Walchand College of Engineering, Sangli

(Government Aided Autonomous Institute)

AY 2024-25

Course Information

Programme	B. Tech. (Electronics Engineering)
Class, Semester	Second Year B. Tech., Sem IV
Course Code	7ESEN201
Course Name	Signals and Systems
Desired Requisites:	Applied Mathematics, Basic Electrical Engineering

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

Course Objectives

1	On completion of the course, students should be sufficiently familiar with the theoretical structure, formal representation, computational methods, notation, and vocabulary of linear models to be able to apply them to the analysis and design of digital and analog communications and control systems. The students will be able to perform signal analysis with reference to spectrum analysis of deterministic signals.

Course Outcomes (CO) with Bloom's Taxonomy Level

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

CO1	Classify signals and systems based on their characteristics and perform basic operations on signals.	Evaluate
CO2	Analyze time domain response of LTI systems	Analyze
CO3	Interpret the spectral properties of signals using Fourier analysis	Understand
CO4	Use Z- transform to study discrete time signals and systems	Apply

Module	**Module Contents**	**Hours**
I	**Signals – CT & DT** Introduction, standard signals, signal representation, Classification of signals- Analog, Discrete time, Digital signals, Classification of signals based on properties, Operations on signals	6
II	**Systems- CT & DT** Definition, representation, classification, Properties of CT and DT systems- Linearity, time invariant, causality ,stability, Invertibility,	7
III	**Time domain Analysis of CT & DT systems** CT systems: Zero state and zero input response, Impulse response, convolution integral, convolution integral - graphical representation of convolution DT systems: zero input, zero state and impulse response, convolution sum, DT LTI system ,Unit step response; properties of DT LTI systems- Memory, causality, stability	7
IV	**Fourier domain Analysis of Periodic Signals** Orthogonality property, Basis function, FS representation of periodic signal, Application of FS representation, Properties of Fourier series for CT signals, Recovery of CT signal from FS, FS representation of DT periodic signals	7

V	**Fourier domain Analysis of Aperiodic Signals** Representation of CT signals using samples, Nyquist sampling theorem,Fourier Transform representation of aperiodic CT signals, Evaluation of magnitude and phase response, DTFT, Properties of DTFT: Time reversal, Linear convolution-time and frequency domain, conjugate symmetry, Definition of DFT	7
VI	**Z Transform** Significance of Z transform, definition , Relation between LT and ZT, Relation between FT and ZT, Region of convergence (ROC), properties of ROC, Relation between pole locations and time domain behaviour of system, Applications	5

Textbooks	
1	A.V. Oppenheim, A.S. Willsky, S.H. Nawab, Signals and Systems, Prentice Hall,1997.
2	Ashok Ambardar, Analog and Digital Signal Processing, CL Engineering, 1999
3	
4	
References	
1	B. P. Lathi, Linear systems and signals ,Oxford University press, 2005
2	M. J. Roberts , Signals and Systems, Tata McGraw-Hill, 2005
3	Simon Haykin, Barry Van Veen, Signals and systems ,Wiley, 2003
4	Hwei P Hsu, Schaum's Outline Signals and Systems, Tata McGraw-Hill, 1995
Useful Links	
1	NPTEL lectures from Prof. S. C. Dutta Roy
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	1	1												1
CO2		1	1											1
CO3					2									1
CO4		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)

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AY 2024-25

Course Information

Programme	B. Tech. (Electronics Engineering)
Class, Semester	Second Year B. Tech., Sem.-II
Course Code	7EN221
Course Name	Integrated Circuits and Applications
Desired Requisites:	Analog Electronics, Electronic Circuit Analysis and Design

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

Course Objectives

1	To **explain** the working of differential amplifier and operational amplifier.
2	To **illustrate** the methods used for analysis of op-amp based circuits.
3	To **explain** the use of op-amp in linear and non-linear industrial circuits.
4	To **explain** the working of and design methods for voltage regulators.

Course Outcomes (CO) with Bloom's Taxonomy Level

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

CO1	**Apply** the fundamentals of op-amp to calculate the circuit conditions, and illustrate functioning of various linear and nonlinear application circuits, such as amplifiers, waveform generators, digital to analog and analog to digital converters (DAC/ADC), , precision rectifiers, PLL, voltage regulators, etc.	Applying
CO2	**Analyz**e the op-amp based circuits considering ideal op-amp and also with effect of practical limitations of op-amp on the circuit output.	Analyzing
CO3	**Evaluate** the performance of op-amp based electronic circuits (Amplifiers, Waveform generators, active filters, DAC and ADC, voltage regulator)	Evaluating
CO4	**Design** op-amp based circuits considering practical limitations and as per given specifications.	Creating

Module	**Module Contents**	**Hours**
I	**Op-Amp Circuits:** Ideal Op-Amp circuit analysis, differential amplifier, instrumentation amplifier, voltage to current converters, current to voltage converters, transducer bridge amplifier, Op-Amp as Integrator and Differentiator, log/antilog amplifier.	8
II	**Op-Amp Practical Limitations:** Simplified Op-Amp circuit diagram, input bias and offset current, input offset voltage, input offset error compensation, low input bias Op-Amp, open loop response, closed loop response, transient response; sources of noise, stability in op-amp circuits, frequency compensation. Design of Op-Amp circuits (studied) considering practical limitations, including output swing and power supply. How to read the data sheet.	8
III	**Op-Amp based Filter Circuits:** Low pass, High pass, Band pass and Band reject filters, Advantage of active filter, First order active filter, standard second order active filters. Design of simple active filters.	4

IV	**Comparator and Waveform Generators:** Voltage Comparator, Schmitt triggers and applications, peak detector, sample and hold circuit, Sine wave generators, multvibrators, triangular wave generators, saw tooth wave generators, monolithic waveform generators, voltage to frequency and frequency to voltage converter, Design of comparator and waveform generator circuits.	8
V	**Digital-to-Analog and Analog-to-Digital Conversion:** Performance specifications, D to A conversion techniques, A to D conversion techniques, single chip DAC/ADC.	4
VI	**Voltage Regulator and PLL:** Precision rectifier, Linear regulators, Linear regulator applications, and design of Op-Amp based linear voltage regulator, three terminal voltage regulators: features, IC 78xx/79xx voltage regulators; Principle of Switching regulator: LM3524; Phase locked loop, Analog and digital phase detector, Monolithic PLLs: NE565, CD4046.	8

Textbooks	
1	Sergio Franco, "Design with Operational Amplifiers and Analog Integrated Circuits", Tata McGraw Hill, New Delhi.
2	Robert F. Coughlin and Frederick F. Driscoll, "Operational Amplifiers and Linear Integrated Circuits", PHI.
3	G.B.Clayton, "Operational Amplifiers", International Edition, 2nd Edition.
4	

References	
1	Ramakant Gaikwad, "Op-amp and Linear Integrated Circuits", Pearson Education India.
2	Tobey and Graeme, "Operational Amplifiers", McGraw-Hill; First Edition, ISBN: 978-0070649170
3	D. Roy Choudhury and S. B. Jain, "Linear Integrated Circuits", New Age International Publishers, 4th Edition, 2017, ISBN: 9788122430981
4	David A. Bell, "Operational Amplifiers and Linear ICs", Oxford University Press, 2015.

Useful Links	
1	https://www.tutorialspoint.com/semiconductor_devices/semiconductor_devices_operational_amplifiers.htm
2	https://www.allaboutcircuits.com/video-tutorials/op-amp-basics-introduction-to-the-operational-amplifier/
3	https://web.mit.edu/6.101/www/reference/op_amps_everyone.pdf
4	https://www.ti.com/amplifier-circuit/op-amps/products.html

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												3
CO3		3												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
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. (Electronics Engineering)
Class, Semester	Second Year B. Tech., Sem IV
Course Code	7EN222
Course Name	Communication Engineering
Desired Requisites:	Basic Electronics Engineering, Engineering Mathematics

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 the techniques of transmitting and receiving information signals using analog and carrier modulation techniques and evaluate their performance levels (SNR) in the presence of channel noise.
2	To establish foundation for understanding the relationship among various technical factors useful for designing communication system.

Course Outcomes (CO) with Bloom's Taxonomy Level

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

CO1	Define various fundamental aspects of the communication systems.	Remember
CO2	Understand various modulation & demodulation techniques used in communication systems.	Understand
CO3	Interpret various radio transmitter & receiver circuits and different types of noise in communication systems.	Apply
CO4	Analyse various parameters such as modulation index, channel capacity, transmission efficiency, S/N ratio etc. used in communication systems.	Analyse

Module	**Module Contents**	**Hours**
I	**Amplitude Modulation and Demodulation** DSB-FC, DSB-SC, SSB, VSB and ISB transmissions: mathematical Analysistime and frequency domain analysis, modulation index, generation and detection methods, power requirement of these systems, Comparison of AM modulation schemes, Quadrature Carrier Multiplexing(QAM), frequency division Multiplexing, AM detection : envelope detection, Demodulation of DSBSC : synchronous detection	9
II	**Frequency Modulation and Demodulation** Frequency Modulation (FM),: Single Tone Frequency Modulation, Spectrum Analysis, Narrowband FM, Wideband FM, Transmission Bandwidth of FM Waves, Generation of FM waves: Direct and Indirect Methods, Demodulation of FM, Phase Locked Loops, Limiting of FM waves, comparison between AM & FM, Phase Modulation, Relation between FM and PM	9
III	**Sampling theorem and Pulse Modulation Techniques** Sampling theorem, Types of sampling, Inter symbol interferences, Modulation & Demodulation of PAM, PWM, PPM, merits & demerits, Introduction to PCM system, quantization of signals, Differential PCM, Delta Modulation, Adaptive Delta Modulation.	4

IV	**Digital Data Transmission** Definition of Line Coding, various line codes, unipolar, bipolar RZ and NRZ techniques, split phase manchester formats	5
V	**Digital Modulation Techniques** Coherent Quadrature Modulation Techniques, Non Coherent Binary Modulation Techniques, Comparison of Binary and Quaternary Modulation Techniques; M array modulation Techniques, Power spectra, Bandwidth efficiency, M array Modulation formats Viewed in the light of channel Capacity theorem, Effect of inters symbol interference.	6
VI	**Noise** Classification and sources of noise, signal to noise ratio (SNR), noise analysis and measurements, equivalent noise bandwidth, noise figure, noise temperature, AWGN.	6

Textbooks	
1	T.L. Singal, "Analog and Digital Communication",6th Edition, Mc Graw Hill, 2012
2	Roy Blake , "Electronic Communication System", Thomson Publications, 2nd Edition,2002
3	Taub Schilling, "Principle of communication system", TMH publication, 4th Edition, 2013
4	

References	
1	Simon Hykin, "Communication System", 4th Edition, John Wiley & Sons, 2000
2	B. P. Lathi, "Modern Digital and Analog Communication Systems", Oxford Publications, 3rd Edition, 1998
3	George Kennedy, "Electronic Communication System", McGraw Hill, 4th Edition, 2009
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	
CO2		2	2										3	
CO3			2										2	
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)

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AY 2024-25

Course Information	
Programme	B. Tech. (Electronics Engineering)
Class, Semester	Second Year B. Tech., Sem.- IV
Course Code	7EN223
Course Name	Microcontroller and Peripheral Interfacing
Desired Requisites:	Digital Electronics, C Programming

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

Course Objectives	
1	To explain the difference between microprocessor and 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 applications / systems.

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

Module	**Module Contents**	**Hours**
I	**Microprocessor vs. Microcontroller** Introduction of Microprocessor and Microcontroller; Block diagram, function of each pin of 8051; Architectural difference between microprocessor and microcontroller; features and applications of 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 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; Creating libraries; Microcontroller based application / system design using internal and external peripherals.	7
VI	**Advanced Microcontrollers and Open Source Electronics Platforms** Introduction to Arduino, Setup computer to use Arduino, Arduino Libraries, Arduino Based Systems Design	4

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	Ramesh Gaonkar, Fundamentals of Microcontrollers and Applications in Embedded Systems, Penram International Publication(India), 2010
4	Michael Margolis, Arduino Cookbook, O'Reilly Publications 2020

References	
1	Intel 8051 datasheet (www.intel.com)
2	Keil A51 and C51 manuals
3	Hi-Tech C Compiler manual
4	Massimo Banzi, Michael Shiloh, Getting Started with Arduino, Shroff/Maker Media 2014

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											2

1: Low, 2: Medium, 3: High

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, mini task, regular tests 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)

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AY 2024-25

Course Information	
Programme	B. Tech. (Electronics Engineering)
Class, Semester	Second Year B. Tech., Sem.-II
Course Code	7EN271
Course Name	Integrated Circuits and Applications Lab
Desired Requisites:	Analog Electronics Lab, Electronic Circuit Analysis and Design Lab

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**, **demonstrate**, proper use of instruments and simulator software.
2	To **explain** the process of constructing a circuit and verifying working of circuits mentioned in the experiment list.
3	To **illustrate** the methods used for analysis and design of op-amp based circuits.
4	To **illustrate** how to perform the experiment and how to document the results.

Course Outcomes (CO) with Bloom's Taxonomy Level		
At the end of the course, the students will be able to,		
CO1	**Use** the required instruments, with proper theoretical understanding of the instruments and modern tools such as circuit simulation software. (Skills of using Conventional as well as Modern Tools)	Applying
CO2	**Examine practically** the performance of a given op-amp based circuit, do correct calculations, draw correct inference and properly write the conclusions. (experiential learning)	Analyzing
CO3	**Design** simple op-amp based applications using the circuits studied in related theory course, and as per given problems. (independent thinking, experiential learning)	Creating
CO4	**Prepare the documentation** of proper observations, neat graphs, writing conclusion in grammatically and technically correct language, explain orally the circuit operation and process of performing the experiments in correct technical language. (Present and defend, measure, assess, interpret and conclude, communication skills)	Creating

List of Experiments / Lab Activities/Topics

List of Topics(Applicable for Interaction mode):

List of Lab Activities: (minimum 8 to 10 experiments)

1. Analysis and Design of Transistorized difference amplifier.
2. Analysis and Design of Adder Circuits.
3. Analysis and Design of Instrumentation Amplifier.
4. Designing with Practical Limitations of op-amp.
5. Analysis and Design of Active Filters.
6. Analysis and Design of Schmitt trigger circuit and Square wave-Triangular wave generator using op-amp.
7. Analysis and Design of RC Oscillators.
8. Analysis and Design of Precision rectifier.
9. Analysis and Design of Linear Regulated Power Supply.
10. Build and test multivibrator/ timer circuits using IC 555.
11. Design and Analysis of DAC and ADC.
12. Study of switching voltage regulator using LM3524.
13. Demonstration of Phase Locked Loop.

Textbooks

1	Sergio Franco, "Design with Op-Amp and Analog Integrated Circuits", Tata McGraw Hill, New Delhi.
2	Robert F. Coughlin and Frederick F. Driscoll, "Operational Amplifiers and Linear Integrated Circuits", PHI.
3	
4	

References

1	Ramakant Gaikwad,"Op-amp and Linear Integrated Circuits", Pearson Education India, ISBN: 9789332549913, Fourth Edition, 2015.
2	Tobey and Gramme, "Operational Amplifiers", McGraw-Hill; First Edition, ISBN: 978-0070649170, 1971 (Classic book)
3	D. Roy Choudhury and S. B. Jain, "Linear Integrated Circuits", New Age International Publishers, 4th Edition, 2017, ISBN: 9788122430981, 2017.
4	

Useful Links

1	https://www.allaboutcircuits.com/video-tutorials/op-amp-basics-introduction-to-the-operational-amplifier/
2	https://web.mit.edu/6.101/www/reference/op_amps_everyone.pdf
3	https://www.ti.com/amplifier-circuit/op-amps/products.html
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
CO2		3												3
CO3			3											3
CO4										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 2024-25

Course Information

Programme	B. Tech. (Electronics Engineering)
Class, Semester	Second Year B. Tech., Sem. III
Course Code	7EN272
Course Name	Communication Engineering Lab
Desired Requisites:	Basic Electronics Engineering, Engineering Mathematics

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

Course Objectives

1	Demonstrate understanding of various digital modulation and demodulation techniques
2	Illustrate the performance of modulation and demodulation techniques in various transmission environments
3	
4	

Course Outcomes (CO) with Bloom's Taxonomy Level

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

CO1	Define the fundamentals and functions of various communication systems.	Remember
CO2	Understand the working operation of analog & digital modulation techniques used in communication systems.	Understand
CO3	Apply various methods used in communication systems for generation & reception of modulated & demodulated signals.	Apply
CO4	Analyse the waveforms of various modulation & demodulation techniques.	Analyse

List of Experiments / Lab Activities/Topics

List of Topics(Applicable for Interaction mode):

List of Lab Activities:

1. Spectrum analyser
2. AM Transmitter/ Receiver
   a. DSB-FC system
   b. DSB – SC system
3. FM Transmitter/ Receiver
   a. Reactance and varactor diode modulator
   b. PLL, quadrature, Foster- Seeley and detuned resonance detectors
4. Sampling theorem and reconstruction
5. Pulse Modulation and demodulation
   a. PAM, PWM,PPM techniques
6. PCM Modulation and Demodulation
7. Digital Data Transmission Techniques
8. Digital Modulation Techniques
9. Experiments on MATLAB
10. Experiments on National Instrument's Emona Datex Board

Textbooks

1	George Kennedy , "Electronic Communication System", McGraw Hill, 4th Edition, 2009

2	Roy Blake , “Electronic Communication System”, Thomson Publications, 2nd Edition,2002
3	Taub Schilling, “Principle of communication system”, TMH publication, 4th Edition, 2013
4	
References	
1	Wayne Tomasi ,“Adavnced Electronic Communications Systems”, Pearson education, 5th Edition,2014
2	Simon Hykin, “Communication System”, 4th Edition, John Wiley & Sons, 2000
3	B. P. Lathi, “Modern Digital and Analog Communication Systems”, Oxford Publications, 3rd Edition, 1998
4	
Useful Links	
1	
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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
CO3					3									2
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.				

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AY 2024-25

Course Information

Programme	B. Tech. (Electronics Engineering)
Class, Semester	Second Year B. Tech., Semester-IV
Course Code	7EN273
Course Name	Microcontroller and Peripheral Interfacing Lab
Desired Requisites:	Digital Electronics, C Programming

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 explain debugging of an assembly and 8051 C program for 8051 microcontrollers in keil micro-vision C51 IDE
2	To show downloading and testing of 8051 C program for 8051 microcontroller using development board.
3	To explain development of 8051 C program for implementing given system requirements using 8051 microcontroller

Course Outcomes (CO) with Bloom's Taxonomy Level

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

CO1	**Use** keil micro-vision C51 IDE to debug an assembly and C programs for 8051 Microcontroller	Apply
CO2	**Write** a program for on chip peripheral configuration and external peripheral interfacings.	Apply
CO3	**Test** C programs written for 8051 microcontroller using development board as well as simulation software.	Analyze
CO4	**Design** of microcontroller based application	Create

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, BULB etc. 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 and hardware delay generation
11. Interrupts configuration and handling
12. Serial communication programming and Multiprocessor communication
13. Design, implementation and demonstration of microcontroller based applications using 8051 / Arduino Boards. (Mini-Project)

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	Ramesh Gaonkar, Fundamentals of Microcontrollers and Applications in Embedded Systems, Penram International Publication(India), 2010
4	Michael Margolis, Arduino Cookbook, O'Reilly Publications 2020
References	
1	Intel 8051 datasheet (www.intel.com)
2	Keil A51 and C51 manuals
3	Hi-Tech C Compiler manual
4	Massimo Banzi, Michael Shiloh, Getting Started with Arduino, Shroff/Maker Media 2014
Useful Links	
1	https://www.alldatasheet.com/
2	https://www.keil.com/
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											2
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.(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 Performance, Oral Exam	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. (Electronics Engineering)
Class, Semester	Second Year B. Tech., Semester-IV
Course Code	7VSEN271
Course Name	Python Programming
Desired Requisites:	Computer Programming

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

Course Objectives	
1	To define the significance of Python in programming.
2	To demonstrate use of computer language constructs and principles such as: conditional branching loops, block structures, functions, and input/output for implementing programs to Solve problems.
3	To make use of the different libraries of Python

Course Outcomes (CO) with Bloom's Taxonomy Level		
At the end of the course, the students will be able to,		
CO1	**Illustrate** the features of Python programming	**Apply**
CO2	**Implement** programs using Python language in a programming environment/using programming tool to solve problems.	**Apply**
CO3	**Examine** a given program to identify its output.	**Analyze**
CO4	**Demonstration** applications implemented using Embedded Systems and Python	**Create**

List of Experiments / Lab Activities/Topics

List of Lab Activities:

1) **Introduction**: Python IDE installation and first python program and python comments
2) **Python Fundamentals**: Programs to study variables, contestants, literals and operators.
3) **Python Flow Control**: Programs to study if else statement, for loop, while loop, break, continue and pass statement.
4) **Python Data Types**: Programs to study Numbers, Type Conversion, Mathematics and List.
5) **Python Data Types**: Programs to study Tuple, Sets and Dictionary.
6) **Python Functions**: Programs to study Python Functions, Python Function Arguments, Python Variable Scope and Python Global Keyword.
7) **Python Functions:** Programs to study Python Recursion, Python Modules, Python Package and Python Main function
8) **Python Exception Handling**: Programs to study Python Exceptions, Python Exception Handling and Python Custom Exceptions.
9) **File Handling:** Programs to study open, create, read, write and delete operations on a file.
10) **Python Array:** Programs to study Arrays and built in methods of Arrays
11) **Data Structure**: Programs to demonstrate data structure example.
12) **Applications:** Programs to demonstrate web based application.
13) **Mini Project**

Textbooks	
1	R. Nageswara Rao, “Core Python Programming”, Dreamtech Press, 2nd Edition, 2017
2	Eric Matthes, “Python Crash Course – A Hands-on, Project-Based Introduction to Programming”, No Starch Press, 2nd Edition, 2019
3	Kenneth Lambert, “Fundamentals of Python: First Programs” Course Technology, Cengage Learning.2nd edition, 2017
References	
1	Barry, Paul, Head First Python, O Rielly,2nd Edition, 2010
2	2 Lutz, Mark, Learning Python, O Rielly, 4th Edition, 2009
Useful Links	
1	https://swayam.gov.in/
2	https://www.tutorialspoint.com/
3	https://www.javatpoint.com/
4	https://in.coursera.org/

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	2				2									
CO3		2			2									
CO4			2		2									
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.(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. (All branches)
Class, Semester	Second Year B.Tech., Sem - IV
Course Code	7AE201
Course Name	Employability Skills Development (ESD)
Desired Requisites:	--

Teaching Scheme		**Examination Scheme (Marks)**			
Lecture	4Hrs/week	**ISE**	**MSE**	**ESE**	**Total**
Tutorial	-	20	30	50	100
Practical	-				
Interaction	-	**Credits: 2**			

Course Objectives

1	To improve the problem-solving skills of students
2	To understand the approach towards problem solving
3	Understanding the sectional cut-offs for different companies

Course Outcomes

CO1	Ability to improve the accuracy percentage	
CO2	Understand the current changing recruitment trends	
CO3	Understanding the differential marking scheme in papers	
CO4	Performance improvement in competitive exams like CAT, GATE	

Module	Module Contents	Hours
I	**Arithmetic I** Ratio, Proportion, Mark Up & Discount, Averages, Mixtures & Alligations, Simple & Compound Interest	6
II	**Arithmetic II** Percentages, Profit & Loss, Time & Work, Time, Speed & Distance, Boat & Streams, Linear Races	8
II	**Numbers** Cyclicity, Remainders, Cyclicity of Remainders, Indices, Factors, LCM, HCF	4
III	**Permutation, Combination, Probability** Fundamental principal of counting, Arrangements, Selection, Grouping, Distribution, Independent Events, Conditional Probability, Binomial Distribution	6
IV	**Logical Reasoning** Clocks, Calendars, Games & Tournaments, Analytical Puzzles, Binary Logic, Blood relations, Directions, Coding, Decoding, Seating Arrangement (Linear, Circular & Rectangular)	6
V	**Verbal Ability I** Vocabulary - Synonyms, Antonyms, Analogies Reading Comprehension, Para Jumbles	6
VI	**Verbal Ability II** Parts of Speech, Tenses, Subject Verb Agreement	4
Text Books		
1	Quantitative Aptitude - Abhijit Guha	
2	Quantitative Aptitude - Sarvesh Agarwal	
References		
1	Quicker Maths - M. Tyra	
2	Quantitative Aptitude - Chandresh Agarwal	
3	Puzzles to puzzle you - Shakuntala Devi	

Useful Links	
1	www.campusgate.co.in
2	www. Lofoya.com
3	www.brainbashers.com

CO-PO Mapping

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

Assessment

The assessment is based on the MCQ test which will be conducted online through the platform and it will be a proctored test. No negative marking will be there in the test. Test will be of 60 minutes with 20 questions each on Quantitative Aptitude, Logical Reasoning & Verbal Ability

Walchand College of Engineering, Sangli *(Government Aided Autonomous Institute)*					
AY 2024-25					
Course Information					
Programme	All WCE Programme				
Class, Semester	SY BTech 1st & 2nd Sem				
Course Code	7VE201				
Course Name	Value Education				
Desired Requisites:	Open mind and a willingness to learn				
Teaching Scheme		**Examination Scheme (Marks)**			
Lecture	01Hrs/week	LA1	LA2	ESE	Total
Tutorial	01 Hrs/week	30	30	40	100
		Credits: -			

Course Objectives	
1	Develop holistic personal and professional skills by enhancing communication, emotional intelligence, and resilience to foster positive relationships and sustainable living practices.
2	Promote ethical and sustainable leadership through the application of integrity, teamwork, and agrowth mindset to navigate success and failure while mastering effective presentation and communication skills.
3	Empower lifelong learning and contribution by reflecting on personal values, engaging in criticalthinking, and committing to continuous self-assessment and professional development for addressing global challenges.

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 Descriptor**
CO1	Learn effective communication, empathy, and relationship-building skills to foster positive interactions in personal andprofessional settings.	I	Remembering
CO2	Incorporate sustainable habits into daily life and build resiliencethrough mindfulness and stress management to handle challenges and support environmental stewardship.	II	Understanding
CO3	Develop goal-setting and achievement strategies, manage success and failure, and deliver impactful presentations foroverall personal and professional development.	III	Applying
CO4	Strengthen analytical skills and creative problem-solving techniques to make informed decisions and tackle complexissues in various contexts.	IV	Analyzing

Module	**Module Contents**	**Hours**
I	**Interpersonal skills** Introduction to Relationships, Communication Skills, Emotional Intelligence, Conflict Resolution, Maintaining Healthy Relationships	5

II	**Sustainable Living** Introduction to Sustainability, Environmental Impact, Sustainable Practices, Community Involvement, Personal Action Plan	5
III	**Inner Peace and Resilience** Understanding Inner Peace, Mindfulness and Meditation, Stress Management, Building Resilience, Positive Mindset	5
IV	**The Art of Winning** Winning Mindset, Goal Setting, Perseverance and Adaptability, Teamwork and Leadership, Case Studies and Real-life Examples	5
V	**Success and Failure Management** Understanding Success and Failure, Learning from Failure, Growth Mindset, Balancing Success and Failure, Personal Development Plan	5
VI	**The Art of Presentation** Introduction to Presentations, Content Organization, Verbal and Non-Verbal Communication, Practice and Delivery, Feedback and Improvement	5

Textbooks	
1	Stephen R. Covey, *The 7 Habits of Highly Effective People*, Free Press, 25thAnniversary Edition, 2013.
2	Daniel Goleman, *Emotional Intelligence: Why It Can Matter More Than IQ*, Bantam Books, 10th Anniversary Edition, 2005.
3	Carol S. Dweck, *Mindset: The New Psychology of Success*, Ballantine Books, Updated Edition, 2016.
4	William McDonough and Michael Braungart, *Cradle to Cradle: Remaking the WayWe Make Things*, North Point Press, 1st Edition, 2002.
5	Garr Reynolds, *Presentation Zen: Simple Ideas on Presentation Design and Delivery*, New Riders, 2nd Edition, 2011.
References	
1	Covey, S. R. (1989). *The 7 Habits of Highly Effective People*. Simon & Schuster.
2	Rosenberg, M. B. (2015). *Nonviolent Communication: A Language of Life*. PuddleDancer Press.
3	Carnegie, D. (1998). *How to Win Friends and Influence People*. Simon & Schuster.
4	Covey, S. R. (1989). *The 7 Habits of Highly Effective People*. Simon & Schuster.
5	Rosenberg, M. B. (2015). *Nonviolent Communication: A Language of Life*. PuddleDancer Press.
	Useful Links
1	https://ideas.ted.com/how-to-build-closer-relationships/
2	https://www.nationalgeographic.com/environment/article/sustainable-living
3	https://www.lexisnexis.in/blogs/family-law-in-india/
4	https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8937019/
5	https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8710473/

CO-PO Mapping														
	Programme Outcomes (PO)												PSO	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	-	-	-	-	-	-	-	2	2	3	-	2		
CO2	-	-	-	-	-	2	3	2	2	-	-	2		
CO3	-	-	-	1	-	1	-	2	3	2	2	2		
CO4	-	-	-	3	2	2	2	2	2	2	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 LA1, LA2 and ESE. LA1 shall be typically on modules 1 to 3. LA2 shall be taken throughout the semester in the form of teacher's assessment. Mode of assessment can be Tests, assignments, oral, seminar etc. and is expected to map at least one higher order PO. ESE shall be on all modules with around 30 - 40% weightage on modules 1 to 3 and 60 - 70% weightage on modules 4 to 6. For passing a theory course, Min. 40% marks in (LA1+LA2+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	Multidisciplinary Minor (Electronics Engineering)
Class, Semester	Second Year B. Tech., Sem.-II
Course Code	7MDEN221
Course Name	Electronic Devices and Circuits
Desired Requisites:	Basic Electrical and Electronics Engineering

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

Course Objectives

1	To **explain** the working of diode circuits and electronic circuits like small signal amplifiers, power amplifiers using BJT and MOSFETs. .
2	To **illustrate** the methods used for AC/DC analysis of transistorized and op-amp based circuits.
3	To **Explain** the working of power semiconductor devices and electrical power converter circuits.
4	To **explain** the working of oscillators, multivibrators, timing circuits and voltage regulators.

Course Outcomes (CO) with Bloom's Taxonomy Level

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

CO1	**Explain** the working of diode circuits, transistorized and op-amp based circuits.	Understand
CO2	**Explain** the working of power semiconductor devices such as SCR, GTO, Power MOSFET and IGBT and power electronics circuits.	Understand
CO3	**Explain** the working of oscillators, multivibrators and applications of operational amplifier in analog computations.	Understand
CO4	**Solve** the examples on diode circuits, amplifiers, voltage regulators and op-amp based circuits considering ideal op-amp.	Applying

Module	**Module Contents**	**Hours**
I	**Diode Circuits:** Rectifier circuits, RC filter circuit, Zener diode voltage regulator, voltage multiplier circuits, diode logic circuits, photodiode and LED circuits.	**6**
II	**Transistorized Amplifiers:** Amplifier fundamentals, small signal amplifiers: common emitter amplifier, common collector amplifier; JFET/MOSFET common source/ common drain amplifier, frequency response of amplifiers.	**8**
III	**Power Amplifiers** Classification of power amplifiers: class-A, class-B, class-AB, class-C power amplifiers; transformer-coupled amplifiers, heat sink and its operation	**6**
IV	**Op-Amp Applications**: Differential amplifier, unity gain buffer (voltage follower), voltage comparator, zero crossing detector, effect of positive feedback, Schmitt trigger circuit, multivibrators, types of oscillator, RC oscillators, monolithic timers (IC555).	**7**
V	**Power Semiconductor Devices and Circuits:** SCR, TRIAC, DIAC, GTO, Power MOSFET and IGBT; controlled rectifiers, ac voltage controllers, inverter, chopper, UPS,	**6**

VI	**Regulated DC Power Supply:** Block diagram of regulated dc power supply, Zener diode voltage regulator, op-amp based voltage regulator, three terminal IC voltage regulator, switching regulators.	**6**

Textbooks	
1	R. Boylestad and L. Nashelsky, "*Electronic Devices and Circuit Theory*", 9th Edition, PHI, 2009.
2	D. A. Neamen, "*Microelectronics: Circuit Analysis and Design*", 4th Edition, McGraw Hill Education (India) Private Limited, New Delhi, 2021.
3	Ramakant Gaikwad, "Op-amp and Linear Integrated Circuits", 4th edition, Pearson, 2015.
4	M.H. Rashid, "*Power Electronics: Circuits, Devices & Applications*", Third Edition, PHI, New Delhi, 2008.
References	
1	Albert Malvino, David J. Bates, "Electronic Principles", 7th Edition, McGraw Hill Education, 2017.
2	Robert F. Coughlin and Frederick F. Driscoll, "Operational Amplifiers and Linear Integrated Circuits," Pearson Education, 2009.
3	M. D. Singh & K. B. Khanchandani, "*Power Electronics*", Second Edition, Tata McGraw-Hill Publishing Company Ltd., New Delhi, 2007.
4	
Useful Links	
1	https://nptel.ac.in/courses/108101091
2	https://nptel.ac.in/courses/108105158
3	https://www.tutorialspoint.com/semiconductor_devices/semiconductor_devices_operational_amplifiers.htm
4	https://nptel.ac.in/courses/108/105/108105066/#

CO-PO Mapping

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