Delhi, 2008. 6. Sears and Zeemansky, "University Physics: with Modern Physics". 12th Edition. Hugh D. Young, Roger A. Freedman, Albert Lewis Ford, Pearson Education India. 2008. 7. Say M.G., "Performance and design of AC machines", ELBS Edn. 8. John K.C., "Mechanical workshop practice", PHI Learning Pvt. Ltd, 2010.
Reference Books: 5. Black B. J., "Workshop Processes, Practices and Materials",EditorNewnes. 2005. 6. Smyth Lawrence, Liam Hennessy "New Engineering Technology", The Educational Company of Ireland. The VaiśeşikaSūtra by Rishi Kanada. 7. SubashKak. Kaṇāda, Great Physicist and Sage of Antiquity 8. ŚrīmadBhāgavatam (BhāgavataPurāṇa) - Canto 3, Chapter 11" Calculation of Time, from the Atom".
Suggestive Digital Platform Web Links: https://www.eshiksha.mp.gov.in/mpdhe/LearningManagementSystem, Departmentof higher education, Government of Madhya Pradesh (M.P.).
Suggested Equivalent Online Courses: htt12s://n12tel.ac.in/courses/115/106/115106090/ Mechanics,Heat,OscillationsandWavesbyProf.V..Balakrishnan,DepartmentofPhysics,IndianInstituteofTechnology,.Madras

Part D: Assessment and Evaluation		
Internal Assessment Continuous Comprehensive Evaluation (CCE)		**Total Marks 30:**
External Assessment **Time :**	**Section (A) :** Objective Type Questions **Section (B) :** Short Questions (200 Words Each) **Section (C) :** Long Questions (500 Words Each)	**Marks :70**
Total Marks	**(Internal Assessment + External Assessment) :**	
Credit Value	3	
Minimum Passing Marks	35	

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PART-A : Introduction			
Programme : BSc	**Year :I**	**Semester: I**	**Session : July 2025-June2026**
Subject : Computer Applications			**Theory / Practical: Theory**
1.	**Course Code**	**BSCCS-103**	
2.	**Course Title**	**Mathematical Logic**	
3.	**Course Type (Core Course/DSE/Minor/MD-ID/SEC/VOC)**	**MDC**	
4.	**Pre-Requisite (if any)**	**Not Required**	
5.	**Course Objectives**	1. To understand the principles of logics to distinguish between valid and invalid arguments. 2. To understand truth tables for logical expressions, tautology and contradiction for given statements. 3. To understand the Language, String, Length of String, Derivation, Language of a Grammar and its applications. 4. To understand the Fuzzy Logic,Fuzzy Propositions,Logical Connectives in Fuzzy Logic,Types of Fuzzy Propositions in mathematical models. 5. To provide applications of Fuzzy logic to solve real world problems.	
6.	**Course Outcomes (COs)**	At the end of this course, the students will be able to: CO1- Using the principles of logic to distinguish between sound and unsound reasoning in discourse of everybody. CO2- Construct truth tables for logical expressions; test statements for logical equivalence and represent mathematical statements in the language of predicate language. CO3- Using the appropriate set theoretic concepts, thinking process, tools and techniques in the solution to various conceptual or real-world problems. CO4- Learn the operations involved in fuzzy logic systems, including fuzzy intersection, union, and complement. CO5- Apply fuzzy logic to various real-world applications across different fields.	
7.	**Credit Value**	Theory: 3	
8.	**Total Marks**	**Max. Marks:100**	**Min. Passing Marks:35**

PART-B : Content of the Course		
No. of Lectures per week : 04		
Total No. of Lectures required : 45		
Unit	**Topics**	**No. of Lectures required**
I	**Indian Knowledge** System: 1.1 Basic concepts of Mathematical Logic in ancient India 1.2 Panini's Logical Structure 1.3 Avaktavtakta 1.4 Navya-Nyaya Logic	5
II	2.1 Propositions and Truth table 2.2 Negation, Conjunction and Disjunction 2.3 Implications and Double implication 2.4 Bi-conditional propositions 2.5 Contrapositive Implication and converse 2.6 Contrapositive and inverse propositions 2.7 Tautology and Contradiction 2.8 Logical equivalences 2.9 Predicates and quantifiers 2.10 De-Morgan Law	15
III	**Formal Language:** 3.1 Language 3.1.1 String 3.1.2 Length of String 3.2 Phrase Structure Grammars 3.2.1 Derivation 3.2.2 Language of a Grammar 3.3 Types of Grammar and Languages 3.3.1 Type-3 Grammar 3.3.2 Type-2 Grammar 3.3.3 Type-1 Grammar 3.3.4 Type-0 Grammar 3.3.5 Type-i Language	10
IV	**Fuzzy Logic:** 4.1 Introduction to Fuzzy Logic 4.1.1 Fuzzy Propositions 4.1.2 Logical Connectives in Fuzzy Logic 4.1.3 Types of Fuzzy Propositions 4.2 Comparison with Classical Logic 4.3 Applications of Fuzzy Logic 4.4 Advantages of Fuzzy Logic	10

Case Study	1. Applications of mathematical logic to solved real world problems. 2. Applications of Fuzzy logic to solved real world problems.	5

Part – C : Learning Resources
Textbooks, Reference Books, Other Resources
Suggested Readings: 1. R. M. Somasundaram: Discrete Mathematical Structures, PHI Learning Pvt. Ltd., 2003. 2. Samar Ballav Bhoi: A Text Book of Logic and Sets, Educreation Publishing, 2018.
Textbooks: 1. Ganesh: Introduction to **Fuzzy** Sets and Fuzzy Logic, Prentice Hall India Learning Private Limited, 2006. 2. Rosen H: Discrete Mathematics and its Applications, McGraw Hill Education, 2017. 3. Lotfi A Zadeh and Rafik A Aliev: Fuzzy Logic Theory and Applications, World 4. Scientific Publishing, 2018.
Reference Books: 1. Ajit Kumar, S. Kumaresan, Bhaba Kumar Sarma: A Foundation Course in Mathematics, Alpha Science International Ltd, 2018. 2. R. P. Grimaldi, Discrete Mathematics and Combinatorial Mathematics, Pearson Education, 1998. 3. Jean-Paul Tremblay , R Manohar: Discrete Mathematical Structures with Applications to Computer Science, McGraw Hill Education, 1st edition, 2017. 4. G. J. Klir and B. Yuan. Fuzzy sets and Fuzzy logic, Pearson, 2015.
Suggestive Digital Platform Web Links: https://www.eshiksha.mp.gov.in/mpdhe
Suggested Equivalent Online Courses: 1. https://npte1.ac.in/courses/111/106/111106052/ 2. https://npteI.ac.in/courses/108104157

Part D: Assessment and Evaluation		
Internal Assessment Continuous Comprehensive Evaluation (CCE)		**Total Marks :** **30**
External Assessment **Time :**	**Section (A) :** Very Short Questions **Section (B) :** Short Questions (200 Words Each) **Section (C) :** Long Questions (500 Words Each)	**Marks : 70**
Total Marks	**(Internal Assessment + External Assessment) :100**	
Credit Value	3	
Minimum Passing Marks	35	

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PART-A : Introduction			
Programme : B.Sc.	**Class : I Year**	**Semester: I**	**Session : July 2025-June2026**
Subject : Computer Application		**Theory / Practical: Theory**	
1.	**Course Code**	**SEC-101**	
2.	**Course Title**	**Digital Marketing**	
3.	**Course Type (Core Course/DSE/Minor/MD-ID/SEC/VOC)**	**SEC**	
4.	**Pre-Requisite (if any)**	Not Required	
5.	**Course Objectives**	1. To understand key concepts and principles of digital marketing. 2. To use digital tools to create and manage online campaigns. 3. To analyze marketing data for informed decision-making. 4. To develop and implement effective digital marketing strategies.	
6.	**Course Outcomes (COs)**	**On successful completion of this course, the students will be able to:** CO1- Explain the concept sand tools of digital marketing. CO2- Apply digital marketing strategies using Indian cultural and traditional insights. CO3- Design and execute a digital marketing campaign. CO4- Analyze the legal frame work and ethical responsibilities involved in digital marketing.	
7.	**Credit Value**	**3 Credit**	
8.	**Total Marks**	**Max. Marks:**100	**Min. Passing Marks:**35

PART-B : Content of the Course		
No. of Lectures per week : 4		
Total No. of Lectures required : 45		
Unit	**Topics**	**No. of Lectures required**
I	**Introduction to Digital Marketing:** Meaning, scope, and significance of digital marketing**;** Difference between digital and traditional marketing**;** Overview of digital marketing channels: SEO, SEM, Social Media, Email; Career opportunities in digital marketing**.** **Practical Activities-** • Students analyze different digital marketing channels(e.g., social media, search engines, email, display ads) and identify their advantages and disadvantages. • Students debate ethical issues in digital marketing, • Students will analyze Indian brands (e.g., Amul, Tanishq, Paper Boat, Fab India) that integrate traditional values with modern marketing approaches. • Group presentation or written report based on selected case	**18**
II	**Customer Research: Digital Consumer Behavior:** Characteristics and factors affecting; Digital Marketing Strategy and Campaign Planning: Segmentation and targeting in the digital environment; **Practical Activity-** • List out various e-commerce apps/platforms. • Students will explore campaigns (e.g., Surf Excel's "Daag Acche Hain–Holi", Cadbury's Diwali campaigns) to study targeting, emotions, platform use, and outcomes. Comparative analysis and class discussion to be encouraged.	**15**

	• Choose a marketing-related topic (e.g., influencer marketing, consumer behaviour trends, and sustainability in branding). • Create engaging and informative content using simple tools like Canva or Google Docs.	
III	**Legal & Ethical Issues in Digital Marketing:** Meaning of ethics in digital marketing, Importance of ethical behavior for brand image and customer trust; Data Protection Laws in India **Practical Activity-** • Students examine real or hypothetical digital ads and identify potential legal or ethical violations. • Role-play a scenario where a marketing team debates whether to use consumer data without consent.	**12**

Part – C : Learning Resources
Textbooks, Reference Books, Other Resources
Suggested Readings: 1. Mathur,Vibha &Arora,Saloni.(2020).Digital Marketing. PHI Learning. 2. Babu KG Raja Sabarish, Anbazhagan B, Meenakumari S. (2023). Digital Marketing. Sultan Chand & Sons. 3. Swaminathan T. N. & Karthik Kumar. (2019). Digital Marketing: From Fundamentals to Future. Cengage India.
Textbooks: **1.** Chaffey,D.(2022).Digitalmarketing:Strategy,implementationandpractice(8thed.). Pearson. **2.** Deiss,R.,&Henneberry,R.(2020).Digitalmarketingfordummies(2nded.).Wiley.
Reference Books: **1.** Mahadevan,B.(2022).TextbookonIndianknowledgesystems.IndianInstituteof Management Bangalore. **2.** The Readers Paradise.(2025). Indian knowledge system: Principles and practices.
Suggestive Digital Platform Web Links: https://onlinecourses.swayam2.ac.in/ugc19_hs26/preview
Suggested Equivalent Online Courses: SWAYAM Course: Digital Marketing

Part D: Assessment and Evaluation		
Internal Assessment Continuous Comprehensive Evaluation (CCE)		**Total Marks : 30**
External Assessment **Time :** 03.00 Hours	**Section (A) :** Objective Type Questions **Section (B) :** Short Questions (200 Words Each) **Section (C) :** Long Questions (500 Words Each)	**Marks :70**
Total Marks	**(Internal Assessment + External Assessment) :100**	
Credit Value	3	
Minimum Passing Marks	35	

PART – A: Introduction		
Program: BBA/ BCA/ B. Sc. Class : I Year Semester: I Session : July 2025-June2026		
Subject: Project Work		**Theory / Practical: Practical**
1	**Course Code**	**Pw/ Ap/ CE - 101**
2	**Course Title**	**Project Work**
3	**Course Type (Core Course/DSE/Minor/MD-ID/SEC/VOC)**	**Project Work (PW)** **PW/Ap/ CE**
4	**Pre-Requisite (if any)**	Open for all
5	**Course Objectives (CO)**	**1:** To develop practical understanding of basic management and business concepts. **2:** To enhance analytical and problem-solving skills through field or desk research. **3:** To improve teamwork, communication, and presentation skills. **4:** To familiarize students with local business practices and entrepreneurship. **5:** To cultivate data collection, interpretation, and reporting skills.
6	**Course Outcomes (COs)**	**CO1:** Students will be able to apply theoretical concepts to real-world business scenarios. **CO2:** Students will be able to demonstrate improved research and analytical skills using surveys, interviews, or observation. **CO3:** Students will be able to enhance team coordination and professional communication. **CO4:** Students will be able to gain exposure to local industries, markets, and entrepreneurial challenges. **CO5:** Students will be able to prepare structured reports

		and presentations effectively.	
7	**Credit Value**	**02**	
8	**Total Marks**	**Max. Marks: 100**	**Min. Passing Marks: 35**

PART – B: Content of the Course

No. of Lectures per week: Theory (02 Hours per week)

Total No. of Lectures required: P: 60 Hours

Topics	**No. of Lectures**
As part of the Skill Based Activity students are required to undertake Project Work. It is designed to provide practical exposure, industry orientation and application of classroom learning in real business scenarios. For this, students are required to: 1. Select an Industry/Organization - Identify a suitable industry or organization for undertaking the project work. 2. Observe Operations - Visit the organization to observe its operations, processes, and overall working environment. 3. Understand Organizational Structure - Interact with employees at various levels to comprehend the hierarchy and organizational structure. 4. Choose a Functional Area - Select a specific functional area (e.g. Marketing or Human Resources or Operations or Finance) for detailed study. 5. Collect and Analyze Data - Gather and analyze data related to the chosen area using both primary sources (interviews, discussions, surveys) and secondary sources (reports, websites, manuals). 6. Prepare and Present Report - Compile a comprehensive project report that includes the company profile, observations, data analysis, key learnings, and actionable recommendations.	**60**

Part C: Assessment and Evaluation	
Suggested Continuous Evaluation Method:	
External Assessment	**Marks**
Viva Voce on Practical (20 Marks)	100
Practical Record File (20 Marks)	
Table Work/Exercise Assigned (60 Marks)	
Total Marks: 100	

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Syllabus

Bachelor of Science (Computer Science)

[B. Sc. (CS)]

Year I / Semester II

w.e.f. Session 2025-26

Scheme No. 71, Gumasta Nagar, Indore-452009 Madhya Pradesh, Ph. : 0731-2780011, 2789925

Toll Free No. : 1800 233 2601 Website : www.svimi.org E-mail address : svimi@svimi.org

B. Sc(CS) II Semester (Course Details)				
Session : January – June 2026				
Sr. No.	**Course Type**	**Course Code**	**Subject Name**	**Total Credits**
1	Major - II (Core Course)	BSCCS – 201 (T)	Programming Methodologies & Data Structures (Using C/C++) (Theory)	4
		BSCCS – 201 (P)	Programming Methodologies & Data Structures (Using C/C++) (Practical)	2
2	Major - III (Core Course)	BSCCS – 202 (T)	Operating System & Office Tools (Theory)	4
		BSCCS – 202 (P)	Operating System & Office Tools (Practical)	2
3	Minor - II	BSCCS – 203 (A)	Ordinary Differential Equations (Theory)	4
		BSCCS – 203 (B) (T)	Thermodynamics (Theory)	3
		BSCCS – 203 (B) (P)	Thermodynamics (Practical)	1
4	Ability Enhancement Course	AEC – 201	English Language and Indian Culture	2
5	Value Added Course	VAC – 201	भारत बोध (Understanding India)	2
			Total Credits	**20**

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PART-A : Introduction		
Programme : B.Sc.(CS)	**Class : I Year**	**Semester : II**	**Session : January - June 2026**
Subject : Computer Science		**Theory/Practical : Theory**
1.	**Course Code**	**BSCCS – 201 (T)**
2.	**Course Title**	**Programming Methodologies & Data Structures (Using C/C++) (Theory)**
3.	**Course Type**	**Major – II (Core Course)**
4.	**Pre-Requisite**	To study this course, Mathematics in XII standard is desirable.
5.	**Course Objectives**	1. To enable students to develop strong problem-solving skills through structured programming principles and efficient use of data structures. 2. To build the ability to design, analyze, and implement algorithms using iterative, recursive, and data-driven approaches. 3. To select appropriate data structures for real-world applications, evaluate complexity, and create optimized solutions. 4. To familiarize students with modern programming practices and recognize the contributions of Indian computer scientists in the field of programming and data structures.
6.	**Course Outcomes (COs)**	On completion of this course, learners will be able to: CO1. Develop simple algorithms and flow charts to solve a problem with programming using top-down design principles; CO2. Formulate iterative solutions and array processing algorithms for problems; CO3. Use recursive techniques, pointers and searching methods in programming; CO4. Implement fundamental data structures & accustomed to the description of algorithms in both functional and procedural styles; CO5. Understand the complexity of basic operations like insert, delete, search on these data structures. CO6. Select appropriate data structure to suitable to different models; CO7. Design programs using various data structures including hash tables, Binary and general search trees, heaps, graphs

		etc.; CO8. Implement and know the applications of algorithms for searching and sorting etc.; CO9. Identify the contributions of Indians in the field of programming and data structures.	
7.	**Expected Job Role/career opportunities**	Upon successful completion of this course, students will be capable of working in various professional roles such as: • Software Developer / Software Engineer • Programmer Analyst • Algorithm and Data Structure Specialist • System Analyst / System Designer • Application & Web Developer • Database Developer • Mobile App Developer • Technical Support and Maintenance Engineer • Research Associate in Computer Science • Quality Assurance / Software Testing Engineer • Junior Data Engineer / Data Analyst	
8.	**Credit Value**	**Theory:** 4 Credits	
9.	**Total Marks**	**Max. Marks**: 100	**Min, Passing Marks**: 35

PART B: Content of the Course		
No. of Lectures (in hours per week): 2 Hrs. per week		
Total No. of Lectures: 60 Hrs.		
Unit	**Topics**	**No. of Lectures**
I	Relevant Indian Knowledge System (IKS) Inclusions: Algorithmic thinking in Ancient India. The Panini Grammar System (Ashtadhyayi). The ChandasShastra (Sanskrit Prosody) a recursive structure, The Brahmagupta Algorithm (7th century CE) an introduction to zero and place value notation. Data Structures & Computational Methods in Ancient India: Vedic method of data structuring - preservation of ancient manuscripts (e.g., Rig Veda) using hierarchical structures. Resemblance of Graph Theory with the Indian Temple Architecture (the connectivity principles of temple design and city planning). Resemblance of efficient Sorting & Searching techniques with Ancient Indian classification methods in Ayurveda & Sanskrit texts. The Buddhist Numerical Sorting Method (Bhāskara II). Introduction to Programming: Program Concept, Characteristics of Programming, Stages in Program Development, Algorithms, Notations, Design, Flowcharts, Types of Programming Methodologies. Introduction to C/C++ Programming: Basic Program Structure in C/C++, Data Types, Variables, Constants, Operators and Basic I/O. Variables: Declaring, Defining and Initializing Variables, Scope of Variables, Using Named Constants, Keywords, Casting of Data Types, Operators (Arithmetic, Logical and Bitwise), Using Comments in programs, Character I/O (getc, getchar, putc, putchar etc.), Formatted and Console I/O [printf(), scanf(), cin(), cout(O], Using Basic Header Files (stdio.h, iostream.h, conio.h etc.), Simple Expressions in C/C++ (including Unary Operator Expressions, Binary Operator Expressions), Understanding Operators Precedence in Expressions. <u>Suggested activities for experiential learning:</u> 1. Comparative Analysis: Research how Panini's grammar rules resemble formal grammar in programming languages. 2. Algorithm Simulation: Implement Brahmagupta's place-value system using C/C++. 3. Keyword Identification Exercise: Analyze the similarity between Sanskrit syntax and C/C++ keywords (e.g., structure in Sanskrit grammar vs. C/C++ struct). 4. Basic I/O Project: Implement a console-based quiz using formatted I/O.	10

II	Conditional Statements if construct, switch-case construct. Iterative Statements: while, do-while, and for loops, use of break and continue in loops, Using Nested Statements (Conditional as well as Iterative). Functions: Top-Down Design, Pre-defined Functions, Programmer defined Functions. Local Variables and Global variables, Functions with Default Arguments, Call-By-Value and Call-By-Reference, Parameters, Recursion. Introduction to Arrays: Declaration and Referring Arrays, Arrays in Memory, Initializing Arrays. Arrays in Functions, Multi Dimensional Arrays. Suggested activities for experiential learning: 1. Code Debugging Challenge: Assign buggy C/C++ programs for students to debug and improve. 2. Concept Visualization: Use flowcharts and pseudocode tools to map variable types and memory usage. 3. Conditional Logic Game: Design a decision-based game using if-else and switch-case. 4. Function Optimization Task: Analyze and optimize recursive vs. iterative function performance. 5. Nested Loops Visualization: Represent nested loops using Pascal's Triangle visualization. 6. Real-World Decision-Making Simulation: Create a banking/ATM system that demonstrates nested loops and conditional logic.	8
III	Structures: Member Accessing, Pointers to Structures, Structures and Functions, Arrays of Structures. Unions: Declaration and Initialization. Strings: Reading and Writing Strings, Arrays of Strings, String and Function, Strings and Structure, Standard String Library Functions. Searching Algorithms: Linear Search, Binary Search. File Handling: Use of files for data input and output, merging and copying files. Ayurvedic Classification System: Map hierarchical classification of medicinal plants to data structures like arrays and pointers, Shulba Sutras for Spatial Computations: Understanding recursive patterns in Shulba Sutras and their application in functions. Suggested activities for experiential learning: 1. Mapping Ayurvedic Taxonomy to Data Structures: Represent Ayurvedic classification of herbs using arrays and nested data structures. 2. Function Optimization Project: Implement recursive and iterative functions to compare execution time. 3. Group seminar and Online quiz based on searching algorithm and file handling 4. Vedic Sorting Implementation: Develop a sorting algorithm inspired by Ayurvedic classification techniques.	8

IV	Data Structure: Basic concepts, Linear and Non-Linear data structures. Algorithm Specifications. Introduction, Recursive algorithms, Data Abstraction, Performance analysis. Linked List: Singly Linked Lists, Operations, Concatenating, circularly linked lists-Operations for Circularly linked lists, Doubly Linked Lists-Operations. Array: Representation of single, two-dimensional arrays, sparse matrices-array and linked representations. Stack: Operations, Array and Linked Implementations, Applications Infix to Postfix Conversion, Postfix Expression Evaluation, Recursion Implementation. Linked List Concept in Indian Knowledge: Ancient Sanskrit texts used linked hierarchical structuring for preserving information (e.g., Vedic oral tradition). Stack Analogy in Nyaya Logic: Indian logical frameworks used last-in first-out (LIFO) reasoning similar to stack operations. Suggested activities for experiential learning: 1. Chart Preparation: Prepare charts Linked List, Array & Stack 2. Stack Simulation Exercise via Role-Play: Implement a LIFO-based task scheduler. 3. Linked List Research Assignment: Compare linked list pointer-based structure with ancient manuscript referencing. 4. Students will map historical Guru-Shishya Parampara in the form of a singly linked list (E.g., Vyasa → Shuka → Gaudapada→ Govindapada → Adi Shankaracharya) Implement this as a linked list in C/C++, where each node represents a teacher and links to their disciples.	12
V	Queue: Definition, Operations, Circular Queue-Insertion and Deletion Operations, De queue (Double Ended Queue), Priority Queue Implementation. Trees: Representation of Trees, Binary tree, Properties of Binary Trees, Binary Tree Representations- Array and Linked Representations, Binary Tree Traversals, Threaded Binary Trees. Heap: Definition, Insertion, Deletion. Buddhist Numerical Sorting: Bhaskara II's early classification techniques, Efficient Searching in Ayurveda: Ayurvedic medicinal classification principles resemble hashing and tree-based sorting. Suggested activities for experiential learning: 1. Queue-based Ticketing System: Develop a queue system (FIFO) for handling real-world ticket processing. 2. Search Algorithm Hackathon: Implement linear, binary, and hashing techniques to solve real-world problems. 3. Sorting Race: Students compete to optimize sorting algorithms based on Ayurvedic classification techniques.	10

	4. Data Organization Challenge: Create efficient storage models for Ayurveda medicinal records using tree-based structures. 5. Comparative Study: Research how Vedic knowledge management compares with modern database indexing.	
VI	Graphs: Graph ADT, Graph Representations, Graph Traversals, Searching. Hashing: Introduction, Hash tables, Hash functions, Overflow Handling. Sorting Methods: Comparison of Sorting Methods, Search Trees - Binary Search Trees, AVL Trees- Definition and Examples. Tree Representation in Ancient India: Genealogy (Gotra System) as an early example of hierarchical tree structures. Graph Connectivity in Temple Design: Principles of temple planning akin to graph traversal. <u>Suggested activities for experiential learning:</u> 1. Family Tree Implementation: Use binary trees to model ancient Indian lineage systems. 2. Graph Problem Solving: Model Indian temple network connectivity using graph algorithms. 3. Heap Data Structure Exploration: Implement heap sorting for priority-based Ayurveda classification. 4. Shortest Path Challenge: Use Dijkstra's Algorithm to optimize ancient pilgrimage route planning. 5. Graph Theory Workshop: Study the resemblance of temple architecture to graph connectivity and model it using Graph viz/Network X. 6. Tree Traversal Experiment: Implement tree traversal to simulate genealogy in Vedic lineage texts.	10
VII	Indian Contribution to the field: Innovations in India, origin of Julia Programming Language, Indian Engineers who designed new programming languages, open-source languages, Dr. SartajSahni — Computer Scientist - Pioneer of data structures, Murthy's Early Work in Software Development. Julia Programming Language's Indian Origins. <u>Suggested activities for experiential learning:</u> 1. Research Presentation: Students present on Indian-origin computer scientists. 2. Coding Tribute: Implement an algorithm inspired by SartajSahni's data structure optimizations. 3. Innovation Showcase: Identify Indian-origin open-source projects and contribute to them. 4. Documentary Screening & Discussion: Screen a documentary on India's tech evolution and discuss its impact.	2
Keywords/Tags: Programming, C++,Data Structures, Expressions, Control, File Handling, Arrays, Stack, Queue, Linked List, Tree, Graph, Structure, Union, Hash, Search, Sort, Algorithm		

Part C-Learning Resources
Text Books, Reference Books, Other resources

Suggested Readings:

- Lipschutz: Schaum's outline series Data structures, Tata McGraw-Hill
- Problem Solving and Program Design in C, J. R. Hanly and E. B. Koffman, Pearson, 2015
- E. Balguruswamy, "C++ " TMH Publication ISBN 0-07-462038-X
- Herbertz Shield, "C++ The Complete Reference "TMH Publication ISBN 0-07-463880-7
- R. Lafore, "Object Oriented Programming C++"
- N. Dale and C. Weems, Programming and problem solving with C++: brief edition, Jones & Bartlett Learning.
- Adam Drozdek, "Data Structures and algorithm in C++", Third Edition, Cengage Learning.
- Tony Gaddis, Starting Out With Python
- Kenneth A. Lambert, Fundamentals of Python
- Kiparsky, P. (2009). Panini as a Formalist.
- Joseph, G. G. (1991). The Crest of the Peacock: Non-European Roots of Mathematics.
- Bhaskara II (12th Century), Lilavati and Bijaganita.
- Staal, F. (2006). The Science of Language and Logic in India.
- Pingree, D. (1978). Mathematical Astronomy in India.
- Kosambi, D. D. (1948). The Culture and Civilization of Ancient India.
- Sahni, S. (2005). Data Structures, Algorithms, and Applications in C++

Suggested online resources:

- http://www.ndl.gov.in/he document/ekumbh/97
- http://www.ndl.gov.in/he document/nptel/INN1CSaE 9093 NPDSaAuP1226512266
- https://archive.nptel.ac.in/courses/106/105/106105171/
- https://archive.nptel.ac.in/courses/106/105/106105234/
- https://archive.nptel.ac.in/courses/106/101/106101208/
- https://archive.nptel.ac.in/courses/106/106/106106133/
- https://epgp.inflibnet.ac.in/Home/ViewSubject?catid=fBYckQKJvP3a/8Vd3L08tQ==
- https://nptel.ac.in/courses/106105151

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Part D-Assessment and Evaluation		
Suggested Continuous Evaluation Methods: Maximum Marks: 100 Continuous Comprehensive Evaluation (CCE): 30 Marks University Exam (UE): 70 Marks		
Internal Assessment: Continuous Comprehensive Evaluation (CCE)	Class Test Assignment/Presentation	Total Marks: 30
External Assessment: University Exam Section: Time : 03.00 Hours	**Section (A):** Objective Type **Section (B):** Short Questions **Section (C):** Long Questions	Total Marks: 70

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PART-A : Introduction		
Programme : B.Sc.(CS)	**Class : I Year**	**Semester : II**	**Session : January - June 2026**
Subject : Computer Science		**Theory/Practical : Practical**
1.	**Course Code**	**BSCCS - 201 (P)**
2.	**Course Title**	**Programming Methodologies & Data Structures (Using C/C++) (Practical)**
3.	**Course Type**	**Major – II (Core Course)**
4.	**Pre-Requisite**	To study this course, Mathematics in XII standard is desirable.
5.	**Course Objectives**	1. To enable students to develop strong problem-solving skills through structured programming principles and efficient use of data structures. 2. To build the ability to design, analyze, and implement algorithms using iterative, recursive, and data-driven approaches. 3. To select appropriate data structures for real-world applications, evaluate complexity, and create optimized solutions. 4. To familiarize students with modern programming practices and recognize the contributions of Indian computer scientists in the field of programming and data structures.
6.	**Course Outcomes (COs)**	On completion of this course, learners will be able to: CO1. Develop simple algorithms and flow charts to solve a problem with programming using top-down design principles. CO2. Writing efficient and well-structured computer algorithms/programs. CO3. Formulate iterative solutions and array processing algorithms for problems. CO4. Apply recursive techniques, pointers and searching methods in programming. CO5. Select appropriate data structure suitable to different models; CO6. Implement and know the applications of algorithms for searching and sorting etc.

7.	**Expected Job Role / Career Opportunities**	Upon successful completion of this course, students will be capable of working in various professional roles such as: • Software Developer / Software Engineer • Programmer Analyst • Algorithm and Data Structure Specialist • System Analyst / System Designer • Application & Web Developer • Database Developer • Mobile App Developer • Technical Support and Maintenance Engineer • Research Associate in Computer Science • Quality Assurance / Software Testing Engineer • Junior Data Engineer / Data Analyst	
8.	**Credit Value**	**Practical -** 2 Credits	
9	**Total Marks**	**Max. Marks**: 100	**Min. Passing Marks**: 35

PART B: Content of the Course		
No. of Lab Practical (in hours per week): 2 per week		
Total No. of Lab.: 30 Hrs.		
Suggestive list of Practical		
	Given the problem statement, students are required to formulate problem, develop flowchart/algorithm, write code in C++, execute and test it. Students should be given assignments on following : 1. a. To learn elementary techniques involving arithmetic operators and mathematical expressions, appropriate use of selection(if, switch, conditional operators) and control structures b. Learn how to use functions and parameter passing in functions, writing recursive programs. 2. Write a program to swap the content of two variables. 3. Write a program for finding the roots of a Quadratic Equation. 4. Write a program to find area of a circle, rectangle, and square using switch case. 5. Write a program to check whether a given number is even or odd.	30 hrs

	6. Write a program to print table of any number. 7. Write a program to print Fibonacci series. 8. Write a program to find factorial of a given number. 9. Write a program to convert decimal (integer) number into equivalent binary number. 10. Write a program to check given string is palindrome or not. 11. Write a program to perform multiplications of two matrices. 12. Write a program to print digits of entered number in reverse order. 13. Write a program to print sum of two matrices. 14. Write a program to print multiplication of two matrices. 15. Write a program to generate even/odd series from1toI00. 16. Write a program whether a given number is prime or not. 17. Write a program for call by value and call by reference. 18. Write a program to generate a series1+1/1!+2/2!+3/3!+----------+n/n! 19. Write a program to create a pyramid structure * ** *** **** 20. Write a program to create a pyramid structure 1 12 123 1234 21. Write a program to check entered number is Armstrong or not. 22. Write a program for traversing an Array. 23. Write a program to input Numbers, add them and find average. 24. Write a program to find largest element from an array. 25. Write a program for Linear search. 26. Write a program for Binary search. 27. Write a program for Bubble sort. 28. Write a program for Selection sort.	

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PARTC: Learning Resources

Text books ,Reference Books, Other Resources

Suggested Readings:

- Problem Solving and Program DesigninC,J.R.HanlyandE.B.Koffman,Pearson,2015
- E. Balguruswamy, "C++"TMHPublicationISBNO-07-462038-X
- HerbertzShield,"C++TheCompleteReference"TMHPublicationISBN0-07-463880-7
- R. Lafore, "Object Oriented Programming C++"
- N.Daleand C.Weems, Programming and problem solving with C++:brief edition, Jones& Bartlett Learning.
- AdamDrozdek,"DataStructuresandalgorithminC++",ThirdEdition,CengageLearning.
- SartajSahani,DataStructures,AlgorithmsandApplicationswithC++,McGrawHill.
- Robert L.Kruse, "Data Structures and Program Design in C++",Pearson.
- D.S.Malik, Data Structure using C++,Second edition, C language Learning.
- M.A.Weiss,DatastructuresandAlgorithmAnalysisinC,2ndedition,Pearson.
- Lipschutz: Schaum'sout lineseries Data structures, TataMcGraw-Hill

Suggestive digital platform web links:

https://www.yout-ube.com/watch?v=BCIS40yzssA
https://www.yout-ube.com/watch?v=vLnPwxZdW4Y&vl=en
https://www.yout-ube.com/watch?v=Umm I ZQ5ItZw
https://nptel.ac.in/courses/106/ 106/106106127/

Suggested equivalent online courses

https://nptel.ac.in/courses/106/105/106105151/
https://nptel.ac.in/courses/106/105/106105171/

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PART D: Assessment and Evaluation			
Internal Assessment	**Marks**	**External Assessment**	**Marks**
Class Interaction/Quiz	Nil	Viva voce on practical(20 Marks)	100
Attendance		Practical Record File (20 marks)	
Assignments (Charts/ Model/Seminar/ Technology Dissemination/Excursion/Lab Visits /Industrial visit)		Table Work / Exercise Assigned (60 marks)	
	Total Marks :100		

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PART-A : Introduction		
Programme : B.Sc.(CS)	**Class : I Year**	**Semester : II** **Session : January – June 2026**
Subject : Computer Science		**Theory/Practical : Theory**
1.	**Course Code**	**BSCCS – 202 (T)**
2.	**Course Title**	**Operating System & Office Tools (Theory)**
3.	**Course Type**	**Major – III (Core Course)**
4.	**Pre-Requisite**	To study this course, Mathematics in XII standard is desirable.
5.	**Course Objectives**	1. To provide learners with a foundational understanding of operating system concepts, functions, and architectures. 2. To develop analytical abilities related to process management, scheduling, concurrency, and memory management. 3. To build a clear understanding of file systems, I/O management, security mechanisms, and virtualization techniques. 4. To enable learners to gain proficiency in modern office productivity tools, including word processing, spreadsheets, presentations, database management, and collaboration platforms. 5. To familiarize learners with India's contributions to computing, knowledge structuring, and resource management methodologies.
6.	**Course Outcomes (COs)**	On completion of this course, learners will be able to: CO1. Understand the fundamental concepts or operating systems, their functions ,and architectures; CO2. Analyze process management, scheduling, concurrency, and memory management techniques; CO3. Understand the file systems, I/O management, security, and virtualization; CO4. Develop proficiency in state-of-the-art office productivity tools ,including word processing, spreadsheets, presentations, database management, and collaboration tools; CO5. Explain India's contributions towards computing, knowledge structuring, and resource management techniques.

7.	**Expected Job Role / Career Opportunities**	• System Administrator • IT Helpdesk Technician • Operating System Analyst (Entry Level) • Network Support Technician • Cloud Support Associate • Office IT Executive • Productivity Tools Specialist / Documentation Executive	
8.	**Credit Value**	**Theory** : 4 Credits	
9.	**Total Marks**	**Max.Marks**:100	**Min. Passing Marks**:35

PART B: Content of the Course		
No. of Lectures (in hours per week): 2 Hrs. per week		
Total No. of Lectures: 60 Hrs.		
Unit	**Topics**	**No. of Lectures**
I	Introduction to Operating Systems: Definition, Functions, Evolution, Types (Batch, Multiprogramming, Time- Sharing, Distributed, Real-Time, Embedded). Resource allocation concepts in Indian Philosophy. –Pancha Kosha theory - layered abstraction akin to OS design, Manuscript storage in ancient Indian libraries (Takshashila & Nalanda) as an analogy for memory management. Suggested activities for experiential Learning 1. Compare modern OS resource allocation techniques with the layered structure of Pancha Kosha. 2. Group Discussion & Concept Mapping: Explore how ancient manuscript storage systems parallel modemn memory management. 3. Simulation exerercise.-Develop a simulation that modern resource allocation algorithms (e.g., CPU scheduling) in an OS environment. 4. Conceptual Flowchart Development: Create flowcharts that map the evolution of OS design, linking abstract layers to practical resource management.	**8**
II	Process Management: Process Concept, Process Scheduling (FCFS, SJF, Round Robin, Priority Scheduling), Threads, Inter-process Communication (IPC). Task scheduling in Vedic rituals: Yagna sequences similar to scheduling algorithms, Efficient computation models in Indian astronomy (Aryabhata's planetary motion calculations). Suggested Activities for experiential Learning: 1. Simulation Modeling: Develop a simulation of process scheduling (e.g., FCFS, SJF) and compare its performance with the sequential order observed in Vedic rituals. 2.Real-life Analogy: Ask students to map everyday situations (e.g., waiting in a queue, dividing tasks among teammates) to process scheduling concepts. 3.Role-Playing Exercise (Core CS): Organize a role-play where students act out process scheduling to understand priorities and time-sharing. 4.Thread Race Game- Create a hands-on game where students simulate threads competing for CPU time. Use physical tokens or cards to represent tasks and resources.	**8**

III	Concurrency & Synchronization: Process Synchronization, Critical Sections, Deadlocks (Prevention, Avoidance, Detection), Semaphores, CPU Scheduling. Parallel execution concepts in Indian astronomical texts (e.g., Surya Siddhanta) compared to modern concurrent processing. Suggested Activities for experiential Learning: 1. Interactive Simulation. - Build a simulation to model concurrent process execution and explore synchronization techniques (e.g., semaphores, monitors). 2. Hands-On Lab.- Design and test synchronization protocols to resolve common issues like race conditions and deadlocks. 3. Role-Playing Activity: Have students simulate process synchronization, with roles assigned as processes and synchronization tools. 4. Organize a debate in which students argue the concept of "parallelism" in the Surya Siddhartha versus modern computational models. 5. Group Discussion: Discuss how tasks can be divided and executed simultaneously to reduce overall execution time.	**8**
IV	Memory Management: Memory Hierarchy, Virtual Memory, Paging, Segmentation, Fragmentation, Thrashing. Indexing & storage techniques in ancient Indian texts (Rigveda's indexing method similar to hierarchical memory management). Suggested Activities for experiential Learning: 1. Simulation Project: Develop a simulator for virtual memory management and paging, drawing analogies with ancient hierarchical indexing. 2. Comparative Research Assignment: Investigate and present on the similarities between ancient manuscript organization and modern cache memory systems. 3. Visualization Workshop: Design flowcharts or diagrams that illustrate memory allocation and fragmentation concepts. 4. Honds-On Implementation: Implement a memory management algorithm to study fragmentation and allocation strategies in a simulated OS environment.	**8**

V	File Systems & I/O Management: File Organization, Allocation Methods (Contiguous, Linked, Indexed), Directory Structure, Disk Scheduling (FCFS, SSTF, SCAN, LOOK). Knowledge documentation in Indian scriptures (Palm-leaf manuscripts stored using structured indexing). Suggested activities for experiential learning: 1. File System Design Project: Design file system architecture inspired by the organized storage of ancient manuscripts. 2. Lab Exercise: Simulate different file allocation methods (contiguous, linked, indexed) using available tools. 3. Group Project: Develop a directory management system incorporating modern OS file system concepts. 4. Case Study Discussion: Analyze real-world file system challenges and propose solutions, integrating both historical insights and modern techniques.	**8**
VI	Office Productivity Tools: Word Processing, Spreadsheets, Presentations, Database Management, Email & Collaboration Tools. Emphasizing latest versions of widely used office productivity suites such as MS Office 365 (with AI support), Google Workspace, Libre Office, and any emerging tools. The focus will be on adaptability to evolving digital technologies. Suggested activities for experiential learning: 1. Tool Comparison Workshop: Compare different office productivity suites (e.g., document editors, spreadsheets, presentations) based on functionality and usability. 2. Integrated Project: Develop a comprehensive project that requires the creation and management of documents, spreadsheets, and presentations to simulate real-world business scenarios. 3. Collaborative Simulation: Organize a virtual group exercise using modern collaboration tools to solve a practical problem. 4. Expert Session: Invite an industry professional to demonstrate advanced features and discuss emerging trends in digital productivity.	**8**

VII	Security & Virtualization: Basics of Computer Security, User Authentication, Access Control, Cloud Computing, Virtual Machines, Containers. Ancient Indian encryption techniques (Kautilya's Arthashastra on cryptography), Role of security in knowledge preservation (e.g., coded messages in ancient war strategies). Suggested activities for experiential learning: 1. Encryption Lab: Implement basic encryption and decryption algorithms inspired by ancient techniques and compare with modern methods. 2. Virtualization Simulation: Develop a simulation to understand virtualization concepts and the isolation of virtual environments. 3. Security Policy Workshop: Draft a security policy for a hypothetical organization, integrating both modern authentication protocols and historical secure communication practices. 4. Case Study Analysis: Examine historical instances of secure communication and relate them to contemporary security challenges.	**8**

Part C-Learning Resources
Text Books, Reference Books, Other resources
Suggested Readings.- • Silberschatz , Galvin, Gagne: Operating System Concepts ,Wiley. • William Stallings : Operating Systems : Internals & Design Principles, Pearson. • Andrew S. Tanenbaum: Modem Opcrating Systems, Pearson. • Rajaraman : Fundamentals of Computers , PHI Learning. • ITL Education: Introduction to Information Technology ,Pearson. • S.(2004).Ancient Indian Knowledge Systems and Their Relevance to Modern Technology. • Ghosh,A.(2001).Indian Philosophy and Organizational Systems. • Nair,A.(2015).Indian Innovators in Computing. • Rao,S.(2013).Technological Contributions from India. • Mehta,P.(2006).Cryptography in Arthashastra. • Desai,V.(2012).Ancient Security Practices and Modem Cryptography. • Banejee,S.(2002).Documentation Systems in Ancient India. • Singh, R.(2008). File Systems: An Indian Historical Perspective. • Kumar,D.(2007).Ancient Indexing Methods and Modern Memory Systems. • Jain,M.(2003).Memory and Manuscripts :An Indian Perspective. • Reddy,N.(2010).Parallel is min Ancient Indian Astronomy. • Menon,K.(2008).Concurrency Concepts in Historical Context. • Gupta,P.(1999). Aryabhata's Contributions to Astronomy and Computing. • Sharma,R.(2005).Ancient Scheduling Techniques in Indian Rituals.
Suggestive digital platforms weblinks : • NPTEL Course: Operating System Principles — NPTEL Link • Office Tools (Latest MS Office 365, AI Support) • httns://npteI.ac.in/courses/106106144 • httDs://archive.nptel.ac.in/courses/106/10S/106105214/ • httns://cpep.inflibnct.ac.in/Home/ViewSubicct?catid=fBYckÇ,lXJvP3a/8Vd3L08tÇI==

Part D-Assessment and Evaluation		
Suggested Continuous Evaluation Methods: Maximum Marks: 100 Continuous Comprehensive Evaluation (CCE): 30 Marks University Exam (UE): 70 Marks		
Internal Assessment: Continuous Comprehensive Evaluation (CCE)	Class Test Assignment/Presentation	Total Marks: 30
External Assessment: University Exam Section: Time : 03.00 Hours	**Section (A):** Objective Type **Section (B):** Short Questions **Section (C):** Long Questions	Total Marks: 70

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PART-A : Introduction		
Programme :B.Sc.(CS)	**Class : I Year**	**Semester : II**	**Session : January - June 2026**
Subject :	**Computer Science**	**Theory/Practical : Practical**	
1.	**Course Code**	**BSCCS – 202 (P)**
2.	**Course Title**	**Operating System & Office Tools (Practical)**
3.	**Course Type**	**Major – III (Core Course)**
4.	**Pre-Requisite**	To study this course, Mathematics in XII standard is desirable.
5.	**Course Objectives**	1. To enable learners to implement and simulate core operating system mechanisms such as process scheduling, disk scheduling, and memory management. 2. To develop the ability to detect and analyze deadlocks using appropriate modeling techniques. 3. To build practical skills in file handling through Linux commands and shell scripting. 4. To enhance learners' proficiency in formatting and managing text using various word-processing tools. 5. To develop competency in creating and analyzing spreadsheets using formulas, functions, and pivot tables. 6. To train learners in creating, organizing, and manipulating data using database management tools. 7. To equip learners with the ability to design effective presentations using AI-enabled tools in an efficient and creative manner. 8. To prepare learners to manage and conduct online meetings through platforms such as Google Meet, MS Teams, and Zoom.
6.	**Course Outcomes (COs)**	On completion of this course, learners will be able to: CO1. Perform the simulation for process scheduling, disk-scheduling, memory management techniques. CO2. Perform the dead-lock detection using modeling. CO3. Perform the file-handling using Linux commands and shell scripting. CO4. Perform the formatting of text on various word processing tools.

		CO5. Create spread sheet using formula and pivot tables. CO6. Create and manipulate the data using database tools. CO7. Create presentations using AI tools in quick and smart way. CO8. Manage online-meetings through Google meet, MS-teams, Zoom etc. applications.	
7.	**Expected Job Role/Career Opportunities**	• System Administrator (Entry-Level) • Linux Operator / Linux Support Technician • IT Support Engineer / Technical Support Executive • Office Productivity Specialist • Data Entry & Data Management Executive • Digital Office Executive • Virtual Meeting Coordinator / Online Events Assistant	
8.	**Credit Value**	**Practical** - 2 Credits	
9.	**Total Marks**	**Max.Marks**:100	**Min .Passing Marks**:35

PART B:Content of the Course(Practical)	
No. of Lab Practical (in hours per week): 2 per week	
Total No. of Lab.: 30 Hrs.	
Suggestive list of Practical	**No. of Labs.**
1- Office Tools: **1 Word Processing Tools:** Document formatting, referencing, macros (Using latest versions of MS Word, Google Docs, LibreOffice). • Create a document and apply different Editing options. • Create Banner for your college. • Design a Greeting Card using Word Art for different festivals. • Design your Bio data and use page borders and shading. • Create a document and insert header and footer, page title, date, time, apply various page formatting features etc. • Implement Mail Merge. • Insert a table into a document and try different formatting options for the table. **2 Spreadsheet Tools:** Advanced formulas, data visualization, pivot tables (Using latest Excel, Google Sheets). • Design your class Time Table. • Prepare a Mark Sheet of your class result. • Prepare a Salary Slip of an employee of an organization. • Prepare a bar chart & pie chart for analysis of Election Results. • Prepare a generic Bill of a Super Market. • Work on the following exercises on a Workbook: • Copy an existing Sheet • Rename the old Sheet • Insert a new Sheet into an existing Workbook • Delete the renamed Sheet. • Prepare an Attendance sheet of 10 students for any 6 subjects of your syllabus. Calculate their total attendance, total percentage of attendance of each student & average of attendance. • Create a worksheet of Students list of any 4 faculties and perform following database functions on it. ○ Sort data by Name ○ Filter data by Class ○ Subtotal of no. of students by Class.	30 hrs

3 Presentation Tools: AI-assisted slide design, animation, transitions (Using PowerPoint, Google Slides). • Design a presentation of your institute using auto content wizard, design template and blank presentation. • Design a presentation illustrating insertion of pictures, Word Art and ClipArt. • Design a presentation, learn how to save it in different formats, copying and opening an existing presentation. • Design a presentation illustrating insertion of movie, animation and sound. • Illustrate use of custom animation and slide transition (using different effects). • Design a presentation using charts and tables of the marks obtained in class.	

Part C-Learning Resources
Text Books, Reference Books, Other resources
Suggested Readings.- 1. Silber schatz ,Galvin,Gagne: Operating System Concepts,Wiley. 2. William Stallings: Operating Systems:Internals & Design Principles ,Pearson. 3. Andrew S.Tanenbaum: Modem Operating Systems ,Pearson. 4. Rajaraman: Fundamentals of Computers, PHI Learning. 5. ITL Education : Introduction to Information Technology, Pearson.
Suggestive digital platforms weblinks: Suggested Digital Learning Resources. • NPTEL Course: Operating System Principles • YouTube Lectures: Operating System Fundamentals Office **Tools** (Latest MS Office 365, AI Support)

PART D: Assessment and Evaluation			
Internal Assessment	**Marks**	**External Assessment**	**Marks**
Class Interaction/Quiz	Nil	Viva voce on practical(20 Marks)	100
Attendance		Practical Record File (20 marks)	
Assignments (Charts/ Model/Seminar/ Technology Dissemination/Excursion/Lab Visits /Industrial visit)		Table Work / Exercise Assigned (60 marks)	
	Total Marks :100		

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Syllabus

Bachelor of Science (Computer Science)

[B. Sc. (CS)]

Year I / Semester II

w.e.f. Session 2025-26

Scheme No. 71, Gumasta Nagar, Indore-452009 Madhya Pradesh, Ph. : 0731-2780011, 2789925

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SHRI VAISHNAV INSTITUTE OF MANAGEMENT & SCIENCE, INDORE

(Autonomous)

Approved by AICTE, New Delhi and Affiliated to DAVV, Indore & RGPV, Bhopal, Madhya Pradesh, IndiaUGC-NAAC Accredited 'A' Grade Institute
ISO 9001:2015 Certified

PART-A : Introduction		
Programme : B.Sc .(CS)	**Class : I Year**	**Semester : II** **Session : January - June 2026**
Subject:	**Computer Science**	**Theory/Practical : Theory**
1.	**Course Code**	**BSCCS – 203**
2.	**Course Title**	**Ordinary Differential Equations**
3.	**Course Type**	**Minor – II**
4.	**Pre-Requisite**	To study this course, Mathematics in XII standard is desirable
5.	**Course Objectives**	1. To explore the historical development and significance of differential equations in mathematics and applied sciences. 2. To attain a clear understanding of first-order and higher-order differential equations along with their solution techniques. 3. To study homogeneous differential equations and analyze their properties and applications. 4. To understand the construction and interpretation of mathematical models involving differential equations and their real-world uses.
6.	**Course Outcomes (COs)**	On completing this course, Learner will be able to: CO1. Identify and classify differential equations based on order, degree, and type, distinguishing between linear and nonlinear forms. CO2. Recognize ordinary differential equations in various contexts and formulate appropriate differential equations for given mathematical or real-life situations. CO3. Apply analytical methods to solve ordinary differential equations and use them to model practical problems across physics, biology, engineering, and economics. CO4. Develop and analyze mathematical models of diverse systems—such as mechanical, biological, and electrical systems—using differential equations as a foundational tool.

7.	**Expected Job Role/Career Opportunities**	• Data Analyst • Quantitative Analyst • Research Scientist • Mathematical Modeler • Simulation Engineer • Software Developer (Modeling/Computation) • Financial Analyst / Economic Modeler	
8.	**Credit Value**	**Theory**: 4 Credit	
9.	**Total Marks**	**Max.Marks**:100	**Min. Passing Marks**:35

PART B: Content of the Course		
No. of Lectures (in hours per week): 2 Hrs. per week		
Total No. of Lectures: 60 Hrs.		
Unit	**Topics**	**No. of Lectures**
I	**Indian Knowledge System:** 1.1 Historical Background of Differential Equations 1.2 Contribution of Indian Mathematicians in Differential Equations: 1.2.1 Aryabhata Bhaskracharya, Madhava	5
II	**Differential Equations-I:** 2.1 Linear differential equations 2.1.1 Linear equation 2.1.2 Equations reducible to the linear form 2.1.3 Change of variables 2.2 Exact differential equations 2.3 First order and higher degree differential equations 2.3.1 Equations solvable for x,y and p 2.3.2 Equations homogenous in x and y, Clairaut's equation Singular solutions	20
IV	**Differential Equations-III:** 4.1 Method of variation of parameters Ordinary Simultaneous Differential Equation of First Order.	10
Case Study	**Industrial Applications:** Applications of Differential equations to solve the problems related to Industries, Business and Economics.	5

Part C-Learning Resources
Text Books, Reference Books, Other resources
Suggested Readings: **Text Books:** 1. GorakhPrasad:IntegralCalculus,PothishalaPrivateLtd.,Allahabad,2015. 2. M. D. Raisinghania: Ordinary and Partial Differential Equations, S Chand & Co Ltd, 2017. 3. GerardG.Emch,R.SridharanandM.D.Srinivas:ContributionstotheHistoryof Indian Mathematics. Hindustan Book Agency, Vol. 3, 2005. 4. Bharati KrsnaTirthaji Maharaja, "Vedic Mathematics",Motilal Banarasidas Publisher, Delhi, 1994. 5. Udayan S. Patankar & sunil S. Patankar: Elements of Vedic Mathematics, TTU Press, 2018. 6. EnriqueFernández-Cara:OrdinaryDifferentialEquationsandApplications,World Scientific, 2024. **Reference Books:** 1. G.F.Simmons:DifferentialEquations,TataMcGrawHill.1972. 2. E. A. Codington: An Introduction to ordinary differential Equation, PrenticeHall ofIndia, 1961. 3. D.A. Murray: Introductory Course in Differential Equations, Orient Longman (India) 1967. 4. H.T.HPiaggio:ElementaryTreatiseonDifferentialEquationsandtheirApplication, C.B.S.Publisher&Distributors,Delhi.1985. 5. Bibhutibhusan Datta and Avadhesh Narayan Singh: History of Hindu Mathematics,Asia Publishing House, 1962. 6BalachandraRao:DifferentialEquationswithApplications,UniversitiesPress,1996.
Suggestive digital platforms weblinks: 1. \ https://epgp.inflibnet.ac.in 2. https://freevideolectures.com/university/iit-roorkee 3. https://www.eshiksha.mp.gov.in/mpdhe
Suggested Equivalent Online Courses: 1. https://nptel.ac.in/courses/111106146/ 2. https://nptel.ac.in/courses/122102004/L02 3. https://nptel.ac.in/courses/111/101/111101080

Part D-Assessment and Evaluation		
Suggested Continuous Evaluation Methods: Maximum Marks: 100 Continuous Comprehensive Evaluation (CCE): 30 Marks University Exam (UE): 70 Marks		
Internal Assessment: Continuous Comprehensive Evaluation (CCE)	Class Test Assignment/Presentation	Total Marks: 30
External Assessment: University Exam Section: Time : 03.00 Hours	**Section (A):** Objective Type **Section (B):** Short Questions **Section (C):** Long Questions	Total Marks: 70

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PART-A : Introduction		
Programme : B.Sc.(CS)	**Class : I Year**	**Semester : II** **Session : January - June 2026**
Subject : Computer Science		**Theory/Practical : Theory**
1.	**Course Code**	**BSCCS – 203 (T)**
2.	**Course Title**	**Thermodynamics**
3.	**Course Type**	**Minor - II**
4.	**Pre-Requisite**	To study this course, a student must have had the subject Physics in 12th Class
5.	**Course Objectives**	1. To understand the historical development of thermodynamics, with a focus on Indian knowledge systems, contributions from Satyendra Nath Bose and Meghna d Saha. 2. To identify the key characteristics and significance of thermal power plants located in Madhya Pradesh. 3. To learn working of a heat engine to transform heat into work. 4. To apply the principles of calorimeter and Newton's Law of cooling in practical scenarios.
6.	**Course Outcomes (COs)**	On completion of this course, learner will be able to: CO1. Outline the historical progression of thermodynamics, specifically recognizing the foundational ideas present in Indian knowledge systems and the key contributions of modern Indian physicists Satyendra Nath Bose and Meghnad Saha. CO2. Identify the key operational characteristics and the regional significance of thermal power plants located within the state of Madhya Pradesh Students will comprehend the working principles of a heat engine and the mechanisms by which thermal energy is systematically transformed into mechanical or electrical work. CO3. Apply the theoretical principles of calorimeter (the measurement of heat transfer) and Newton's law of cooling (the rate of heat loss) to solve problems in practical, real-world scenarios

7.	**Expected job roles /carrier opportunities**	A strong understanding and practical experience in thermodynamics open up diverse career opportunities in 1. Mechanical 2. Chemical 3. Aerospace 4. Research and Development (R&D) Engineer/Scientist 5. Piping Designer 6. Simulation These roles involve designing, analyzing, and optimizing systems that manage heat and energy transfer in a wide array of industries.	
8.	**Credit Value**	**Theory**:3	
9.	**Total Marks**	**Max Marks**: 100	**Min. Passing Marks**:35

PART B: Content of the Course (Theory)

No. of Lectures (in hours per week): 2 Hrs. per week		
Total No. of Lectures: 60 Hrs.		
Unit	**Topics**	**No. of Lectures**
Unit I	**Historical background & Kinetic theory** 1. Historical context of thermodynamics in Indian knowledge systems, Contributions of Satyendra Nath Bose to statistical physics. Biography and significant contributions of Meghnad Saha. 2. Thermal Power Plants Located in Madhya Pradesh and Their Key Characteristics. 3. Kinetic Theory of gases, Maxwell's speed distribution, Mean free path. Elementary treatment of transport phenomena, 4. Viscous flow and Thermal conduction in gases. Real gases, Andrew's curves, Equation of state. 5. Virial coefficients, Vander Waals equation, Critical constants. **Activities:** 1. Visit thermal power plant (if possible) / make model of thermal power plant / make chart of thermal power plant. 2. To compare the viscosity of different fluids by observing how they flow down an inclined surface. **Keywords/Tags:** Thermodynamics. Thermal Power Plants.	09
Unit II	**Laws of thermodynamics** 1. Thermo dynamical system, Thermodynamic equilibrium, Zeroth law of thermodynamics. The concept of path function and point function, First law of thermodynamics, Reversible and irreversible processes 2. Heat engine and its efficiency, Carnot's engine and its efficiency. Carnot's theorem, Otto engine and diesel engine. 3. Second law of thermodynamics, Statement of Kelvin-Plank and Clapeyron, Third law of thermodynamics. **Activities:** 1. Compare Otto and Diesel engines via model and chart. 2. Illustrate the Second Law of Thermodynamics with a chart on entropy, heat flow, and applications. **Keywords/Tags:** Thermodynamic equilibrium. Reversible and irreversible processes. Heat engine	15

Unit III	**Entropy** 1. Concept of entropy, Clausius theorem, Entropy change in adiabatic reversible process, Entropy as point function, Change in entropy of universe in reversible and irreversible processes. 2. Principle of increase of entropy. Entropy and unavailable energy, Entropy of ideal gases, Entropy as a thermodynamic variable, T-S diagram. **Activities:** 1. Ask students to observe the example of reversible and irreversible process in daily life. 2. Ask students to present the 'T-S Diagram using the graph. **Keywords/Tags:** Entropy, T-S diagram.	15
Unit IV	**Thermodynamic potentials** 1. Thermodynamic functions: Internal energy. Enthalpy, Helmholtz and Gibb's free energy. Maxwell's thermodynamical equations and their applications. 2. TdS equations, Derivation of expressions of C_P-C_V for ideal and real gases, derivation of the expression $E_S/E_T = C_P/C_V$ Energy and heat capacity equations, Clapeyron equations and its applications (sublimation, vaporization). **Activities:** 1. Assign students to create a flowchart or diagram showing the relationships between internal energy, enthalpy, Helmholtz free energy, and Gibb's free energy. 2. Provide numerical problems where students calculate C_P-C_V for ideal gases and compare results with real gases. **Keywords/Tags:** Thermodynamic potential, Internal energy, Enthalpy, Helmholtz free energy, Gibb's free energy.	11

Unit V	**Thermometry, Calorimetry and Radiation** 1. Types of thermometers, Platinum Resistance Thermometer, Seebeck effect, Peltier effect, Absolute scale of temperature. Calorimetry, Newton's law of cooling, calorific value of fuels, coefficient of thermal conductivity, Searle's method, Lee's method for badconductors. 2. Blackbody Radiation, Wien's displacement law, Rayleigh-Jean's law, Planck's quantum theory of radiation. **Activities:** 1. Study temperature management techniques used in ancient Indian architecture, such as cooling in public buildings, stepwells, and havelis, 2. Study Scientific significance of Rituals and Yajnas. **Keywords/Tags:** Seebeck effect, Peltier effect, Radiations.	10

Part C-Learning Resources
Text Books, Reference Books, Other resources
1. Bhaskara II, "Siddhanta Shiromani", (1150 CE). 2. Dongre N. G., Nene S. G., "Physics in Ancient India", National Book Trust, India. 3. Saha, M. N., & Srivastava, B. N. (1958). Treatise on Heat. Indian Press. 4. Zemansky M. W. & Dittman R., "Heat and Thermodynamics", Tata McGraw-Hill. 5. Sears and Salinger, "Thermodynamics, Kinetic Theory & Statistical Thermodynamics", Narosa. 6. Garg S. C. & Ghosh C. K., "Thermal Physics", Tata McGraw-Hill. 7. Subrahmanyam N., Brij Lal, Hemne P.S., " Heat Thermodynamics and statistical", S. Chand, 2012.
Suggestive digital platforms weblinks: 1. https://www.eshiksha.mp.gov.in/mpdhe/ Learning Management System, Department of higher education, Government of Madhya Pradesh (M.P.). **2.** https://www.edx.org course/thermodynamics/ Thermodynamics course**.**

Part D-Assessment and Evaluation		
Suggested Continuous Evaluation Methods: Maximum Marks: 100 Continuous Comprehensive Evaluation (CCE): 30 Marks University Exam (UE): 70 Marks		
Internal Assessment: Continuous Comprehensive Evaluation (CCE)	Class Test Assignment/Presentation	Total Marks: 30
External Assessment: University Exam Section: Time : 03.00 Hours	**Section (A):** Objective Type **Section (B):** Short Questions **Section (C):** Long Questions	Total Marks: 70

PART-A : Introduction

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Programme : B.Sc.(CS)	**Class : I Year**	**Semester : II**	**Session : January - June 2026**
Subject : Computer Science		**Theory/Practical : Practical**	
1.	**Course Code**	**BSCCS - 203 (P)**	
2.	**Course Title**	**Thermodynamics (Practical)**	
3.	**Course Type**	**Minor – II**	
4.	**Pre-Requisite**	To study this course, Mathematics in XII standard is desirable.	
5.	**Course Objectives**	1. To understand the historical development of thermodynamics, with a focus on Indian knowledge systems, contributions from Satyendra Nath Bose and Meghna d Saha. 2. To identify the key characteristics and significance of thermal power plants located in Madhya Pradesh. 3. To learn working of a heat engine to transform heat into work. 4. To apply the principles of calorimeter and Newton's Law of cooling in practical scenarios.	
6.	**Course Outcomes (COs)**	On completion of this course, learner will be able to: CO1. Students will be able to outline the historical progression of thermodynamics, specifically recognizing the foundational ideas present in Indian knowledge systems and the key contributions of modern Indian physicists Satyendra Nath Bose and Meghnad Saha. CO2. Students will learn to identify the key operational characteristics and the regional significance of thermal power plants located within the state of Madhya Pradesh Students will comprehend the working principles of a heat engine and the mechanisms by which thermal energy is systematically transformed into mechanical or electrical work. CO3. Students will be able to apply the theoretical principles of calorimeter (the measurement of heat transfer) and Newton's law of cooling (the rate of heat loss) to solve problems in practical, real-world scenarios.	
8.	**Credit Value**	**Theory** : 1	

9.	**Total Marks**	**Max. Marks**: 100	**Min. Passing Marks**:35

PART B: Content of the Course		
No. of Lectures (in hours per week): 1 Hr. per week		
Total No. of Lectures: 15 Hrs.		
Sr. No.	**List of experiments**	**No. of Practical**
1.	Determination of the mechanical equivalent of heat by Callender & Barne's method	15 Hrs.
2.	Determination of Efficiency of electrical Kettle with variable voltages.	
3.	Determination of thermal conductivity of a bad conductor by Lee's disc method.	
4.	Verification of Newton's law of cooling	
5.	Determination of Ratio of specific heat of air by Clement-Desorme's method)	
6.	Determination of Specific heat of a liquid using Newton's law of cooling.	
7.	Determination of Thermal conductivity of a metal by Searl's method.	
8.	Determination of Thermal conductivity of rubber using calorimeter.	
9.	Determination of Mechanical equivalent of heat (J) using Joule calorimeter.	
10.	Determination of Temperature coefficient of resistance by Carey-Foster bridge.	

Part C-Learning Resources
Text Books, Reference Books, Other resources
Suggested Reading 1. Prakash I. & Ramakrishna, "A Text Book of Practical Physics", Kitab Mahal, 2011, 11/e. 2. Squires G. L., "Practical Physics", Cambridge University Press, 2015, 4/e. 3. Flint B. L. and Worsnop H. T., "Advanced Practical Physics for students", Asia Publishing House, 1971. 4. Chattopadhyay D. & Rakshit P. C., "An Advanced Course in Practical Physics", New Central Book Agency.
Suggestive digital platforms weblinks: 1. https:/www.vlab.co.in/broad-area-physical-sciences 2. https://storage.googleapis.com/uniquecourses/online.html

PART D: Assessment and Evaluation			
Internal Assessment	**Marks**	**External Assessment**	**Marks**
Class Interaction/Quiz	Nil	Viva voce on practical(20 Marks)	100
Attendance		Practical Record File (20 marks)	
Assignments (Charts/ Model/Seminar/ Technology Dissemination/Excursion/Lab Visits /Industrial visit)		Table Work / Exercise Assigned (60 marks)	
	Total Marks :100		