

Walchand College of Engineering, Sangli (Government Aided Autonomous Institute)					
AY 2023-24					
Course Information					
<b>Programme</b>		B.Tech. (Information Technology)			
<b>Class, Semester</b>		Third Year B. Tech., Sem V			
<b>Course Code</b>		6OE386			
<b>Course Name</b>		Open Elective - 1: Joy of Programming using Python			
<b>Desired Requisites:</b>		Computer Programming			
Teaching Scheme		Examination Scheme (Marks)			
<b>Lecture</b>	3 Hrs/week	<b>MSE</b>	<b>ISE</b>	<b>ESE</b>	<b>Total</b>
<b>Tutorial</b>	-	30	20	50	100
	-	<b>Credits: 3</b>			
Course Objectives					
<b>1</b>	To introduce the significance of Python in programming				
<b>2</b>	To compare various programming paradigms in Python				
<b>3</b>	To familiarize different libraries of Python				
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	Implement the programming concepts in Python			III	Applying
CO2	Examine the data using python programming libraries			V	Evaluating
CO3	Design application using Python libraries			VI	Creating
Module	Module Contents				Hours
I	<b>Introduction to Python:</b> The basic elements of python, Branching Programs, Control Structures, Strings and Input, Iteration, Functions and scoping, Specifications, Recursion, Global variables.				6
II	<b>Advanced features of Python:</b> Modules, Files, System Functions and Parameters, Strings, Tuples, Lists and Dictionaries, Lists and Mutability, Functions as Objects.				6
III	<b>Classes and Object-Oriented Programming:</b> Abstract Data Types and Classes, Inheritance, Encapsulation and Information Hiding.				7
IV	<b>Module:</b> Importing module, Math module, Random module, Packages Composition. <b>Data Visualization:</b> Matplot lib, Bar Graph, Pie Chart, Box plot, Histogram, Line chart, Sub plot				6
V	<b>Python-Numpy Library</b> <b>NumPy:</b> Introduction, Numpy array, Numpy array indexing, Numpy operations.				7

VI	<b>Pandas Library:</b> <b>Pandas:</b> Series, Data frames, managing missing data, groupby, merging & concatenation, operations, data input and data output.	7
<b>Text Books</b>		
1	R. Nageswara Rao, “ <i>Core Python Programming</i> ”, Dreamtech Press, 2nd Edition, 2017	
2	Chun, J Wesley, “ <i>Core Python Programming</i> ”, Pearson, 2nd Edition, 2007 Reprint 2010	
<b>References</b>		
1	Barry, Paul, Head <i>First Python</i> , O Rielly, 2nd Edition, 2010	
2	Lutz, Mark, <i>Learning Python</i> , O Rielly, 4th Edition, 2009	
<b>Useful Links</b>		
1	<a href="https://onlinecourses.nptel.ac.in/noc21_cs32/preview">https://onlinecourses.nptel.ac.in/noc21_cs32/preview</a>	
2	<a href="https://docs.python.org/3/tutorial/">https://docs.python.org/3/tutorial/</a>	
3	<a href="https://www.learnpython.org/">https://www.learnpython.org/</a>	

<b>CO-PO Mapping</b>														
	<b>Programme Outcomes (PO)</b>												<b>PSO</b>	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
<b>CO1</b>	3		2										3	
<b>CO2</b>		1			2									2
<b>CO3</b>	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.

<b>Assessment</b>
<p>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)</p>

Walchand College of Engineering, Sangli (Government Aided Autonomous Institute)					
AY 2024-25					
Course Information					
<b>Programme</b>	B.Tech. (Information Technology)				
<b>Class, Semester</b>	Third Year B. Tech., Sem V				
<b>Course Code</b>	6OE385				
<b>Course Name</b>	Open Elective - 1: Cloud Computing System				
<b>Desired Requisites:</b>	Computer Networks				
Teaching Scheme		Examination Scheme (Marks)			
<b>Lecture</b>	3 Hrs/week	<b>MSE</b>	<b>ISE</b>	<b>ESE</b>	<b>Total</b>
<b>Tutorial</b>	-	30	20	50	100
	-	<b>Credits: 3</b>			
Course Objectives					
<b>1</b>	To introduce fundamentals of virtualization				
<b>2</b>	To impart various service and deployment model in cloud computing				
<b>3</b>	To acquaint the significance of virtualization in data centre				
Course Outcomes (CO) with Bloom's Taxonomy Level					
At the end of the course, the students will be able to,					
<b>CO</b>	<b>Course Outcome Statement/s</b>			<b>Bloom's Taxonomy Level</b>	<b>Bloom's Taxonomy Description</b>
<b>CO1</b>	Comprehend the fundamentals of cloud computation			II	Understanding
<b>CO2</b>	Choose virtualization techniques to deploy the service on cloud infrastructure			III	Applying
<b>CO3</b>	Analyze service models for data centre applications			IV	Analysing
<b>Module</b>	<b>Module Contents</b>				<b>Hours</b>

I	<b>Introduction to Cloud Computing</b> Virtualization and Cloud Computing, Cloud Reference Model: IAAS, PAA SAAS, Cloud Deployment Model: Public Cloud, Private Cloud and Hybrid Cloud, Cloud Platforms in Industry	7
II	<b>Virtualization</b> Hosted and Bare-Meta, Server Virtualization, Desktop Virtualization, Application Virtualization, Storage Virtualization	6
III	<b>Network Functions</b> Public Cloud Networking: Route53, Content Delivery Networks, Resilience Infrastructure, Virtual Network Functions: Cloud Firewall, DNS, Load Balancers, Intrusion Detection Systems	6
IV	<b>Virtual Private Clouds (VPC)</b> VPC fundamentals, Public and Private Subnets, Security Groups, Network Access Control List, Network Address Translation.	7
V	<b>Cloud Management</b> Service Management in Cloud Computing, Data Management in Cloud Computing, Resource Management in Cloud	7
VI	Open Source and Commercial Clouds, Cloud Simulator, Research trend in Cloud Computing, Fog Computing	6

#### Text Books

1	Rajkumar Buyya, Christian Vecchiola, S. Thamarai Selvi, <i>“Mastering cloud computing”</i> , Mc Graw Hill Education, 3rd Edition, 2011
2	Thomas Erl, Zaigham Mahmood and Ricardo Puttini, <i>“Cloud Computing: Concepts, Technology &amp; Architecture”</i> , Pearson, 1st Edition, 2010

#### References

1	Richardo Puttini, Thomas Erl, and Zaigham Mahmood, <i>“Cloud Computing: Concepts, Technology &amp; Architecture”</i> , Pearson Prentice Hall, 2nd edition, 2013
2	Srinivasan, J. Suresh, <i>“Cloud Computing: A practical approach for learning and implementation”</i> , Pearson, 2nd Edition, 2012

#### Useful Links

1	Module: I, II, IV, V, VI <a href="https://nptel.ac.in/content/syllabus_pdf/106105167.pdf">https://nptel.ac.in/content/syllabus_pdf/106105167.pdf</a>
2	<a href="https://aws.amazon.com/">https://aws.amazon.com/</a>

#### CO-PO Mapping

	<b>Programme Outcomes (PO)</b>	<b>PSO</b>
--	--------------------------------	------------

	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
<b>CO1</b>	1		2										2		
<b>CO2</b>			3												
<b>CO3</b>	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 2023-24**

### Course Information

<b>Programme</b>	B.Tech. (Computer Science and Engineering)
<b>Class, Semester</b>	Third Year B. Tech., Sem V
<b>Course Code</b>	6OE371
<b>Course Name</b>	Data Science
<b>Desired Requisites:</b>	Probability and Statistics

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

### Course Objectives

<b>1</b>	To provide the knowledge and expertise to become a proficient data scientist.
<b>2</b>	To critically evaluate data visualizations based on their design and use for communicating.
<b>3</b>	

### Course Outcomes (CO) with Bloom's Taxonomy Level

<b>CO1</b>	Acquaint core concepts and technologies in Data Science.	Understanding
<b>CO2</b>	Demonstrate data collection and management using different technologies.	Applying
<b>CO3</b>	Analyse and interpret large data sets in the context of real-world problems.	Analyzing

Module	Module Contents	Hours
I	<b>Module 1: Introduction to core concepts and technologies</b> Introduction, Terminology, data science process, data science toolkit, Types of data, Example applications	4
II	<b>Module 2 Data Collection and Management</b> Introduction, Sources of data, Data collection, Exploring and fixing data, Data storage and management, Using multiple data sources.	7
III	<b>Module 3 Data Preprocessing</b> Data Cleaning, Data Integration, Data Reduction, Data Transformation and Data Discretization.	8
IV	<b>Module 4 Data Visualization</b> Introduction, Types of data visualization, Data for visualization: Data types, Data encodings, Retinal variables, Mapping variables to encodings, visual encodings.	6
V	<b>Module 5 Data Analysis</b> Introduction, Terminology and concepts, Introduction to statistics, Central tendencies and distributions, Variance, Distribution properties and arithmetic, Samples/CLT, Correlation, Linear Regression, Least Squares, Residuals, Regression Inference, classification, classifiers.	8
VI	<b>Module 6 Recent trends</b> Recent trends in various data collection and analysis techniques, various visualization techniques, Case Study, application development methods used in data science.	6

### Text Books

1	Adhikari Ani and DeNero John. Computational and Inferential Thinking, The Foundations of Data Science, UC Berkeley.
---	---

2	Jiawei Han, Micheline Kamber and Jian Pei. Data Mining Concepts and Techniques. Morgan Kaufmann, Third Edition.
<b>References</b>	
1	O'Neil Cathy and Schutt Rachel. Doing Data Science, Straight Talk From The Frontline. O'Reilly.
2	Leskovek Jure, Rajaraman Anand and Ullman Jeffrey. Mining of Massive Datasets. v2.1, Cambridge University Press.
3	
<b>Useful Links</b>	
1	
2	

<b>CO-PO Mapping</b>															
	<b>Programme Outcomes (PO)</b>												<b>PSO</b>		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
<b>CO1</b>	3												1		
<b>CO2</b>	1	2								1			1		
<b>CO3</b>	1	2								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.

<b>Assessment</b>	
Two components of In Semester Evaluation (ISE), One Mid Semester Examination (MSE) and one End Semester Examination (ESE) having 20%, 30% and 50% weights respectively.	
Assessment	Marks
ISE1	10
MSE	30
ISE2	10
ESE	50

ISE 1 and ISE 2 are based on assignment/declared test/quiz/seminar etc.  
MSE: Assessment is based on 50% of course content (Normally first three modules)  
ESE: Assessment is based on 100% course content with 70-80% weightage for course content (normally last three modules) covered after MSE.

<b>Walchand College of Engineering, Sangli</b> (Government Aided Autonomous Institute)					
<b>AY 2023-24</b>					
<b>Course Information</b>					
<b>Programme</b>		B.Tech. (Electronics Engineering)			
<b>Class, Semester</b>		Third Year B. Tech., Sem V			
<b>Course Code</b>		6OE358			
<b>Course Name</b>		Open Elective -1: Signals and Systems			
<b>Desired Requisites:</b>		-			
<b>Teaching Scheme</b>		<b>Examination Scheme (Marks)</b>			
<b>Lecture</b>	3 Hrs/week	<b>MSE</b>	<b>ISE</b>	<b>ESE</b>	<b>Total</b>
<b>Tutorial</b>	-	30	20	50	100
		<b>Credits: 3</b>			
<b>Course Objectives</b>					
<b>1</b>	Develop the mathematical skills to solve problems involving signals and systems in various areas of applications				
<b>2</b>	To Understand signals and systems in terms of both the time and transform domains with , complementary insights into tools for analysis				
<b>3</b>					
<b>4</b>					
<b>Course Outcomes (CO) with Bloom's Taxonomy Level</b>					
At the end of the course, the students will be able to,					
<b>CO1</b>	Classify the different signals and systems				Understand
<b>CO2</b>	Characterize LTI systems in the time domain and frequency domain				Apply
<b>CO3</b>	Use MATLAB software to implement the signal processing and system analysis for different applications				Apply
<b>Module</b>	<b>Module Contents</b>				<b>Hours</b>
I	<b>Classification of Signals and Systems:</b> Standard signals- Step, Ramp, Pulse, Impulse, Real and complex exponentials and Sinusoids, Classification of signals – Continuous time (CT) and Discrete Time (DT) signals, Periodic & Aperiodic signals, Deterministic & Random signals, Energy & Power signals, Classification of systems- CT systems and DT systems, Linear & Nonlinear, Time-variant & Time-invariant, Causal & Noncausal, Stable & Unstable.				6
II	<b>Analysis of CT and DT signals</b> Fourier series for periodic signals - Fourier Transform – properties- Laplace Transforms and properties.				8
III	<b>Analysis of DT signals</b> Baseband signal Sampling – Fourier Transform of discrete time signals (DTFT) – Properties of DTFT - Z Transform & Properties				6
IV	<b>Linear Time Invariant DT Systems</b> Impulse response – Difference equations-Convolution sum- Discrete Fourier Transform and Z Transform Analysis of Recursive & Non-Recursive systems-DT systems connected in series and parallel.				8
V	<b>Application areas of Signals and Systems</b> Overview of applications of Signals and Systems in the fields of Speech and audio processing.Multimedia processing (image and video),Underwater acoustic, Biological signal analysis, Biometrics, control applications				7
VI	<b>Analysis of Signals and Systems using Simulation Tools</b> Introduction to MATLAB, Use MATLAB software to implement the signal processing and system analysis.				4



Textbooks	
1	B.P. Lathi, "Signals, Systems & Communications"- BS Publications, 2003.
2	A.V. Oppenheim, A.S. Willsky and S.H. Nawab,"Signals and Systems"- PHI, 2nd Edn.
3	
4	
References	
1	Simon Haykin and Van Veen,"Signals & Systems" -,Wiley, 2nd Edition.
2	
3	
4	
Useful Links	
1	NPTEL lectures
2	<a href="https://www.mathworks.com">https://www.mathworks.com</a>
3	
4	

CO-PO Mapping														
	Programme Outcomes (PO)												PSO	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
<b>CO1</b>	3													
<b>CO2</b>		2												
<b>CO3</b>					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
<p>The assessment is based on MSE, ISE and ESE.</p> <p>MSE shall be typically on modules 1 to 3.</p> <p>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.</p> <p>ESE shall be on all modules with around 40% weightage on modules 1 to 3 and 60% weightage on modules 4 to 6.</p> <p>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)</p>

<b>Walchand College of Engineering, Sangli</b> (Government Aided Autonomous Institute)					
<b>AY 2023-24</b>					
<b>Course Information</b>					
<b>Programme</b>	B.Tech. (Electronics Engineering)				
<b>Class, Semester</b>	Third Year B. Tech., Sem. -V				
<b>Course Code</b>	6OE357				
<b>Course Name</b>	Open Elective-1: Introduction to Electronic Systems				
<b>Desired Requisites:</b>	Basic Electronics Engineering				
<b>Teaching Scheme</b>		<b>Examination Scheme (Marks)</b>			
<b>Lecture</b>	3 Hrs/week	<b>MSE</b>	<b>ISE</b>	<b>ESE</b>	<b>Total</b>
<b>Tutorial</b>	-	30	20	50	100
<b>Credits: 3</b>					
<b>Course Objectives</b>					
<b>1</b>	To illustrate the concept behind electronics systems and its application.				
<b>2</b>					
<b>3</b>					
<b>4</b>					
<b>Course Outcomes (CO) with Bloom's Taxonomy Level</b>					
At the end of the course, the students will be able to,					
<b>CO1</b>	Explain the working of components used in the electronic systems.				Understand
<b>CO2</b>	Develop a digital circuit for a given logic and build circuit for given specifications.				Apply
<b>CO3</b>	Analyze the performance of Data Acquisition System and Power Electronics Circuits.				Analyze
<b>CO4</b>	Test embedded system applications using Arduino board.				Apply
<b>Module</b>	<b>Module Contents</b>				<b>Hours</b>
I	<b>Electronic System Components</b> Transducers-Types, Classification, Characteristics: Signal Conditioning of inputs, Instrumentation Amplifiers, Capacitive type, Inductive type sensors, Limit switches, Temperature sensors:RTD, thermistor, Thermocouple, semiconductor diode sensor, piezoelectric transducer photovoltaic cell, LDR, Speed measurement using magnetic photoelectric pickup. Distance measurement: LVDT, capacitive transducers, Resistive, Glass scales, Magnetic scales. Concept of Quadrature output and index pulse.PH Sensors, ProximitySensors, Motion Sensors.				7
II	<b>Operational Amplifier</b> Differential amplifier, Basic op-Amp configuration, Ideal op-amp analysis, Op-amp characteristics, Inverting and Non inverting amplifiers, Adder, Subtractor, voltage to current converters, current to voltage converters, instrumentation amplifiers, Active filters. Voltage comparator, Comparator application, waveform generators: multivibrators, oscillators.				8
III	<b>Digital Systems</b> Flip-flops, Counters, Up-counters, Down Counters, Mod-N counters, State diagram.				5
IV	<b>Data Acquisitions System</b> Digital to Analog Converter (DAC), Analog to Digital converter (ADC), Data Acquisition System (DAS): introduction, objectives of DAS, single and multichannel, data conversion, sample and hold circuit, elements of DAS, interfacing of transducers-multiplexing.				7
V	<b>Power Semiconductor Devices and its Applications</b> SCR, TRIAC, DIAC, UJT, AC voltage regulator, Controlled rectifiers, Inverters, Speed control of AC and DC motors, SMPS,UPS, Electronics lamp ballast.				5

VI	<b>Embedded Systems</b> Introduction to microcontroller based system: Arduino board, Arduino based systems, Simple Arduino program, interfacing display board to Arduino, Speed control of DC motor, motor driver IC: L293D.	8
<b>Textbooks</b>		
1	R. Boylestad and L. Nashelsky, "Electronics Devices and Circuits", 8th Edition, Prentice Hall International, 2005.	
2	Anand Kumar, "Fundamentals of Digital circuits", 2nd Edition, PHI, 2009.	
3	A. K. Sawhney, "Measurements and Instrumentation", Dhanpat Rai and Sons, 2013	
4		
<b>References</b>		
1	R. P. Jain, "Modern Digital Design", Mc-Graw-Hill, 2008	
2	Ramakant Gaikwad, "Op-amps and Linear Integrated Circuits", Pearson Education, 2011.	
3	M.D. Singh and KB Khanchandani, "Power Electronics", 2nd Edition, McGraw-Hill, 2007.	
4		
<b>Useful Links</b>		
1	<a href="http://www.spoken-tutorial.org">www.spoken-tutorial.org</a> ---IIT Bombay.	
2		
3		
4		

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

<b>Assessment</b>
<p>The assessment is based on MSE, ISE and ESE.</p> <p>MSE shall be typically on modules 1 to 3.</p> <p>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.</p> <p>ESE shall be on all modules with around 40% weightage on modules 1 to 3 and 60% weightage on modules 4 to 6.</p> <p>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)</p>

<b>Walchand College of Engineering, Sangli</b> (Government Aided Autonomous Institute)					
<b>AY 2023-24</b>					
<b>Course Information</b>					
<b>Programme</b>		B.Tech. (Electrical Engineering)			
<b>Class, Semester</b>		Third Year B. Tech., Sem V			
<b>Course Code</b>		6OE343			
<b>Course Name</b>		Open Elective I : Electrical Machine Technology			
<b>Desired Requisites:</b>		Basic Electrical Engineering			
<b>Teaching Scheme</b>		<b>Examination Scheme (Marks)</b>			
<b>Lecture</b>	3 Hrs/week	<b>MSE</b>	<b>ISE</b>	<b>ESE</b>	<b>Total</b>
<b>Tutorial</b>	-	30	20	50	100
<b>Credits: 3</b>					
<b>Course Objectives</b>					
<b>1</b>	To make students understand operation and performance of ac and dc machines.				
<b>2</b>	To make students learn characteristics of ac and dc machines.				
<b>3</b>	To develop skills to choose ratings of ac and dc machines for various applications.				
<b>Course Outcomes (CO) with Bloom's Taxonomy Level</b>					
At the end of the course, the students will be able to,					
<b>CO</b>	<b>Course Outcome Statement/s</b>			<b>Bloom's Taxonomy Level</b>	<b>Bloom's Taxonomy Description</b>
<b>CO1</b>	<b>Explain</b> the construction and working principle of A.C. and D.C. Machines.			II	Understand
<b>CO2</b>	<b>Examine</b> the various characteristics of A.C. and D.C. machines.			III	Apply
<b>CO3</b>	<b>Analyze</b> the performance of A.C. and D.C. machines for various applications.			IV	Analyze
<b>Module</b>	<b>Module Contents</b>				<b>Hours</b>
I	<b>Module 1: DC Motors</b> Review of Construction, Working and Types, Back emf, Speed equation, Armature Reaction, Torque equation, Speed torque characteristics, Applications, Power losses in d.c. motors. Need of starter speed control of D.C. shunt and series motor, Reversal of rotation, Electric braking of shunt and series motor.				7
II	<b>Module 2: Single Phase Transformer</b> Construction and type, EMF equation phasor diagram, equivalent circuit, efficiency, losses, regulation, Experimental determination of equivalent circuit parameters and calculation of efficiency and regulation, Introduction to three Phase Transformer, Connection of three Phase Transformer, Applications of Transformers.				7
III	<b>Module 3: Single-Phase Induction Motor</b> Double revolving field theory and principle of operation. Construction and operation of split-phase, capacitor start, capacitor run, and shaded pole motors. Comparison of single-phase motors and applications.				6
IV	<b>Module 4: Three Phase Induction Motor</b> Construction, Types, Working, Speed equation, Torque equation, Starting torque, Concept of full load torque, torque speed characteristics, Power stages in motor, Induction Generator.				6

V	<b>Module 5: Synchronous Machines</b> Alternator, Construction of Alternator, Synchronous Motor, Equivalent Circuit, Motor on load, Pull-Out Torque, Motor Phasor Diagram, Mechanical Power Developed by Motor, Power Factor of Synchronous Motor, Application of Synchronous Motor, Comparison of Synchronous Motor with Induction Motor.	6
VI	<b>Module 6: Special-Purpose Electric Machines</b> Stepper motor-Variable-Reluctance Motor, Permanent Magnet Motor, Hybrid Stepper Motor, Servomechanism, D.C. Servomotors, A.C. Servomotors, Switched Reluctance Motor, Permanent Magnet D.C. Motor, Brushless D.C.Motor. Selection and Sizing of Motors based on applications.	4

#### Textbooks

1	S. J. Chapman, "Electric Machinery Fundamentals", Tata Mc Graw Hill publication, 4th Edition, 2011, ISBN: 9780071070522
2	M. G. Say. "Performance Design of AC Machines", CBS Publishers, 3rd Edition, 2017, ISBN: 9788123910277

#### References

1	SK Bhattacharya, "Electrical Machines", Tata Mc Graw Hill, 3rd Edition, 2010, ISBN: 9789332902855
2	J. B. Gupta, "Electrical Machines", SK Kataria and Sons, 2013, ISBN: 9789350140550

#### Useful Links

1	<a href="https://nptel.ac.in/courses/108/102/108102146/">https://nptel.ac.in/courses/108/102/108102146/</a>
2	<a href="https://nptel.ac.in/courses/108/105/108105155/">https://nptel.ac.in/courses/108/105/108105155/</a>
3	<a href="https://nptel.ac.in/courses/108/105/108105131/">https://nptel.ac.in/courses/108/105/108105131/</a>

#### CO-PO Mapping

	Programme Outcomes (PO)												PSO	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
<b>CO1</b>	3													
<b>CO2</b>		2												
<b>CO3</b>		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 2023-24**

### Course Information

<b>Programme</b>	B. Tech. (Mechanical Engineering)
<b>Class, Semester</b>	Third Year B. Tech., Sem. V
<b>Course Code</b>	6OE329
<b>Course Name</b>	OE 1-Non Conventional Machining Processes
<b>Desired Requisites:</b>	

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

### Course Objectives

<b>1</b>	To learn about various nonconventional machining processes the various techniques, performance characteristics and their applications
<b>2</b>	To introduce students with various machine tools and their peculiars used for nonconventional machining.
<b>3</b>	To train the students to identify main variables of nonconventional machining processes and to judge their effect on developed products.

### Course Outcomes (CO) with Bloom's Taxonomy Level

At the end of the course, the students will be able to,		
<b>CO1</b>	Explain various nonconventional machining processes, tooling and equipment's required for various manufacturing applications.	understanding
<b>CO2</b>	Exploit the capabilities and applications of nonconventional machining processes.	Apply
<b>CO3</b>	Analyze effect of different parameters influencing on nonconventional machining processes and compare with other technique applications.	Analyze

Module	Module Contents	Hours
I	<b>Introduction:</b> Introduction to nontraditional machining methods -Need for non -traditional machining -Sources of metal removal, Classification on the basis of energy sources -Parameters influencing selection of process.	6
II	<b>Mechanical Type AMPs:</b> Abrasive Jet Machining – Water Jet Machining – Abrasive Water Jet Machining – Ultrasonic Machining.(AJM, WJM, AWJM and USM). Working Principles – equipment used – Process parameters– MRR- Applications	7

III	<b>Thermal Type AMPs:</b> Electric Discharge Machining (EDM)- working Principle-equipments-Process Parameters-Surface Finish and MRR- electrode / Tool – Power and control Circuits- Tool Wear – Dielectric – Flushing – Wire cut EDM – Applications- Micro-EDM, Micro-WEDM.	7
IV	<b>Chemical Type AMPs:</b> Principles of Chemical machining and Electro-Chemical machining (CHM and ECM)-Etchants – Maskant -techniques of applying maskants - Process Parameters – Surface finish and MRR-Applications- equipments-Surface Roughness and MRR, Electrical circuit-Process Parameters- ECG and ECH – Applications	7
V	<b>Medium Assisted AMPs:</b> Laser Beam Machining: Material removal mechanism, types of Lasers, LBM equipment, process characteristics, applications. Electron Beam Machining: Basic equipment and metal removal mechanism, process characteristics, applications. Plasma Beam Machining: Machining systems, material removal rate, accuracy and surface quality, applications. Ion Beam Machining: Introduction, material removal rate, accuracy and surface effects, applications	7
VI	<b>Advanced MPs:</b> Basics and definitions: Principle of layer-based technology, advantages, classification. Rapid Prototyping Process Chain: 3D Modeling, Data Conversion and Transmission, Checking and Preparing, model building, post processing. Rapid prototyping techniques: Stereo lithography, Solid Ground Curing (SGC), Fused Deposition Modeling (FDM)	6
<b>Text Books</b>		
1	Jagadeesha T., “Nontraditional Machining Processes”, Wiley India-Dreamtech Presss ,2020	
2	Jagadeesha T., “Unconventional Machining Processes”, Wiley India-Dreamtech Presss ,2020	
3	Mishra P. K., “Non-Conventional Machining”, The Institution of Engineers (India), Text Book Series, New Delhi, 1997	
4	Vijay.K. Jain “Advanced Machining Processes” Allied Publishers Pvt. Ltd, New Delhi, 2009.	
<b>References</b>		
1	Hassan El-Hofy, “Advanced Machining Processes: Nontraditional and Hybrid Machining Processes”, McGraw-Hill Co, New York (2005).	
2	Benedict, Gary F., “Non-Traditional Manufacturing Processes”, Marcel Dekker Inc., New York (1987)	
3	Garry F. Benedict, “Unconventional Machining Process”, Marcel Dekker Publication, New York, 1987	
<b>Useful Links</b>		
1	<a href="https://www.youtube.com/watch?v=oI3RIAvyVxc&amp;list=PLbMVogVj5nJSzoQXmu7dsj9ZKJyZ1P4O8">https://www.youtube.com/watch?v=oI3RIAvyVxc&amp;list=PLbMVogVj5nJSzoQXmu7dsj9ZKJyZ1P4O8</a>	
2	<a href="https://www.youtube.com/watch?v=P8zdXuIxQt4">https://www.youtube.com/watch?v=P8zdXuIxQt4</a>	
3	<a href="https://www.youtube.com/watch?v=Hc6mfNWT8oQ&amp;t=5s">https://www.youtube.com/watch?v=Hc6mfNWT8oQ&amp;t=5s</a>	
4	<a href="https://nptel.ac.in/courses/112/105/112105212/">https://nptel.ac.in/courses/112/105/112105212/</a>	
5	<a href="https://nptel.ac.in/courses/112/103/112103202/">https://nptel.ac.in/courses/112/103/112103202/</a>	
6	<a href="https://www.youtube.com/watch?v=yWBGnkhGKz8">https://www.youtube.com/watch?v=yWBGnkhGKz8</a>	

7	<a href="https://www.youtube.com/watch?v=Cz-KsEBLWNI">https://www.youtube.com/watch?v=Cz-KsEBLWNI</a>
8	<a href="https://www.youtube.com/watch?v=r4Qws2G3f8E">https://www.youtube.com/watch?v=r4Qws2G3f8E</a>
9	<a href="https://youtu.be/Sfj8_9oRCNk">https://youtu.be/Sfj8_9oRCNk</a>
10	<a href="https://www.youtube.com/watch?v=cxU1zUOpGLk">https://www.youtube.com/watch?v=cxU1zUOpGLk</a>
11	<a href="https://www.youtube.com/watch?v=PaYInS9axxw&amp;list=PLzCSUZGIUJkaSyCzPiQMWynGyxmC8hrpl">https://www.youtube.com/watch?v=PaYInS9axxw&amp;list=PLzCSUZGIUJkaSyCzPiQMWynGyxmC8hrpl</a>
12	<a href="https://www.youtube.com/watch?v=QJ-kKIdALRk">https://www.youtube.com/watch?v=QJ-kKIdALRk</a>

### Civil

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

### Electronics

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

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

### Electrical

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

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

### Computer Science

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

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



### Information Technology

#### CO-PO Mapping

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

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

#### 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)

<b>Walchand College of Engineering, Sangli</b> (Government Aided Autonomous Institute)					
<b>AY 2024-25</b>					
<b>Course Information</b>					
<b>Multidisciplinary Minor in Structural Engineering</b>					
<b>Programme</b>		B. Tech. (All branches except Civil Engineering)			
<b>Class, Semester</b>		Third Year B. Tech, Sem VI			
<b>Course Code</b>		60E307			
<b>Course Name</b>		Rehabilitation of Concrete Structures			
<b>Desired Requisites:</b>		Strength and Mechanics of Materials – I & II			
<b>Teaching Scheme</b>		<b>Examination Scheme (Marks)</b>			
<b>Lecture</b>	3 Hrs/week	<b>MSE</b>	<b>ISE</b>	<b>ESE</b>	<b>Total</b>
		30	20	50	100
<b>Credits: 3</b>					
<b>Course Objectives</b>					
<b>1</b>	To impart knowledge of concrete and their advances in modern construction.				
<b>2</b>	To make conversant with the techniques for Retrofitting and strengthening of structures.				
<b>3</b>	To Identify various NDT methods and select the appropriate technique for different materials and inspection scenarios.				
<b>Course Outcomes (CO) with Bloom's Taxonomy Level</b>					
At the end of the course, the students will be able to,					
<b>CO</b>	<b>Course Outcome Statement/s</b>			<b>Bloom's Taxonomy Levels</b>	<b>Bloom's Taxonomy Description</b>
<b>CO1</b>	<b>Examine</b> properties of fresh concrete for given grade with help of code provision.			III	Applying
<b>CO2</b>	<b>Determine</b> the different properties of given grade of cement and aggregates.			III	Applying
<b>CO3</b>	<b>Analyse</b> the various admixture based on their applications to achieve advancement in concrete.			IV	Analysing
<b>CO4</b>	<b>Test</b> different non-destructive testing for finding the properties of concrete.			V	Evaluating
<b>CO5</b>	<b>Assess</b> the different types of concrete used for repair and rehabilitation of structures based of its characteristics.			V	Evaluating
<b>CO6</b>	<b>Select</b> suitable rehabilitation and retrofitting systems based on different types of deteriorations in concrete structures.			VI	Creating
<b>Module</b>	<b>Module Contents</b>				<b>Hours</b>
I	<b>Properties of concrete ingredients</b> Properties of coarse and fine aggregates and their influence on concrete, types of cement and their use, Grades of ordinary Portland cement, Portland pozzolana cement, rapid hardening Portland cement, hydrophobic cement, low heat Portland cement and sulphate resisting Portland cement as per relevant I.S. codes. Types of aggregates and their properties. Testing of aggregates as per relevant IS Codes				4
II	<b>Properties of different types of concrete</b> Concrete for structural work, light weight concrete, high density concrete, workability, durability and strength requirements, effect of w/c ratio on properties of fresh and hardened concrete, acceptability criteria, laboratory testing of fresh and hardened concrete, Fire resistant properties of hardened				4

	concrete.	
III	<p><b>Advances in Concrete Admixtures</b> - Plasticizers, Retarders, Accelerators and other Admixtures, Test on Admixtures, Chemistry and Compatibility with concrete. GGBS fly Ash, Metakaolin, Silica Fumes, crush sand.</p> <p><b>Ready Mix Concrete</b> - Requirements of ready mix concrete, properties of RMC, transit mixer details, Automation, instrumentation and Layout of RMC plant.</p>	5
IV	<p><b>Non-destructive testing of concrete</b> Rebound hammer test, Ultrasonic pulse velocity test, Magnetic particle testing, Liquid penetration testing, Visual testing, Laser Testing methods, Impact echo test, carbonation test, Half-cell potentiometer and corrosion of steel, Core test and relevant provisions of I.S. codes.</p>	5
V	<p><b>Concrete for repairs and rehabilitation of structures</b> High Performance concrete, Polymer Concrete, Fiber Reinforced Concrete, Light weight concrete and its manufacture, Polymer Impregnated Cement Concrete, Polymer Modified cement concrete and Ferro Cement, Special Tests for concrete used for repairs and rehabilitation.</p>	4
VI	<p><b>Rehabilitation and Retrofitting Methods</b> Grouting &amp; crack repair, patch repair, replacement of structurally weak concrete, replacement of spalled, and/or delaminated concrete, replacement of carbonated concrete surrounding steel reinforcement, repairs using mortars, portland cement mortars, polymer modified cement mortars, epoxy mortars, pre-placed aggregate concrete, shotcrete, concrete replacement epoxy bonded concrete, silica fume concrete, polymer concrete system.</p>	4
<b>Textbooks</b>		
1	M.L. Gambhir, Concrete Technology, McGraw Hill Book Company, Fifth Edition, 2017. (ISBN-1259062554, 978-1259062551).	
2	M.S. Shetty, Concrete Technology, Theory and Practice, S. Chand Publication, Sixth Edition, 2018. (ISBN- 9788121900034,978-8121900034)	
3	P.K. Guha, "Maintenance and Repairs of Buildings", New Central book Agencies Publications, 5 th Edition, 2015.	
4	Nayak B. S., "Maintenance Engineering For Civil Engineers" Khanna Publication, 2 nd Edition, 2011.	
<b>References</b>		
1	B.L. Gupta and A. Gupta, Concrete Technology, Jain Book Agency, 2013. (ISBN8180140407, 978-8180140402).	
2	Neville A.M., and Brooks J.J., Concrete Technology, Pearson Education, Indian reprint, Chennai, 2002.	
3	Hutchin B. D., "Maintenance and Repairs of Buildings", Newnes Butterworth Publications, 6 th edition, 1975.	
4	CPWD hand book on Repairs and Rehabilitation of RCC buildings published by DG (Works), CPWD, Government of India (Nirman Bhawan),	
5	Campbell D., Allen and Roper H., Concrete Structures, Materials, Maintenance and Repair, Longman Scientific and Technical UK, 1991.	
<b>Useful Links</b>		
1	<a href="https://archive.nptel.ac.in/courses/105/106/105106202/#">https://archive.nptel.ac.in/courses/105/106/105106202/#</a>	
2	<a href="https://iitb.vlabs.co.in/discipline.html?discipline=Civil_Engineering">https://iitb.vlabs.co.in/discipline.html?discipline=Civil_Engineering</a>	

<b>CO-PO Mapping</b>														
	<b>Programme Outcomes (PO)</b>												<b>PSO</b>	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
<b>CO1</b>														
<b>CO2</b>														
<b>CO3</b>														
<b>CO4</b>														
<b>CO5</b>														
<b>CO6</b>														
<p>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.</p>														

<b>Assessment</b>
<p>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 a teacher's assessment. 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 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).</p>

<b>Walchand College of Engineering, Sangli</b> (Government Aided Autonomous Institute)					
<b>AY 2023-24</b>					
<b>Course Information</b>					
<b>Programme</b>		B. Tech. (Other than Civil Engg.)			
<b>Class, Semester</b>		Third Year, Semester II			
<b>Course Code</b>					
<b>Course Name</b>		Building Planning and Construction			
<b>Desired Requisites:</b>					
<b>Teaching Scheme</b>		<b>Examination Scheme (Marks)</b>			
<b>Lecture</b>	3 Hrs/week	<b>MSE</b>	<b>ISE</b>	<b>ESE</b>	<b>Total</b>
<b>Tutorial</b>		30	20	50	100
		<b>Credits: 3</b>			
<b>Course Objectives</b>					
<b>1</b>	To impart Necessary knowledge and concepts in Building Planning and functional design.				
<b>2</b>	To impart Necessary knowledge and concepts in the utilization of building materials, their properties and their applications in construction of building.				
<b>Course Outcomes (CO) with Bloom's Taxonomy Level</b>					
At the end of the course, the students will be able to,					
<b>CO1</b>	Grasp the principles of planning, building bye laws to apply in the planning of residential/public buildings in relation to functional planning.				Understand
<b>CO2</b>	Classify the various components and their relationships in buildings and identify the materials and building services to be adopted for different buildings.				Apply
<b>Module</b>	<b>Module Contents</b>				<b>Hours</b>
I	<b>Site, Building and Building Drawings</b> Categories of buildings, Types of Residential buildings, Site selection, Factors influencing selection of site, guidelines for planning and drawing of buildings, Positions of various building components, types of drawings and relevant scales.				6
II	<b>Principles of Building Planning and Building Bye laws</b> Principles of planning: Aspects, prospect, Privacy, Furniture, Roominess, Grouping, Circulation, Sanitation, Lighting, Ventilation, Flexibility, Elegance, Sanitation, Economy. Bye laws: Minimum plot size, building frontage, open spaces, standard dimensions in buildings, Provision for light & ventilation, FSI, Height of Building.				7
III	<b>Planning concepts in Buildings</b> Requirements in different types of buildings, Integrated approach to planning in various aspects like aesthetics, landscape, interior, etc. Guidelines for planning & drawing residential and public buildings.				6
IV	<b>Components of building</b> Sub structure, Foundations, Bearing Capacity of Soils, Types of Shallow and Deep foundations, Conditions for their applications, masonry, Bonds, Doors, Windows, Staircases, Roofs and Floors, Flooring and their Applications				7
V	<b>Construction Materials</b> Types, Engineering properties and Uses of Bricks, Stones, Aggregate, Lime, Cement, Steel, Aluminium, PVC, Glass. Concrete: Ingredients, Preparation, Properties of concrete, Types of concrete and their applications				7

VI	<b>Building Services and Finishes</b> Plumbing services for water supply, plumbing services for drainage, symbols, Electrification, symbols of electrical fixtures, Types of Plastering and Pointing, Defects, Paints and Varnishes Types, Application, Methodology on various surfaces, Defects.	7
----	--	---

#### Textbooks

1	R.K.Rajput S. 'Building Materials' S. Chand Publications.
2	Bindra and Arora, "Building Construction", Dhanpat Rai and Sons
3	Kumarswamy and Kameshwar Rao., "Building Planning and Design," Tata McGraw Hill Pvt. Ltd, 1995.
4	Civil Engineering Drawing - V. B. Sikka, S. K. Kataria and Sons.

#### References

1	Punmia, Jain, Jain, "Building Construction", Laxmi Publications Ltd. 2005
2	Mantri Institute's 'The A to Z of Practical Building Construction and its Management' Mantri Institute of Devp. and Research. Pune, 1994.
3	Building drawing with Integrated approach – Shah, Kale & Patki, Tata Mc Graw Hill Pub.
4	National Building Code of India and SP- 7.

#### Useful Links

1	<a href="https://www.youtube.com/watch?v=pYLKA4YQMyl&amp;list=PL46yD-wnVQqxZ8f-_g1PZaFjJlXnJWyFE">https://www.youtube.com/watch?v=pYLKA4YQMyl&amp;list=PL46yD-wnVQqxZ8f-_g1PZaFjJlXnJWyFE</a>
2	<a href="https://www.youtube.com/watch?v=4kLXfCGB_RI&amp;list=PL46yD-wnVQqxZ8f-_g1PZaFjJlXnJWyFE&amp;index=5">https://www.youtube.com/watch?v=4kLXfCGB_RI&amp;list=PL46yD-wnVQqxZ8f-_g1PZaFjJlXnJWyFE&amp;index=5</a>
3	<a href="https://www.youtube.com/watch?v=2tb1heySCx0">https://www.youtube.com/watch?v=2tb1heySCx0</a>
4	<a href="https://www.youtube.com/watch?v=Y0Y8zuETHOQ">https://www.youtube.com/watch?v=Y0Y8zuETHOQ</a>

#### CO-PO Mapping

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

#### 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)

<b>Walchand College of Engineering, Sangli</b> (Government Aided Autonomous Institute)					
<b>AY 2024-25</b>					
<b>Course Information</b>					
<b>Programme</b>		B.Tech. All Branches			
<b>Class, Semester</b>		Third Year B. Tech., Sem V			
<b>Course Code</b>		6OE388			
<b>Course Name</b>		Biology for Engineers			
<b>Desired Requisites:</b>					
<b>Teaching Scheme</b>		<b>Examination Scheme (Marks)</b>			
<b>Lecture</b>	03 Hrs/week	<b>MSE</b>	<b>ISE</b>	<b>ESE</b>	<b>Total</b>
<b>Tutorial</b>	00 Hrs/week	30	20	50	100
		<b>Credits: 03</b>			
<b>Course Objectives</b>					
<b>1</b>	To familiarize the students to gain a comprehensive understanding of the fundamental principles governing biological systems, including cellular biology, genetics, and physiology, to appreciate the complexities involved in biological processes.				
<b>2</b>	To foster collaboration between engineering and biology disciplines by engaging in interdisciplinary projects, discussions, and case studies				
<b>3</b>	To explore the intersections between biology and engineering disciplines, focusing on how engineering principles can be applied to understand, manipulate, and design biological systems and technologies.				
<b>4</b>	To motivate the students to develop interdisciplinary vision of biological engineering.				
<b>Course Outcomes (CO) with Bloom's Taxonomy Level</b>					
At the end of the course, the students will be able to					
<b>CO</b>	<b>Course Outcome Statement/s</b>	<b>Bloom's Taxonomy Level</b>	<b>Bloom's Taxonomy Descriptor</b>		
<b>CO1</b>	Perceive the fundamental principles of biology and its relevance to engineering disciplines.	II	Understanding		
<b>CO2</b>	Demonstrate effectively with other interdisciplinary team members to address challenges of biology and engineering.	III	Applying		
<b>CO3</b>	Inspect the interactions between biological systems and engineered technologies, considering ethical implications.	III	Applying		
<b>CO4</b>	Execute innovative biobased solutions for socially relevant problems.	III	Applying		
<b>Module</b>	<b>Module Contents</b>	<b>Hours</b>			
I	<b>CELL BIOLOGY AND IMMUNOLOGY.</b> Structure and functions of Prokaryotic and Eukaryotic cell. Introduction to Immunity, Types of Immunities and Antigens. Immunoglobulins: Structure and functions, different classes of immunoglobulins.	7			
II	<b>INFECTIOUS DISEASES IN HUMAN BODY.</b> Viral Infections, Bacterial Infections, Fungal Infections, Parasitic Infections, Emerging and Re-emerging Infections.	4			
III	<b>HUMAN ORGAN SYSTEMS AND BIO DESIGNS 1</b> Brain as a CPU system. Eye as a Camera system. Heart as a pump system, Pacemaker.	7			
IV	<b>HUMAN ORGAN SYSTEMS AND BIO-DESIGNS - 2</b> Lungs as purification system, Kidney as a filtration system and Muscular and Skeletal Systems as scaffolds	7			
V	<b>TRENDS IN BIOENGINEERING</b> Bioprinting techniques and materials, 3D printing of ear, bone and skin. 3D printed foods. Self- healing Bioconcrete, Bioremediation and Biomining.	7			

VI	<b>APPLIED BIOLOGY AND BIOTECHNOLOGY</b> Principles and process of Biotechnology: Genetic engineering (Recombinant DNA technology). Transgenics. <ul style="list-style-type: none"> <li>• Application of Biotechnology in Health and Agriculture</li> <li>• Introduction to transgenics: Gene therapy, Biosafety issues– Bio piracy</li> </ul>	7
<b>Textbooks</b>		
1	T. S. Ranganathan, Text book of Human Anatomy, S. Chand and Company Ltd, 2002.	
2	P. S. Verma and V. K. Agarwal, Concept of Cell Biology, S. Chand and Company Ltd, 2002.	
3	R. D. Vidyarthi and P. N. Pandey, A Text book of Zoology, S. Chand and Company Ltd, 2004.	
<b>References</b>		
1	Bruce Alberts and Alexander Johnson, Molecular Biology of the Cell Garland Science, Taylor & Francis Group, 6th Edition, 2015.	
2	Peter H. Raven, George B. Johnson, Biology, McGraw hill, 11th edition, 2017.	
3	Laurence A. Cole, Biology of Life - Biochemistry, Physiology and Philosophy, Elsevier, 2016.	
<b>Useful Links</b>		
1	<a href="https://www.youtube.com/watch?v=yaQhH9iKY0M">https://www.youtube.com/watch?v=yaQhH9iKY0M</a>	
2	<a href="https://www.youtube.com/watch?v=V6s0xOTNmT4">https://www.youtube.com/watch?v=V6s0xOTNmT4</a>	
3	<a href="https://www.youtube.com/watch?v=5Q9LgvQs5Nw">https://www.youtube.com/watch?v=5Q9LgvQs5Nw</a>	
4	<a href="https://www.youtube.com/watch?v=nzJXq4YMPYE">https://www.youtube.com/watch?v=nzJXq4YMPYE</a>	

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

<b>Assessment</b>
<p>The assessment is based on MSE, ISE and ESE. MSE shall be typically on modules 1 to 3.</p> <p>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.</p> <p>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)</p>