Walchand College of Engineering, Sangli

(Government Aided Autonomous Institute)

AY 2025-26 onwards

Course Information

Programme	B. Tech. (Civil Engineering)
Class, Semester	Second Year B. Tech.
Course Code	7CV204
Course Name	Concrete Technology
Desired Requisites:	-

Teaching Scheme		**Examination Scheme (Marks)**			
Lecture	3 Hrs/week	**MSE**	**ISE**	**ESE**	**Total**
Tutorial	-	30	20	50	100
		Credits: 3			

Course Objectives

1	To impart conceptual knowledge of cement, cement concrete, aggregates and admixtures.
2	To make students conversant with fresh and hardened properties and durability issues of concrete.
3	To provide and develop skills to prepare and design concrete mixes.

Course Outcomes (CO)

At the end of the course, the students will be able to,

CO	**Description**	**Blooms Taxonomy**	
		Descriptor	Level
CO1	Perceive the knowledge of cement, aggregate, admixtures and concrete to fulfil the requirements of the construction industry.	Understand	II
CO2	Articulate the process of manufacturing concrete, and demonstrate properties of fresh concrete.	Apply	III
CO3	Apply the knowledge of the properties of hardened concrete and the durability issues of concrete.	Apply	III
CO4	Design concrete mixes according to IS 10262: 2019 codal provisions.	Design	VI

Module	**Module Contents**	**Hrs**
I	**Ingredients of Concrete** **Cement:** Manufacturing of Portland cement, Chemical composition, Hydration of cement, Classification and types of cement, Tests on cement. **Aggregate:** Classification, Mechanical and Physical Properties, Grading of Aggregates, Tests on aggregate, Artificial and recycled aggregate. **Water -** Mixing Water and Curing Water	7
II	**Concrete Manufacturing Process** Mixing, Transportation, Placing, compaction and finishing. **Admixtures:** Introduction to Mineral and Chemical Admixtures **Ready Mix Plant:** Layout, Components and Functions, etc.	7
III	**Properties of Fresh Concrete** Workability: Factors affecting workability, measurement of workability, Cohesion and segregation, bleeding, and Setting of concrete. **Curing** - Methods of curing	6
IV	**Concrete Mix Design** Factors to be considered, Concrete mix design for compressive strength by IS: 10262 (2019) method, Statistical quality control.	7
V	**Properties of Hardened Concrete** Strength of concrete, factors affecting strength, Micro-cracking and stress-strain relation, Elasticity, tensile and flexural strength, Creep, and Shrinkage. Non-destructive testing of concrete. **Durability:** Fundamental Concepts, Degradation Process, Attacks, and Durability issues.	8
VI	**Special Concretes**: High-Performance Concrete, Self-Compacting Concrete, Dry Lean Concrete, Pavement Quality Concrete, Pre-stressed Concrete, Low Carbon footprint concrete	4

Textbooks	
1	Shetty M. S., Concrete Technology, S. Chand & Company Ltd. New Delhi.
2	Neville A. M. and Brooks J. J., Concrete Technology, Pearson Education Limited.
3	Gambhir, M. L., Concrete Technology, Tata McGraw-Hill Publishers.
References	
1	Neville A. M., "Properties of Concrete", Prentice Hall.
2	Mehta P. K. and Paulo J. M. M, "Concrete – Microstructure, Properties and Material", McGraw-Hill Professional.
3	Newman J., Choo B.S., Advanced Concrete Technology-Constituent Materials, Elsevier Ltd.
Useful Links	
1	https://www.digimat.in/nptel/courses/video/105102012/L01.html
2	https://www.digimat.in/nptel/courses/video/105104030/L01.html
3	https://www.digimat.in/nptel/courses/video/105106176/L01.html
4	https://www.digimat.in/nptel/courses/video/105102012/L01.html

CO-PO Mapping														
	Programme Outcomes (PO)												**PSO**	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	2						2					1	2	
CO2	2												2	
CO3	2				1							1	2	
CO4	3		3									1	2	
The strength of mapping: 1: Low, 2: Medium, 3: High														

Assessment	
1.	The assessment is based on MSE, ISE and ESE.
2.	MSE shall be typically on modules 1 to 3.
3.	ISE shall be taken throughout the semester in the form of a teacher's assessment.
4.	The mode of assessment can be field visits, assignments, Presentations, Complex Problems, etc. and is expected to map at least one higher-order PO.
5.	ESE shall be on all modules with around 25-30% weightage on modules 1 to 3 and 70-75% weightage on modules 4 to 6.
6.	Min. 40% marks in (MSE+ISE+ESE) are needed, and Min. 40% marks in ESE (ESE shall be a separate head of passing) are needed to pass a theory course.

Prepared by	DAC/BoS Secretary	Head/BoS Chairman

Walchand College of Engineering, Sangli

(Government Aided Autonomous Institute)

AY 2025-26 onwards

Course Information

Programme	B. Tech. (Civil Engineering)
Class, Semester	Second Year B. Tech.
Course Code	7CV205
Course Name	Design of Reinforced Concrete Structures
Desired Requisites:	Strength of Materials, Structural Analysis, Concrete Technology

Teaching Scheme		**Examination Scheme (Marks)**			
Lecture	3 Hrs/week	**MSE**	**ISE**	**ESE**	**Total**
Tutorial	-	30	20	50	100
Practical	-				
Interaction	-	**Credits: 3**			

Course Objectives

1	To introduce students to fundamental concepts of Limit state design of reinforced concrete structures using IS 456:200.
2	To equip students with the skill of determining the strength of RCC members for different criteria of the Limit state.
3	To provide knowledge and skills to students required for the design of basic RCC members using the IS 456:2000.

Course Outcomes (CO)

CO	**Description**	**Blooms Taxonomy**	
		Descriptor	**Level**
At the end of the course, the students will be able to,			
CO1	**Summarize** design philosophies, material behaviour, and IS 456:2000 provisions on durability and load combinations.	Understand	II
CO2	Apply relevant clauses of IS 456:2000 for designing reinforced concrete structural elements.	Apply	III
CO3	Design RC slabs, staircases, and columns under axial and combined loads as per IS code.	Analyze	IV
CO4	Design isolated and combined RC footings as per limit state method and relevant codal provisions.	Create	VI

Module	**Module Contents**	**Hrs**
I	**Fundamentals of Structural Design and Design Philosophies:** RCC Design Overview: Importance, applications, and structural behavior. Design Methods: Working Stress, Ultimate Load, and Limit State Methods – concepts and comparison. Design Steps: Load types, combinations, structural system selection, analysis, and design procedure. Material Properties: Key properties and stress-strain behavior of concrete and steel. IS 456:2000 Introduction: Code guidelines, safety factors, and design approach.	3
II	**Design of RC Beams: Part 1** Singly and Doubly Reinforced Beams: Stress block analysis, neutral axis depth, section types (balanced, under-reinforced, over-reinforced), moment of resistance, design procedure, effective length Flanged Beams (T and L Sections): Types, effective flange width, stress block analysis, moment of resistance, design steps	9

III	**Design of RC Beams: Part 2, Shear, Bond, and Torsion:** Shear: Shear stress distribution in isotropic and RC beams, truss analogy, critical shear sections, IS code design provisions for shear Bond: Bond stress, development length, standard hooks and anchorage details Torsion: Equivalent shear and moment in RC members, design of beams for torsion as per IS code	7
IV	**Design of RC Slabs and Staircases:** Types and behavior of slabs, Codal provisions for slabs, Design of one-way slabs: single span, continuous, and cantilever, Design of two-way slabs using IS code method, Design of dog-legged staircases.	7
V	**Design of RC Columns:** Types of columns: short & long, axially loaded & with bending, Effective length of columns, IS 456 codal provisions, Load carrying capacity of axially loaded short and long columns, Design of columns under combined axial load and uniaxial bending, P-M interaction diagram.	7
VI	**Design of RC Footing:** Design of isolated footings: Square and Rectangular footing, Eccentric footing Design of combined footings: Rectangular & Trapezoidal Combined Footing	6

Text Books

1	Punmia, B. C., Jain A. K., Limit state design of reinforced concrete, Laxmi Publication.
2	Shah, V. and Karve, S., Limit state theory and design of reinforced concrete, Structures Publications.
3	Varghese, P. C., Limit state design of reinforced concrete structures, Prentice Hall.

References

1	IS 456:2000 (Reaffirmed in 2021) – Code of practice for plain and reinforced concrete, BIS and SP 34-1987 – Handbook on concrete reinforcement and detailing.
2	Pillai, S. V. and Menon. D, "Reinforced concrete design", Tata McGraw-Hill Book Co..
3	Ramamruthm, S., Design of reinforced concrete structures (conforming to IS 456), Dhanpat Rai Publishing.

Useful Links

1	https://onlinecourses.nptel.ac.in/noc23_ce79/preview
2	https://youtu.be/v325KpFJxnQ?si=3pPi5mWBh0DN2sVs

CO-PO Mapping

	Programme Outcomes (PO)												PSPO	
COs	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	3	2											1	2
CO2	2	3	2										1	3
CO3	2	3	2	2									2	3
CO4	2	3	3	2	2								3	3

The strength of mapping: - 1: Low, 2: Medium, 3: High

Assessment

The assessment is based on MSE, ISE, and ESE.

MSE shall typically be on modules 1 to 3.

ISE shall be taken throughout the semester in the form of a teacher's assessment. The mode of assessment can be field visits, assignments, etc., and is expected to map at least one higher-order PO.

ESE shall be on all modules, with around 25-30% weightage on modules 1 to 3 and 70-75% weightage on modules 4 to 6.

For passing a theory course, Min. 40% marks in (MSE+ISE+ESE) are needed, and Min. 40% marks in ESE are needed. (ESE shall be a separate head of passing)

Prepared by	DAC/BoS Secretary	Head/BoS Chairman

Walchand College of Engineering, Sangli

(Government Aided Autonomous Institute)

AY 2025-26 onwards

Course Information

Programme	B. Tech. (Civil Engineering)
Class, Semester	Second Year B. Tech.
Course Code	7VSCV254
Course Name	Concrete Technology Lab
Desired Requisites:	-

Teaching Scheme		**Examination Scheme (Marks)**			
Lecture	-	**LA1**	**LA2**	**Lab ESE**	**Total**
Tutorial	-	30	30	40	100
Practical	2 hrs/week				
Interaction	-	**Credits: 1**			

Course Objectives

1	To make students familiar with basic test methods for evaluating properties of cement, aggregate and concrete.
2	To develop the ability to interpret and analyse test results for assessing the quality of material according to codal provisions.
3	To provide skills to determine fresh and hardened properties of concrete and assess concrete by non-destructive techniques.

Course Outcomes (CO) with Bloom's Taxonomy Level

At the end of the course, the students will be able to,

CO	Description	Blooms Taxonomy	
		Descriptor	Level
CO1	Comprehend and apply test methods to assess the properties of cement, aggregate and concrete.	Apply	III
CO2	Analyse the test results of cement and aggregate to decide the suitability for construction as per the IS Code provisions.	Evaluate	V
CO3	Assess the quality of concrete based on the test results of the concrete.	Evaluate	V
CO4	Inspect the concrete quality by non-destructive test methods.	Analyse	IV

List of Experiments / Lab Activities

List of Experiments:

6. Consistency of cement
7. Initial and Final Setting Time of Cement
8. Strength of Cement
9. Soundness of Cement
10. Gradation of Coarse aggregate
11. Workability of concrete - Slump Cone and slump retention test, Compaction factor test
12. Compressive and Split tensile strength of concrete
13. Flexural Strength of Concrete
14. Rebound Hammer Test
15. Ultrasonic Pulse velocity test

Text Books

1	Mehta P. K. and Paulo J. M. M, "Concrete – Microstructure, Properties and Material", McGraw Hill Professional 3rd Edition, 2009.

2	Neville A. M. and Brooks J. J., "Concrete Technology", Pearson Education Limited, 1987
3	Shetty M. S., "Concrete Technology", S. Chand & Company Ltd. New Delhi, 7th Edition, 2013.
References	
1	IS 4031 (1999). "Methods of physical tests for hydraulic cement" Bureau of Indian Standards (BIS), New Delhi, India.
2	IS 516 (1959). "Methods of tests for strength of concrete" Bureau of Indian Standards (BIS), New Delhi, India.
3	IS 13311 (1992). "Method of Non-destructive testing of concrete" Bureau of Indian Standards (BIS), New Delhi, India.
Useful Links	
1	https://www.digimat.in/nptel/courses/video/105106176/L01.html
2	

CO-PO Mapping														
	Programme Outcomes (PO)												**PSO**	
CO	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	1			2					1				1	
CO2	1			2					1				1	
CO3	1			2					1				1	
CO4	1			2	3				1				1	
The strength of mapping: 1: Low, 2:Medium, 3: High														

Assessment				
There are three components of lab assessment, LA1, LA2, and Lab ESE IMP: Lab ESE is a separate head of passing. Lab ESE is treated as End Semester Exam and is based on all experiments/lab activities.				
Assessment	**Based on**	**Conducted by**	**Typical Schedule**	**Marks**
LA1	Lab activities, attendance, journal	Lab Course Faculty	During Week 1 to Week 6 Marks Submission at the end of Week 6	30
LA2	Lab activities, attendance, journal	Lab Course Faculty	During Week 7 to Week 12 Marks Submission at the end of Week 12	30
Lab ESE	Lab Performance and documentation	Lab Course faculty	During Week 13 to Week 18 Marks Submission at the end of Week 18	40
Week 1 indicates the starting week of a semester. The actual schedule shall be as per the academic calendar. Lab activities/Lab performance shall include performing experiments, mini-projects, presentations, drawings, programming and other suitable activities, as per the nature and requirement of the lab course. The experimental lab shall have typically 8-10 experiments.				

Prepared by	DAC/BoS Secretary	Head/BoS Chairman

Walchand College of Engineering, Sangli

(Government Aided Autonomous Institute)

AY 2025-26 onwards

Course Information	
Programme	B. Tech. (Civil Engineering)
Class, Semester	Second Year B. Tech.
Course Code	7VSCV255
Course Name	Computer-Aided Structural Design
Desired Requisites:	Design of Reinforced Concrete Structures, Structural Analysis,

Teaching Scheme		**Examination Scheme (Marks)**			
Lecture	-	**LA1**	**LA2**	**Lab ESE**	**Total**
Tutorial	-	30	30	40	100
Practical	2 hrs/week				
Interaction	-	**Credits: 1**			

Course Objectives	
1	To demonstrate the design of residential building and combined footing.
2	To apply holistic approach of planning, analysis and design of RCC building.
3	To impart training of various analysis, design and drawing professional software for civil engineering structures using relevant IS codes

Course Outcomes (CO)			
CO	Description	Blooms Taxonomy	
		Descriptor	Level
CO1	Apply fundamental RC design principles to develop practical structural solutions for real-world projects.	Apply	III
CO2	Demonstrate a thorough understanding of relevant design codes and standards, ensuring compliance in all design aspects.	Create	VI
CO3	Design various RC structural elements, such as beams, slabs, columns, and foundations, ensuring structural integrity and safety.	Apply	III
CO4	Prepare detailed structural drawings that clearly communicate design intent, including reinforcement detailing and connection details using software tools.	Analyze	IV

List of Experiments / Lab Acti
vities

The lab work shall consist of detailed design &drawing of the following R. C. structures

Part 1. Residential G+1 storey building

1. Forming groups of 4-5 students in each batch and choose a specific Residential RC structure (G+1) with isolated footing to design.
2. Prepare detailed drawing of structure using AutoCAD.
3. Design structural element of RC structure. (Footing, Column, Beam, slab etc.)
4. Prepare detailed bar bending schedule for all structural elements.
5. Prepare detailed report of project.

Part 2. Residential G+1 Storey Building Design Using STAAD.Pro

1. Form groups of 4–5 students in each batch and select a specific Residential RC structure (G+1) with isolated footing for structural design.
2. Create a 3D structural model of the building using **STAAD.Pro**, defining appropriate materials, supports, and load cases.
3. Analyze and design RC structural elements such as **footings, columns, beams, and slabs** using STAAD.Pro as per relevant design codes.
4. Generate and compile a **detailed bar bending schedule** for all structural elements based on the analysis and design output.
5. Prepare a comprehensive **project report** including modeling steps, design results, bar bending schedule, and conclusions.

Text Books	
1	N. C. Sinha & S. K. Roy, "Fundamentals of Reinforced Concrete" S. Chand Publishing,
2	B. C. Punmia, Jain and Jain, "Comprehensive Design of R.C. Structures",
3	Dr. V. L. Shah and Dr. S.R. Karve, "Limit State Theory and Design".
References	
1	P. C. Varghese "Limit State Design of Reinforced Concrete", Prentice Hall of India, New Delhi, 1st Edition,1999.
2	STAAD.Pro V8i for Structural Analysis and Design – T.S. Sarma
3	AutoCAD 2024 for Engineers and Designers – Sham Tickoo
Useful Links	
1	https://www.csiamerica.com/
2	https://www.bentley.com/
3	https://www.autodesk.com/

CO-PO Mapping

	Programme Outcomes (PO)												PSO	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1		3			2				2	1			1	
CO2			3						2	1			1	
CO3			2		3				2	1			1	
CO4			2		3				2	2				

The strength of mapping: 1: Low, 2:Medium, 3: High

Assessment

There are three components of lab assessment, LA1, LA2, and Lab ESE
IMP: Lab ESE is a separate head of passing. Lab ESE is treated as End Semester Exam and is based on all experiments/lab activities.

Assessment	Based on	Conducted by	Typical Schedule	Marks
LA1	Lab activities, attendance, journal	Lab Course Faculty	During Week 1 to Week 6 Marks Submission at the end of Week 6	30
LA2	Lab activities, attendance, journal	Lab Course Faculty	During Week 7 to Week 12 Marks Submission at the end of Week 12	30

Lab ESE	Lab Performance and documentation	Lab Course faculty	During Week 13 to Week 18 Marks Submission at the end of Week 18	40
Week 1 indicates the starting week of a semester. The actual schedule shall be as per the academic calendar. Lab activities/Lab performance shall include performing experiments, mini-projects, presentations, drawings, programming and other suitable activities, as per the nature and requirement of the lab course. The experimental lab shall have typically 8-10 experiments.				

Prepared by	DAC/BoS Secretary	Head/BoS Chairman

Walchand College of Engineering, Sangli

(Government Aided Autonomous Institute)

AY 2025-26

Course Information

Programme	B. Tech. (Mechanical Engineering)
Class, Semester	Exit_TY B.Tech
Course Code	
Course Name	Energy Engineering
Desired Requisites:	Chemistry, Thermodynamics

Teaching Scheme		**Examination Scheme (Marks)**			
Lecture	2 Hr/week	**MSE**	**ISE**	**ESE**	**Total**
Tutorial	--	30	20	50	100
		Credits: 2			

Course Objectives

1	To provide a foundational understanding of energy sources and global energy systems
2	To introduce thermal and renewable energy systems used in power and process industries.
3	To analyze energy conversion processes and efficiency-enhancing techniques.
4	To develop skills in energy audit, conservation, and sustainable energy planning.

Course Outcomes (CO) with Bloom's Taxonomy Level

At the end of the course, the students will be able to,

CO	**Course Outcome Statement/s**	**Bloom's Taxonomy Level**	**Bloom's Taxonomy Description**
CO1	Identify and classify conventional and renewable energy resources and their roles in sustainable development.	I	Remembering
CO2	Explain working principles of thermal, solar, wind, and biomass energy systems.	II	Understanding
CO3	Apply energy management and audit techniques in industrial or domestic environments.	III	Applying
CO4	Analyze energy conversion efficiency and system performance in various applications.	IV	Analyzing

Module	**Module Contents**	**Hours**

I	**Energy Fundamentals & Global Scenario** Energy types: primary vs secondary, renewable vs non-renewable, Indian and global energy consumption trends, Energy units and conversion, Environmental impacts of energy systems. Need for sustainable and efficient energy practices	4
II	**Thermal Energy Systems** Steam power plants: Rankine cycle and components, Gas turbine and combined cycle systems, Heat recovery and cogeneration systems, Efficiency improvement techniques	5
III	**Solar Energy Systems** Solar radiation and measurement, Solar thermal systems: flat plate and concentrating collectors, Solar photovoltaic (PV) systems, PV module characteristics, applications and design basics, Solar-powered industrial & rural systems	5
IV	**Wind & Hydro Energy** Wind energy principles and site selection, Types of wind turbines and their characteristics, Small vs large-scale wind farms, Hydropower classification: run-of-river, pumped storage, Basic design and efficiency considerations	5
V	**Biomass & Emerging Energy Systems** Biomass resources and classification, Biomass conversion: thermal, biochemical, and thermochemical, Biogas generation: digester design and applications, Hybrid energy systems for remote areas	4
VI	**Energy Conservation and Management** Energy audit: types and methodology, Energy conservation techniques in industries, Energy efficient equipment and practices, Basic principles of energy management, Energy conservation act and policies in India	5

References	
1	**D.Y. Goswami, F. Kreith**, *Energy Conversion*, CRC Press
2	**B.H. Khan**, *Non-Conventional Energy Resources*, McGraw-Hill
3	**K.K. Ramalingam**, *Power Plant Engineering*, Scitech Publications

Useful Links	
1	https://nptel.ac.in/courses/121/106/121106014/
2	https://mnre.gov.in

Textbooks	
1	**P.K. Nag,** Power Plant Engineering, McGraw-Hill Education
2	**S.S. Thipse**, *Alternative Fuels*, Jaico Publishing House
3	**G.D. Rai**, *Non-Conventional Energy Sources*, Khanna Publishers

Walchand College of Engineering, Sangli *(Government Aided Autonomous Institute)*					
AY 2025-26					
Course Information					
Programme	B. Tech. Mechanical				
Class, Semester	Exit_TY B.Tech				
Course Code					
Course Name	Maintenance of Mechanical Systems				
Desired Requisites:	Basic knowledge of mechanical components and manufacturing processes.				
Teaching Scheme		**Examination Scheme (Marks)**			
Lecture	2 Hrs/week	**MSE**	**ISE**	**ESE**	**Total**
Tutorial	-	30	20	50	100
	-	**Credits: 2**			

Course Objectives	
1	To introduce the fundamental principles, types, and economics of maintenance.
2	To impart knowledge about failure mechanisms and the role of lubrication in preventing them.
3	To familiarize students with various condition monitoring techniques for fault diagnosis.
4	To develop the ability to plan, schedule, and safely execute maintenance tasks.

Course Outcomes (CO) with Bloom's Taxonomy Level

At the end of the course, the students will be able to,

CO	**Course Outcome Statement/s**	**Bloom's Taxonomy Level**	**Bloom's Taxonomy Description**
CO1	Classify different maintenance strategies and explain their significance in industrial applications.	II	Understanding
CO2	Apply the principles of tribology to select appropriate lubricants and maintenance procedures for common mechanical components.	III	Applying
CO3	Analyse the root causes of failure in mechanical systems using failure analysis techniques and interpret data from condition monitoring tools.	IV	Analysing
CO4	Evaluate and recommend a suitable maintenance plan and safety procedure for a given mechanical system.	V	Evaluating

Module	**Module Contents**	**Hours**
I	**Fundamentals of Maintenance Engineering:** Introduction, objectives, and importance of maintenance. Maintenance strategies: Corrective, Preventive,	5

	Predictive, and Proactive maintenance. Maintenance costs and their control. Introduction to Total Productive Maintenance (TPM).	
II	Tribology and Lubrication Practices: Fundamentals of friction, wear, and lubrication. Types and properties of lubricants (liquid, solid, greases). Lubrication systems and methods. Lubricant selection for different applications. Used oil analysis.	4
III	Failure Analysis and Component Maintenance: Common failure modes of machine elements: bearings, gears, shafts, belts, and chains. Introduction to Failure Modes and Effects Analysis (FMEA). Techniques for machinery installation, alignment, and correction (e.g., shaft alignment, belt tensioning).	5
IV	Condition Monitoring Techniques: Introduction to condition-based maintenance. Vibration Analysis: fundamentals, data acquisition, and analysis for detecting unbalance, misalignment, etc. Thermography: principles and application in detecting electrical and mechanical faults. Introduction to Acoustic Emission and Ultrasonic testing.	5
V	Maintenance Planning and Management: Principles of maintenance planning, scheduling, and control. Work order systems, maintenance records, and documentation. Spare parts management and inventory control. Introduction to Computerized Maintenance Management Systems (CMMS).	4
VI	Safety and Modern Trends in Maintenance: Safety protocols in maintenance: Lock-Out Tag-Out (LOTO), work permits, and use of PPE. Introduction to Reliability Centered Maintenance (RCM). The role of IoT, AI, and Big Data in predictive maintenance (Industry 4.0).	5

Text Books	
1	S. K. Srivastava, "Maintenance Engineering and Management," S. Chand & Company Ltd.
2	B.S. Dhillon, "Engineering Maintenance: A Modern Approach," CRC Press.

References	
1	R. Keith Mobley, "Maintenance Engineering Handbook," McGraw-Hill Professional.
2	Heinz P. Bloch, "Machinery Failure Analysis and Troubleshooting," Gulf Professional Publishing.
3	Seichi Nakajima, "Introduction to TPM: Total Productive Maintenance," Productivity Press.

Useful Links	
1	https://nptel.ac.in/courses/112107293
2	https://reliabilityweb.com/
3	https://www.machinerylubrication.com/

CO-PO Mapping

	Programme Outcomes (PO)												**PSO**	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	3						2					1	2	
CO2	3	2	2										3	
CO3		3		3	2									3
CO4						2		2			3	2	2	

The strength of mapping is to be written as 1: Low, 2: Medium, 3: High
Each CO of the course must map to at least one PO.

Assessment

The assessment is based on MSE, ISE and ESE.
MSE shall be typically on modules 1 to 3.
ISE shall be taken throughout the semester in the form of teacher's assessment. Mode of assessment can be field visit, assignments etc. and is expected to map at least one higher order PO.
ESE shall be on all modules with around 40% weightage on modules 1 to 3 and 60% weightage on modules 4 to 6.

For passing a theory course, Min. 40% marks in (MSE+ISE+ESE) are needed and Min. 40% marks in ESE are needed. (ESE shall be a separate head of passing)

Walchand College of Engineering, Sangli

(Government Aided Autonomous Institute)

AY 2025-26

Course Information	
Programme	B. Tech. (Mechanical Engineering)
Class, Semester	Exit_TY B.Tech
Course Code	
Course Name	Internship
Desired Requisites:	

Teaching Scheme		**Examination Scheme (Marks)**			
Lecture	2 Hr/week	**LA1**	**LA2**	**ESE**	**Total**
Tutorial	--	30	30	40	100
		Credits : 2			

Course Objectives	
1	Gain Practical Experience in Mechanical Systems:
2	Apply Theoretical Knowledge to Real-World Engineering Problems
3	Develop Professional Skills and Work Ethics
4	Gain Insights into Industry Practices and Standards

Course Outcomes (CO) with Bloom's Taxonomy Level

At the end of the course, the students will be able to,

CO	**Course Outcome Statement/s**	**Bloom's Taxonomy Level**	**Bloom's Taxonomy Description**
CO1	Demonstrate Competence in Operating and Maintaining Mechanical Systems	3	Applying
CO2	Apply Theoretical Knowledge to Solve Engineering Problems	3	Applying
CO3	Exhibit Professional Skills and Ethics in the Workplace	6	Creating

CO4	Understand and Apply Industry Standards and Practices	2	Understanding

Module	**Module Contents**	**Hours**
Students need to complete an internship at local or multinational (MNC) companies to fulfill the mentioned objectives. The internship program requires a minimum of 15 days and a maximum of 60 days. Internship placement at core mechanical engineering or manufacturing industries is highly recommended. After completing the internship program, students must submit a detailed report along with a certificate for evaluation purposes. A presentation on the internship will be conducted at the department level for evaluation.		

Reference	
1	
2	
3	

Useful Links	
1	https://nptel.ac.in/internship
2	

Textbooks	
1	Engineering Internship Survival Guide – Matthew Moran
2	
3	

Walchand College of Engineering, Sangli

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AY 2025-26

Course Information

Programme	B.Tech. (Mechanical Engineering)
Class, Semester	Exit_TY.B.Tech
Course Code	
Course Name	Mini Project
Desired Requisites:	

Teaching Scheme		**Examination Scheme (Marks)**			
Practical	2 Hrs./Week	**LA1**	**LA2**	**Lab ESE**	**Total**
Interaction	-	30	30	40	100
		Credits: 01			

Course Objectives

1	To familiarize students with the concept of project based learning.
2	To give hands-on experience to students on developing problem statement and methodology to attempt solving such problems.
3	To learn the technical report writing skills.
4	To ensure seamless working in team.

Course Outcomes (CO) with Bloom's Taxonomy Level

At the end of the course, the students will be able to,

CO	**Course Outcome Statement/s**	**Bloom's Taxonomy Level**	**Bloom's Taxonomy Description**
CO1	Conceive a problem statement either from rigorous literature survey or from the requirements raised from need analysis.	II	Understanding
CO2	Cultivate teamwork and collaboration skills by requiring students to work effectively in teams, manage project tasks, and communicate ideas clearly.	III	Applying
CO3	Write comprehensive report on mini project work.	IV	Analysing

CO4	Design, and develop the model / prototype / algorithm in order to solve the conceived problem.	VI	Creating

Course contents

Guidelines:

1. The mini-project is a team activity having 3-5 students in a team.
2. Mini project should include mainly Mechanical Engineering contents but can be multi-disciplinary as well.
2. The mini project may be a complete hardware or a combination of hardware and software.
3. Mini Project should cater to a small system required in laboratory, repair, maintenance or upgradation of existing laboratory equipment or solution for a real life problem/case study.
4. After interactions with batch teacher and based on comprehensive literature survey/ need analysis, the student shall identify the title and define the aim and objectives of mini-project.
5. Student is expected to detail out specifications, methodology, resources required, critical issues involved in design and implementation and submit the proposal within first week of the semester.
6. The student is expected to exert on design, development and testing of the proposed work as per the schedule.
7. Completed mini project and documentation in the form of mini project report is to be submitted at the end of semester.

Guidelines for Assessment of Mini Project Examination:

Each batch should prepare a detailed technical report as per the guidelines issued by the department / guide.

Mini Project shall be assessed through a presentation and demonstration by the student project group to faculty advisor / a panel of examiners.

Students shall be motivated to publish a paper based on the work in students competitions / Conferences / journals.

Mini Project shall be assessed based on following points;

1. Quality of problem and clarity.
2. Proper use of knowledge and practices of mechanical and or other engineering disciplines.
3. Effective use of tools and skill sets.
4. Contribution of an individual's as a team member.
5. Clarity in written and oral communication and preparation and presentation of final technical report.

Text Books

1	Various national, international and industry standards applicable to project area.
2	Handbooks and user manuals for software's, equipment and products.

References

1	Meredith, Jack R., and Samuel J. Mantel Jr. Project management: a managerial approach. John Wiley & Sons, 2011.
2	K. T. Ulrich, S. D. Eppinger, and M. C. Yang , Product Design & Development, , 7th Edition, McGraw Hill, 2019.
3	M. Mahajan, Industrial Engineering and Production Management, 1st Edition, DhanpatRai & Co. (P) Limited, 2015.
4	V. Balachandran and Chandrasekaran, Corporate Governance, Ethics and Social Responsibility, PHI, 2nd Edition, 2011

Useful Links

1	
2	

CO-PO Mapping														
	Programme Outcomes (PO)												PSO	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	3		1		2	2	1		3			3	2	
CO2	2	2	3		2	1	2	1	3		3		2	1
CO3		3						3		3				1
CO4										3	2			1
The strength of mapping is to be written as 1,2,3; where, 1: Low, 2: Medium, 3: High Each CO of the course must map to at least one PO, and preferably to only one PO.														

Assessment				
There are three components of lab assessment, LA1, LA2 and ESE. IMP: Lab ESE is a separate head of passing.(min 40 %), LA1+LA2 should be min 40%.				
Assessment	**Based on**	**Conducted by**	**Typical Schedule**	**Marks**
LA1	Idea and synopsis presentation, aim and objectives	Project guide Faculty	During Week 1 to Week 6 Marks Submission at the end of Week 6	30
LA2	Actual progress report	Lab Course Faculty	During Week 7 to Week 12Marks Submission at the end of Week 12	30
Lab ESE	Analysis of the model or project, technical report and final presentation	Lab Course Faculty and External Examiner as applicable	During Week 13 to Week 16 Marks Submission at the end of Week 16	40
Week 1 indicates starting week of a semester. Performance shall include idea finalization, synopsis presentation, continuous evaluation and final presentations, drawings, programming, and other suitable activities, as per the nature and requirement of the mini project.				

Exit Courses After First Year

Walchand College of Engineering, Sangli

(Government Aided Autonomous Institute)

AY 2024-25

Course Information

Programme	B. Tech. (Electrical Engineering)
Class, Semester	First Year Exit
Course Code	7EL103
Course Name	Domestic Appliances Maintenance and Repair
Desired Requisites:	NIL

Teaching Scheme		**Examination Scheme (Marks)**			
Lecture	3 Hrs/week	**MSE**	**ISE**	**ESE**	**Total**
Tutorial	-	30	20	50	100
		Credits: 3			

Course Objectives

1	To understand the Basic safety practices.
2	To understand the various principles of domestic equipment's.
3	To troubleshoot the defects of the most common household equipment's.
4	To understand the techniques involved in advanced repairing of household equipment's.

Course Outcomes (CO) with Bloom's Taxonomy Level

At the end of the course, the students will be able to,

CO	**Course Outcome Statement/s**	**Bloom's Taxonomy Level**	**Bloom's Taxonomy Description**
CO1	**Explain** Basics and Working Electrical Appliances.	II	Understanding
CO2	**Grasp** the techniques involved in advanced repairing of household equipment's.	II	Understanding
CO3	**Execute** Repair and maintenance of the basic electrical and electronics appliances.	III	Applying
CO4	**Identify** remedial measures in the domestic equipment.	IV	Analyzing

Module	**Module Contents**	**Hours**
I	**SAFETY MEASURES, GENERAL TOOLS AND EQUIPMENT** Understanding Electricity, Electrical Energy and Its Conversions, Basic Safety Practice, Tools and Equipment.	5
II	**ELECTRICAL THERMAL APPLIANCES** Construction, Operation and Maintenance of Electrical Heating Appliances: Room Heater, Electric Cooking Heater, Electric Iron, Immersion Rod, Electric Kettle, Induction Cooker, Toaster, Hair Dryer.	7
III	**ROTATING ELECTRIC APPLIANCES** Basics of domestic motor, Construction, Operation and Maintenance of domestic motor, Basics of Mixer and Grinder, Construction, Operation and Maintenance of Washing Machine.	6
IV	**REFRIGERATION EQUIPMENT and VACUUM CLEANER** Refrigerator: Basics and Working, Refrigeration Cycle and Refrigerant, Troubleshooting and Retrofitting, Demonstration and Maintenance, Vacuum cleaner Basics and Working, Operation and Maintenance.	7
V	**COOLING EQUIPMENT and POWER SUPPLY BASICS** Fundamentals of Air Conditioner and its Trouble-Shooting, Air Conditioner: Basics, Working principle and Operation, Demonstration and Maintenance, Introduction to Power Supply, Basics and working.	7
VI	**INVERTER AND GEYSER** Inverter: Basics and Working, Operation and Maintenance, Geyser: Basics and Working, Operation and Maintenance.	7

Textbooks	
1	Principles of Electronics by V. K. Mehta and Rohit Mehta, S Chand Publication.
2	Study of Electrical Appliances and Devices by K. B. Bhatia, Khanna Publishers, ISBN-13 978-9387394223.
3	Electrical Appliances: The Complete Step-by-step Guide to Repair and Maintenance of a Wide Ranges of Domestic Electrical Appliances by Graham Dixon.
References	
1	Electricity and Electrical Appliances Handbook by Jeannette T. Adams, Arco Publishing Company.
Useful Links	
1	https://onlinecourses.swayam2.ac.in/nou23_ge80/preview

CO-PO Mapping														
	Programme Outcomes (PO)												**PSO**	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	3					2								
CO2		3												
CO3			3											
CO4			3	2										
The strength of mapping is to be written as 1: Low, 2: Medium, 3: High Each CO of the course must map to at least one PO.														

Assessment
The assessment is based on MSE, ISE and ESE. MSE shall be typically on modules 1 to 3. ISE shall be taken throughout the semester in the form of teacher's assessment. Mode of assessment can be field visit, assignments etc. and is expected to map at least one higher order PO. ESE shall be on all modules with around 40% weightage on modules 1 to 3 and 60% weightage on modules 4 to 6. For passing a theory course, Min. 40% marks in (MSE+ISE+ESE) are needed and Min. 40% marks in ESE are needed. (ESE shall be a separate head of passing)

Syllabus Prepared By	Mr. S. S. Medhekar
Syllabus Checked By	

Walchand College of Engineering, Sangli

(Government Aided Autonomous Institute)

AY 2024-25

Course Information	
Programme	B. Tech. (Electrical Engineering)
Class, Semester	First Year Exit
Course Code	7EL104
Course Name	Arduino Based Systems
Desired Requisites:	NIL

Teaching Scheme		**Examination Scheme (Marks)**			
Lecture	3 Hrs/week	**MSE**	**ISE**	**ESE**	**Total**
Tutorial	-	30	20	50	100
		Credits: 3			

Course Objectives	
1	To understand the fundamentals of digital systems and Arduino based simple system.
2	To explain Arduino programming language and IED.
3	To illustrate programming for basic Arduino systems.
4	To illustrate how to build the prototype circuits using Arduino systems.

Course Outcomes (CO) with Bloom's Taxonomy Level

At the end of the course, the students will be able to,

CO	**Course Outcome Statement/s**	**Bloom's Taxonomy Level**	**Bloom's Taxonomy Description**
CO1	Explain fundamentals of digital systems and Arduino based simple system.	II	Understanding
CO2	Discuss the fundamentals of Arduino, installation of Arduino IED and running the Arduino executable files.	II	Understanding
CO3	Demonstrate the programming for basic Arduino systems.	III	Applying
CO4	Illustrate the use of Arduino for system interface.	IV	Analyzing

Module	**Module Contents**	**Hours**
I	**Overview of Digital Systems:** Combinational circuit, Adder, Sub-tractor, Multiplexer, D-multiplexer, Decoder, Flip-Flops, S-R, D Clocked flip flop, J-K flip flop, counter, synchronous and asynchronous, MOD-N counter, shift registers, Memory Block.	6
II	**Operational Amplifiers:** Block diagram, Basic operation, Op-Amps as comparator, Op-am in feedback mod, Inverting and Noninverting amplifiers, Adders and sub-tractor.	6
III	**Introduction to Arduino:** Arduino device, types, feature, components of Arduino, Arduino programming, uploading and execution of file, using IED prepare sketch, program notation, variables, functions, control flow, convention.	7
IV	**Input/Output Programming 1:** Sensor input: definition, types, interfacing Arduino with different sensors, light, temperature, sound, distance, water level, smoke, gas, alcohol, ultrasonic sensors. Displays: Basic LED, 7 segment display and LCD.	7
V	**Input/Output Programming 1:** Motor Control: speed, spin direction, servo motor, stepper motor controls. Communication over Ethernet: Ethernet shield, internet weather, display, e-mail alert systems, logging data on online server using ThingSpeak	7
VI	**Arduino Application:** Case studies: Arduino based robot car and PLC industrial application.	6

Textbooks	
1	Arduino Cook Book, Michael Margolis, O'Reilly Publication 2020
References	
1	Beginning Arduino, Michal Mc Roberts, Second Edition, Apress Publishing, 2013
2	Getting started with Arduino, Massimo Banzi, 2nd Edition, O'Reilly 2011
Useful Links	
1	https://onlinecourses.swayam2.ac.in/aic20_sp04/preview

CO-PO Mapping														
	Programme Outcomes (PO)												**PSO**	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	3													
CO2	3													
CO3		3												
CO4		3												
The strength of mapping is to be written as 1: Low, 2: Medium, 3: High Each CO of the course must map to at least one PO.														

Assessment
The assessment is based on MSE, ISE and ESE. MSE shall be typically on modules 1 to 3. ISE shall be taken throughout the semester in the form of teacher's assessment. Mode of assessment can be field visit, assignments etc. and is expected to map at least one higher order PO. ESE shall be on all modules with around 40% weightage on modules 1 to 3 and 60% weightage on modules 4 to 6. For passing a theory course, Min. 40% marks in (MSE+ISE+ESE) are needed and Min. 40% marks in ESE are needed. (ESE shall be a separate head of passing)

Syllabus Prepared By	Dr. Swapnil D. Patil
Syllabus Checked By	

Walchand College of Engineering, Sangli

(Government Aided Autonomous Institute)

AY 2024-25

Course Information	
Programme	B. Tech. (Electrical Engineering)
Class, Semester	First Year Exit
Course Code	7VSEL153
Course Name	Domestic Appliances Maintenance and Repair Lab
Desired Requisites:	NIL

Teaching Scheme		**Examination Scheme (Marks)**			
Practical	2 Hrs/ Week	**LA1**	**LA2**	**Lab ESE**	**Total**
Interaction	-	30	30	40	100
		Credits: 1			

Course Objectives	
1	To understand the key elements of Domestic Appliances.
2	To perform layman checks and rectify minor defects of Domestic Appliances.

Course Outcomes (CO) with Bloom's Taxonomy Level

At the end of the course, the students will be able to,

CO	**Course Outcome Statement/s**	**Bloom's Taxonomy Level**	**Bloom's Taxonomy Description**
CO1	**Describe** various parts of Domestic Appliances.	I	Remembering
CO2	**Estimate** relevant techniques and tools for repair and maintenance of Domestic Appliances.	II	Understanding
CO3	**Apply** different techniques and tools for Repair and maintenance of Domestic Appliances.	III	Applying
CO4	**Identify** faulty Domestic Appliance	IV	Analyzing

List of Experiments / Lab Activities/Topics

List of Lab Activities:

1. Safety measures and practices.
2. Demonstration of Heating Appliances and their applications.
3. Identification, working and specification of each part of domestic pump motor.
4. Dismantling, re-assembling and troubleshooting of domestic pump motor.
5. Identification, working and specification of each part of ceiling and table fan.
6. Dismantling, re-assembling and troubleshooting of ceiling and table fan.
7. Identification, working and specification of each part of electric iron.
8. Dismantling, re-assembling and troubleshooting of electric iron.
9. Identification, working and specification of inverters.
10. Assemble different type of inverters circuit & its measurements. Assemble battery charger circuit used in inverter with protection circuit.
11. Identification, working and specification of each part of electric stove (Induction), electric kettle.
12. Identification, working and specification of each part of Refrigerator.
13. Identification, working and specification of each part of Air Conditioner.

Textbooks

1	Principles of Electronics by V. K. Mehta and Rohit Mehta, S Chand Publication.
2	Study of Electrical Appliances and Devices by K. B. Bhatia, Khanna Publishers, ISBN-13 978-9387394223.
3	Electrical Appliances: The Complete Step-by-step Guide to Repair and Maintenance of a Wide Ranges of Domestic Electrical Appliances by Graham Dixon.

References	
1	Electricity and Electrical Appliances Handbook by Jeannette T. Adams, Arco Publishing Company.
Useful Links	
1	https://onlinecourses.swayam2.ac.in/nou23_ge80/preview

CO-PO Mapping														
	Programme Outcomes (PO)												PSO	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	3													
CO2	3	3												
CO3			3											
CO4			3	2										
The strength of mapping is to be written as 1,2,3; where, 1: Low, 2: Medium, 3: High Each CO of the course must map to at least one PO, and preferably to only one PO.														

Assessment				
There are three components of lab assessment, LA1, LA2 and Lab ESE. IMP: Lab ESE is a separate head of passing.(min 40 %), LA1+LA2 should be min 40%				
Assessment	**Based on**	**Conducted by**	**Typical Schedule**	**Marks**
LA1	Lab activities, attendance, journal	Lab Course Faculty	During Week 1 to Week 8 Marks Submission at the end of Week 8	30
LA2	Lab activities, attendance, journal	Lab Course Faculty	During Week 9 to Week 16 Marks Submission at the end of Week 16	30
Lab ESE	Lab activities, journal/ performance	Lab Course Faculty and External Examiner as applicable	During Week 18 to Week 19 Marks Submission at the end of Week 19	40
Week 1 indicates starting week of a semester. Lab activities/Lab performance shall include performing experiments, mini-project, presentations, drawings, programming, and other suitable activities, as per the nature and requirement of the lab course. The experimental lab shall have typically 8-10 experiments and related activities if any.				

Syllabus Prepared By	Mr. S. S. Medhekar
Syllabus Checked By	

Walchand College of Engineering, Sangli

(Government Aided Autonomous Institute)

AY 2024-25

Course Information

Programme	B. Tech. (Electrical Engineering)
Class, Semester	First Year Exit
Course Code	7VSEL154
Course Name	Arduino Based Systems Lab
Desired Requisites:	NIL

Teaching Scheme		**Examination Scheme (Marks)**			
Practical	2 Hrs/ Week	**LA1**	**LA2**	**Lab ESE**	**Total**
Interaction	-	30	30	40	100
		Credits: 1			

Course Objectives

1	To illustrate programming for basic Arduino systems.
2	To illustrate how to build the prototype circuits using Arduino systems.

Course Outcomes (CO) with Bloom's Taxonomy Level

At the end of the course, the students will be able to,

CO	**Course Outcome Statement/s**	**Bloom's Taxonomy Level**	**Bloom's Taxonomy Description**
CO1	Discuss the fundamentals of Arduino, installation of Arduino IED and running the Arduino executable files.	II	Understanding
CO2	Demonstrate the programming for basic Arduino systems.	III	Applying
CO3	Apply Arduino system to operate and control different equipment.	III	Applying
CO4	Illustrate the use of Arduino for system interface with IO ports.	IV	Analyzing

List of Experiments / Lab Activities/Topics

List of Lab Activities:

1. **LED Blink**: The classic beginner project where you make an LED blink on and off.
2. **Traffic Light Controller**: Simulate traffic lights using LEDs and program them to change at intervals.
3. **Temperature Sensor**: Use a temperature sensor to measure ambient temperature and display it.
4. **Ultrasonic Distance Sensor**: Measure distance using an ultrasonic sensor and display it.
5. **Servo Motor Control**: Control the movement of a servo motor using potentiometers or sensors.
6. **LCD Display**: Interface an LCD display with Arduino to output text or sensor data.
7. **Sound Reactive LEDs**: Make LEDs react to sound using a microphone sensor.
8. **Motor Control**: Control DC motors or stepper motors for various applications like robotics or automation.
9. **IR Remote Control**: Use an IR receiver to control devices with a remote control.
10. **Data Logging**: Log sensor data to an SD card and analyze it later.
11. **Wireless Communication**: Use modules like Bluetooth or Wi-Fi to communicate with other devices or the internet.
12. **Home Automation**: Automate home appliances like lights, fans, etc., using relays and sensors.
13. **Gesture Control**: Control devices using gestures detected by sensors like accelerometers or gyroscopes.
14. **RFID Access Control**: Create an RFID-based access control system.
15. **Weather Station**: Measure temperature, humidity, and other weather parameters and display them.
16. **Robotics Projects**: Build robots like line-following robots, obstacle avoidance robots, etc., using Arduino.
17. **Pulse Rate Monitor**: Use sensors to measure pulse rate and display it.
18. **Smart Agriculture**: Monitor soil moisture, temperature, etc., and automate irrigation systems.
19. **GPS Tracker**: Track location using GPS modules.
20. **Touch-based Interfaces**: Create touch-sensitive interfaces using capacitive touch sensors.

Textbooks	
1	Arduino Cook Book, Michael Margolis, O'Reilly Publication 2020

References	
1	Beginning Arduino, Michal Mc Roberts, Second Edition, Apress Publishing, 2013
2	Getting started with Arduino, Massimo Banzi, 2nd Edition, O'Reilly 2011

Useful Links	
1	https://onlinecourses.swayam2.ac.in/aic20_sp04/preview

CO-PO Mapping														
	Programme Outcomes (PO)												**PSO**	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	3													
CO2	3			3										
CO3				3										
CO4				3										

The strength of mapping is to be written as 1,2,3; where, 1: Low, 2: Medium, 3: High
Each CO of the course must map to at least one PO, and preferably to only one PO.

Assessment

There are three components of lab assessment, LA1, LA2 and Lab ESE.
IMP: Lab ESE is a separate head of passing.(min 40 %), LA1+LA2 should be min 40%

Assessment	Based on	Conducted by	Typical Schedule	Marks
LA1	Lab activities, attendance, journal	Lab Course Faculty	During Week 1 to Week 8 Marks Submission at the end of Week 8	30
LA2	Lab activities, attendance, journal	Lab Course Faculty	During Week 9 to Week 16 Marks Submission at the end of Week 16	30
Lab ESE	Lab activities, journal/ performance	Lab Course Faculty and External Examiner as applicable	During Week 18 to Week 19 Marks Submission at the end of Week 19	40

Week 1 indicates starting week of a semester. Lab activities/Lab performance shall include performing experiments, mini-project, presentations, drawings, programming, and other suitable activities, as per the nature and requirement of the lab course. The experimental lab shall have typically 8-10 experiments and related activities if any.

Syllabus Prepared By	Dr. Swapnil D. Patil
Syllabus Checked By	

Exit Courses After Second Year

Walchand College of Engineering, Sangli

(Government Aided Autonomous Institute)

AY 2025-26

Course Information

Programme	B. Tech. (Electrical Engineering)
Class, Semester	Second Year Exit
Course Code	
Course Name	Electrical Installation, Testing & Maintenance
Desired Requisites:	Electrical Machines, Power Systems

Teaching Scheme		**Examination Scheme (Marks)**			
Practical	6 Hrs/ Week	**LA1**	**LA2**	**Lab ESE**	**Total**
Tutorial	1 Hrs/ Week	30	30	40	100
		Credits: 4			

Course Objectives

1	Appropriate tools and accessories for electrical installation, testing & maintenance and safety measures
2	Different artificial respiration methods.
3	Methods of electrical installation, testing & maintenance for electrical equipment
4	Troubles in electrical machines, transmission and distribution system, transformers & grid substations

Course Outcomes (CO) with Bloom's Taxonomy Level

At the end of the course, the students will be able to,

CO	**Course Outcome Statement/s**	**Bloom's Taxonomy Level**	**Bloom's Taxonomy Description**
CO1	Choose appropriate tools and accessories for electrical installation, testing & maintenance and safety measures.	III	Applying
CO2	Choose artificial respiration methods according to electric accidents.	III	Applying
CO3	Classify methods of electrical installation, testing & maintenance for electrical equipment.	III	Applying
CO4	Categorize common troubles in electrical machines, transmission and distribution system, transformers & grid substations.	IV	Analyzing

List of Experiments / Lab Activities/Topics

1. Equipment and tools required for electrical installation and maintenance
2. Codes and practices pertaining to safety in installation and maintenance of electrical equipment.
3. Electric accidents and artificial respiration methods.
4. Measurement of insulation resistance.
5. Earthing system for electrical installations and trouble-shooting.
6. Troubles in electrical machines, transmission and distribution system, transformers & grid substations.
7. Electrical installation, testing & maintenance for electrical equipment.
8. Laying of underground cables and tools used for installation.
9. Insulation testing of lightning arresters.
10. Phase sequence measurement.

Textbooks

1	Installation commissioning & maintenance, Tarlok singh, Katariya& sons.
2	Testing, Commissioning Operation and Maintenance of Electrical Equipment, S Rao, Khanna, Technical Publication, New Delhi.
3	Preventive Maintenance of Electrical Apparatus, SK Sharotri, Katson, Publishing House Ludhiana.
References	
1	Operation & Maintenance of Electrical Equipment's Vol-I & II, B.V.S. Rao, Media promoters and publisher Ltd. Mumbai.
2	Electrical Power Equipment Maintenance and Testing, Paul Gill, CRC press.
3	Testing & Maintenance of Electrical Machines, B P Patil, Technical Publication.
Useful Links	
1	https://onlinecourses.swayam2.ac.in/aic20_sp04/preview

CO-PO Mapping														
	Programme Outcomes (PO)												**PSO**	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1				3		2			2	2			1	
CO2				3		2			2	2			1	
CO3				3					2	2			1	
CO4				3					2	2			1	
The strength of mapping is to be written as 1,2,3; where, 1: Low, 2: Medium, 3: High Each CO of the course must map to at least one PO, and preferably to only one PO.														

Assessment				
There are three components of lab assessment, LA1, LA2 and Lab ESE. IMP: Lab ESE is a separate head of passing.(min 40 %), LA1+LA2 should be min 40%				
Assessment	**Based on**	**Conducted by**	**Typical Schedule**	**Marks**
LA1	Lab activities, attendance, journal	Lab Course Faculty	During Week 1 to Week 8 Marks Submission at the end of Week 8	30
LA2	Lab activities, attendance, journal	Lab Course Faculty	During Week 9 to Week 16 Marks Submission at the end of Week 16	30
Lab ESE	Lab activities, journal/ performance	Lab Course Faculty and External Examiner as applicable	During Week 18 to Week 19 Marks Submission at the end of Week 19	40
Week 1 indicates starting week of a semester. Lab activities/Lab performance shall include performing experiments, mini-project, presentations, drawings, programming, and other suitable activities, as per the nature and requirement of the lab course. The experimental lab shall have typically 8-10 experiments and related activities if any.				

Syllabus Prepared By	Dr. Swapnil D. Patil
Syllabus Checked By	

Walchand College of Engineering, Sangli

(Government Aided Autonomous Institute)

AY 2025-26

Course Information	
Programme	B. Tech. (Electrical Engineering)
Class, Semester	Second Year Exit
Course Code	
Course Name	Mini-Project 1
Desired Requisites:	

Teaching Scheme		**Examination Scheme (Marks)**			
Practical	4 Hrs/ Week	**LA1**	**LA2**	**Lab ESE**	**Total**
Interaction	-	30	30	40	100
		Credits:2			

Course Objectives	
1	To acquire the skills of electrical and electronic circuit design and assembly.
2	To develop the skills of analysis and fault diagnosis of the electrical and electronic circuit as per design
3	To test the electrical and electronic circuit assembly

Course Outcomes (CO) with Bloom's Taxonomy Level

At the end of the course, the students will be able to,

CO	**Course Outcome Statement/s**	**Bloom's Taxonomy Level**	**Bloom's Taxonomy Description**
CO1	Understand the basics concepts used in Mini Project.	III	Understanding
CO2	Analyse and infer the reference literature critically and efficiently.	IV	Analysing
CO3	Construct the model of the project	VI	Creating
CO4	Evaluate the performance of the project.	V	Evaluating
CO5	Write and Present the report of the project.	VI	Creating

List of Experiments / Lab Activities/Topics

List of Lab Activities:

1. Visit to a local industry or search for the study of problems of industry.
2. Prepare the problem based hardware Mini project.
3. Evaluate the performance of project.
4. Prepare a report on the same.

Note :

Student will have to perform a group project based on above points which will be evaluated as In Semester Examination (LA1, LA2 and Lab ESE).

Textbooks

References

1	

Useful Links

1	

CO-PO Mapping														
	Programme Outcomes (PO)												PSO	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1						3			1					
CO2		3							3					
CO3	1		3											
CO4				2	3									
CO5									3					
The strength of mapping is to be written as 1,2,3; where, 1: Low, 2: Medium, 3: High Each CO of the course must map to at least one PO, and preferably to only one PO.														

Assessment				
There are three components of lab assessment, LA1, LA2 and Lab ESE. IMP: Lab ESE is a separate head of passing.(min 40 %), LA1+LA2 should be min 40%				
Assessment	**Based on**	**Conducted by**	**Typical Schedule**	**Marks**
LA1	Lab activities, attendance, journal	Lab Course Faculty	During Week 1 to Week 8 Marks Submission at the end of Week 8	30
LA2	Lab activities, attendance, journal	Lab Course Faculty	During Week 9 to Week 16 Marks Submission at the end of Week 16	30
Lab ESE	Lab activities, journal/ performance	Lab Course Faculty and External Examiner as applicable	During Week 18 to Week 19 Marks Submission at the end of Week 19	40
Week 1 indicates starting week of a semester. Lab activities/Lab performance shall include performing experiments, mini-project, presentations, drawings, programming, and other suitable activities, as per the nature and requirement of the lab course. The experimental lab shall have typically 8-10 experiments and related activities if any.				

Syllabus Prepared By	Dr. Mrs. A. S. Karvekar
Syllabus Checked By	

Exit Courses After Third Year

Walchand College of Engineering, Sangli

(Government Aided Autonomous Institute)

AY 2025-26

Course Information	
Programme	B. Tech. (Electrical Engineering)
Class, Semester	Third Year Exit
Course Code	
Course Name	Industrial Automation
Desired Requisites:	Microcontroller and Applications

Teaching Scheme		**Examination Scheme (Marks)**			
Lecture	3 Hrs/week	**MSE**	**ISE**	**ESE**	**Total**
Tutorial	-	30	20	50	100
		Credits: 3			

Course Objectives	
1	This course gives overview of various types of sensors, actuators and controllers for closed loop control.
2	It intends to develop basics of ladder logic programming for PLC.
3	It provides the foundation level knowledge of SCADA System.
4	It provides the applications of variable speed drives in industries.

Course Outcomes (CO) with Bloom's Taxonomy Level

At the end of the course, the students will be able to,

CO	**Course Outcome Statement/s**	**Bloom's Taxonomy Level**	**Bloom's Taxonomy Description**
CO1	**Study** various types of sensors and actuators used in industrial automation	II	Understanding
CO2	**Compare** the various types of controllers for Industrial Automation.	III	Applying
CO3	**Apply** the knowledge of PLC and SCADA for Industrial Automation.	III	Applying
CO4	**Illustrate** the use of variable speed drives for Industrial Automation.	III	Applying

Module	**Module Contents**	**Hours**
I	**Measurement of Various Process Parameters** Measurement of quantities such as temperature, pressure, force, displacement, speed, flow, level, humidity, pH etc., signal conditioning, estimation of errorsand calibration.	7
II	**Actuators** Introduction to various actuators such as flow control valves, Hydraulic andpneumatic, servo motors, symbols and characteristics.	6
III	**Process Control and Various Controllers** Introduction to process control, PID controller and tuning, various control configurations such as cascade control, feed forward control, split rangecontrol, ratio control, override control and selective control.	6
IV	**PLC** Introduction to sequence control and relay ladder logic, basic PLC system, I/O modules, scan cycle, programming of timers, counters and I/O programming.	6

V	**SCADA for Industrial Automaton** Components of SCADA systems, functions, classification of SCADA, networking and communication protocols.	7
VI	**Variable Speed Drives** Role of variable speed drives in automation, DC drives, AC drives and synchronous motor drives applications of variable speed drives.	7

Textbooks	
1	John webb, "Programmable logic controllers-Principles & applications", Prentice Hall of India, 2003.
2	C. D. Johnson, "Process control instrumentation Technology, 3rd Edition, John Wiley & Sons, 1988.
References	
1	George Stephanopoulos, "*Chemical Process Control - An introduction to Theory and Practice*", Pearson Education, 1st Edition, 2015.
2	G. K. Dubey ,"*Fundamentals of Electrical Drives*", Narosa publication, 2nd edition.
Useful Links	
1	https://onlinecourses.nptel.ac.in/noc21_me67/preview
2	https://nptel.ac.in/courses/108105063
3	https://archive.nptel.ac.in/courses/108/105/108105062/

CO-PO Mapping

	Programme Outcomes (PO)												PSO	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	3	3												
CO2		3												
CO3					3									
CO4						3								3

The strength of mapping is to be written as 1: Low, 2: Medium, 3: High
Each CO of the course must map to at least one PO.

Assessment

The assessment is based on MSE, ISE and ESE.
MSE shall be typically on modules 1 to 3.
ISE shall be taken throughout the semester in the form of teacher's assessment. Mode of assessment can be field visit, assignments etc. and is expected to map at least one higher order PO.
ESE shall be on all modules with around 40% weightage on modules 1 to 3 and 60% weightage on modules 4 to 6.
For passing a theory course, Min. 40% marks in (MSE+ISE+ESE) are needed and Min. 40% marks in ESE are needed. (ESE shall be a separate head of passing)

Syllabus Prepared By	Dr. Mrs. A. S. Karvekar
Syllabus Checked By	Mr. A. N. Inamdar

Walchand College of Engineering, Sangli

(Government Aided Autonomous Institute)

AY 2025-26

Course Information	
Programme	B. Tech. (Electrical Engineering)
Class, Semester	Third Year Exit
Course Code	
Course Name	Industrial Automation Lab
Desired Requisites:	Microcontroller & Applications, Electrical Measurement and Instrumentation

Teaching Scheme		**Examination Scheme (Marks)**			
Practical	2 Hrs/ Week	**LA1**	**LA2**	**Lab ESE**	**Total**
Interaction	-	30	30	40	100
		Credits: 1			

Course Objectives	
1	The lab course is aimed to develop programming skills using PLC for Industrial Automation
2	The course intends to introduce the use of PLC for solving real world problems.
3	It will enable students to use PLC for control applications in electrical engineering
4	The lab course will enable students to integrate PLC, SCADA and HMI for various projects in industrial automation

Course Outcomes (CO) with Bloom's Taxonomy Level

At the end of the course, the students will be able to,

CO	**Course Outcome Statement/s**	**Bloom's Taxonomy Level**	**Bloom's Taxonomy Description**
CO1	Demonstrate skills to design, write, and troubleshoot PLC programs using various programming languages such as ladder logic	III	Applying
CO2	Execute experiments based on PLC and SCADA systems.	III	Applying
CO3	Construct control strategies using PLCs to improve reliability and operational efficiency in industries.	IV	Analyzing
CO4	Design ladder logic programs for various PLC applications.	VI	Creating

List of Experiments / Lab Activities/Topics

List of Lab Activities:

1. To understand and implement the functionality logic gates using PLC
2. Implement ladder diagram for ON/OFF and latching functions.
3. Design of PLC program for motor reversal control.
4. Illustrate stair case lighting using PLC programming.
5. Implement PLC program for building automation.
6. Design of PLC program for various arithmetical functions.
7. Devise the PLC program for traffic control system.
8. Design of ON/ OFF control mechanism using PLC timer functions.
9. Design of basic applications employing PLC counter functions.
10. Design of basic applications employing PLC analog inputs.

Textbooks

1	John W. Webb, Ronald A. Reis, "Programmable logic controllers, principles & applications", PHI publication, Eastern Economic Edition, 1994.
2	Gary dunning, "Introduction to PLC", Thomson learning, Edition III, 2006.

3	Frank D. Petruzella ,"Programmable Logic Controllers", 3rd Edition, Tata McGraw Hill, New York, 2010
4	Madhuchhanda Mitra, Samarjit Sengupta, " Programmable logic controllers and Industrial Automation: An Introduction", Penram International, Edition II, 2017.
References	
1	John R. Hackworth and Peterson, "PLC controllers programming methods and applications", PHI, 2004.
2	Stuart A. Boyer , "SCADA: Supervisory Control and Data Acquisition Systems", 4th Edition, ISA Press, 2010.
3	William H. Bolton, "Programmable logic controllers", Newnes , Edition VI, 2006.
Useful Links	
1	Industrial Automation and Control, IIT Kharagpur Prof. S. Mukhopadhyay, Prof. S. Sen https://nptel.ac.in/courses/108105063
2	NOC: Industrial Automation and Control, IIT Kharagpur: https://nptel.ac.in/courses/108105088

CO-PO Mapping

	Programme Outcomes (PO)												PSO	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1			3											
CO2				3					3					
CO3				3					3					
CO4			3		3				3					

The strength of mapping is to be written as 1,2,3; where, 1: Low, 2: Medium, 3: High
Each CO of the course must map to at least one PO, and preferably to only one PO.

Assessment

There are three components of lab assessment, LA1, LA2 and Lab ESE.
IMP: Lab ESE is a separate head of passing.(min 40 %), LA1+LA2 should be min 40%

Assessment	Based on	Conducted by	Typical Schedule	Marks
LA1	Lab activities, attendance, journal	Lab Course Faculty	During Week 1 to Week 8 Marks Submission at the end of Week 8	30
LA2	Lab activities, attendance, journal	Lab Course Faculty	During Week 9 to Week 16 Marks Submission at the end of Week 16	30
Lab ESE	Lab activities, journal/ performance	Lab Course Faculty and External Examiner as applicable	During Week 18 to Week 19 Marks Submission at the end of Week 19	40

Week 1 indicates starting week of a semester. Lab activities/Lab performance shall include performing experiments, mini-project, presentations, drawings, programming, and other suitable activities, as per the nature and requirement of the lab course. The experimental lab shall have typically 8-10 experiments and related activities if any.

Syllabus Prepared By	Dr. Mrs. A. S. Karvekar
Syllabus Checked By	Dr. S. S. Karvekar

Walchand College of Engineering, Sangli

(Government Aided Autonomous Institute)

AY 2025-26

Course Information	
Programme	B. Tech. (Electrical Engineering)
Class, Semester	Third Year Exit
Course Code	
Course Name	Mini-Project 2
Desired Requisites:	

Teaching Scheme		**Examination Scheme (Marks)**			
Practical	4 Hrs/ Week	**LA1**	**LA2**	**Lab ESE**	**Total**
Interaction	-	30	30	40	100
		Credits:2			

Course Objectives

1	To acquire the skills of electrical and electronic circuit design and assembly.
2	To develop the skills of analysis and fault diagnosis of the electrical and electronic circuit as per design
3	To test the electrical and electronic circuit assembly

Course Outcomes (CO) with Bloom's Taxonomy Level

At the end of the course, the students will be able to,

CO	**Course Outcome Statement/s**	**Bloom's Taxonomy Level**	**Bloom's Taxonomy Description**
CO1	Understand the basics concepts used in Mini Project.	III	Understanding
CO2	Analyse and infer the reference literature critically and efficiently.	IV	Analysing
CO3	Construct the model of the project	VI	Creating
CO4	Evaluate the performance of the project.	V	Evaluating
CO5	Write and Present the report of the project.	VI	Creating

List of Experiments / Lab Activities/Topics

List of Lab Activities:

1. Visit to a local industry or search for the study of problems of industry.
2. Prepare the problem based hardware Mini project.
3. Evaluate the performance of project.
4. Prepare a report on the same.

Note :
Student will have to perform a group project based on above points which will be evaluated as In Semester Examination (LA1, LA2 and Lab ESE).

Textbooks

References

1	

Useful Links

1	

CO-PO Mapping														
	Programme Outcomes (PO)												PSO	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1						3			1					
CO2		3							3					
CO3	1		3											
CO4				2	3									
CO5									3					
The strength of mapping is to be written as 1,2,3; where, 1: Low, 2: Medium, 3: High Each CO of the course must map to at least one PO, and preferably to only one PO.														

Assessment				
There are three components of lab assessment, LA1, LA2 and Lab ESE. IMP: Lab ESE is a separate head of passing.(min 40 %), LA1+LA2 should be min 40%				
Assessment	**Based on**	**Conducted by**	**Typical Schedule**	**Marks**
LA1	Lab activities, attendance, journal	Lab Course Faculty	During Week 1 to Week 8 Marks Submission at the end of Week 8	30
LA2	Lab activities, attendance, journal	Lab Course Faculty	During Week 9 to Week 16 Marks Submission at the end of Week 16	30
Lab ESE	Lab activities, journal/ performance	Lab Course Faculty and External Examiner as applicable	During Week 18 to Week 19 Marks Submission at the end of Week 19	40
Week 1 indicates starting week of a semester. Lab activities/Lab performance shall include performing experiments, mini-project, presentations, drawings, programming, and other suitable activities, as per the nature and requirement of the lab course. The experimental lab shall have typically 8-10 experiments and related activities if any.				

Syllabus Prepared By	Dr. Mrs. A. S. Karvekar
Syllabus Checked By	

Walchand College of Engineering, Sangli

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AY 2025-26

Course Information

Programme	B. Tech. (Electronics Engineering)
Class, Semester	After second year
Course Code	7VSEN153
Course Name	Electronics Workshop
Desired Requisites:	Basic Electronics, Engineering Skill-II

Teaching Scheme		**Examination Scheme (Marks)**			
Practical	2 Hrs/ Week	**LA1**	**LA2**	**Lab ESE**	**Total**
Interaction	-	30	30	40	100
		Credits: 4			

Course Objectives

1	To provide basic knowledge of handling electrical equipment and safety.
2	To provide exposure to the students with hands on experience on various basic engineering practices in Electronics Engineering.
3	To explain the working of small electronic devices.
4	To provide students hands on experience on, troubleshooting, maintenance, fabrication, innovation, record keeping, documentation etc. thereby enhancing the skill and competency part of technical education.

Course Outcomes (CO) with Bloom's Taxonomy Level

At the end of the course, the students will be able to,

CO1	Identify various types of Switches, Relays, Connectors, Cables, Network and Data cables.	Understand
CO2	Test various electronic components using relevant equipment	Apply
CO3	Identify and explain the use of electronic instruments and components	Understand
CO4	Applying knowledge in a lab setting as a group, analyzing results collaboratively, troubleshooting as a team.	Analyze

Topics

Module 1: Electronic Components, Measuring Instruments and Tools:
Study of components (Resistance, capacitor, Diode, Transistor, Transformer, switches, relays, PCB etc.) testing and lead identification. Introduction to Lab Instruments like CRO, Power supply, Oscillator, Multi meter. Frequency measurement, AC-DC voltage measurement using CRO and multi meter.

Module 2: Sensors and Transducers
Introduction, Sensors vs Transducers, Temperature sensors, Motion sensors, Proximity sensors, LDR, Humidity sensor [Hygrometer], selection factors, Temperature sensor characteristics.

Module 3: Electronics circuits building
Assembling of electronic circuit/system on general purpose PCB, test and show the functioning. Design and analysis of Zener diode voltage regulator, Adder Circuits using opamp, RC Oscillators, Build and test multivibrator/ timer circuits using IC 555

Module 4: Introduction to Testing in Electronics:
importance of testing, Types of testing: functional, parametric, in-circuit Stages of circuit testing: Pre-build, breadboarding, PCB-level. Testing of electronic components [Resistor, Capacitor, Diode, Transistor and JFET using multimeter.]

Module 5: Electronics Simulation Tools
Introduction, Importance of simulation in electronics design, Real-time vs offline simulation, digital and analog circuit simulations, Overview of different simulation tools (Proteus, Multisim, PSpice, MATLAB Simulink)

Module 6: Electronics in Different streams
Electronics in Communication Engineering (Wireless communication systems, Antennas, Mobile phones, satellite systems), Electronics in Computer Engineering, (Microprocessors and microcontrollers, Digital logic design and interfacing Embedded systems, IoT devices), Electronics in Electrical Engineering, (power electronics (inverters, converters), Smart meters and energy monitoring), Electronics in Mechanical & Mechatronics (Robotics: Actuators, sensors, control logic Automation using PLCs, Automobiles), Electronics in Biomedical Engineering (Bio-potential amplifiers (ECG, EMG), Patient monitoring systems)

Textbooks	
1	Make: Electronics, by Charles Platt, Published by Maker Media, 2015
2	Electronics Projects For Dummies, by by Earl Boysen and Nancy Muir, Published by Wiley Publishing, Inc., 2006
3	
4	

References	
1	A. E. Ward, J.A.S. Angus, "Electronic Product Design", Stanley Thrones (Publishers) Limited, 1996.
2	Paul Horowitz, Winfield Hill, "The Art of Electronics", Cambridge University Press, 1989
3	
4	

Useful Links	
1	https://www.labcenter.com/
2	https://ltwiki.org/index.php?title=Main_Page
3	https://matlabacademy.mathworks.com/
4	

CO-PO Mapping														
	Programme Outcomes (PO)												**PSO**	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	3										2			2
CO2			3		2									
CO3			3		2						1		1	
CO4		2							3	3				

The strength of mapping is to be written as 1,2,3; where, 1: Low, 2: Medium, 3: High Each CO of the course must map to at least one PO, and preferably to only one PO.

Assessment				
There are three components of lab assessment, LA1, LA2 and Lab ESE. IMP: Lab ESE is a separate head of passing.(min 40 %), LA1+LA2 should be min 40%				
Assessment	**Based on**	**Conducted by**	**Typical Schedule**	**Marks**
LA1	Lab activities, attendance, journal	Lab Course Faculty	During Week 1 to Week 8 Marks Submission at the end of Week 8	30
LA2	Lab activities, attendance, journal	Lab Course Faculty	During Week 9 to Week 16 Marks Submission at the end of Week 16	30
Lab ESE	Lab activities, journal/ performance	Lab Course Faculty and External Examiner as applicable	During Week 18 to Week 19 Marks Submission at the end of Week 19	40
Week 1 indicates starting week of a semester. Lab activities/Lab performance shall include performing experiments, mini-project, presentations, drawings, programming, and other suitable activities, as per the nature and requirement of the lab course. The experimental lab shall have typically 8-10 experiments and related activities if any.				

Walchand College of Engineering, Sangli

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AY 2025-26

Course Information	
Programme	B. Tech. (Electronics Engineering)
Class, Semester	After First Year
Course Code	7VSEN154
Course Name	ARDUINO based System
Desired Requisites:	Basic Electronics, Digital Electronics

Teaching Scheme		**Examination Scheme (Marks)**			
Lecture	3 Hrs/week	**MSE/LA1**	**ISE/LA2**	**ESE**	**Total**
Tutorial	-	30	30	40	100
		Credits: 3+1=4			

Course Objectives	
1	To explain and illustrate the fundamentals of digital systems and op-amps which are necessary for Arduino based simple systems.
2	To explain, demonstrate the Arduino programming language and IDE
3	To illustrate and demonstrate programming for basic Arduino systems.
4	To illustrate how to build the prototype circuits and connect them to the Arduino for building useful systems.

Course Outcomes (CO) with Bloom's Taxonomy Level		
At the end of the course, the students will be able to,		
CO1	Explain fundamentals of digital systems and operational amplifiers	Understand
CO2	Illustrate the fundamentals of Arduino, installation of Arduino IDE, Running the Arduino executable file, Using IDE to prepare Arduino sketch	Understand
CO3	Writing programs for interfacing various sensors and output devices with Arduino	Apply
CO4	Illustrate use of Arduino for an application or a system	Analyse

Module	**Module Contents**	**Hours**
I	**Embedded System design: Basics** Introduction to embedded systems, Components of embedded system, Advantages and applications of embedded systems, Examples of real time embedded systems and how they are manufactured industry ready, Different Microcontroller Architectures (CISC, RISC, ARISC), Internal Resources & Hardware Chips in Details, History of AVR Microcontrollers and Features, Memory Architectures	8
II	**Introduction to Arduino:** Arduino device, Types of Arduino, Features of Arduino, Components of Arduino board, Description of Microcontrollers, Installation of Arduino, Run the Arduino executable file, Using IDE to prepare Arduino sketch, Uploading and running the sketch,	7
III	**Learning Arduino Platform:** Program notation: variables, functions, control flow, Arduino conventions. The concept of a program variable. Numerical values and basic numerical operators. If/then/else iteration using for loops. Real world timing and the delay () function	6

IV	**Input/Output Programming:** Sensor Inputs: - Definition, Types. Interfacing Arduino to different sensors- light sensor, temperature sensor, sound sensor, distance ranging sensor, water/detector sensor, smoke, gas, alcohol sensor, ultrasonic sensor Displays: Basics of LED's and LCD's. Interfacing Arduino to LED's- blinking single LED, blinking multiple LED's, 7 segment display, LED dot matrix. Interfacing to LCD's- 16x2 LCD display	6
V	**Input/Output Interface:** Motor control: DC motors- Speed control, spin direction control. Servo motor control, Steppers and Robots, Communication over Ethernet: Ethernet shield, internet weather, display, e-mail alert system, Arduino Libraries Using ESP 8266 – Logging data on online server using ThingSpeak	6
VI	**Arduino Applications:** Case studies: Arduino based robot car, Arduino based PLC industrial application	6

Textbooks	
1	"Arduino Cookbook", Michael Margolis, O'Reilly Publications, 2020
References	
1	"Beginning Arduino", Michal Mc Roberts, Second Edition, Apress Publishing, 2013
2	"Getting started with Arduino", Massimo Banzi, 2nd Edition, O'Reilly, 2011
Useful Links	

CO-PO Mapping														
	Programme Outcomes (PO)												**PSO**	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	3													
CO2		3												
CO3			2										1	
CO4		2												
The strength of mapping is to be written as 1: Low, 2: Medium, 3: High Each CO of the course must map to at least one PO.														

Assessment
The assessment is based on MSE, ISE and ESE. MSE shall be typically on modules 1 to 3. ISE shall be taken throughout the semester in the form of teacher's assessment. Mode of assessment can be field visit, assignments etc. and is expected to map at least one higher order PO. ESE shall be on all modules with around 40% weightage on modules 1 to 3 and 60% weightage on modules 4 to 6. For passing a theory course, Min. 40% marks in (MSE+ISE+ESE) are needed and Min. 40% marks in ESE are needed. (ESE shall be a separate head of passing)

List of Experiments / Lab Activities.
1 Writing a program to blink the onboard LED
2 Arduino interfacing with Tricolor LED and Push button
3 Sensing analog voltage using onboard ADC and printing it on serial monitor
4 Using Arduino to generate Pulse width modulation output
5 Arduino-based servo motor control
6 Interfacing of ultrasonic distance sensor(HC-SR04) with Ardiuno
7 Ethernet and WiFi Connectivity with Arduino
8 Arduino interfacing with Tricolor LCD

List of Experiments / Lab Activities/Topics
List of Lab Activities: 1. Introduction to software tool and hardware of 8051 2. Assembly language programs to perform different operations, implement if else, for loop, while loop, logic gates and to study block transfer 3. 8051 C program for LED blinking and operating LED using SWITCH 4. Interfacing Motor with 8051 microcontroller 5. Interfacing 4 digits Multiplexed Display with 8051 microcontroller 6. Interfacing 16x2 characters LCD with 8051 microcontroller 7. Interfacing 4x4 Matrix Keyboard with 8051 microcontroller 8. Interfacing DAC0800 with 8051 microcontroller 9. Interfacing ADC0809 with 8051 microcontroller 10. Using Timer as Timer and Timer as Counter 11. Interrupts configuration and handling 12. Serial communication programming 13. Multiprocessor communication (Using Proteus) 14. Design and demonstration of microcontroller based applications

Walchand College of Engineering, Sangli

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Course Information

Programme	B. Tech. (Electronics Engineering)
Class, Semester	After Second Year
Course Code	7VSEN251
Course Name	Microcontroller and Peripheral Interfacing
Desired Requisites:	Digital Electronics

Teaching Scheme		**Examination Scheme (Marks)**			
Lecture	3 Hrs/week	**MSE**	**ISE**	**ESE**	**Total**
Tutorial		30	20	50	100
		Credits: 3+1=4			

Course Objectives

1	To explain the difference between Intel 8085 microprocessor and Intel 8051 microcontroller
2	To explain Intel 8051 microcontroller and its programming in assembly and 8051 C language
3	To explain interfacing of external devices with Intel 8051 and 8051 C programming.
4	To explain design and development of microcontroller-based system.

Course Outcomes (CO) with Bloom's Taxonomy Level

At the end of the course, the students will be able to,

CO1	Illustrate the architecture of 8051 Microcontroller in comparison with 8085 Microprocessor.	Apply
CO2	Demonstrate situation-based interfacing of external devices with Intel 8085	Apply
CO3	Write assembly and C language programs for Intel 8051 to meet given system requirements.	Analyze
CO4	Design 8051 microcontroller-based system.	Create

Module	**Module Contents**	**Hours**
I	**Microprocessor vs. Microcontroller** Introduction of Microprocessor and Microcontroller; Block diagram of 8085 and 8051; function of each pin of 8085 and 8051; Architectural difference between 8085 and 8051; features and applications of 8085 and 8051.	4
II	**Microcontroller Programming** Microcontroller Programming basics; 8051 assembly language programming; Instruction set; Instruction types; Addressing modes; 8051 C programming; Features and advantages of 8051 C programming; Programming examples for both; Use of Development tools for Intel 8051.	8
III	**External Peripheral** Interfacing Port structure of 8051; Interfacing led and switch with 8051; Interfacing devices like relay, DC motor, Stepper motor, seven segment display, character LCD, DAC0808, digital sensors, analogue sensors through ADC0808; External memory interface; Writing algorithm and C program for interfaces.	8

IV	**Internal Peripherals** 8051 Timer and its working, Timer modes, Programming timer as timer in C, Programming timer as counter in C; 8051 UART and its working, Serial communication modes, Programming UART in C; 8051 Interrupts sources, Interrupt flags, Vector addresses, Interrupt structure, Interrupt blocking conditions, Interrupt priorities, Interrupt latency, Interrupt configuration, Writing an Interrupt Service Routine in C	8
V	**Microcontroller Based System Design** System requirements; Selection of components; Interface design; Flow chart design; Writing Algorithm; Writing C program for system; Design examples like Temperature controller etc.	8
VI	**RISC Microcontrollers** Introduction to RISC architecture; Block diagram of PIC microcontroller; Architectural difference between PIC controller and 8051; PIC microcontroller features.	3

Textbooks	
1	Kenneth J. Ayala,The 8051 Microcontroller Architecture, Programming and Applications, 2nd Edition, Penram International Publication, revised edition 2009
2	Mohammad Ali Mazidi, The 8051 Microcontroller and Embedded Systems, Pearson Education, 2nd edition, 2010.
3	John B. Peatman, Design with PIC microcontrollers, Pearson Education, 1st edition, 2003
4	Ramesh Gaonkar, Fundamentals of Microcontrollers and Applications in Embedded Systems, Penram International Publication(India), 2010
References	
1	Intel 8085 and 8051 datasheet (www.intel.com) 2
2	Keil A51 and C51 manuals
3	PIC16F877A datasheet (www.microchip.com)
4	Hi-Tech C Compiler manual
Useful Links	
1	https://nptel.ac.in/
2	https://in.coursera.org/
3	https://www.tutorialspoint.com/
4	https://www.javatpoint.com/

CO-PO Mapping

	Programme Outcomes (PO)												PSO	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	3													
CO2	3													
CO3		3			3									
CO4			3											1

The strength of mapping is to be written as 1: Low, 2: Medium, 3: High
Each CO of the course must map to at least one PO.

Assessment

The assessment is based on MSE, ISE and ESE.
MSE shall be typically on modules 1 to 3.
ISE shall be taken throughout the semester in the form of teacher's assessment. Mode of assessment can be field visit, assignments etc. and is expected to map at least one higher order PO.
ESE shall be on all modules with around 40% weightage on modules 1 to 3 and 60% weightage on modules 4 to 6.
For passing a theory course, Min. 40% marks in (MSE+ISE+ESE) are needed and Min. 40% marks in ESE are needed. (ESE shall be a separate head of passing)

AY 2025-26

Course Information

Programme	B. Tech. Electronics Engineering
Class, Semester	After Second Year
Course Code	7VSEN245
Course Name	Mini Project
Desired Requisites:	ECAD, ICA, Digital Signal Processing, Embedded System Design, Digital Signal Processing

Teaching Scheme		**Examination Scheme (Marks)**			
Practical	2 Hrs/ Week	**LA1**	**LA2**	**Lab ESE**	**Total**
Interaction	-	30	30	40	100
		Credits: 1			

Course Objectives

1	To provide students hands on experience on, troubleshooting, maintenance, fabrication, innovation, record keeping, documentation etc. thereby enhancing the skill and competency part of technical education.
2	To create an Industrial environment and culture within the institution.
3	To inculcate innovative thinking and practice based learning and thereby preparing students for their final year project.
4	To set up self-maintenance cell within departments to ensure optimal usage of infrastructure Facilities.

Course Outcomes (CO) with Bloom's Taxonomy Level

At the end of the course, the students will be able to,

CO1	Choose, Initiate and manage a minor project.	Understand
CO2	Propose research problem and present it in a clear and distinct manner through different oral, written and design techniques.	Apply
CO3	Construct the circuit using hardware and/or software.	Create
CO4	Execute the project and comment upon the results of it.	Analyze

List of Experiments / Lab Activities/ Topics

Mini Project Description:

A project group shall consist of normally 3 students per group. The mini project will involve the design, construction, and debugging of an electronic system approved by the department. Each student should conceive, design and develop the idea leading to a project/product. **The theme of the project should be related to electronics engineering discipline to be decided by the students based on the societal needs after an exhaustive survey.**

Each student must keep a project notebook/logbook. The project notebooks will be checked periodically throughout the semester, as part of in-semester-evaluation. The student should submit a soft bound report at the end of the semester. The final product as a result of mini project should be demonstrated at the time of examination.

Textbooks	
1	Electronics Projects For Dummies, by by Earl Boysen and Nancy Muir, Published by Wiley Publishing, Inc., 2006
2	Make: Electronics, by Charles Platt, Published by Maker Media, 2015
3	
4	

References	
1	A. E. Ward, J.A.S. Angus, “Electronic Product Design”, Stanley Thrones (Publishers) Limited, 1996.
2	Paul Horowitz, Winfield Hill, “The Art of Electronics”, Cambridge University Press, 1989
3	
4	

Useful Links

CO-PO Mapping

	Programme Outcomes (PO)												**PSO**	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	3	3								2	2			2
CO2			3		2									
CO3			3		2						1		1	1
CO4		2							3	3				

The strength of mapping is to be written as 1,2,3; where, 1: Low, 2: Medium, 3: High
Each CO of the course must map to at least one PO, and preferably to only one PO.

Assessment

There are three components of lab assessment, LA1, LA2 and Lab ESE.
IMP: Lab ESE is a separate head of passing.(min 40 %), LA1+LA2 should be min 40%

Assessment	**Based on**	**Conducted by**	**Typical Schedule**	**Marks**
LA1	Lab activities, attendance, journal	Lab Course Faculty	During Week 1 to Week 8 Marks Submission at the end of Week 8	30

LA2	Lab activities, attendance, journal	Lab Course Faculty	During Week 9 to Week 16 Marks Submission at the end of Week 16	30
Lab ESE	Lab activities, journal/ performance	Lab Course Faculty and External Examiner as applicable	During Week 18 to Week 19 Marks Submission at the end of Week 19	40
Week 1 indicates starting week of a semester. Lab activities/Lab performance shall include performing experiments, mini-project, presentations, drawings, programming, and other suitable activities, as per the nature and requirement of the lab course. The experimental lab shall have typically 8-10 experiments and related activities if any.				

CO-PO Mapping						
	Programme Outcomes (PO)					
	1	2	3	4	5	6
CO1					2	
CO2				2		
CO3		2				
CO4					2	

Assessment

- The assessment is based on ESE. The panel of minimum two members from the department shall assess the student for the internship.
- The students are expected to present the work done in an internship tenure.
- The students shall also submit a detailed report based on activities done in an internship and learnings through the same.
- The students shall also submit the duly signed internship certificate from the organization/s where internship was done, clearly indicating the period of internship in the certificate.

Walchand College of Engineering, Sangli

(Government Aided Autonomous Institute)

AY 2025-26

Course Information

Programme	B. Tech. Electronics Engineering
Class, Semester	After Second Year
Course Code	7VSEN246
Course Name	Internship
Desired Requisites:	Courses taught in semester I and II

Teaching Scheme		**Examination Scheme (Marks)**			
Lecture	-	**LA1**	**LA2**	**ESE**	**Total**
Tutorial	-	30	30	40	100
Practical	4 Hrs./Week	**Credits: 2**			

Course Objectives

1	To expose the students to real life engineering problems encountered in industry/society.
2	To provide an opportunity to work in collaborative and multidisciplinary environment.

Course Outcomes (CO) with Bloom's Taxonomy Level

At the end of the course, the students will be able to,

CO	Description	Blooms Taxonomy	
		Descriptor	Level
CO1	***Perceive*** knowledge of group dynamics and contribute to multidisciplinary work.	Understand	II
CO2	***Demonstrate*** knowledge to solve societal problems and ***apply*** it for efficient management of projects independently and in teams.	Apply	III
CO3	***Communicate*** with industry/society regarding engineering activities effectively and ***comprehend*** and write effective reports.	Understand	II
CO4	***Demonstrate*** ethical behaviour with professional code of conduct and contribute to sustainable development of society.	Apply	III

Contents

The objective of this training is to expose the students to industry environment and practices. Students are sent to leading Engineering organizations/Research laboratories/Design and Consultancy organizations to undergo a rigorous training for a minimum period of **one month** during summer term/vacation.

Walchand College of Engineering, Sangli

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AY 2025-26

Course Information

Programme	B. Tech. (Electronics Engineering)
Class, Semester	After Third Year
Course Code	7VSEN352
Course Name	Real Time Operating System
Desired Requisites:	C programming, Embedded System Design

Teaching Scheme		**Examination Scheme (Marks)**			
Lecture	3 Hrs/week	**MSE**	**ISE**	**ESE**	**Total**
Tutorial		30	20	50	100
		Credits: 3 + 1= 4			

Course Objectives

1	To make students familiar with installation and use of the Linux/ Embedded Linux operating system.
2	To give exposure for Embedded Linux boards as per the industry trends
3	To explain /demonstrate services provided by RTOS and their usage
4	To illustrate/demonstrate how to design of applications using RTOS. (uCOS-II)

Course Outcomes (CO) with Bloom's Taxonomy Level

At the end of the course, the students will be able to,

CO1	Illustrate various OS, Linux commands, Embedded Linux Board and concepts of RTOS	Understand
CO2	Develop programs by applying the knowledge acquired in Linux/ RTOS	Apply
CO3	Design the tasks and their interactions by using appropria RTOS services for multitasking based (RTOS based) embedded system	Create
CO4	Implement Inter task communication using mailbox, semaphore, and Queue in RTOS	Apply

Module	**Module Contents**	**Hours**
I	Introduction to Operating System: Introduction to OS, Types of OS, Comparison of different OS, Linux Distributions, Linux architecture, Linux Kernel, File Systems, Shell utility, Installation and Configuration of Linux, Basic commands of Linux, Application programming in Linux, multifile programming	6
II	Introduction to Embedded Linux: Embedded Linux introduction, Why Embedded Linux? Linux vs. Embedded Linux, Components of Embedded Linux Systems, Embedded Linux Boot Flow Process, Embedded Linux Boards- Raspberry Pi /Beagle Bone, Raspberry Pi / Beagle Bone - OS installation and configuration, Facilities in Embedded Linux Boards used in Industry/Market	7
III	Introduction to Real-time OS and Real Time system contents RTOS Introduction, Foreground/Background Systems, Pre-emptive and Non-Pre-emptive Kernels, Priority inversion, Deadlock	7

List of Experiments / Lab Activities/Topics

IV	Task Management in RTOS: Task structure, RTOS initialization, Task stack, Task states and task state transitions. Creating and deleting a task, Task priority, Case studies of task-based applications.	7
V	Time and Event management in RTOS Clock tick, delaying a task, resuming the delayed task, getting system time, case study of application based on time management	7
VI	Intertask Communication in RTOS Need of Intertask communication, Semaphore, Mailbox, Queues in RTOS. Internals of RTOS for managing tasks and Intertask communication, Case study of RTOS applications.	6

Textbooks	
1	"MicroC OS II: The Real Time Kernel" Jean J. Labrosse, CMP books publication ISBN: 978-1578201037
2	"Mastering Embedded Linux Programming", Second Edition, Chris Simmonds.
3	"Simple Real-time Operating System: A Kernel," Chowdary Venkateswara Amazon, ISBN: 978-1425117825
4	"Real-Time Concepts for Embedded Systems," Qing Li, Caroline Yao Elsevier ISBN: 978-1578201240032

References	
1	https://www.engineersgarage.com/embedded-linux-tutorial-basics/
2	Exploring Raspberry Pi: Interfacing to the Real World with Embedded Linux" first Edition, Derek Molloy
3	https://freertos.org/Documentation/161204_Mastering_the_FreeRTOS_Real_Time_Kernel, A_Hands-On_Tutorial_Guide.pdf
4	www.micrium.com for uCOS-II related documents, tutorials, downloads.

Useful Links	
1	https://www.linux.org/.
2	www.nxp.com for processor specific documents
3	www.NPTEL.org for OS and RTOS related video courses
4	

CO-PO Mapping

	Programme Outcomes (PO)												**PSO**	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	3													
CO2		3												2
CO3			2											2
CO4														

The strength of mapping is to be written as 1: Low, 2: Medium, 3: High
Each CO of the course must map to at least one PO.

Assessment

The assessment is based on MSE, ISE and ESE.
MSE shall be typically on modules 1 to 3.
ISE shall be taken throughout the semester in the form of teacher's assessment. Mode of assessment can be field visit, assignments etc. and is expected to map at least one higher order PO.
ESE shall be on all modules with around 40% weightage on modules 1 to 3 and 60% weightage on modules 4 to 6.
For passing a theory course, Min. 40% marks in (MSE+ISE+ESE) are needed and Min. 40% marks in ESE are needed. (ESE shall be a separate head of passing)

List of Lab Activities:

1. Experiments to revise an Embedded System Design
2. Experiment to study Linux distribution installation, configuration and basic commands of it.
3. Experiment to study configuration for an Embedded Linux Board.
4. Experiment to access GPIO of an Embedded Linux Board to control components / devices interfaced to it.
5. Demonstration of RTOS based application in keil micro vision
6. Writing of RTOS based application.
7. Finding the type of kernel for a given RTOS (Pre-emptive or Non-pre-emptive)
8. Semaphore for managing shared resource and task synchronization
9. Demonstration of Clock tick and its effect of event timing in RTOS based systems.
10. Semaphore for event synchronization
11. Using mailbox facility in RTOS
12. Using queue facility in RTOS
13. Avoiding deadlock in RTOS

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Course Information

Programme	B. Tech. (Electronics Engineering)
Class, Semester	After Third Year
Course Code	7VSEN347
Course Name	Mini Project
Desired Requisites:	ECAD, ICA, Digital Signal Processing, Embedded System Design, Digital Signal Processing

Teaching Scheme		**Examination Scheme (Marks)**			
Practical	2 Hrs/ Week	**LA1**	**LA2**	**Lab ESE**	**Total**
Interaction	-	30	30	40	100
		Credits: 1			

Course Objectives

1	To provide students hands on experience on, troubleshooting, maintenance, fabrication, innovation, record keeping, documentation etc. thereby enhancing the skill and competency part of technical education.
2	To create an Industrial environment and culture within the institution.
3	To inculcate innovative thinking and practice based learning and thereby preparing students for their final year project.
4	To set up self-maintenance cell within departments to ensure optimal usage of infrastructure Facilities.

Course Outcomes (CO) with Bloom's Taxonomy Level

At the end of the course, the students will be able to,

CO1	Choose, Initiate and manage a minor project.	Understand
CO2	Propose research problem and present it in a clear and distinct manner through different oral, written and design techniques.	Apply
CO3	Construct the circuit using hardware and/or software.	Create
CO4	Execute the project and comment upon the results of it.	Analyze

List of Experiments / Lab Activities/ Topics

Mini Project Description:

A project group shall consist of normally 3 students per group. The mini project will involve the design, construction, and debugging of an electronic system approved by the department. Each student should conceive, design and develop the idea leading to a project/product. **The theme of the project should be related to electronics engineering discipline to be decided by the students based on the societal needs after an exhaustive survey.**

Each student must keep a project notebook/logbook. The project notebooks will be checked periodically throughout the semester, as part of in-semester-evaluation. The student should submit a soft bound report at the end of the semester. The final product as a result of mini project should be demonstrated at the time of examination.

Textbooks

1	Electronics Projects For Dummies, by by Earl Boysen and Nancy Muir, Published by Wiley Publishing, Inc., 2006
2	Make: Electronics, by Charles Platt, Published by Maker Media, 2015
3	
4	
References	
1	A. E. Ward, J.A.S. Angus, “Electronic Product Design”, Stanley Thrones (Publishers) Limited, 1996.
2	Paul Horowitz, Winfield Hill, “The Art of Electronics”, Cambridge University Press, 1989
3	
4	
Useful Links	
1	
2	
3	
4	

CO-PO Mapping

	Programme Outcomes (PO)												PSO	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	3	3								2	2			2
CO2			3		2									
CO3			3		2						1		1	1
CO4		2							3	3				

The strength of mapping is to be written as 1,2,3; where, 1: Low, 2: Medium, 3: High
Each CO of the course must map to at least one PO, and preferably to only one PO.

Assessment

There are three components of lab assessment, LA1, LA2 and Lab ESE.
IMP: Lab ESE is a separate head of passing.(min 40 %), LA1+LA2 should be min 40%

Assessment	Based on	Conducted by	Typical Schedule	Marks
LA1	Lab activities, attendance, journal	Lab Course Faculty	During Week 1 to Week 8 Marks Submission at the end of Week 8	30
LA2	Lab activities, attendance, journal	Lab Course Faculty	During Week 9 to Week 16 Marks Submission at the end of Week 16	30
Lab ESE	Lab activities, journal/ performance	Lab Course Faculty and External Examiner as applicable	During Week 18 to Week 19 Marks Submission at the end of Week 19	40

Week 1 indicates starting week of a semester. Lab activities/Lab performance shall include performing experiments, mini-project, presentations, drawings, programming, and other suitable activities, as per the nature and requirement of the lab course. The experimental lab shall have typically 8-10 experiments and related activities if any.

Walchand College of Engineering, Sangli

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Course Information

Programme	B. Tech (Electronics Engineering)
Class, Semester	After Third Year
Course Code	7VSEN348
Course Name	Internship
Desired Requisites:	Courses taught in semester I and II

Teaching Scheme		**Examination Scheme (Marks)**			
Lecture	-	**LA1**	**LA2**	**ESE**	**Total**
Tutorial	-	30	30	40	100
Practical	4 Hrs./Week	**Credits: 2**			

Course Objectives

1	To expose the students to real life engineering problems encountered in industry/society.
2	To provide an opportunity to work in collaborative and multidisciplinary environment.

Course Outcomes (CO) with Bloom's Taxonomy Level

At the end of the course, the students will be able to,

CO	Description	Blooms Taxonomy	
		Descriptor	Level
CO1	***Perceive*** knowledge of group dynamics and contribute to multidisciplinary work.	Understand	II
CO2	***Demonstrate*** knowledge to solve societal problems and ***apply*** it for efficient management of projects independently and in teams.	Apply	III
CO3	***Communicate*** with industry/society regarding engineering activities effectively and ***comprehend*** and write effective reports.	Understand	II
CO4	***Demonstrate*** ethical behaviour with professional code of conduct and contribute to sustainable development of society.	Apply	III

Contents

The objective of this training is to expose the students to industry environment and practices. Students are sent to leading Engineering organizations/Research laboratories/Design and Consultancy organizations to undergo a rigorous training for a minimum period of **one month** during summer term/vacation.

CO-PO Mapping

	Programme Outcomes (PO)					
	1	2	3	4	5	6
CO1					2	
CO2				2		
CO3		2				
CO4					2	

Assessment
○ The assessment is based on ESE. The panel of minimum two members from the department shall assess the student for the internship. ○ The students are expected to present the work done in an internship tenure. ○ The students shall also submit a detailed report based on activities done in an internship and learnings through the same. ○ The students shall also submit the duly signed internship certificate from the organization/s where internship was done, clearly indicating the period of internship in the certificate.

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AY 2024-25

Course Information

Programme	B.Tech. (Computer Science and Engineering)
Class, Semester	First Year B. Tech, Exit Course
Course Code	7VSCS153
Course Name	Object oriented programming
Desired Requisites:	C programming

Teaching Scheme		**Examination Scheme (Marks)**			
Lecture	2 Hrs/week	**LA1**	**LA2**	**ESE**	**Total**
Practical	4 Hrs/week	30	30	40	100
		Credits: 4			

Course Objectives

1	To provide in-depth coverage of object-oriented programming principles and techniques using C++ and Java.
2	To inculcate the advanced programming concepts in C++ and Java.
3	To use appropriate concepts of java programming such as collection, interface, exception handling, multi-threading, packages etc.
4	To infuse skills of integrating all components to build small java application for real world problem.

Course Outcomes (CO) with Bloom's Taxonomy Level

At the end of the course, the students will be able to,

CO	**Course Outcome Statement/s**	**Bloom's Taxonomy Level**	**Bloom's Taxonomy Description**
CO1	Summarize the concepts and usage principles of OOP.	II	Understanding
CO2	Develop the skills to apply concepts of OOP to solve small problems.	III	Applying
CO3	Investigate and evaluate different OOP languages to determine their suitability for specific software development projects.	IV	Analyzing
CO4	Design and create solution for real-life applications using OOP concepts.	VI	Creating

Module	**Module Contents**	**Hours**
I	**Introduction to object oriented programming** Introduction to properties of object oriented programming, Beginning with c++ programs, operators, control structures, loops, examples with class and objects, Functions in c++, function overloading, Constructors, Destructors, operator overloading, static class members.	6
II	**Properties of object oriented programming** Inheritance and its types, pointers, virtual functions, Polymorphism. File Handling, Exception Handling, Templates, and Namespace fundamentals.	5
III	**Fundamentals of Java** Features of Java, Java programming environment-jdk, jre, JVM, Java programming structure, class and object, Interface, Packages and access control mechanism. Exception handling	5
IV	**Collection Framework** Collection utility classes – list, set, map with their specific methods, File handling in java, Multithreading.	4

V	**Database connectivity** Introduction to JDBC, JDBC drivers and initialization, Creating connection and connecting to database, CRUD operations using JDBC	3
VI	**GUI Design** GUI design and Event handling using Swing	3

List of Lab Activities:

1. Program based on creating Class and Object.
2. Program based on constructor and destructor.
3. Program based on operator overloading.
4. Program based on Static class members.
5. Implementation of Inheritance.
6. Implementation of polymorphism.
7. Implementation of File handling.
8. Implementation of Exception handling.
9. Programs based on use of template, generic template and function.
10. Programs based on namespaces.
11. Installation of jdk package, understand the difference between jdk and jre folder, set environment variable PATH/CLASSPATH.
12. Implementation of Interface and Package.
13. Implementation of Exception Handling.
14. Implement collection utility classes – list, set, map with their specific methods available in interface or implemented class.
15. Implementation of Multithreading.
16. Implementation of database connectivity using JDBC.
17. Programs based on CRUD operations using JDBC.
18. GUI design and Event handling using Swing.

Textbooks

1	Herbert Schildt, "The Complete Reference: C++" Tata McGraw-Hill, 4th Edition, 2010.
2	E Balaguruswamy, "Object Oriented Programming with C++", Tata McGraw-Hill, 4th Edition, 2008.
3	Cay S. Horstmann, Gary Cornell "Core Java Fundamentals Volume –I" (The Sun Microsystems Press Java Series), 10th Edition, March 2016.
4	Cay S. Horstmann, Gary Cornell, "Core Java Volume – II" (The Sun Microsystems Press Java Series), 10th Edition, April 2017

References

1	Herbert Schildt, "Java Complete Reference", McGraw Hill Education, 10th Edition, November 2017
2	Kathy Sierra and Bert Bates, "Oracle Certified Associates JAVA Standard Edition 8 Programmer I Exam Guide", McGraw Hill Education (Oracle Press), May 2017
3	Kathy Sierra and Bert Bates, "Oracle Certified Associates JAVA Standard Edition 8 Programmer II Exam Guide", McGraw Hill Education (Oracle Press), July 2018
4	Stanley B. Lippman , "C++ Primer" Pearson , 4th Edition, Jan 2010.

Useful Links

1	https://onlinecourses.nptel.ac.in/noc21_cs32/announcements?force=true

CO-PO Mapping

	Programme Outcomes (PO)												PSO	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1			2										2	
CO2				3									2	2

CO3					3								2	2
CO4			3										2	2
The strength of mapping is to be written as 1: Low, 2: Medium, 3: High Each CO of the course must map to at least one PO.														

Assessment				
There are three components of lab assessment, LA1, LA2 and Lab ESE. IMP: Lab ESE is a separate head of passing (min 40 %), LA1+LA2 should be min 40%				
Assessment	**Based on**	**Conducted by**	**Typical Schedule**	**Marks**
LA1	Lab activities, attendance, journal	Lab Course Faculty	During Week 1 to Week 8 Marks Submission at the end of Week 8	30
LA2	Lab activities, attendance, journal	Lab Course Faculty	During Week 9 to Week 16 Marks Submission at the end of Week 16	30
Lab ESE	Lab activities, journal/ performance	Lab Course Faculty and External Examiner as applicable	During Week 18 to Week 19 Marks Submission at the end of Week 19	40
Week 1 indicates starting week of a semester. Lab activities/Lab performance shall include performing experiments, mini-project, presentations, drawings, programming, and other suitable activities, as per the nature and requirement of the lab course. The experimental lab shall have typically 8-10 experiments and related activities if any.				

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Course Information

Programme	B.Tech.
Class | Semester	First Year B. Tech., Exit course
Course Code	7VSCS154
Course Name	Python Programming
Desired Requisites:	Problem solving

Teaching Scheme		**Examination Scheme (Marks)**			
Practical	4 Hrs/ Week	**LA1**	**LA2**	**Lab ESE**	**Total**
Theory	2 Hrs/ Week	30	30	40	100
		Credits: 4			

Course Objectives

1	To inspire the learner's mind to think logically and arrive at a solution programmatically.
2	To inculcate the art of programming with Python as a language.
3	To acquaint learner with fundamental constructs and uses of Python.
4	To introduce some of the current advances in computing to motivate the enthusiastic learner to pursue further directions.

Course Outcomes (CO) with Bloom's Taxonomy Level

At the end of the course, the students will be able to,

CO	**Course Outcome Statement/s**	**Bloom's Taxonomy Level**	**Bloom's Taxonomy Description**
CO1	follow fundamental constructs such as data types, control statements, functions, module etc. in python.	II	Understanding
CO2	use various constructs in python for solving a problem.	III	Applying
CO3	examine performance of solution by adopting different ways to achieving same functionality.	IV	Analysing
CO4	estimate performance of programming solution in python for solving a given problem.	V	Evaluating
CO5	propose a programming solution for a given problem using python.	VI	Creating

List of Experiments / Lab Activities/Topics

List of Topics to be covered during lectures	**Hrs/ Week**
Module I: Python Programming: Writing and Executing Python Program, Variables, Keywords, Identifiers, Constants, Operators & Expressions, Operators, Data Types. **Decision Control Statements:** Conditional Statements: If, If-else, Nested If, If-elseif Statements. **Iterative Statements:** While Loop, For Loop, Do While Loop, Break, Continue, Pass.	**3**
Module II: Functions: Need, Definition, Call, Variable Scope, Return Statement, Lambda or Anonymous Function, Recursion. **Modules:** Definition, Introduction to packages in Python, Introduction to standard library modules. **Strings and Operations:** Concatenation, Appending, Multiplication and Slicing. Strings are Immutable, Strings Formatting Operator	**6**
Module III: File Handling: Introduction, File path, Types of files, Opening and Closing files, Reading and Writing files.	**3**
Module IV: Object Oriented Programming concepts: Abstraction, Encapsulation, Inheritance and Polymorphism. Implementing these concepts using python.	**6**
Module V: Data handling with python: Loading structured data, manipulating rows and columns, slicing and dicing, basic data visualizations. Loading and manipulating images.	**4**
Module VI: Case study: discussion and giving a full-fledged solution - Counting Candies, Count the words, Calculation of the Area (Problem statements are from NPTEL course)	**4**

List of Experiments:

1. Program to simulate simple calculator that performs basic tasks such as addition, subtraction, multiplication and division.
2. Program to accept the number and Compute a) Square root of number, b) Square of number, c) Cube of number d) Check for prime, d) factorial of number,
3. Program to accept a number from user and print digits of number in a reverse order.
4. Program to accept two numbers from user and compute smallest divisor and Greatest Common Divisor of these two numbers.
5. Program to find whether the number is positive / negative / zero using conditional statement.
6. Program to accept N numbers from user and compute and display maximum in list, minimum in list, sum and average of numbers.
7. Program to print the Fibonacci Series (with & without recursion).
8. Program to swap two number using function.
9. Program to accepts a string from user and perform following string operations, a) Calculate length of string, b) String reversal, c) Check palindrome,
10. Program to demonstrate different file handling functions.
11. Program to copy contents of one file to other.
12. Program to demonstrate OOP concepts.
13. Program to load a .csv file using pandas and performing following operations: filtering, summarizing, slicing and dicing.
14. Program to create basic visualizations from data.
15. Program to load images and manipulate them.
16. Case study implementation.

Textbooks	
1	Reema Thareja, "Python Programming Using Problem Solving Approach", Oxford University Press, ISBN 13: 978-0-19-948017-6.
2	R. Nageswara Rao, "Core Python Programming", Dreamtech Press; Second edition ISBN10: 938605230X, ISBN-13: 978-9386052308 ASIN: B07BFSR3LL.
References	
1	Maureen Spankle, "Problem Solving and Programming Concepts", Pearson; 9th edition, ISBN-10: 9780132492645, ISBN-13: 978-0132492645.
2	Romano Fabrizio, "Learning Python", Packt Publishing Limited, ISBN: 9781783551712, 1783551712.
3	Martin C. Brown, "Python: The Complete Reference", McGraw Hill Education, ISBN-10: 9789387572942, ISBN-13: 978-9387572942, ASIN: 9387572943.
4	Jeeva Jose, P. Sojan Lal, "Introduction to Computing & Problem Solving with Python", Khanna Computer Book Store; First edition, ISBN-10: 9789382609810, ISBN-13: 978-9382609810
Useful Links	
1	https://www.w3schools.com/python/
2	https://www.geeksforgeeks.org/python-programming-language/

CO-PO Mapping														
	Programme Outcomes (PO)												**PSO**	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	1	1	1										1	1
CO2	1	1	1		2								1	1
CO3	3	2	1	2	1				1			1	1	1
CO4	2	3	1	2	1				1			1		1
CO5	1	1	2	2	1				1			1		1

The strength of mapping is to be written as 1,2,3; where, 1: Low, 2: Medium, 3: High
Each CO of the course must map to at least one PO, and preferably to only one PO.

Assessment				
There are three components of lab assessment, LA1, LA2 and Lab ESE. IMP: Lab ESE is a separate head of passing.(min 40 %), LA1+LA2 should be min 40%				
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LA2	Lab activities, attendance, Submission	Lab Course Faculty	During Week 9 to Week 16 Marks Submission at the end of Week 16	30
Lab ESE	Lab activities/ submission/ performance	Lab Course Faculty and External Examiner as applicable	During Week 18 to Week 19 Marks Submission at the end of Week 19	40
Week 1 indicates starting week of a semester. Lab activities/Lab performance shall include performing experiments, mini-project, presentations, drawings, programming, and other suitable activities, as per the nature and requirement of the lab course. The experimental lab shall have typically 8-10 experiments and related activities if any.				

Walchand College of Engineering, Sangli

(Government Aided Autonomous Institute)

AY 2024-25

Course Information	
Programme	B.Tech. (Computer Science and Engineering)
Class, Semester	Second Year B. Tech, Exit Course
Course Code	7VSCS252
Course Name	Network Administration
Desired Requisites:	Computer Networks

Teaching Scheme		**Examination Scheme (Marks)**			
Lecture	02 Hrs/week	**LA1**	**LA2**	**ESE**	**Total**
Tutorial	-	30	30	40	100
Practical	04 Hrs/week	**Credits: 04**			

Course Objectives	
1	Develop a comprehensive understanding of networking concepts and principles.
2	Gain hands-on experience with network configuration, management, and troubleshooting.
3	Learn to design and implement secure network architectures.
4	Prepare for network administrator certification exams.

Course Outcomes (CO) with Bloom's Taxonomy Level

At the end of the course, the students will be able to,

CO	**Course Outcome Statement/s**	**Bloom's Taxonomy Level**	**Bloom's Taxonomy Description**
CO1	Explain the fundamental concepts and principles of networking, including network topologies, protocols, and models.	II	Understanding
CO2	Configure and manage network devices and IP addressing schemes to create efficient and secure network environments.	III	Applying
CO3	Diagnose and troubleshoot network issues using systematic methodologies and diagnostic tools.	IV	Analysing
CO4	Assess network security measures and design secure network architectures based on best practices and industry standards.	V	Evaluating

Module	**Module Contents**	**Hours**
I	**Introduction to Networking** Basics of Networking, Network Types and Topologies, OSI and TCP/IP Models, Networking Protocols and Standards, Network Devices (Routers, Switches, Hubs, etc.)	4
II	**Network Design and Architecture** Network Design Principles, IP Addressing and Subnetting, VLANs and Trunking, WAN Technologies, Network Documentation and Diagrams	5
III	**Network Security** Network Security Fundamentals, Firewalls and VPNs, Intrusion Detection and Prevention Systems (IDS/IPS), Security Policies and Best Practices, Wireless Network Security	4
IV	**Network Administration and Management** Network Operating Systems, User and Group Management, Network Monitoring Tools and Techniques, Backup and Recovery Strategies, Performance Tuning and Optimization	4
V	**Troubleshooting and Maintenance** Network Troubleshooting Methodologies, Common Network Issues and Solutions, Hardware and Software Diagnostic Tools, Network Maintenance Procedures, Incident Response and Reporting	5

VI	**Advanced Networking Concepts** Cloud Networking and Virtualization, IPv6 and Transition Mechanisms, Network Automation and Scripting, Software-Defined Networking (SDN), Future Trends in Networking	4

List of Experiments

1. Network Device Configuration (Connect and configure a router and switch, assign IP addresses, and verify connectivity using ping and traceroute commands.)
2. Exploring Network Protocols (Use Wireshark to capture network traffic, identify different protocol packets, and analyse their headers and payloads.)
3. IP Addressing and Subnetting (Calculate subnet masks, create subnets, assign IP addresses, and verify using subnetting tools.)
4. VLAN Configuration (Create multiple VLANs, assign ports to VLANs, configure trunk ports, and verify VLAN communication.)
5. Configuring a Firewall (Set up a firewall, configure inbound and outbound rules, and test the effectiveness of the rules using different traffic scenarios.)
6. VPN Setup (Configure VPN settings on routers or dedicated VPN devices, establish a connection, and verify secure data transmission.)
7. Network Monitoring with SNMP (Configure SNMP on network devices, use a network monitoring tool to collect data, and analyse the performance metrics.)
8. User and Group Management (Create and manage user accounts, assign users to groups, set permissions, and test access control.)
9. Network Troubleshooting with Ping and Traceroute (Simulate network issues, use ping and traceroute commands to identify problems, and document the troubleshooting steps.)
10. Using Network Diagnostic Tools (Use tools like Nmap, Netstat, and ipconfig/ifconfig to gather network information and troubleshoot common issues.)
11. Cloud Network Configuration (Use a cloud platform (e.g., AWS, Azure) to create a virtual network, configure subnets, and establish connectivity between virtual machines.)
12. IPv6 Configuration (Configure IPv6 addresses on network devices, set up dual-stack environments, and test IPv6 connectivity.)
13. Network Automation with Scripting (Write scripts using Python or Bash to automate network configuration, deploy the scripts on network devices, and verify the automated setup.)

Textbooks

1	Computer Networking: A Top-Down Approach" by James F. Kurose and Keith W. Ross
2	Network Warrior" by Gary A. Donahue
3	Network Security Essentials: Applications and Standards" by William Stallings

References

1	TCP/IP Illustrated, Volume 1: The Protocols" by W. Richard Stevens
2	Network Troubleshooting Tools" by Joseph D. Sloan

Useful Links

1	https://www.youtube.com/watch?v=rcv55BikicY&list=PLZURQ_XyXLwDBCD6BtfRP-Bc9DM4_U1Om
2	https://www.youtube.com/watch?v=lb1Dw0elw0Q&list=PLR0bgGon_WTK9PHDzrlje4bqEh3p0NxxX

CO-PO Mapping

	Programme Outcomes (PO)												PSO	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	2	1											1	
CO2	3	2	1	2	2								1	
CO3			1	2	2								1	
CO4			1	1									1	

The strength of mapping is to be written as 1: Low, 2: Medium, 3: High

Each CO of the course must map to at least one PO.

Assessment
The assessment is based on MSE, ISE and ESE. MSE shall be typically on modules 1 to 3. ISE shall be taken throughout the semester in the form of teacher's assessment. Mode of assessment can be field visit, assignments etc. and is expected to map at least one higher order PO. ESE shall be on all modules with around 40% weightage on modules 1 to 3 and 60% weightage on modules 4 to 6. For passing a theory course, Min. 40% marks in (MSE+ISE+ESE) are needed and Min. 40% marks in ESE are needed. (ESE shall be a separate head of passing)

Walchand College of Engineering, Sangli

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AY 2024-25

Course Information	
Programme	B.Tech. (Computer Science Engineering)
Class, Semester	Second Year B. Tech., Exit Course
Course Code	7VSCS253
Course Name	Data Centre Essentials
Desired Requisites:	

Teaching Scheme		**Examination Scheme (Marks)**			
Lecture	2 Hrs/ week	**LA1**	**LA2**	**Lab ESE**	**Total**
Practical	4 Hrs/ week	30	30	40	100
Interaction		**Credits: 4**			

Course Objectives	
1	Understanding Data Storage Technologies and Concepts
2	Mastering Database Fundamentals and Query Languages
3	Implementing and Managing Data Center Operations
4	Exploring Advanced Data Center Concepts and Virtualization

Course Outcomes (CO) with Bloom's Taxonomy Level

At the end of the course, the students will be able to,

CO	**Course Outcome Statement/s**	**Bloom's Taxonomy Level**	**Bloom's Taxonomy Description**
CO1	Demonstrate the use of different storage technologies in practical scenarios.	III	Applying
CO2	Write SQL queries to create, read, update, and delete database records.	III	Applying
CO3	Configure basic network setups for data centers using appropriate tools and equipment.	III	Applying
CO4	Compare traditional data centers with cloud data centers in terms of scalability and cost-efficiency.	IV	Analysing

Module	**Module Contents**	**Hours**
I	**DATA STORAGE BASICS** Computer Data Storage | Overview, Memory & Function, what is Data Storage? - Definition & Technologies, Data Storage Units | Kilobytes, Megabytes, Gigabytes & Terabytes, History of Data Storage: Hard Drives, Memory & Disks, Data Storage | Definition, Types & Examples, what is Online Data Storage? What is Cloud Data Storage? - Definition & Methods	**3**
II	**DATABASE BASICS** Database Terminology | Definition, Table & Examples, Database Query: Definition & Tools, Database Record | Meaning & Examples , Storing Hierarchical Data in a Database	**3**
III	**MANGING DATA IN DATABASE** Introduction to SQL, SQL Languages, DDL, DML, DCL, TCL, DQL.	**5**
IV	**DATABASE STRUCTURE** Relational Database: Model & Example, Designing a Relational Database: ,Tutorial & Overview , Flat File Database | Meaning, Uses & Example, Flat File vs. Relational Database | Definition & Uses, Hierarchical Database: Model & Definition, Hierarchical Database vs. Relational Database, What are Subject Databases? - Definition & Types, Design for Databases & SQL, What is a Database Schema? - Example & Definition, What is a Database Index? - Definition & Tutorial, Database Table: Design & Conventions, Database Fields: Definition & Types, Database Objects Definition, Examples & Uses, What is an Attribute in a Database?, What is an Entity in a Database?	**4**

V	**DATA CENTRE BASICS** What is a Data Center? - Definition & Overview, Data Center vs Cloud, What is a Cloud Data Center?, Data Center Architecture, Data Center , Design: Best Practices & Standards, Data Center Security Design, Data Center: Best Practices & Strategy, What are Data Center Operations?, What is a Data Recovery Center?, Data Center Monitoring: Software & Tools, Data Centers: Metrics & Standards, Software Defined Data Center, Data Center Terminology	**4**
VI	**UNDERSTANDING DATA CENTER** Data Center Tier Levels: Standards & Classification, Tier 1 & 2 Data Centers, What is a Tier 3 Data Center? - Definition & Requirements, What is a Tier 4 Data Center? - Requirements & Design , Data Center Tier Levels Comparison, Data Center Consolidation: Benefits & Best Practices, Data Center Consolidation: Plan & Strategy, Data Center Virtualization | Definition, Advantages & Example, What is a Virtual Data Center? , Visual Data Center Architecture, Data Center Security Levels, Data Center Security: Standards, Best Practices & Requirements, Data Center Network: Design & Architecture, Data Center Migration: Project Plan, Checklist & Steps, Data Center Migration Strategy & Tools, Data Center Risk Assessment: Checklist & Questionnaire, Data Center Automation Data Center Bridging	**3**

List of Experiments / Lab Activities/Topics

List of Lab Activities:

Data Storage Basics

1. Experiment: Comparing Data Storage Technologies
2. Experiment: Calculating Data Storage Requirements
3. Experiment: Understanding Data Storage Units
4. Experiment: Creating and Managing Database Tables
5. Experiment: Writing Basic SQL Queries
6. Experiment: Database Record Insertion and Retrieval

Managing Data in Database

7. Experiment: Exploring SQL DDL Commands
8. Experiment: Using SQL DML Commands
9. Experiment: Implementing SQL DCL Commands

Database Structure

10. Experiment: Designing a Relational Database
11. Experiment: Comparing Flat File and Relational Databases
12. Experiment: Creating and Using Database Indexes

Data Center Basics

13. Experiment: Exploring Data Center Components
14. Experiment: Setting Up a Basic Data Center Network
15. Experiment: Data Center Monitoring Tools

Understanding Data Center

16. Experiment: Data Center Tier Level Assessment
17. Experiment: Data Center Consolidation Strategy
18. Experiment: Implementing Data Center Virtualization

Advanced Data Center Experiments

19. Experiment: Data Center Security Implementation
20. Experiment: Data Center Migration Planning
21. Experiment: Data Center Automation Tools
22. Experiment: Data Center Risk Assessment
23. Experiment: Understanding Software-Defined Data Centers
24. Experiment: Data Center Network Design

Textbooks

1	"Understanding Data Storage: An Introduction to Storage Devices and Data Processing" by David R. Brooks
2	"Database System Concepts" by Abraham Silberschatz, Henry F. Korth, and S. Sudarshan
3	"SQL: The Complete Reference" by James R. Groff and Paul N. Weinberg

References	
1	"The Data Warehouse Toolkit: The Definitive Guide to Dimensional Modeling" by Ralph Kimball and Margy Ross
2	"The Data Center Builder's Bible: Defining, Designing, and Deploying Data Centers" by Art Carapola
3	"Data Center Virtualization Fundamentals: Understanding Techniques and Designs for Highly Efficient Data Centers with Cisco Nexus, UCS, MDS, and Beyond" by Gustavo A. A. Santana
Useful Links	
2	https://study.com/academy/lesson/data-center-network-management.html
3	

CO-PO Mapping														
	Programme Outcomes (PO)												PSO	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	3												2	1
CO2		3												
CO3			3											
CO4				3										
The strength of mapping is to be written as 1,2,3; where, 1: Low, 2: Medium, 3: High Each CO of the course must map to at least one PO, and preferably to only one PO.														

Assessment				
There are three components of lab assessment, LA1, LA2 and Lab ESE. IMP: Lab ESE is a separate head of passing (min 40 %), LA1+LA2 should be min 40%				
Assessment	**Based on**	**Conducted by**	**Typical Schedule**	**Marks**
LA1	Lab activities, attendance, journal	Lab Course Faculty	During Week 1 to Week 8 Marks Submission at the end of Week 8	30
LA2	Lab activities, attendance, journal	Lab Course Faculty	During Week 9 to Week 16 Marks Submission at the end of Week 16	30
Lab ESE	Lab activities, journal/ performance	Lab Course Faculty and External Examiner as applicable	During Week 18 to Week 19 Marks Submission at the end of Week 19	40
Week 1 indicates starting week of a semester. Lab activities/Lab performance shall include performing experiments, mini-project, presentations, drawings, programming, and other suitable activities, as per the nature and requirement of the lab course. The experimental lab shall have typically 8-10 experiments and related activities if any.				

Walchand College of Engineering, Sangli

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AY 2024-25

Course Information

Programme	B.Tech. (Information Technology)
Class, Semester	Second Year IT Exit Course
Course Code	
Course Name	Advance Java Programming
Desired Requisites:	Java Programming

Teaching Scheme		**Examination Scheme (Marks)**			
Lecture	2 Hrs/week	**ISE**	**MSE**	**ESE**	**Total**
Tutorial	-	20	30	50	100
Practical	-				
Interaction	-	**Credits: 2**			

Course Objectives

1	To introduce the Java Applets
2	To inculcate the Java Servlets API to develop web page
3	To familiarize with JSP

Course Outcomes (CO) with Bloom's Taxonomy Level

At the end of the course, the students will be able to,

CO1	Illustrate the Java Applet programming	Apply
CO2	Apply event handling concepts in Java Applet	Apply
CO3	Explain the concepts of Java Servlets API	Analyse
CO4	Design client server application using JSP	Create

Module	Module Contents	Hours
I	**Module 1: Introduction to Java Applet** Applet, Applet Basics & Features, Graphics in Applets, Work with Images, Work with Animation	4
II	**Module 2: Even Handlin in Java Applet** Event Handling, JApplet Class, Painting in Applet, Applet Analog Clock, Applet Digital Clock, Applet's Parameter, Applet's Communications	4
III	**Module 3: Introduction to Java Servlets** Basics of Servlets, Different ways to create Servlets, Servlet Life Cycle, Servlets Configuration in web.xml file	4
IV	**Module 4: Java Servlets API** Packages, Interfaces, Classes, Adaptor Design Pattern, Servlet Config	7
V	**Module 5: Introduction to JSP** Basics of JSP, Features of JSP, Advantages of JSP, JSP Life Cycle	4
VI	**Module 6: Java Servers** Apache Tomcat Server, Installation, Changing Port Number, User Name, Password of Apache Tomcat Server, Tomcat Folder Architecture	3

Text Books

1	A. A. Puntambekar, "Advanced Java Programming", 1st Edition, Technical

	Publications, 2021
2	Andriy Redko, "Preparing you for Java Mastery", 3rd Edition, ava Code Geeks Publications
References	
1	Herbert Schildt, "*Java: The Complete Reference*", McGraw Hill Education, 9th Edition, 2014
2	E. Balguruswamy, "*Programming with Java: A Primer*", McGraw Hill Education, 5th Edition, 2014
Useful Links	
1	https://enos.itcollege.ee/~jpoial/allalaadimised/reading/Advanced-java.pdf
2	https://www.coursera.org/learn/advanced-java

CO-PO Mapping

	Programme Outcomes (PO)												**PSO**	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	3												1	2
CO2	2	2	2		2								2	
CO3	2	1	1		3									3
CO4	1	2			2								3	

The strength of mapping is to be written as 1,2,3; Where, 1: Low, 2: Medium, 3: High

Each CO of the course must map to at least one PO.

Assessment (for Theory Course)

The assessment is based on MSE, ISE and ESE.

MSE shall be typically on modules 1 to 3.

ISE shall be taken throughout the semester in the form of teacher's assessment. Mode of assessment can be field visit, assignments etc. and is expected to map at least one higher order PO.

ESE shall be on all modules with around 40% weightage on modules 1 to 3 and 60% weightage on modules 4 to 6.

For passing a theory course, Min. 40% marks in (MSE+ISE+ESE) are needed and Min. 40% marks in ESE are needed. (ESE shall be a separate head of passing)

Walchand College of Engineering, Sangli

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AY 2024-25

Course Information

Programme	B.Tech. (Information Technology)
Class, Semester	Second Year IT Exit Course
Course Code	
Course Name	Mobile Application Development
Desired Requisites:	Android Programming

Teaching Scheme		**Examination Scheme (Marks)**			
Lecture	3 Hrs/week	**ISE**	**MSE**	**ESE**	**Total**
Tutorial	-	20	30	50	100
Practical	-				
Interaction	-	**Credits: 2**			

Course Objectives

1	To familiarize Android APIs for mobile application development
2	To introduce basics of iOS application development environment
3	To inculcate working knowledge of Basic Controls, View Controllers

Course Outcomes (CO) with Bloom's Taxonomy Level

At the end of the course, the students will be able to,

CO1	Identify various mobile application development platforms	Applying
CO2	Utilize android APIs to develop prototyping and mobile interfaces	Applying
CO3	Explain basics of ios development platform	Analysing
CO4	Compose mobile application using ios development platform	Creating

Module	Module Contents	Hours
I	**Module 1: Android APIs** Common Android APIs: Using Android Data and Storage APIs, Managing data using Sqlite, Sharing Data between Applications with Content Providers, Using Android Networking APIs, Using Android Web APIs	6
II	**Module 2:** iOS Platforms and Tools Introduction to iOS Platform, iOS Devices and the Apple Developer Tools, UI Guidelines to IOS, Introduction to Xcode and the iOS Simulator,	7
III	**Module 3: ios Life Cycle and Framework** Exploring the iOS Technology Layers, iOS Application Life Cycle, Foundation Framework, iOS Coding Standards.	6
IV	**Module 4: Interface Builder for ios** Introduction to Interface Builder and Storyboard, Creating User Interfaces, Auto layout, Customizing the Interface Appearance, Connecting to Code, Outlets and Actions	7
V	**Module 5: Basic Controls** Protocols and Delegates, Working with labels, Basic User Input and Output Using Text Fields, Text Views, Buttons, Image Views, Animation, Sliders, Steppers, Search Box, Switches and Segmented Controls.	6
VI	**Module 6: View Controllers** Web Views, Scrolling Views, Alert Controllers, System Sound Services, Vibrations, Tables and Split View Controllers and Collection View	7

Text Books	
1	Matt Neuberg, "iOS 11 Programming Fundamentals with Swift, O□Reilly, 2017
2	Serhan Yamacli , "Beginner's Guide to IOS 11 App Development Using Swift",1st edition, 2017
References	
1	Reto Meier, "Professional Android 2 Application Development", 1st Edition, Wrox, 2010
2	Web Reference: https://developer.apple.com/
Useful Links	
1	https://developer.android.com
2	https://nptel.ac.in/courses/106106147
3	https://www.sourcekode.in/ios-8-swift-programming-training-institute.php

CO-PO Mapping

	Programme Outcomes (PO)												PSO	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	2	1	2		1								1	1
CO2	1	3			2				2				2	
CO3	3	2	2		2			1			1			2
CO4	2				3				2			2	3	2

The strength of mapping is to be written as 1,2,3; Where, 1: Low, 2: Medium, 3: High

Each CO of the course must map to at least one PO.

Assessment (for Theory Course)

The assessment is based on MSE, ISE and ESE.

MSE shall be typically on modules 1 to 3.

ISE shall be taken throughout the semester in the form of teacher's assessment. Mode of assessment can be field visit, assignments etc. and is expected to map at least one higher order PO.

ESE shall be on all modules with around 40% weightage on modules 1 to 3 and 60% weightage on modules 4 to 6.

For passing a theory course, Min. 40% marks in (MSE+ISE+ESE) are needed and Min. 40% marks in ESE are needed. (ESE shall be a separate head of passing)

Walchand College of Engineering, Sangli

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AY 2024-25

Course Information	
Programme	B.Tech. (Information Technology)
Class, Semester	Second Year IT Exit Course
Course Code	
Course Name	Python for Application Development
Desired Requisites:	Python Programming

Teaching Scheme		**Examination Scheme (Marks)**			
Lecture	2 Hrs/week	**ISE**	**MSE**	**ESE**	**Total**
Tutorial	-	20	30	50	100
Practical	-				
Interaction	-	**Credits: 2**			

Course Objectives	
1	To familiarize Packages, Data Analysis and Web Scrapping
2	To establish connection with database
3	To create web applications using Python

Course Outcomes (CO) with Bloom's Taxonomy Level		
At the end of the course, the students will be able to,		
CO1	Discuss Packages and Data Analysis in Python	Understanding
CO2	Identify various python APIs to retrieve data from multiple sources	Applying
CO3	Use appropriate tools for web scrapping	Analysing
CO4	Create an web application with the support of graphics in Python	Creating

Module	**Module Contents**	**Hours**
I	**Module 1: Packages & Data Analysis** Creating packages, NumPy, Pandas, Matplotlib, Regex in Python, Files in Python	4
II	**Module 2: Web Scraping** Web Scraping in Python, Web Structures, Scraping data using Beautiful Soup, scraping static websites, Scraping dynamic websites using Beautifulsoup	4
III	**Module 3: Database Access** Accessing Database using MySql, Creating tables, Insert Values, Commit changes, Query, Update and Delete	4
IV	**Module 4: Python APIs** Introduction to APIs, Accessing Public APIs, Case Study: Retrieve data from various websites	7
V	**Module 5: Python for Web Development** Introduction to Python Web Framework Flask, Installing Flask, GET, POST, PUT, METHODS using the Python Flask Framework, Templates, render_template function	4
VI	**Module 6: Working on Data Analysis** Introduction and Working on Numpy-Multidimensional Arrays, Working on Pandas – EDA Process, Data Visualization	3

Text Books	
1	R. Nageswara Rao, □*Core Python Programming*□, Dreamtech Press, 2nd Edition, 2017
2	Chun, J Wesley, □*Core Python Programming*□, Pearson, 2nd Edition, 2007 Reprint 2010
References	
1	Fabrizio Romano, "Learn Web Development with Python", 1st Edition, Packt Publishing, 2018
Useful Links	
1	https://codegnan.com/blogs/python-course-syllabus/
2	https://onlinecourses.nptel.ac.in/noc24_cs45/preview

CO-PO Mapping

	Programme Outcomes (PO)												PSO	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	3	2												1
CO2	1	2											2	
CO3	2		2		3								2	
CO4		2			2									3

The strength of mapping is to be written as 1,2,3; Where, 1: Low, 2: Medium, 3: High

Each CO of the course must map to at least one PO.

Assessment (for Theory Course)

The assessment is based on MSE, ISE and ESE.

MSE shall be typically on modules 1 to 3.

ISE shall be taken throughout the semester in the form of teacher's assessment. Mode of assessment can be field visit, assignments etc. and is expected to map at least one higher order PO.

ESE shall be on all modules with around 40% weightage on modules 1 to 3 and 60% weightage on modules 4 to 6.

For passing a theory course, Min. 40% marks in (MSE+ISE+ESE) are needed and Min. 40% marks in ESE are needed. (ESE shall be a separate head of passing)

Walchand College of Engineering, Sangli
(Government Aided Autonomous Institute)

AY 2024-25

Course Information

Programme	B.Tech. (Information Technology)
Class, Semester	Second Year Exit Course
Course Code	
Course Name	Mobile App Development and Python Lab
Desired Requisites:	

Teaching Scheme		**Examination Scheme (Marks)**			
Practical	2 Hrs/ Week	**LA1**	**LA2**	**Lab ESE**	**Total**
Interaction	-	30	30	40	100
		Credits: 1			

Course Objectives

1	To demonstrate iOS application development platform
2	To illustrate Basic Controls and View Controllers in ios
3	To familiarize Packages, Data Analysis and Web Scrapping

Course Outcomes (CO) with Bloom's Taxonomy Level

At the end of the course, the students will be able to,

CO	Course Outcome Statement/s	Bloom's Taxonomy Level	Bloom's Taxonomy Description
CO1	Use android APIs to develop prototyping and mobile interfaces	III	Applying
CO2	Demonstrate web scrapping tools	III	Applying
CO3	Create an web application with the support of graphics in Python	VI	Creating
CO4	Create mobile application using ios development platform	VI	Creating

List of Experiments / Lab Activities/Topics

List of Lab Activities:

1. Use android APIs for managing data and interfaces
2. Debugging and troubleshooting the iOS apps using Xcode and Xcode tools
3. Profiling and performance optimization of iOS apps using XCode tools and Instruments for speed, memory, battery/power, network
4. Implement Basic Controls: Text Views, Buttons, Image Views, Animation, Sliders, Steppers, Search Box, Switches and Segmented Controls
5. Implement view controller: Web Views, Scrolling Views, Alert Controllers, System Sound Services, Vibrations
6. Implement Web Scraping Dynamic Website with multiple pages along with Data Analysis
7. Implement Sending automated email messages in Python, including text messages, photos, and important files
8. Implement Building a Virtual Assistant with Frontend Interface
9. Assess Public Weather APIs and People in Space API
10. Implment any Hackerrank use cases and solving level-by-level challenges in Python

Textbooks

1	Matt Neuberg, "iOS 11 Programming Fundamentals with Swift, O□Reilly, 2017
2	R. Nageswara Rao, □Core Python Programming, Dreamtech Press, 2nd Edition, 2017

References

1	Fabrizio Romano, "Learn Web Development with Python", 1st Edition, Packt Publishing, 2018

2	https://onlinecourses.nptel.ac.in/noc24_cs45/preview
Useful Links	
1	https://codegnan.com/blogs/python-course-syllabus/
2	Web Reference: https://developer.apple.com/

CO-PO Mapping														
	Programme Outcomes (PO)												**PSO**	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	1		1	1									3	
CO2		3		2	3									1
CO3			2		2								2	
CO4	1	2		3	2									3
The strength of mapping is to be written as 1,2,3; where, 1: Low, 2: Medium, 3: High Each CO of the course must map to at least one PO, and preferably to only one PO.														

Assessment				
There are three components of lab assessment, LA1, LA2 and Lab ESE. IMP: Lab ESE is a separate head of passing.(min 40 %), LA1+LA2 should be min 40%				
Assessment	**Based on**	**Conducted by**	**Typical Schedule**	**Marks**
LA1	Lab activities, attendance, journal	Lab Course Faculty	During Week 1 to Week 8 Marks Submission at the end of Week 8	30
LA2	Lab activities, attendance, journal	Lab Course Faculty	During Week 9 to Week 16 Marks Submission at the end of Week 16	30
Lab ESE	Lab activities, journal/ performance	Lab Course Faculty and External Examiner as applicable	During Week 18 to Week 19 Marks Submission at the end of Week 19	40
Week 1 indicates starting week of a semester. Lab activities/Lab performance shall include performing experiments, mini-project, presentations, drawings, programming, and other suitable activities, as per the nature and requirement of the lab course. The experimental lab shall have typically 8-10 experiments and related activities if any.				

Walchand College of Engineering, Sangli

(Government Aided Autonomous Institute)

AY 2025-26

Course Information	
Programme	B.Tech. (Information Technology)
Class, Semester	Third Year B. Tech., (Exit Course)
Course Code	
Course Name	Advance Web Technologies
Desired Requisites:	Web Technologies

Teaching Scheme		**Examination Scheme (Marks)**			
Lecture	3 Hrs/week	**ISE**	**MSE**	**ESE**	**Total**
Tutorial	-	20	30	50	100
		Credits: 3			

Course Objectives

1	To introduce advanced client-side and server-side web development techniques.
2	To impart front-end and back-end technologies with databases using industry best practices
3	To develop interactive, dynamic, and secure web applications using modern web technologies and frameworks.

Course Outcomes (CO) with Bloom's Taxonomy Level

At the end of the course, the students will be able to,

CO	**Course Outcome Statement/s**	**Bloom's Taxonomy Level**	**Bloom's Taxonomy Description**
CO1	Design and develop responsive and interactive websites using HTML5, CSS3, and JavaScript	III	Applying
CO2	Apply front-end frameworks for modular web applications	III	Applying
CO3	Study version control and collaborative tools for web application development	III	Analyzing
CO4	Design and develop interactive, dynamic, and secure web application	VI	Creating

Module	**Module Contents**	**Hours**
I	**Advanced Front-End Development** HTML5 semantic structure, CSS3 Flexbox, Grid, animations, transitions, JavaScript ES6+: arrow functions, classes, destructuring, modules, event handling	6
II	**Front-End Framework** Single Page Applications, Component-based architecture, Props, state, and lifecycle methods (React), Routing and forms State management	6

III	**Server-Side Technologies** Node.js with Express / Python with Django or Flask / PHP, RESTful API development, Middleware and routing, User authentication	7
IV	**Database Integration** Relational Database, NoSQL Database (MongoDB/Firebase): schema-less data, embedded documents, Data validation and error handling	6
V	**Asynchronous Web Communication and External Services** Introduction to client-server interaction using HTTP requests, Data interchange formats: JSON, XML, Integration of third-party services and external APIs, event-driven web updates	7
VI	**Web Security, Deployment & DevOps** Secure coding practices, HTTPS, SSL, and secure authentication, Version control using Git & GitHub, Continuous Integration/Deployment (CI/CD), Cloud Deployment	6

Textbooks	
1	Jon Duckett, "HTML and CSS: Design and Build Websites", Wiley, 3rd Edition, 2023
2	Noel Rappin,"Modern Front-End Development for Rails", Pragmatic Bookshelf, 2nd Edition, 2023
References	
1	Dawn Griffiths, David Griffiths, ""Head First Android Development: A Brain-Friendly Guide" O'Reilly Media, 2nd Edition, 2021
Useful Links	
1	https://archive.nptel.ac.in/courses/106/106/106106156/
2	https://nptel.ac.in/courses/106106147

CO-PO Mapping

	Programme Outcomes (PO)												PSO	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	3	3			3									
CO2	2			1				2			2	1	3	
CO3	1	2			2				1					1
CO4	2		2		3					2		2	2	3

The strength of mapping is to be written as 1: Low, 2: Medium, 3: High

Each CO of the course must map to at least one PO.

Assessment

The assessment is based on MSE, ISE and ESE.

MSE shall be typically on modules 1 to 3.

ISE shall be taken throughout the semester in the form of teacher's assessment. Mode of assessment can be field visit, assignments etc. and is expected to map at least one higher order PO.

ESE shall be on all modules with around 40% weightage on modules 1 to 3 and 60% weightage on modules 4 to 6.

For passing a theory course, Min. 40% marks in (MSE+ISE+ESE) are needed and Min. 40% marks in ESE are needed. (ESE shall be a separate head of passing)

Walchand College of Engineering, Sangli

(Government Aided Autonomous Institute)

AY 2025-26

Course Information	
Programme	B.Tech. (Information Technology)
Class, Semester	Third Year B. Tech., (Exit Course)
Course Code	
Course Name	Web Database
Desired Requisites:	Fundaments of Information Technology, Programming Basics

Teaching Scheme		**Examination Scheme (Marks)**			
Lecture	3 Hrs/week	**ISE**	**MSE**	**ESE**	**Total**
Tutorial	-	20	30	50	100
		Credits: 3			

Course Objectives	
1	To introduce basic concepts of database management systems
2	To impart conceptual designs for databases and working with SQL
3	To develop simple web form using web technologies

Course Outcomes (CO) with Bloom's Taxonomy Level

At the end of the course, the students will be able to,

CO	**Course Outcome Statement/s**	**Bloom's Taxonomy Level**	**Bloom's Taxonomy Description**
CO1	Summarize the relational database system	II	Understanding
CO2	Determine the use of basics of HTML and CSS styles	II	Understanding
CO3	Execute databases using Query languages	III	Applying
CO4	Implement Web Forms and web pages using front end technologies	III	Applying
CO5	Construct a simple web application with database connectivity	IV	Analysing

Module	**Module Contents**	**Hours**

I	**Introduction of database system and relation model**: Database Systems, view of data, Database design, Data abstraction, Data Models, Architecture of Database Systems, Entity-Relationship Model Relational model: Structure of Relational Databases, database schema, keys,	6
II	**Integrity Constraints and Design**: Domain Constraints, Referential Integrity, Normal forms, Functional Dependencies Features of Good Relational Designs, Database Decomposition	6
III	**Structured Query Language (SQL):** Overview of the SQL Query Language, SQL Data Definition, Basic Structure of SQL Queries, Additional Basic Operations, Set Operations, Aggregate Functions	7
IV	**HTML and CSS Basics:** Creating simple HTML Page with Headings, Paragraphs, Lists, working with Hyperlinks, tables, DIVs, Introduction to CSS styles, Styling HTML elements: text, colour, background, borders, creating layouts using CSS positioning and floats	6
V	**Introduction to JavaScript and Document Object Model (DOM):** Basics of JavaScript Programming language, variables, Data Types, Operators, JavaScript's Functions and control structures DOM and its significance, Manipulating HTML Elements using JavaScript, Handling Events and User Interaction	7
VI	**Web Forms and Data validation:** HTML form Attributes, Form Elements, Input Types, Input Attributes, Creating HTML Forms for user input, Form Handling using JavaScript, server side scripting, Building a simple server side application	6
Textbooks		
1	Abraham Silberschatz, Henry F. Korth, and S. Sudarshan, "*Database System Concepts*", McGraw-Hill Education, 6th Edition, 2010.	
2	Raghu Ramakrishnan, "*Database Management Systems*", McGraw-Hill Education, 3rd Edition, 2003	
3	Web Technology: Theory and Practice by M. Srinivasan, Pearson India, Released June 2012	
References		
1	C.J.Date, A.Kannan, S.Swamynathan, "*An Introduction to Database Systems*", Pearson Education, 8th Edition, 2006	
2	Achyut Godbole and Atul Kahate , "Web Technologies", Tata MacGraw Hill Education, 3rd Edition, 2022	
Useful Links		
1	http://www.nptelvideos.in/2012/11/database-management-system.html	
2	https://www.w3schools.com/	

CO-PO Mapping														
	Programme Outcomes (PO)												**PSO**	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	3	1												

CO2	2	2										1	3	
CO3	1	2			2				1					1
CO4	2		2		3					2			2	
CO5	3		3									2	2	1

The strength of mapping is to be written as 1: Low, 2: Medium, 3: High

Each CO of the course must map to at least one PO.

Assessment

The assessment is based on MSE, ISE and ESE.

MSE shall be typically on modules 1 to 3.

ISE shall be taken throughout the semester in the form of teacher's assessment. Mode of assessment can be field visit, assignments etc. and is expected to map at least one higher order PO.

ESE shall be on all modules with around 40% weightage on modules 1 to 3 and 60% weightage on modules 4 to 6.

For passing a theory course, Min. 40% marks in (MSE+ISE+ESE) are needed and Min. 40% marks in ESE are needed. (ESE shall be a separate head of passing)

Walchand College of Engineering, Sangli
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AY 2025-26

Course Information

Programme	B.Tech. (Information Technology)
Class, Semester	Third Year B. Tech., (Exit Course)
Course Code	
Course Name	Cloud Technologies
Desired Requisites:	Computer Networks

Teaching Scheme		**Examination Scheme (Marks)**			
Lecture	3 Hrs/week	**MSE**	**ISE**	**ESE**	**Total**
Tutorial	-	30	20	50	100
	-	**Credits: 3**			

Course Objectives

1	To introduce fundamentals of virtualization
2	To impart various service and deployment model in cloud computing
3	To acquaint the significance of virtualization and cloud services in data centre

Course Outcomes (CO) with Bloom's Taxonomy Level

At the end of the course, the students will be able to,

CO	**Course Outcome Statement/s**	**Bloom's Taxonomy Level**	**Bloom's Taxonomy Description**
CO1	Comprehend the fundamentals of cloud computation	II	Understanding
CO2	Choose virtualization techniques to deploy the service on cloud infrastructure	III	Applying
CO3	Analyze service models for data centre applications	IV	Analysing
CO4	Evaluate cloud computing solutions for scalability, resilience, and security based on organizational requirements	v	Evaluating

Module	**Module Contents**	**Hours**
I	**Introduction to Cloud Computing** Virtualization and Cloud Computing, Cloud Reference Model: IAAS, PAAS, SAAS, Cloud Deployment Model: Public Cloud, Private Cloud and Hybrid Cloud, Cloud Platforms in Industry	7
II	**Cloud Architecture & Virtualization** Cloud reference model (NIST), Service-oriented architecture (SOA) and its relationship with cloud, Hypervisors: Type 1 & Type 2, Virtual machines vs containers (Docker), Resource pooling and elasticity, Cloud scalability and load balancing	6

III	**Cloud Services** Public Cloud Networking: Route53, Content Delivery Networks, Resilience Infrastructure, Virtual Network Functions: Cloud Firewall, DNS, Load Balancers, Intrusion Detection Systems	6
IV	**Cloud Application Development** CI/CD in the cloud: Jenkins, GitHub Actions, CodePipeline, Developing cloud-native applications, micro-service, API Gateway usage	7
V	**Cloud Management** Service Management in Cloud Computing, Data Management in Cloud Computing, Resource Management in Cloud	7
VI	**Security, Privacy, and Compliance in the Cloud** Cloud security fundamentals, Authentication, Authorization, and Accounting (AAA)Data encryption at rest and in transit Shared responsibility model	6

Text Books	
1	Rajkumar Buyya, Christian Vecchiola, S. Thamarai Selvi, *"Mastering cloud computing"*, Mc Graw Hill Education, 3rd Edition, 2013
2	Thomas Erl, Zaigham Mahmood and Ricardo Puttini, *"Cloud Computing: Concepts, Technology & Architecture"*, Pearson, 1st Edition, 2013
References	
1	Srinivasan, J. Suresh, *"Cloud Computing: A practical approach for learning and implementation"*, Pearson, 2nd Edition, 2014
2	
Useful Links	
1	https://onlinecourses.nptel.ac.in/noc25_cs11/preview
2	https://aws.amazon.com/

CO-PO Mapping

	Programme Outcomes (PO)												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	1		2										2		1
CO2	3	2	3		2	2			1			2		3	
CO3	2	3					1			1				2	2
CO4	2	3	1		3	1			2			3		3	

The strength of mapping is to be written as 1: Low, 2: Medium, 3: High

Each CO of the course must map to at least one PO.

Assessment

The assessment is based on MSE, ISE and ESE.

MSE shall be typically on modules 1 to 3.

ISE shall be taken throughout the semester in the form of teacher's assessment. Mode of assessment can be field visit, assignments etc. and is expected to map at least one higher order PO.

ESE shall be on all modules with around 40% weightage on modules 1 to 3 and 60% weightage on modules 4 to 6.

For passing a theory course, Min. 40% marks in (MSE+ISE+ESE) are needed and Min. 40% marks in ESE are needed. (ESE shall be a separate head of passing)

Walchand College of Engineering, Sangli
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Course Information

Programme	B.Tech. (Information Technology)
Class, Semester	Third Year B. Tech., (Exit Course)
Course Code	
Course Name	Mini Project
Desired Requisites:	

Teaching Scheme		**Examination Scheme (Marks)**			
Practical	2 Hrs/Week	**LA1**	**LA2**	**Lab ESE**	**Total**
Interaction	-	30	30	40	100
		Credits: 1			

Course Objectives

1	To identify industry-based, interdisciplinary, or socially relevant problems
2	To introduce software project management tools, technologies, and frameworks
3	To emphasize the use of version control systems, documentation through report writing.

Course Outcomes (CO) with Bloom's Taxonomy Level

At the end of the course, the students will be able to,

CO	**Course Outcome Statement/s**	**Bloom's Taxonomy Level**	**Bloom's Taxonomy Description**
CO1	Interpret and analyze the requirements of problem to translate into software specifications	III	Applying
CO2	Implement effective solutions using web interface and database management systems	III	Applying
CO3	Analyze the performance of the web interface and database tuning	IV	Analysing
CO4	Propose the findings and outcomes of the project through a technical seminar and report	VI	Creating

List of Experiments / Lab Activities

Guidelines for Mini-Project 3:

Mini-project is to be carried out in a group of maximum 5 to 6 students.

Each group will carry out a mini-project by developing any application software based on the following areas.

1. Design and develop application using front end technologies (Web) and database engineering
2. Industry based problem / Sponsored application / Interdisciplinary application /socially useful application / Problem solving of previously learned complex concepts
3. Project group should achieve all the proposed objectives of the problem statement.
4. The work should be completed in all aspects Software Development Life Cycle (SDLC) with Continuous Integration and Continuous Development (CI/CD)
5. Apply project management tools such as Jira to manage timelines, track progress, and collaborate effectively on development of project
6. The project report should be prepared and submitted in both soft and hard copies, along with the source code and any necessary dependency documents
7. It is recommended to use online code repositories (such as GitHub or Bitbucket) for version control and collaboration
8. Modern tools are to be studied in self-mode for effective project implementation, result analysis, and deployment.
9. Project will be evaluated continuously by the guide/panel as per assessment plan
10. Presentation and report should use standard templates provided by department

Project report (pre-defined template) should be prepared using Latex/Word and submitted along with link of online repository of project.

Students should maintain a project log book containing weekly progress of the project.

Text Books	
1	Hofmann, Angelika H. , "*Scientific Writing and Communication: Papers, Proposals, and Presentations*", Oxford Press, 3rd Edition, 2016
References	
1	Marilyn Deegan, "*Academic Book of the Future Project Report*", A Report to the AHRC & the British Library, 2017
Useful Links	
1	https://onlinecourses.nptel.ac.in/noc25_hs14/preview
2	https://www.youtube.com/watch?v=0oSDa2kf5I8 (report writing)
3	https://nptel.ac.in/courses/109105115

CO-PO Mapping

	Programme Outcomes (PO)												**PSO**	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2

CO1	3	2			2							2	1	2
CO2	2	3	2		3					2		2	3	
CO3	1		3	3	1	2	3		3		2	1		2
CO4	2	2	1		3	1	2	2	3	3	2	2	2	1

The strength of mapping is to be written as 1,2,3; where, 1: Low, 2: Medium, 3: High

Each CO of the course must map to at least one PO, and preferably to only one PO.

Assessment

There are three components of lab assessment, LA1, LA2 and Lab ESE.

IMP: Lab ESE is a separate head of passing.(min 40 %), LA1+LA2 should be min 40%

Assessment	Based on	Conducted by	Typical Schedule	Marks
LA1	Lab activities, attendance, journal	Lab Course Faculty	During Week 1 to Week 8 Marks Submission at the end of Week 8	30
LA2	Lab activities, attendance, journal	Lab Course Faculty	During Week 9 to Week 16 Marks Submission at the end of Week 16	30
Lab ESE	Lab activities, journal/ performance	Lab Course Faculty and External Examiner as applicable	During Week 18 to Week 19 Marks Submission at the end of Week 19	40

Week 1 indicates starting week of a semester. Lab activities/Lab performance shall include performing experiments, mini-project, presentations, drawings, programming, and other suitable activities, as per the nature and requirement of the lab course. The experimental lab shall have typically 8-10 experiments and related activities if any. Modern tools are to be studied in self-mode for implementation laboratory assignment and will be evaluated in Laboratory Assessment (LA).