Government College of Engineering, Karad

SCHEME OF INSTRUCTION & SYLLABI

Programme: Electronics and Telecommunication Engineering

Scheme of Instructions: Third Year B. Tech. in Electronics and Telecommunication Engineering

Semester – V

Sr. No.	Course Category	Course Code	Course Title	L	T	P	Contact Hrs/Wk	Course Credits	EXAM SCHEME				
									CT-1	CT-2	TA/CA	ESE	TOTAL
1	OEC	EX2501	Embedded Systems& RTOS	3	-	-	3	3	15	15	10	60	100
2	PCC	EX2502	Digital Communication	3	-	-	3	3	15	15	10	60	100
3	PCC	EX2503	Digital Signal Processing	3	-	-	3	3	15	15	10	60	100
4	PCC	EX2504	Electromagnetic Engineering and WP	3	1	-	4	4	15	15	10	60	100
5	PEC	EX25*5	Elective – I	2	1	-	3	3	15	15	10	60	100
6	OEC	EX2506	Embedded Systems & RTOS Lab	-	-	2	2	1	-	-	25	25	50
7	PCC	EX2507	Digital Communication. Lab	-	-	2	2	1	-	-	25	25	50
8	PCC	EX2508	Digital Signal Processing Lab	-	-	2	2	1			25	25	50
10	P/S/IT	EX2509	Mini Project	-	-	4	4	2	-	-	50	50	100
11	MCC	EX2510	Industrial Training and Evaluation	-	1	-	-	Audit			50	-	50
			Total	**14**	**03**	**10**	**26**	**21**	**75**	**75**	**225**	**425**	**800**

L-Lecture T-Tutorial P-Practical

CT1-ClassTest1 TA/CA- TeacherAssessment/ContinuousAssessment

CT2-ClassTest2 ESE- End Semester Examination (For Laboratory EndSemesterperformance)

Course Category	HSMC (Hum., Soc. Sc, Mgmt.)	BSC (Basic Sc.)	ESC (Engg. Sc.)	PCC (Programme Core courses)	PEC (Programme Elective courses)	OEC (Open Elective courses from other discipline)	MCC (Mandatory Courses)	Project / Seminar / Industrial Training
Credits	--	--	--	12	03	04	Yes	02
Cumulative Sum	06	21	28	29	03	08	Yes	03

PROGRESSIVE TOTAL CREDITS : 77+21= 98

Government College of Engineering, Karad

SCHEME OF INSTRUCTION & SYLLABI

Programme: Electronics and Telecommunication Engineering

Scheme of Instructions: Third Year B. Tech. in Electronics and Telecommunication Engineering

Semester – VI

Sr. No.	Course Category	Course Code	Course Title	L	T	P	Contact Hrs / Wk	Course Credits	EXAM SCHEME				
									CT-1	CT-2	TA/CA	ESE	TOTAL
1	HSMC	EX2601	Economics for Engineers	2	-	-	2	2	15	15	10	60	100
2	OEC	EX2602	Internet of Things	3	-	-	3	3	15	15	10	60	100
3	PCC	EX2603	Computer Network	3	-	-	3	3	15	15	10	60	100
4	PCC	EX2604	Antenna and Microwave	3	-	-	3	3	15	15	10	60	100
5	PCC	EX2605	VLSIDesign	3	-	-	3	3	15	15	10	60	100
6	PEC	EX26*6	Elective – II	2	1	-	3	3	15	15	10	60	100
7	OEC	EX2607	Internet of Things Lab	-	-	2	2	1	-	-	25	25	50
8	PCC	EX2608	Computer Network Lab	-	-	2	2	1	-	-	25	25	50
9	PCC	EX2609	Antenna and Microwave Lab	-	-	2	2	1	-	-	25	-	25
10	PCC	EX2610	VLSI DesignLab	-	-	2	2	1			25	25	50
11	HSMC	EX2611	Technical Presentation		1		1	1	-	-	25	-	25
			Total	**16**	**02**	**08**	**26**	**22**	**90**	**90**	**185**	**435**	**800**

L-Lecture T-Tutorial P-Practical

CT1-ClassTest1 TA/CA- TeacherAssessment/ContinuousAssessment

CT2-ClassTest2 ESE- End Semester Examination (For Laboratory EndSemesterperformance)

Course Category	HSMC (Hum., Soc. Sc, Mgmt.)	BSC (Basic Sc.)	ESC (Engg. Sc.)	PCC (Programme Core courses)	PEC (Programme Elective courses)	OEC (Open Elective courses from other discipline)	MCC (Mandatory Courses)	Project / Seminar / Industrial Training
Credits	03	--	--	12	03	04	--	--
Cumulative Sum	9	21	28	41	06	12	Yes	03

PROGRESSIVE TOTAL CREDITS : 98+22=120

List of PROGRAM ELECTIVE courses:

Sr.No.	Course Category	Course Code	Elective I
Semester-V			
1	PEC	EX2515	Power Electronics
2	PEC	EX2525	Control System
3	PEC	EX2535	Computer Organization and System Programming
4	PEC	EX2545	Industrial Automation

Sr.No.	Course Category	Course Code	Elective II
Semester-VI			
1	PEC	EX2616	Satellite Communication and Remote Sensing
2	PEC	EX2626	Broadband Communication
3	PEC	EX2636	Wireless and Mobile Communication
4	PEC	EX2646	Information Theory, Coding and Compression Techniques

*** Elective list will be updated according to cutting edge Technology.**

Government College of Engineering, Karad

Third Year (Semester – V) B. Tech. Electronics and Telecommunication

EX2501: Embedded Systems and RTOS

Teaching Scheme			Examination Scheme	
Lectures	03 Hrs/week		CT – 1	15
Tutorials	00 Hrs/week		CT – 2	15
Total Credits	03		TA	10
			ESE	60
			Duration of ESE	02 Hrs 30 Min

Course Outcomes (CO)

	Student will be able to	
1.	Illustrate general concepts of Embedded Systems.	L2
2.	Illustrate & Apply concepts of Cortex M4 Microcontroller in Embedded System applications.	L3
3.	Design & Develop Embedded System applications for Real life, Engineering and Industrial Purpose.	L6
4.	Implement the real-time operating system principles such as multitasking techniques.	L4
5.	Analyze the structure and working of real-time operating systems.	L4
6.	Apply Programming concepts Python to Embedded System solutions.	L5

	Course Contents	Hours
Unit 1	**Introduction to Embedded Systems:** Introduction to Embedded Systems, Application Areas, Design Methodology, Design Metrics, Categories of embedded systems, Overview of embedded system architecture, Specialties of embedded systems, recent trends in embedded systems, Architecture of embedded systems, Hardware architecture, Software architecture, Application Software, Communication Software. Embedded system design and development: Embedded system design, Life-Cycle Models, Development tools.	**(07)**
Unit 2	**ARM CORTEX Fundamentals**: Background of ARM Architecture ,ARM CORTEX series features, Improvement over classical series, CORTEX ARM processors series, Features and applications, ARM-M series Based Microcontroller : Features, Architecture block diagram & its description, System Control, Clock & Power Control, Pin Connect Block. CMSIS Standard, Bus Protocols Ethernet, CAN, USB, Bluetooth. Development and Debugging Tools: Software and Hardware tools like Cross Assembler, Compiler, Debugger, Simulator, In-Circuit Emulator (ICE), Logic Analyzer etc.	**(08)**
Unit 3	**Real world interfacing using Raspberry-Pi /Cortex M4:** LED,LCD, Keypad interfacing, switch interfacing, stepper motor interfacing, digital -input output interfacing, Programming on I2c & SPI bus Protocol, Study of any two real life embedded products in detail.	**(06)**
Unit 4	**RTOSConcepts**:Foregroundandbackgroundsystems,Criticalsection,SharedResources,Tasks, Multitasking, Context Switching, Kernel Structure, Pre-emptive and non-pre-emptive Schedulers, Static and Dynamic Priorities, Priority Inversion, Mutual exclusion, Synchronization , Inter task communication mechanisms, Interrupts: Latency, Response and recovery, Clock Tick,Memory Requirements.	**(08)**
Unit 5	**Inter-process Communication and Synchronization of Processes, Threads and Tasks :** Multiple Processes in an application, Multiple Threads in an application, Task and Data, Clear-cut distinctionbetweenFunctions,ISRSandtasksbytheirCharacteristics,ConceptofSemaphores,Shared Data, Inter-process Communication, Signal Function, Semaphore Functions, MessageQueue Functions, Mail Box Functions, Pipe Functions, Socket Functions, RPC Functions.	**(07)**
Unit 6	**Python Programming For Embedded Systems Applications:** Introduction to Python, Identifiers, Expressions and Statements, Variables, Operators, Data types, Type Conversions, Dictionaries, Tuples, and Sets. Python on Raspberry Pi, Python Programming Environment, Python Expressions, Strings, Functions, Function Arguments , Lists , List Methods , Control Flow , Python Libraries For Embedded Systems Applications.	**(06)**

Text Books

1. Raj Kamal, “Embedded Systems, 4th Edition”, Published by McGraw Hill India, 2020
2. Joseph Yiu, “The Definitive Guide to ARM Cortex M3/M4 Processors”, Elsevier; First edition, 2014
3. Dr. K. V. K. K. Prasad; Embedded / real–time systems: concepts, design & programming, Black Book; Dreamtech press, Reprint edition2013

Reference Books

1. Mark Lutz, “Learning Python”, O'Reilly Media, 5th Edition, 2016.
2. Jean Labrosse: MicroC/OS-II: The Real-Time Kernel; Meets Requirements for Safety-Critical Systems , 2nd Edition, Elsevier/Shroff Publishers, 2011.

Useful Links

1. www.arm.com
2. www.nxp.com

3.	https://www.python.org/
4.	https://sourceforge.net/projects/raspberry-gpio-python/

Mapping of COs and POs

PO → CO↓	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO7	PO8	PO 9	PO10	PO11	PO12	PSO 1	PSO2	PSO3
CO 1	1	2	-	-	-	-	-	-	1	-	1	1	1	-	1
CO2	2	2	2	2	2	-	2	-	2	-	2	2	2	1	2
CO 3	3	3	3	3	3	3	3	-	3	-	3	3	3	3	3
CO 4	1	2	-	2	1	-	-	-	-	-	1	2	2	1	2
CO 5	1	2	-	2	1	-	-	-	-	-	2	2	2	1	2
CO 6	3	3	3	3	3	3	2	-	2	-	3	3	3	2	3
Average	1.83	2.33	2.66	2.4	2	3	2.33		2	-	2	2.16	2.16	1.6	2.16
Percentage	61	77.66	88.66	80	66.66	100	77.7	-	66.66	-	66.66	72	72	53.33	72

Assessment Pattern (with revised Bloom's Taxonomy)

Knowledge Level	CT 1	CT 2	TA	ESE
Remember	-	-	-	10
Understand	05	-	05	10
Apply	05	05	05	10
Analyze	05	05	-	10
Evaluate	-	05	-	10
Create	-	-	-	10
TOTAL	15	15	10	60

Government College of Engineering, Karad				
Third Year(Semester- V) B. Tech Electronics and Telecommunication				
EX2502: Digital Communication				
Teaching Scheme			Examination Scheme	
Lectures	3 Hrs/week		CT1	15
Tutorial	-		CT2	15
Total credits	3		TA	10
			ESE	60
			Duration of ESE	2 Hrs 30 Min

Course Outcome (CO): Student will be able to		
1	Apply concept of pulse modulation for transmission of signal.	L3
2	Interpret the baseband pulse signal.	L2
3	Analyze the different digital modulation technique.	L4
4	Analyse spread spectrum systems.	L4
5	Determine information, entropy, rate at which reliable communication can take place.	L5
6	Detect and correct the errors introduced in the channel using error control coding.	L4

CourseContents		Hours
Unit I	**Waveform Coding:** Pulse Code Modulation - Quantization, uniform and non-uniform quantize, companding, bandwidth, quantization noise, signal to noise ratio, non-uniform quantization and companding, compander characteristics, non-uniform quantization for speech signal, differential PCM, delta modulation(DM),slope overload distortion, granular noise adaptive delta modulation(ADM),Voice coder (VOCODER).l.	**10**
Unit II	**Baseband Pulse Transmission**: Line coding, Pulse shaping, Inter-symbol interference (ISI), Eye pattern, Scrambler, unscramble, difference between source coding and line coding, Nyquist criterion for distortion less base band binary transmission,	**05**
Unit III	**Digital Modulation Techniques**: Digital Band pass Modulation techniques -Amplitude Shift Keying, Frequency Shift Keying, Phase Shift Keying, Quadrature Phase Shift Keying, Quadrature Amplitude Shift Keying. Coherent and non-coherent detection, M-ary Modulation Techniques- M-aryPhase Shift Keying, M-ary Frequency Shift Keying.	**10**
Unit IV	**Spread Spectrum and multiple access technique:** Introduction, Pseudo noise sequence, direct spread spectrum (DS-SS), processing gain, probability of error, jamming margin. Frequency hop spread spectrum (FH-SS)-slow and fast hopping. **Multiple access techniques** - frequency division multiple access(FDMA),time division multiple access(TDMA) and Code division multiple access(CDMA)	**8**
Unit V	**Information Theory:** Uncertainty, information and entropy, Mutual Information, Channel Capacity, Shannon Hartley Theorem, Source coding - Huffman coding and Shannon- Fanon Coding.	**8**
Unit VI	**Channel Coding:** Error detection and correction, Types of codes, FEC and ARQ ,Linear block codes, Hamming code- encoding and syndrome decoding, Cyclic codes- nonsystematic and systematic code.,	**8**

Text Books	
1	Principle of Communication System, Taub& Schilling, McGraw- Hill, New Delhi, 4th edition.2017
2	Communication system Communications, Simon Haykin, John Wiley and Sons ,5th edition 2009
3	Analog and Digital Communication, B.P. Lathi, TMH, New Delhi, 2nd edition, 2013.

References	
1	Information Theory coding and Cryptography, Ranjan Bose, McGraw-Hill Publication, 2nd Edition.
2	Digital Communications – Theory and Lab Practice, K. N. HariBhat and D. Ganesh Rao, Pearson, Third Edition 2010

Useful Links	
1	http://www.satishkashyap.com/2013/03/video-lectures-on-digital.html
2	http://www.nptelvideos.in/2012/12/digital-communication.html
3	https://ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-450-principles-of-digital-communications-i-fall-2006/video-lectures/

Mapping of Course outcome with Program Outcomes

PO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	1	-	-	1	-	-	-	-	-	-	-	1	2	-
CO2	2	1	-	-	1	-	-	-	-	-	-	-	1	2	-
CO3	3	2	1	-	-	1	-	-	-	-	-	-	1	3	1
CO4	1	1	1	-	1	-	-	-	-	-	1	-	-	3	-
CO5	2	1	-	-	2	-	-	-	-	-	-	-	-	3	1
CO6	2	2	-	-	2	-	-	-	-	-	-	-	1	3	2
	12	8	2		7	1	-	-	-	-	1	-	4	16	4
Average	2	1.33	1	-	1.4	1	-	-	-	-	1	-	1	2.66	1.33
percentage	3.33	22.16	50		28	100	-	-	-	-	100	-	25	43.33	44.33
1 – Low 2 – Medium3 –High															

Assessment Pattern

Knowledge Level	**CT1**	**CT 2**	**TA**	**ESE**
Remember	-	-	-	05
Understand	05	-	05	35
Apply	05	05	05	10
Analyze	05	05	-	05
Evaluate	-	05	-	05
Create	-	-	-	-
Total Marks 100	15	15	10	60

Government College of Engineering, Karad

Third Year (Semester – V) B. Tech. Electronics andTelecommunication

EX2503: Digital Signal Processing

Teaching Scheme			Examination Scheme	
Lectures	03 Hrs/week		CT – 1	15
Tutorials	00 Hrs/week		CT – 2	15
Total Credits	03		TA	10
			ESE	60
			Duration of ESE	02 Hrs 30 Min

Course Outcomes (CO)

Student will be able to

1.	Illustrate FFT algorithm.	L2
2.	Design FIR and IIR filters as per specification	L4
3.	Develop FIR and IIR realization in different forms	L3
4.	Design filter banks.	L4
5.	Demonstrate DCT and Wavelet transform	L2
6.	Illustrate DSP Processor architecture.	L2

	Course Contents	Hours
Unit 1	**Discrete Fourier Transform**: Review of DTFT, Introduction to DFT, Properties of DFT, Relationship between DTFT and DFT Computation methods. Linear Convolution, circular convolution, Overlap Save and Overlap add algorithm. FFT Algorithms – Radix 2: DIT-FFT and Radix 2: DIF.	**(07)**
Unit 2	**IIR Filter Design:** Introduction to IIR Filters, Butterworth Filter approximation, IIR Filter Designing using Impulse Invariant method and Bilinear Transformation method, Frequency Transformation, Comparison of elliptic and Butterworth Filter design, IIR filter realization.	**(08)**
Unit 3	**FIR Filter Design:** Introduction to FIR Filters, FIR Design using Frequency Sampling Technique and Windowing methods. FIR filterrealization	**(07)**
Unit 4	**Multi-rateandAdaptiveDSP:**Introduction,Decimationandinterpolation,DesignofSamplingRate Converters, Poly phase Structures, Multistage Implementation ofSampling Rate Conversion, Filter banks, Quadrature Mirror Filters bank, Application. Adaptive Wiener filter and LMS algorithm, Applications of adaptive filtering to echo cancellation and equalization	**(10)**
Unit 5	**DCT, wavelet transform and its application:** Forward DCT, Inverse DCT and DCT as orthogonal transformation. Introduction to wavelets, STFT, Continuous wavelet transform (CWT),Discrete wavelet transform, Comparison of Fourier transform & wavelet transform, Application of wavelets transforms.	**(06)**
Unit 6	**DSP Processor:** Introduction, Architecture of DSP Processor and its specifications(any one such as TMS, Analog DSP), 5400 series floating point Digital Signal Processor, Advantages and typical applications of DSP	**(04)**

Text Books

1.	P. Ramesh Babu, *"Digital Signal Processing",* SciTech publication, 7th Edition, 2019.
2.	J. G. Proakis, *"Digital Signal Processing",* TMG publication, 5th Edition, 2018.
3.	Vaidyanathan, P.P., "*Multirate Systems and Filter Banks*", Pearson Education.

Reference Books

1.	A. V. Oppenheim and R. W. Schafer, *"Digital Signal Processing",* Prentice Hall, Technology
2.	E. C. Ifeachor, Barrie W. Jervis, *"Digital Signal Processing",* Prentice Hall, Technology & Engineering, 3rd Edition, 2002.
3.	V. K. Ingle and J. G. Proakis, "Digital Signal Processing using MATLAB," Thomso Learning, 2000
4	R. G. Lyons, "Understanding Digital Signal Processing," 3rd Ed., Prentice Hall, 2010

Useful Links

1.	https://www.youtube.com/playlist?list=PLB75F3DF81054644C
2.	https://ocw.mit.edu/resources/res-6-008-digital-signal-processing-spring-2011/video-lectures/
3.	https://www.ti.com/lit/ds/sprs038/sprs038.pdf?ts=1603989840208&ref_url=https%253A%252F%252Fwww.google.com%252F

Mapping of COs and POs

PO → CO ↓	PO 1	PO 2	PO3	PO4	PO 5	PO 6	PO7	PO8	PO 9	PO 10	PO11	PO12	PSO1	PSO2	PSO3
CO 1	2	2	2	-	2	-	-	-	-	-	-	-	2	-	
CO2	3	3	2	3	-	-	-	-	-	-	-	-	3	2	
CO 3	2	2	2	2	-	-	-	-	-	-	-	-	-	2	
CO 4	3	2	3	3	2	-	-	-	-	-	-	-	-	3	2
CO 5	1	2	2	-	1	-	-	-	-	-	-	-	-	1	
CO 6	2	2	2	-	-	-	-	-	-	-	-	-	2	-	2
	13	13	13	8	5								7	8	4
Avg	2.16	2.16	2.16	2	1.66								2.33	2	2
%	72.22	72.22	72.22	66.66	55.33								77.66	66.66	66.66

Assessment Pattern (with revised Bloom's Taxonomy)

Knowledge Level	CT 1	CT 2	TA	ESE
Remember	-	-	-	-
Understand	05	-	05	15
Apply	10	-	05	10
Analyze	-	-	-	-
Evaluate	-	10	-	20
Create	-	05	-	15
TOTAL	15	15	10	60

Government College of Engineering, Karad

Third Year (Semester – V) B. Tech. Electronics andTelecommunication

EX2504: Electromagnetic Engineering and Wave Propagation

Teaching Scheme			Examination Scheme	
Lectures	03 Hrs/week		CT – 1	15
Tutorials	01 Hrs/week		CT – 2	15
Total Credits	04		TA	10
			ESE	60
			Duration of ESE	02 Hrs 30 Min

Course Outcomes (CO)

Student will be able to

1	Apply basic laws of electromagnetic for solving problems in Electrostatic and Magneto statics.	L3
2	Analyze Maxwell's equations.	L4
3	Relate electromagnetic phenomenon suitable to real-life applications.	L1
4	Explain radio wave propagation phenomena in communication system.	L2
5	Estimate various parameters of circuit/equipment for Electromagnetic compatibility.	L5
6	Discover cost-effective Electronic equipment/product compatible with the electromagnetic environment	L4

	Course Contents	Hours
Unit 1	**Electrostatics & Magneto statics:** Coulomb's Law, Electric field intensity, Gauss's law and applications. Electric potential, Concept of Uniform and Non-Uniform field, Electric Flux Density, Boundary Conditions, Poisson's and Laplace's Equations. BiotSavart's Law, Ampere's Circuit Law, Magnetic field due to straight conductor, Magnetic flux density, Boundary conditions, The Scalar and Vector Magnetic Potentials	**(07)**
Unit 2	**Time-Varying Fields and Maxwell's Equations:** Integral and differential form of Maxwell's equations for static and time varying fields and its interpretations, Wave equation, Uniform Plane Wave, Wave Propagation in Free Space, Lossy and Lossless Dielectrics and in Good Conductors. Depth of penetration, concept of polarization, Poynting Theorem and Vector.	**(08)**
Unit 3	**Ground Wave Propagation:** Different Modes of Wave Propagation, Structure of Atmosphere, Ray/ModeConcepts,GroundWavePropagation,PlaneEarthReflections,SpaceandSurfaceWaves, Wave Tilt, Curved Earth Reflections, Space Wave Propagation, Field Strength Variation with Distance and Height, Effect of Earth's Curvature, Absorption, Super retraction, M-Curves and Duct Propagation, Scattering Phenomena, TroposphericPropagation.	**(07)**
Unit 4	**Ionospheric Propagation:** Structure of Ionosphere, effective permittivity and conductivity of an ionizedgas,RefractionandReflectionofSkyWavesbyIonosphere,regularandirregularvariations of ionosphere, attenuation factor, Critical Frequency, Maximum Usable Frequency, Virtual Height and Skip Distance, Relation between MUF and skip Distance, Faraday rotation and measurement of total electron content,Multi-hopPropagation.	**(08)**
Unit 5	**Basics of EMI/EMC:** Introduction to EMI and EMC, Intra and inter system EMI, Conducted and Radiated EMI emission and susceptibility, Radiation hazards to humans, EMC Engineering Application, Coupling methods, shielding and grounding technique.	**(06)**
Unit 6	**System Design and measurements for EMC:**General Standards for Residential and Industrial environment, Product Standards, NonidealBehaviour of Components, System Configuration and Design, Diagnostic Tools, Environment and considerations for EMI testing, EMI Shielding effectiveness tests, Open field test.	**(06)**
	Self-Study: Vector Analysis, Gradient, Divergence, Curl, Conductors and Dielectrics, Reflection of a Plane Wave at Normal Incidence & Oblique Incidence, Transmission Line Theory and Impedance Matching.	

Text Books

1.	William H. Hayt, Jr. and John A. Buck, Engineering Electromagnetic, 9th ed., McGraw Hill (2019).
2.	Henry W. Ott, Electromagnetic compatibility engineering, A John Wiley & Sons, Inc. Publication, 2009

Reference Books

1.	R.K. Shevgaonkar, Electromagnetic Waves, TATA McGraw Hill Companies, 3rd Edition,2009
2.	Clayton R. Paul , Introduction to electromagnetic compatibility, A John Wiley & Sons, Inc. Publication, Second edition 2006 Reprint 2010
3.	Antenna and Wave Propagation, K. D. Prasad, SatyaPrakashan, 2009.

Useful Links

1.	https://nptel.ac.in/courses/108104087/
2.	https://nptel.ac.in/courses/108/106/108106138/

3.	https://nptel.ac.in/courses/115104088/

Mapping of Course outcome with Program Outcomes:

PO → CO ↓	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2		2										1	2
CO2	2	3	3	1										1	2
CO3	2	1					1							1	1
CO4	2	3	3	1										1	2
CO5	2	2		3									2		1
CO6	3	2	3	2	1								2	1	1
Total	14	11	6	8	1	0	1	0	0	0	0	0	4	5	7
Avg	2.34	1.84	3	2	1	0	1	0	0	0	0	0	2	1	1.4
%	77.78	61.12	100	66.67	33.34	0	33.34	0	0	0	0	0	66.67	33.34	46.67

Assessment Pattern:

Knowledge Level	**CT1**	**CT2**	**TA**	**ESE**
Remember	5	-	3	15
Understand	5	-	2	5
Apply	-	5	2	10
Analyze	5	-	1	15
Evaluate	-	5	2	10
Create	-	5	-	5
Total Marks 100	15	15	10	60

Government College of Engineering, Karad

Third Year (Semester – V) B. Tech. Electronics andTelecommunication

EX2515: Power Electronics

Teaching Scheme			Examination Scheme	
Lectures	02 Hrs/week		CT – 1	15
Tutorials	01 Hrs/week		CT – 2	15
Total Credits	03		TA	10
			ESE	60
			Duration of ESE	02 Hrs 30 Min

Course Outcomes (CO)

Student will be able to

1.	Explain various Power Devices	L2
2.	Apply design techniques to controlled rectifiers.	L3
3.	Analyze switching circuits like choppers and appraise their industrial importance.	L4
4.	Analyze Inverter circuits using different control strategies and harmonic reduction techniques.	L4
5.	Evaluate design issues in SMPS, Fly back and Forward Converters.	L5
6.	Evaluate real time systems using concept of AI, Fuzzy Logic and ANN in power electronics.	L5

	Course Contents	Hours
Unit 1	**Characteristics of Semiconductor Power Devices:** Thyristor, power MOSFET and IGBT- Treatment should consist of structure, Characteristics, operation, ratings, protections and thermal considerations.Briefintroductiontopowerdevicesviz.Triac,Diac,MOScontrolledthyristor(MCT), Power Integrated Circuit (PIC) (Smart Power), Triggering/Driver, commutation and snubber circuits forthyristor,powerMOSFETsandIGBTs(discreteandICbased).Conceptoffastrecoveryand schottky diodes as freewheeling and feedback diode	**(06)**
Unit 2	**Controlled Rectifier:** Single phase: Study of semi and full bridge converters for R, RL, RLE and level loads. Analysis of load voltage and input current, Effect of source impedance, Fourier series analysisofinputcurrenttoderiveinputsupplypowerfactor,displacementfactorandharmonicfactor.	**(06)**
Unit 3	**Choppers**: Concept of Single and Multi Quadrant Choppers (Type A, Type B, Type C, Type D and type E choppers), Control strategies of choppers – TRC and CLC, Analysis of Type A chopper. Step up chopper. Concept of Multiphase Chopper, Concept of SMPS , Analysis of Fly back and Forward Converters, Concept of Resonant Converter.	**(06)**
Unit 4	**SinglePhaseInverters**:Principleofoperationoffullbridgesquarewave,quasi-squarewave,PWM inverters and comparison of their performance. Driver circuits for above inverters and mathematical analysisofoutput(Fourierseries)voltageandharmoniccontrolatoutputofinverter(Fourieranalysis of output voltage). Filters at the output of inverters. Concept of Three Phase Inverter.	**(06)**
Unit 5	**Applications:** Power line disturbances, power conditioners, Block diagram and configuration of UPS, salient features of UPS, selection of battery and charger ratings for Online UPS. Separately excited DC motor drive. Concept of AI, Fuzzy Logic and ANN in Power Electronics.	**(06)**

Text Books

1.	Ned Mohan, Robbins, **"**Power electronics: Converters, Applications and Design**"**, John Wiley and sons Edition III.
2.	Bimal K. Bose, "Power Electronics and Motor Drives", Elsevier, 2015.
3.	Muhammad H. Rashid, **"**Power Electronics: Devices, Circuits, and Applications**"** Pearson Publication, Edition 4th,2017

Reference Books

1.	P.C. Sen., **"**Modern Power Electronics**"**, S.Chand publication, Edition V,2005
2.	V.R.Moorthi, **"**Power Electronics**"**, Oxford University Press,2005
3.	Cyril W., Lander **"**Power Electronics**"**, McGraw Hill, Edition III.
4.	G K Dubey, S R Doradla, "Thyristorised Power Controllers**"**, New Age International Publishers
5.	SCR manual from GE, USA.

Useful Links

1.	https://www.youtube.com/watch?v=1Auay7ja2oY
2.	https://www.youtube.com/watch?v=M59eR0RnaOg

Mapping of COs and POs

PO → CO ↓	PO 1	PO 2	PO3	PO4	PO 5	PO 6	PO7	PO8	PO 9	PO 10	PO11	PO12	PSO1	PSO2	PSO3
CO 1	2	1	-	-	1	-	1	-	1	1	1	-	1	-	-
CO2	-	2	2	1	2	-	1	-	1	1	2	-	1	-	1
CO 3	-	1	3	1	1	-	-	-	2	-	1	1	2	-	1
CO 4	1	1	2	2	2	-	-	-	2	1	-	1	2	-	2
CO 5	1	1	2	2	1	-	-	-	2	2	-	-	3	-	2
CO 6	1	-	-	2	2	-	-	-	-	3	-	1	3	-	3
Total	5	6	9	8	9	-	2	-	8	8	4	3	12	-	9
Avg.	1.25	1.2	2.25	1.6	1.5	-	1	-	1.6	1.6	1.33	1	2	-	1.8
%	41.66	40	75	53.33	50	-	33.33	-	53.33	53.33	44.44	33.33	66.66	-	60

Assessment Pattern (with revised Bloom's Taxonomy)

Knowledge Level	CT 1	CT 2	TA	ESE
Remember	-	-	-	05
Understand	05	-	05	35
Apply	05	05	05	10
Analyze	05	05	-	05
Evaluate	-	05	-	05
Create	-	-	-	-
TOTAL	15	15	10	60

Government College of Engineering, Karad

Third Year (Semester – V) B. Tech. Electronics andTelecommunication

EX2525: Control System

Teaching Scheme			Examination Scheme	
Lectures	02 Hrs/week		CT – 1	15
Tutorials	01 Hrs/week		CT – 2	15
Total Credits	03		TA	10
			ESE	60
			Duration of ESE	02 Hrs 30 Min

Course Outcomes (CO)

Student will be able to

1.	Construct the transfer function of the dynamic systems.	L3
2.	Analyze the time domain responses of first & second order system.	L4
3.	Identify the stability of the systems	L3
4.	Examine basic concept of the different controllers	L4
5.	Evaluate behavior system using frequency response methods	L5
6.	Interpret controllability &observability of the system using state variable models	L3

	Course Contents	Hours
Unit 1	**Introduction to Control Systems** - Need of Control Systems, Types of control systems, Signal Flow Graph and Mason's gain formula reduction, Mathematical Modeling of physical systems	**(06)**
Unit 2	**Time Domain Analysis** -Transient response & Steady state response, Transient response of first & second.Ordersystems,Timedomainspecifications,Steadystateresponse – Steadystateerrorsanderrorconstants.	**(06)**
Unit 3	**Stability Analysis & Root Locus Technique**-The concept of stability & Necessary condition of stability. Routh stability criterion, Relative stability analysis. Definition of root locus, Rules for plotting root loci, Root locus plots.	**(06)**
Unit 4	**Frequency domain analysis**-Introduction, Frequency domain specifications, Stability Analysis from Bode Plots, Polar Plots, Nyquist Stability Criterion, Nyquist plots.	**(06)**
Unit 5	**State Variable Analysis and Controller**-Concept of state, state variable & state model, state transition matrix, Solution of state equations. Concept of Controllability and observability**.** Introduction to Controller Design – P,PI,PD,PID	**(06)**

Text Books

1.	Ananda Natarajan R and Ramesh Babu"Control systems Engineering"Scitech; 5th Revised edition, 2018
2.	I. J. Nagrath and M. Gopal, "Control systems Engineering", Anshan Ltd; 5th Revised edition, 2008.
3.	Li Qui and Kemin Zhou, "Introduction to Feedback Control", Prentice Hall, StudentEdition, 2009.

Reference Books

1.	Norman S. Nise, "Control System Engineering", Wiley; 7th Edition, 2014.
2.	B. C. Kuo, "Automatic Control Systems", Wiley; 8th edition, 2002.
3.	M. Gopal, "Control Systems – Principles and Design", Pearson Education, 3rd Edition, 2001.

Useful Links

1.	http://nptel.ac.in/courses/108101037/
2.	http://www.nptelvideos.in/2012/11/control-engineering.html
3.	http://freevideolectures.com/Course/2337/Control-Engineering

Mapping of COs and POs

PO → CO ↓	PO 1	PO 2	PO3	PO4	PO 5	PO 6	PO7	PO8	PO 9	PO 10	PO11	PO12	PSO1	PSO2	PSO3
CO 1	1	2	-	-	1	-	1	-	2	1	1	-	1	-	-
CO2	1	2	2	1	2	-	-	-	2	-	1	-	2	2	-
CO 3	-	2	2	1	2	-	-	-	2	1	-	-	3	-	1
CO 4	-	1	3	1	1	-	-	-	2	1	-	-	3	2	2
CO 5	1	1	2	2	1				2	2	-	-	3	2	1
CO 6	1	-	-	2	2				-	2	-	-	3	-	-
	4	8	9	7	9	-	1	-	10	7	2	-	15	6	4
Avg.	0.66	1.33	1.5	1.16	1.5	-	0.16	-	1.66	1.16	0.33	-	2.5	1	0.66
%	22.22	44.33	50	38.66	50	-	53.33	-	55.33	38.66	11.1	-	83.33	33.33	22.22

Assessment Pattern (with revised Bloom's Taxonomy)

Knowledge Level	CT 1	CT 2	TA	ESE
Remember	-	-	-	05
Understand	05	-	05	35
Apply	05	05	05	10
Analyze	05	05	-	05
Evaluate	-	05	-	05
Create	-	-	-	-
TOTAL	15	15	10	60

Government College of Engineering, Karad

Third Year (Semester – V) B. Tech. Electronics andTelecommunication

EX2535: Computer Organization and System Programming

Teaching Scheme			Examination Scheme	
Lectures	02 Hrs/week		CT – 1	15
Tutorials	01 Hrs/week		CT – 2	15
Total Credits	03		TA	10
			ESE	60
			Duration of ESE	02 Hrs 30 Min

Course Outcomes (CO)

	Student will be able to	
1.	Analyze the design of a computer Architecture.	L4
2.	Evaluate the issues related to performance improvement.	L2
3.	Expertise to decide performance trade-off between different memory units and instruction sets	L4
4.	Design, implement and test the assemblers and macro processor.	L4
5.	Recognize the use of functions, compilers, loaders.	L3
6.	Create the programs that to be used by editors, debuggers, grammars and automation process.	L6

	Course Contents	Hours
Unit 1	**Basic functional blocks of a computer:** CPU, memory, input-output subsystems, controlunit.CPU Sub block, Data path: ALU, registers, CPU buses; Control unit design: hardwired and micro-programmed design approaches. Memory system design: semiconductor memory technologies, memory organization, cache memory hierarchy, Programming management, Memory management.	**(04)**
Unit 2	**InstructionsetarchitectureofaCPU**:registers,instructionexecutioncycle,RTLinterpretation of instructions, addressing modes, instruction set, Instruction set architecture CISC, RISC.Peripheral devices and their characteristics: Input-output subsystems, I/O transfers: program controlled, interrupt driven andDMA	**(05)**
Unit 3	**Privileged and non-privileged instructions:** software interrupts and exceptions, Programs and processes: role of interrupts in process state transitions, Pipelining : Basic concepts of pipelining, throughput and speedup, pipeline hazards Introduction to superscalar processors architecture: parallel pipelines, out of order execution, branch prediction	**(06)**
Unit 4	**Introduction:** Introduction to Software processors, Translators and Loaders, Interpreters Assemblers: Elements of Assembly Language Programming, Design of Two-Pass assemblers Macros and Macro Processors: Macro Instructions, Features of a Macro facility, Implementation of Two pass Macro.	**(04)**
Unit 5	**Compilers:** Aspects of Compilation, Phases of compilation, Scanning and Parsing, Compilation of Expressions, Compilation of Control Structures Code Generation and Code optimization techniques, Compiler Writing Tools Loaders & Linkage Editors: Loading Linking and Relocation, Overview of Linkage Editing, Linking for Program Overlay	**(06)**
Unit 6	**Editors and debuggers**: introduction to editors, types of editor, design of an editor, debug monitors, introduction to various debugging techniques, turbo c++ debuggers. Grammar and automation: introduction to grammar, types of grammar, acceptability of grammar, introduction to automation, characteristics of automation, finite control, transition system, finite automation.	**(05)**

Text Books

1.	Hamacher, V.C., Vranesic, Z.G. and Zaky, S.G., Computer Organization, 5th ed., Tata McGraw Hill, 2013.
2.	W. Stallings, “Computer Organization and Architecture: Designing for performance”, 6^{7h} Edition, Prentice Hall of India, 2003, ISBN 81 – 203 – 2962 – 7
3.	Beck L L, “Systems Software: An Introduction to Systems Programming”, AddisonWesley 2001.

Reference Books

1.	Patterson, D. A. & Hennessy, J. L., Computer Organization and Design: The Hardware/ Software Interface, Elsevier Science (2014).
2.	Hayes, J. P., (1998), Computer Architecture and Organization, McGraw-Hill.
3.	Stallings, W. Computer Organization and Architecture: Designing for Performance, Pearson Education (2008).
4.	Dhamdhere, D M, "Introduction to Systems Software", Tata Mc-Graw Hill (2000).
5.	Aho A V and J D Ullman, "Principles of compiler Design", Addison Wesley/ Narosa (1985).

Useful Links			
1.	https://www.educative.io/?affiliate_id=5073518643380224		
2.	https://nptel.ac.in/course.html		

Mapping of COs and POs

PO → CO ↓	PO 1	PO 2	PO3	PO4	PO 5	PO 6	PO7	PO8	PO 9	PO 10	PO11	PO12	PSO1	PSO2	PSO3
CO 1	1	1	-	-	1	-	-	-	-	1	1	-	1	1	-
CO 2	1	2	1	1	2	-	-	-	1	-	-	-	-	2	-
CO 3	1	2	2	1	1	-	-	-	1	1	-	-	2	-	1
CO 4	-	1	2	2	2	-	-	-	1	1	-	-	2	2	1
CO 5	1	1	2	2	3				-	-	-	-	-	2	1
CO 6	-	-	-	-	2				-	-	-	-	1	3	-
Total	4	7	7	6	11	-	-	-	3	3	1	-	6	10	3
Avg	1	1.4	1.75	1.5	1.8	-	-	-	1	1	1	-	1.5	2	1
%	33.3	46.6	58.33	50	60	-	-	-	33.3	33.3	33.3	-	58.33	66.6	33.3

Assessment Pattern (with revised Bloom's Taxonomy)

Knowledge Level	CT 1	CT 2	TA	ESE
Remember	-	-	-	05
Understand	05	-	05	30
Apply	05	05	05	15
Analyze	05	05	-	05
Evaluate	-	05	-	05
Create	-	-	-	-
TOTAL	15	15	10	60

Government College of Engineering, Karad

Third Year(Semester V) B. Tech. Electronics and Telecommunication

EX2545: Industrial Automation

Teaching Scheme			Examination Scheme	
Lectures	2 Hrs/week		CT – 1	15
Tutorials	1 Hr/week		CT – 2	15
Total Credits	3		TA	10
			ESE	60
			Duration of ESE	02 Hrs 30 Min

Course Outcomes (CO)

Student will be able to

1.	Develop the PLC program for various timing and sequencing operations.	L2
2.	Identify the necessity of using Supervisory Control and Data Acquisition (SCADA) for Complex projects.	L3
3.	Analyze the requirements for a given industrial process and select the most appropriate automation architecture andtechnologies	L4
4.	Outline the interfacing methods and industrial communication protocols.	L3
5.	Specify the strategies for utilizing robots in industrial environment	L5
6.	Design the automation systems for various industrial processes	L4

	Course Contents	Hours
Unit 1	**Introduction to Automation in Manufacturing Industries, Material Handling and Identification Technologies** - Automation in production system, Principles and strategies of automation, Basic elements of an automated system, Advanced automation functions, Levels of automations, Automated flow lines and transfer mechanisms, Analysis of transfer lines without storage, Automated flow lines with storage buffers. Overview of material handling systems, Types of material handling equipment, Design of the system, Conveyor system, Automated guided vehicle system, Automated storage systems, Interfacing handling and storage with manufacturing, Overview of Automatic Identification Methods	**(09)**
Unit 2	**Introduction to Programmable logic controllers (PLC) & its Programming** Ladderdiagramfundaments,PLCconfiguration,SystemBlockDiagram,PLCInput&Outputmodules, CPUs & Programmer/monitors, Solid state memory, the processor, Input modules (Interfaces), Power supplies. PLC programming – Physical components vs. program components, Programming of Boolean logic & relay logic, programming of ON/OFF Inputs to produce ON/OFF outputs, Advanced programming technique, Mnemonic programming code, Wiring techniques, Analog I/O	**(05)**
Unit 3	**Introduction to Industrial Communication Protocols-** TCP/IP protocol- HART communicator protocol Wireless communication (Ip56, Ip58) LAN – PROFI bus – Mod bus – CAN bus- field bus architecture.	**(05)**
Unit 4	**Process Control system principles-** Basic concepts, ON/OFF, P, PI, PD, PID controllers case studies Automated Manufacturing Systems-Components, Classification and overview of manufacturing systems, Cellular manufacturing, Flexible manufacturing system(FMS), FMS and its planning and implementation, Automated assembly system – design and types of automated assembly systems, Analysis of multi station and single station assembly machine.	**(05)**
Unit 5	**Distributed Control System-** SCADA, Local Control Unit (LCU) architecture, LCU Process Interfacing Issues, Block diagram and Overview of different LCU security design approaches, Networking of DCS. Data gathering, Data analytics, Real-time analysis of data stream from DCS, Historian build, Integration of business inputs with process data, Leveraging RTU (as different from PLCs and DCS), Industry 4.0, Introduction to Robotics, Computer vision. Fuzzy Neuro Controllers, Case studies.	**(06)**

Text Books

1. Rangan and Sharma, Instrumentation Systems, Second Edition, Tata McGraw-Hill Education, 2018
2. Federick D. Hackworth, “Programmable Logic Controllers”, Pearson Education, 2004.
3. Curtis D Johnson, Process Control, Instrumentation Technology, Eighth Edition, Pearson Education, 2016

Reference Books

1. I.J.Nagrath&M.Gopal, Control System Engineering, Fifth edition, New Age International Publication,2018
2. Helfric A.D & Cooper W.D, Modern Electronic Instrumentation & Measurement Techniques, Pearson Education,2009
3. H.S. Kalsi, Electronic Instrumentation, Third Edition, Tata McGraw-Hill Education, 2012

4.	G.C. Goodwin , S.R. Graebe, M.E. Salgado, Control System Design, Third Edition, Pearson Education,2016
Useful Links	
1.	https://nptel.ac.in/courses/108/105/108105088/
2.	https://doc.lagout.org/science/0_Computer%20Science/8_Electronics%20%26%20Robotics/Handbook%20of%20Industrial%20Automation%20-%20Richard%20L.%20Shell%20and%20Ernest%20L.%20Hall.pdf

Mapping of COs and POs

PO → CO ↓	PO1	PO2	PO3	PO 4	PO5	PO 6	PO 7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	-	-	-	2	-	-	-	-	-	-	1	1	-	-
CO2	-	3	-	-	-	-	-	-	-	-	-	2	2	-	-
CO3	1	-	-	-	-	-	-	-	-	-	-	1	3	-	1
CO4	1	-	2	-	3	-	-	-	-	-	-	-	3	-	2
CO5	1	-	-	1	3	-	-	-	-	-	-	1	3	-	1
CO6	2	1	-	2	3	-	-	-	-	-	1	-	3	-	1
Avg	1.2	2	2	1.5	2.75	-	-	-	-	-	1	1.25	2.5	-	1.25
%	40	66.66	66.66	50	91.66	-	-	-	-	-	33.3	41.66	83.33	-	41.66
1 – Low 2 – Medium3 – High															

Assessment Pattern (with revised Bloom's Taxonomy)

Assessment Pattern Level No.	**Knowledge Level**	Test 1	Test 2	Teachers Assessment/ Assignment	End Semester Examination
L1	Remember	05	-	-	05
L2	Understand	10	10	05	40
L3	Apply	05	05	05	05
L4	Analyze	00	-	-	-
L5	Evaluate	00	-	-	-
L6	Create	00	-	-	10
Total		15	15	10	60

Government College of Engineering, Karad

Third Year (Semester – V) B. Tech. Electronics and Telecommunication Engineering

EX2506 : Embedded Systems and RTOS Lab

Laboratory Scheme			**Examination Scheme**	
Practical	2 Hrs/week		TA/CA	25
Total Credits	1		ESE	25

Course Outcomes (CO)

Student Will be able to		
1.	Develop Program, Test, and Debug code using Keil software.	L3
2.	To design, development programming and testing of ARM Cortex processor	L5
3.	Develop and Analyze Python programming for Embedded System Applications.	L5
4.	Demonstrate interfacing of physical world devices	L6

	List of Experiment	
Experiment 1	Develop & Analyze embedded C program for interfacing LED, Seven Segment display, Stepper Motor, Relay with Cortex M4 Microcontroller.	
Experiment 2	Develop & Analyze embedded C program for interfacing Sensor (LM35), ADC, DAC, Keyboard with Cortex M4.	
Experiment 3	Develop & Analyze embedded C program for interfacing I2C EEPROM ,RTC, UART with LPC 21XX/Cortex M4	
Experiment 4	Design & Evaluate program for Zigbee interfacing with LPC 21XX/Cortex M4.	
Experiment 5	Configuration & Installation of Operating system on Raspberry Pi.	
Experiment 6	Exploring multitasking features of µC/OS -II.	
Experiment 7	Exploring Message Queue Services of µC/OS –II.	
Experiment 8	Real Time Application Development using µC/OS –II services.	
Experiment 9	Camera interface with Raspberry Pi using Python Programming.	
Experiment 10	Design & Evaluate DCT image Compression implemented on Raspberry Pi.	
Experiment11	Call & Text using Raspberry Pi and GSM Module.	
Experiment12	Interfacing HDMI Touch-screen Display with Raspberry Pi.	
Experiment13	Design & Implement Mini-project based on any one. (Raspberry Pi/Cortex M4/LPC2148).	
List of Submission		
1	Total number of Experiments: 10	
2	Total number of sheets: NA	
3	Project/Dissertation Report: NA	
4	Seminar report: NA	
5	Field Visit Report: NA	

Mapping of COs and POs

PO → CO ↓	PO 1	PO 2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO 1	2	2	2	2	3	-	-	-	2	-	2	2	2	1	1
CO 2	2	2	3	3	3	-	-	-	2	-	3	3	3	2	2
CO 3	3	3	3	3	3	1	2	-	3	2	3	3	3	2	2
CO 4	3	3	3	3	3	1	2	-	3	3	3	3	3	2	2
Average	2.5	2.5	2.27	2.27	3	1	2	-	2.5	2.5	2.27	2.27	2.27	1.75	1.75
Percentage	83.33	83.33	91.66	91.66	100	33.33	6.66	-	83.33	83.33	91.66	91.66	91.66	58.33	58.33

Assessment Pattern(with revised Bloom's Taxonomy)

Knowledge Level	CA	ESE
Remember	-	-
Understand	5	5
Apply	5	5
Analyze	5	5
Evaluate	5	5
Create	5	5
TOTAL	25	25

Government College of Engineering, Karad				
Third Year(Semester – V) B. Tech Electronics and Telecommunication				
EX2507: Digital Communication Laboratory				
Teaching Scheme			**Examination Scheme**	
Lectures	2 Hrs/week		CA	25
Total Credits	1		ESE	25

Course Outcome (CO):
Upon successful completion of this course, the student will be able to:

1	Construct and test digital modulation schemes for communication	L3
2	Analyze different digital data representation techniques.	L4
3	Apply different coding techniques for error detection and correction.	L3
4	Evaluate Eye pattern	L5

List of Experiment

Experiment 1	Analyze ASK, FSK modulation systems and interpret the modulated and demodulated waveforms.
Experiment 2	Analyze a BPSK modulation system and interpret the modulated and demodulated waveforms.
Experiment 3	Perform QPSK/QAM modulation system and interpret the modulated and demodulated waveforms.
Experiment 4	Generate the various encoding schemes for a given data stream.
Experiment 5	Analysis of Eye Diagram using oscilloscope
Experiment 6	Perform PCM.
Experiment 7	Generate Huffman coding.
Experiment 8	Perform error detection and correction using Hamming Code
Experiment 9	Perform detection and correction using Cyclic Code
Experiment 10	Generation of PN- Sequence
Experiment 11	Analyze DSSS
Experiment 12	Analyze FHSS

List of Submission

1	Total number of Experiments: 10
2	Field Visit Report

Mapping of Course outcome with Program Outcomes:

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	1	-	-	-	-	-	-	-	-	-	-	-	3	1
CO2	2	1	-	-	-	-	-	-	-	-	-	-	1	2	1
CO3	2	1	-	-	-	-	-	-	-	-	-	-	-	3	1
CO4	1	1	-	-	-	-	-	-	-	-	-	-	1	2	-
	6	4	-	-	-	-	-	-	-	-	-	-	2	10	3
	1.5	1	-	-	-	-	-	-	-	-	-	-	1	2.5	1
Average	50	33.33											33.33	100	33.33
1 – Low 2 – Medium3 – High															

Assessment Pattern:

Knowledge Level	**Continuous Assessment**	**End Semester Examination**
Remember	-	-
Understand	05	05
Apply	05	10
Analyze	05	10
Evaluate	10	15
Create	-	10
	25	50

Government College of Engineering, Karad				
Third Year (Semester – V) B. Tech. Electronics and Telecommunication Engineering				
EX2508: Digital Signal Processing Laboratory				
Laboratory Scheme			**Examination Scheme**	
Practical	2 Hrs/week		TA/CA	25
Total Credits	1		ESE	25

Course Outcomes (CO)

Student Will be able to

1.	Illustrate discrete time systems using appropriate tool.	L2
2.	Develop systems using FIR filter	L3
3.	Develop systems using IIR filter to get smooth data.	L3
4.	Design system using Decimation and interpolation	L4

	List of Experiment	
Experiment 1	Illustrate Linear and Circular convolution..	
Experiment 2	Examine DFT and IDFT as filter.	
Experiment 3	Evaluate Segmented Convolution using Overlap Add or Overlap Save Method.	
Experiment 4	Design of LPF, HPF FIR filter using Frequency Sampling method	
Experiment 5	Design of LPF, HPF FIR filter using windowing method.	
Experiment 6	Design of Butterworth IIR filter using Impulse Invariance Technique	
Experiment 7	Design of Butterworth IIR filter using Bilinear Transformation Technique.	
Experiment 8	Implementation of Decimation algorithm.	
Experiment 9	Implementation of interpolation algorithm.	
Experiment 10	Develop adaptive filter using Least Mean Squares (RLS) algorithm	
Experiment 11	Compute DCT and Inverse DCT.	
Experiment 12	Develop two-level decomposition of 2D signal.	
Experiment 13	Examine FFT algorithm (Hardware based)	
Experiment 14	Design of FIR filter (Hardware based)	
List of Submission		
1	Total number of Experiments: 10	
2	Total number of sheets: NA	
3	Project/Dissertation Report: NA	
4	Seminar report: NA	
5	Field Visit Report: NA	

Mapping of COs and POs

PO → CO ↓	PO 1	PO 2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO2	PSO3
CO 1	1	1	2	1	-	-	-	-	-	-	-	-	2	-	-
CO 2	2	3	2	3	-	-	-	-	-	-	-	-	-	3	-
CO 3	2	3	3	3	2	-	-	-	-	-	-	-	-	3	2
CO 4	2	2	2	-	2	-	-	-	-	-	-	-	-	2	2
	7	8	9	7	4								2	8	4
	1.75	2	2.25	2.33	2								2	2	2
	58.33	66.66	75	77.66	66.66								66.66	66.66	66.66

Assessment Pattern (with revised Bloom's Taxonomy)

Knowledge Level	CA	ESE
Remember	-	-
Understand	5	5
Apply	5	5
Analyze	5	5
Evaluate	5	5
Create	5	5
TOTAL	25	25

Government College of Engineering Karad

Third Year(Semester V) B. Tech. Electronics and Telecommunication

EX2509: Mini Project

Teaching Scheme			Examination Scheme	
Practical	4 Hr/week		CA	50
Total Credits	2		ESE	50

The main aim of this course is to demonstrate the important attributes like critical thinking, creativity, collaborative efforts and communication skills in students. The aim is also to make students aware with the process involved in making product from idea. Not more than two students may carry out the minor project together. One supervisor from the department shall be assigned three project batches of the minor project.
The steps involved for completion of minor project includes, but not limited to:

1. Conceptualizationofinnovativeideathroughliteratureandmarketsurvey;sight visits; interaction with community or industry, socio-economic surveyetc.

2.Design of product, processes, methods and systems using multidisciplinary knowledge 3 .Fabrication of product, development of software, measurement methods etc.

4. Deployment, implementation and demonstration of project.

5.Presentation of project

(For purchase of consumables required for completion of project, every project batch shall receive funding from institute with maximum limit decided by BOM)

Course Outcome (CO):

Upon successful completion of this course, the student will be able to:

1	Understand community needs	L2
2	Convert idea in to product	L3
3	Work in a team	L4
4	Implement electronic hardware by learning PCB artwork design, soldering techniques, troubleshooting etc.	L5

Guidelines for Project Selection:

Project work shall be based on any of the following:

1. **Design of any equipment /test setup/product (based on facilities available incollege.)**
2. **Hardware/numerical or theoretical analysis /review of surveystudy/research and developmentwork**

The subject content of the minor project shall be from emerging/thrust areas, topic of current relevance. The completion of work, the submission of the report and assessment should be done at the end of semester.

Project Report Format:

Project report should be of 15 to 20 pages (typed on A4 size sheets). For standardization of the project reports the following format should be strictly followed.

1. **Page Size**:TrimmedA4
2. **Top Margin**:1.00Inch
3. **Bottom Margin:**1.32Inches
4. **Left Margin:**1.5Inches
5. **Right Margin:**1.0Inch
6. **Para Text:** Times New Roman 12 PointFont
7. **Line Spacing:**1.5Lines
8. **Page Numbers:** Right Aligned at Footer. Font 12 Point. Times NewRoman
9. **Headings:** Times New Roman, 14 Point Bold Face
10. **Certificate:** All students should attach standard format of Certificate as described by the department. Certificate should be awarded to batch and not to individual student. Certificate should have signatures of Guide, Head of Department andPrincipal/Director.
11. **Index ofReport:**
    a. TitleSheet
    b. Certificate
    c. Acknowledgement
    d. Table ofContents
    e. List ofFigures
    f. List ofTables

12. References: References should have the following format

For Books: "Title of Book", Authors, Publisher, Edition

For Papers: "Title of Paper", Authors, Journal/Conference Details, Year

List of Submission:

1. Working model of theproject
2. Project Report
3. Presentation and demonstration of project inexhibition

Mapping of Course outcome with Program Outcomes

PO → CO ↓	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	-	-	-	2	-	-	-	-	-	-	1	1	-	-
CO2	-	3	-	-	-	-	-	-	-	-	-	2	2	-	-
CO3	1	-	-	-	-	-	-	-	-	-	-	1	3	-	1
CO4	1	-	2	-	3	-	-	-	-	-	-	-	3	-	2
CO5	1	-	-	1	3	-	-	-	-	-	-	1	3	-	1
CO6	2	1	-	2	3	-	-	-	-	-	1	-	3	-	1
Total	6	4	2	3	11	-	-	-	-	-	1	5	15	-	5
Avg	1.2	2	2	1.5	2.75	-	-	-	-	-	1	1.25	2.5	-	1.25
%	40	66.66	66.66	50	91.66	-	-	-	-	-	33.33	41.66	83.33	-	41.66
1 – Low 2 – Medium3 – High															

Assessment Pattern:

The continuous assessment shall be done by the supervisor based on attributes like critical thinking, creativity, collaborative efforts and communication skills in students. The end semester assessment shall be done by external referee one week before the term end. The department shall arrange exhibition (all department will arrange the exhibition on same day) of the minor projects done by students and the referee will judge the project work in accordance with the outcomes of the course by interacting with students and marks will be awarded to individual student. This exhibition will remain open for all students, parents, and other citizens visiting the exhibition.

Government College of Engineering, Karad

Third Year (Semester – V) B. Tech. Electronics and Telecommunication Engineering

EX 2510 : Industrial Training and Evaluation

Teaching Scheme			Examination Scheme	
practical	Audit Course		TA	50
Tutorial	01		ESE	-

Course Outcomes (CO)

Student Will be able to

1.	Relate theoretical knowledge with Industrial environment for skill enhancement	L2
2.	Apply knowledge of engineering with applied engineering procedures, and processes, to provide solution for industrial problems	L3
3.	Predict engineering solution by properly identifying, formulating and modelling complex industrial problem	L5
4.	Develop Project Planning Skills for complex engineering situations	L6
5.	Apply ethical principles and commit to responsibilities and norms of engineering practice	L3
6.	Articulate Self learning and Time management Skills	L3

Course Contents

Task 1	Execution scheme Industrial training of two to four weeks should be done after semester-IV in summer vacation and its assessment will be done based on report submitted. Workload of the assessment can be assigned to the guide.
Task 2	Industrial Training: The students have to undergo an industrial training of two to four weeks in an industry preferably dealing with Electronics and Telecommunication engineering during the semester break after fourth semester and complete within 30 calendar days before the start of next semester. The students have to submit a report of the training undergone and present the contents of the report before the evaluation committee constituted by the department. An internal evaluation will be conducted for examining the quality and authenticity of contents of the report and award the marks at the end of the semester. It is expected that students should undertake small assignment or work related to any of the course related aspect. Report is based on compilation of work carried out related to measuring instruments, state-of-art technologies and layout, Industry organization chart, Various departmental activities, Management functions,Safety,Rulesandregulations,Documentationwork,Industrystandards,Processesandtoolsused, Industrialautomation,Computerizationandsoftwareusedinvariousdepartments,Productflow,Testingand quality control checks and Packing procedures asidentified.
Task 3	**Proof of concept and mini project on innovative idea in the area of training conducted** In consultation with internal guide and industry person student should develop, built and test mini project on innovativeideainthefieldofElectronicsandTelecommunication.Firsthe/sheshouldshowProofofconcept to respective guide and further he/she will complete mini project. Then will prepare project report and will submit.

Task 4	**Mini Project and Industrial Training Report Format:** Maximumfivestudentsinonegroup,threegroupsshallworkunderoneFaculty.However, each group should have different industrial training and its presentation. The report should be of 20 to 30 pages For standardization of the report the following format should be strictly followed. 1. Page Size: TrimmedA4 2. Top Margin:1.00Inch 3. Bottom Margin:1.32Inches 4. Left Margin:1.5Inches 5. Right Margin:1.0Inch 6. Para Text: Times New Roman 12 Point.Font 7. Line Spacing:1.5Lines 8. PageNumbers:RightAlignedatFooter.Font12Point.TimesNewRoman 9. Headings: Times New Roman, 14 Point., BoldFace 10. Certificate: All students should attach standard format of Certificate as described by the department. Certificateshouldbeawardedtobatchandnottoindividualstudent.Certificateshouldhave signatures of Guide, Head of Department and Principal. 11. Theen tire report should be documented as one chapter with detailslike a. "Name ofIndustry with address along with completed training certificate" b. Area in which Industrial training is completed All Students have to present their reports individually.	

Mapping of COs and POs

PO → CO ↓	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO 8	PO 9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO 1	3	-	1	-	-	1	-	1	2	2	-	2	-	-	2
CO 2	2	-	-	-	-	-	-	-	-	-	1	-	1	-	-
CO 3	3	-	1	-	-	2	-	2	1	3	-	1	1	1	2
CO 4	3	-	-	-	-	-	-	-	2	3	2	-	-	-	2
Total	11	-	2	-	-	3	-	3	5	8	3	3	2	1	6
Avg	2.75	-	1	-	-	1.5	-	1.5	1.66	2.66	1.5	1.5	1	1	2
%	91.6	-	33.3	-	-	50	-	50	55.3	88.6	50	50	33.3	33.3	66.6

Assessment Pattern (with revised Bloom's Taxonomy

Knowledge Level	CT 1	CT 2	CA	ESE
Remember	-	-	08	-
Understand	-	-	10	08
Apply	-	-	07	10
Analyze	-	-	-	07
Evaluate	-	-	-	-
Create	-	-	-	-
TOTAL			25	25

Government College of Engineering, Karad

Third Year (Semester – VI) B. Tech. Electronics andTelecommunication

EX2601: Economics for Engineers

Teaching Scheme			Examination Scheme	
Lectures	02 Hrs/week		CT – 1	15
Tutorials	00 Hrs/week		CT – 2	15
Total Credits	02		TA	10
			ESE	60
			Duration of ESE	02 Hrs 30 Min

Course Outcomes (CO)

Student will be able to

1.	Construct engineering economics demand supply and its importance in economics decision making and problem solving.	L4
2.	Apply knowledge of mathematics, economics and engineering principles to solve engineering problem.	L3
3.	Analyze various interest rate factors and implement the same for economic decision making.	L4
4.	Demonstrate the procedure involved in estimation of cost for a simple component, product costing and depreciation, its methods	L2
5.	Build the graph of short run and long run costs of production, supply and demand elasticity's	L3
6.	Discover the knowledge with respect to concepts, principles and practical applications of Economics which govern the functioning of a firm/organization under different market conditions.	L4

	Course Contents	Hours
Unit 1	**Introduction to Economics**:Flow in an economy, Engineering and Economics, Problem solving and decision making, Laws of demand and supply, Difference between Microeconomics and Macroeconomics, Equilibrium between Demand & Supply, Elasticity of Demand, Price Elasticity, Income Elasticity.	**(04)**
Unit 2	**Introduction to Engineering Economics:** Principle of Engineering Economy, Engineering economy and design process, Engineering efficiency, Economic efficiency, Scope of engineering economics – Elementofcosts,Marginalcost,MarginalRevenue,Sunkcost,Opportunitycost,Elementaryeconomic Analysis – Material selection for product Design selection for a product, Process planning.	**(08)**
Unit 3	**Value of Engineering**: Make or Buy decision- Introduction, Criteria for make or buy, Approaches for make or buy decision-Simple cost Analysis, Break even Analysis, Economic Analysis. Introduction of Value Engineering, When to apply value analysis, Value analysis verses value Engineering, Function, Aims, Value Engineering Procedure. Interest formulae and their applications –Time value of money, Single payment compound amount factor, Single payment present worth factor, Equal payment series sinking fund factor, Equal payment series payment Present worth factor- equal payment series capital recovery factor – Uniform gradient series annual equivalent factor, Effective interest rate, Examples in all the methods.	**(08)**
Unit 4	**ProductionAndCostAnalysis:**ProductionFunction,Returnstoscale,Productionoptimization,Least cost input-Isoquants-Managerial uses of production function. Cost Concepts-Cost function, Determinants of cost-Short run and Long run cost curves, Cost Output Decision,Estimation Cost, Estimation cost for Engineering Project work.	**(08)**

Text Books

1. Engineering Economics, by Parameshwari R, Ramachandran S, Devaraj R,AIRWALK PUBLICATIONS,1st edition,6 January 2017
2. Riggs, Bedworth and Randhwa, "Engineering Economics", McGraw Hill Education India.1 January 2012
3. Ahuja,H.L.,"PrinciplesofMicroEconomics",S.Chand&CompanyLtd,Harlowpearsoneducation,17th edition2020.

Reference Books

1. Principles of Engineering Economic Analysis, White, Case, and Pratt. Wiley & Sons 6th edition (March 27, 2012)
2. Engineering Economics, R.Paneerselvam, PHI publication, 30 January 2014

Mapping of COs and POs

PO → CO ↓	PO 1	PO 2	PO 3	PO4	PO 5	PO 6	PO7	PO8	PO 9	PO 10	PO11	PO12	PSO1	PSO2	PSO3
CO 1	1	2	1	-	-	-	-	-	-	-	-	-	1	1	-
CO2	2	1	1	3	-	1	-	2	-	-	-	-	-	1	-
CO 3	-	1	-	-	1	-	-	-	-	-	-	-	-	1	-
CO 4	1	-	-	-	-	2	-	-	-	-	-	-	-	-	-
CO 5	1	1	2	1	-	-	-	-	-	-	-	-	-	-	-
CO 6	3	2	1	-	-	-	-	-	-	-	-	-	-	-	-
AVG	1.6	1.4	0.35	2	1	1.5	-	2	-	-	-	-	1	1`	-
%	53.33	46.66	11.66	66.66	33.33	50	-	66.66	-	-	-	-	33.33	33.33	-

Assessment Pattern (with revised Bloom's Taxonomy)

Knowledge Level	CT 1	CT 2	TA	ESE
Remember	-	-	-	05
Understand	05	-	05	35
Apply	05	05	05	10
Analyze	05	05	-	05
Evaluate	-	05	-	05
Create	-	-	-	-
TOTAL	15	15	10	60

Government College of Engineering, Karad

Third Year (Semester – VI) B. Tech. Electronics and Telecommunication

EX2602: Internet Of Things

Teaching Scheme			Examination Scheme	
Lectures	03 Hrs/week		CT – 1	15
Tutorials	00 Hrs/week		CT – 2	15
Total Credits	03		TA	10
			ESE	60
			Duration of ESE	02 Hrs 30 Min

Course Outcomes (CO)

Student will be able to

1.	Recognize various devices, sensors and applications.	L1
2.	Analyze various Machine-to-Machine Communications and Internet of Things architectures.	L4
3.	Analyze Various protocol for Internet of Things.	L4
4.	Construct a portable Internet of Things using Raspberry Pi.	L3
5.	Deploy an Internet of Things application and connect to the cloud.	L3
6.	Analyze application of Internet of Things in real time scenario.	L4

	Course Contents	Hours
Unit 1	**Introduction to Internet of Things and Things in Internet of Things:** Sensing, Actuation, Networking basics, Sensor Networks, Machine-to-Machine Communications, Internet of Things Definition, Characteristics. Internet of Things Functional Blocks, Physical design of Internet of Things, Logical design of Internet of Things, Communication models & APIs.	**(08)**
Unit 2	**Internet of Things Reference Architecture-** Internet of Things Open source architecture (OIC), - OIC Architecture & Design, Internet of Things reference model - Domain model - information model - functional model - communication model, Core functional stack, Data management stack.	**(08)**
Unit 3	**Internet of Things Protocols**: Internet of Things Network Layer: IP as Internet of Things network layer, 6LoWPAN, 6Lo, 6TiSCH, RPL Internet of Things Application Layer: Internet of Things application transport methods, CoAP, MQTT Communicationcriteria,InternetofThingsaccesstechnologies–IEEE802.15.4,IEEE802.15.4e,IEEE 802.11ah, IEEE 1901.2a, NB- Internet of Things	**(08)**
Unit 4	**Building Internet Of Things With Raspberry Pi &Arduino** Building Internet of Things with Raspberry Pi and ESP32 module, Internet of Things Systems , Logical Design using Python , Internet of Things Physical Devices & Endpoints , Internet of Things Device ,Building blocks ,Raspberry Pi Board ,Raspberry Pi Interfaces ,Programming Raspberry Pi with Python , ESP32 processors, Wireless connectivity, Other Internet of Things Platforms -Arduino.	**(08)**
Unit 5	**Internet of Things Application case study** IoT applications for industry: Future Factory Concepts, Smart City, Smart Grid, Smart Transportation, Smart Manufacturing, Smart Healthcare, Software& Management Tools for Internet of Things Cloud Storage Models & Communication APIs, Cloud for Internet of Things.	**(10)**

Text Books

1. "IoT Fundamentals: Networking Technologies, Protocols, and Use Cases for the Internet of Things", by David Hanes, Gonzalo Salgueiro, Patrick Grossetete, Robert Barton, Jerome Henry; 1st Edition, 2018, Pearson India Pvt. Ltd.

2. "Internet of Things: A Hands-on Approach", by ArshdeepBahga and Vijay Madisetti, 1st Edition, 2015, Universities Press (India) Pvt. Ltd.

3. Matt Richardson, Shawn Wallace, "Getting Started with Raspberry Pi", O'Reilly SPD, 1st edition, 2014, ISBN: 9789350239759

Reference Books

1. "21 Internet of Things (IOT) Experiments: Learn IoT, the programmer's way", by YashavantKanetkar and ShrirangKorde, 1st Edition, 2018, BPB Publications.

2. Francis daCosta, "Rethinking the Internet of Things: A Scalable Approach to Connecting Everything", 1st Edition, Apress Publications, 2013

Useful Links

1. https://www.udemy.com/internet-of-things-iot-for-beginners-getting-started/

2. http://playground.arduino.cc/Projects/Ideas

3. http://www.megunolink.com/articles/arduino-garage-door-opener

4. http://www.willward1.com/arduino-wifi-tutorial

Mapping of COs and POs

PO → CO ↓	PO 1	PO 2	PO3	PO4	PO 5	PO 6	PO7	PO8	PO 9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO 1	1	2	-	-	1	-	1	-	2	1	1	-	1	1	-
CO2	1	2	2	1	2	-	-	-	2	-	1	-	2	2	-
CO 3	-	2	2	1	2	-	-	-	2	1	-	-	3	2	1
CO 4	-	1	3	1	1	-	-	-	2	1	-	-	3	2	2
CO 5	1	1	2	2	1	-	-	-	2	2	-	-	3	-	1
CO 6	1	-	-	2	2	-	-	-	-	2	-	-	3	3	-
Total	4	8	9	7	9	-	-	-	10	7	2	-	15	10	4
Avg	1	1.6	2.25	1.4	1.5	-	-	-	2	1.4	1	-	2.5	2	1.33
%	33.3	53.3	75	46.6	50	-	-	-	66.6	46.6	33.3	-	83.3	66.6	44.3

Assessment Pattern (with revised Bloom's Taxonomy)

Knowledge Level	CT 1	CT 2	TA	ESE
Remember	-	-	-	05
Understand	05	-	05	35
Apply	05	05	05	10
Analyze	05	05	-	05
Evaluate	-	05	-	05
Create	-	-	-	-
TOTAL	15	15	10	60

Government College of Engineering, Karad

Third Year (Semester – VI) B. Tech. Electronics and Telecommunication

EX2603:Computer Network

Teaching Scheme			Examination Scheme	
Lectures	03 Hrs/week		CT – 1	15
Tutorials	00 Hrs/week		CT – 2	15
Total Credits	03		TA	10
			ESE	60
			Duration of ESE	02 Hrs 30 Min

Course Outcomes (CO)

Upon successful completion of this course, the student will be able to

1.	Identify the issues and challenges in the architecture of a computer network and recognize security issues in a network.	L1
2.	Enumerate and Explain the function(s) of the layers of the OSI model and TCP/IP Model	L3
3.	Demonstrate the different types of network devices and their functions within a network	L3
4.	Analyze the requirements for a given organizational structure and select the most appropriate networking architecture and technologies	L4
5	Apprise the skills of sub netting and routing mechanisms	L4
6	Correlate various practical protocols used to assist in network design and implementation	L4

	Course Contents	Hours
Unit 1	**Introduction to Data Communication**: Networks, Protocols and Standards, Categories of Networks, OSI & TCP/IP Protocol suites **Physical layer**: Topology, Guided media, Unguided media, Network Devices.	**(07)**
Unit 2	**Data Link Layer Design Issues**: Framing, Error control, Flow control, Elementary data link protocols (ARQs: Stop and Wait, go back N, Sliding window.), HDLC, PPP. **Medium Access Technique**: Wired LANs: Ethernet, Wireless LANs, CSMA /CD, CSMA/CA, channel allocation, Random Access, Channelization. High speed LAN‟s like FDDI.	**(07)**
Unit 3	**Network Layer & Design Issues**: IP addressing, IPV4, ARP, RARP, Error reporting protocol ICMP .IGMP. Routing & congestion control algorithms :OSPF & BGP, CIDR & IPV6	**(07)**
Unit 4	**Transport Layer:** Transport Protocols, Addressing, Establishing & releasing a connection Transport protocol for Internet TCP & UDP	**(07)**
Unit 5	**Application Layer**: Application Layer Protocols DHCP, DNS, TELNET, FTP, SMTP, HTTP, WWW, VoIP, Introduction to Network security: Goals of Security Basic Cryptography Internet security IPSec	**(07)**
Unit 6	**A simple client-server implementation**: A simple web server implementation, Networking simulation and modeling techniques. Practical Network Simulators Case studies: Networking using Windows and Linux Operating systems.	**(07)**

Text Books

1.	Behrouz A. Forouzan, Data Communications And Networking, 5th Edition, Tata McGraw Hill 2017
2.	Andrew S. Tanenbaum, Computer Networks, 4th Edition, Prentice Hall 2003

Reference Books

1.	William Stallings Data And Computer Communication, 8th Edition, Prentice Hall Of India, New Delhi, 2007.
2.	Douglas E Comer, Computer Networks And Internet, Pearson Education Asia, 4thEdition2008
3.	Larry L. Peterson And Bruce S. Davie, Computer Networks: A Systems Approach, 3rd Edition (2003), Morgan Kaufmann Publishers.

Useful Links

1.	http://www.rfceditor.org/rfcsearch.html
2.	http://www.cisco.cn .com.

Mapping of COs and POs

PO → CO ↓	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	3	2	-	1	-	-	-	-	-	-	1	-	1	-
CO2	2	3	2	-	1	-	-	-	-	-	-	1	-	1	-
CO3	2	3	2	2	1	-	-	-	-	-	-	1	-	2	-
CO4	2	3	2	2	2	-	-	-	-	-	-	1	-	3	1
CO5	2	3	2	2	2	-	-	-	-	-	1	1	-	3	1
CO6	2	3	2	2	2	-	-	-	-	-	1	1	-	3	1
Total	12	18	12	8	9	-	-	-	-	-	2	6	-	13	3
Avg	2	3	2	2	1.5	-	-	-	-	-	1	1	-	2.1	1
%	66.6	100	66.6	66.6	50	-	-	-	-	-	33.3	33.3	-	70	33.3

Assessment Pattern (with revised Bloom's Taxonomy)

Knowledge Level	CT 1	CT 2	TA	ESE
Remember	05	05	00	10
Understand	10	05	05	20
Apply	00	05	05	25
Analyze	00	00	05	05
Evaluate	00	00	00	00
Create	00	00	00	00
TOTAL	15	15	10	60

Government College of Engineering, Karad

Third Year (Semester – VI) B. Tech. Electronics and Telecommunication

EX2604: Antenna & Microwave

Teaching Scheme			Examination Scheme	
Lectures	03 Hrs/week		CT – 1	15
Tutorials	00 Hrs/week		CT – 2	15
Total Credits	03		TA	10
			ESE	60
			Duration of ESE	02 Hrs 30 Min

Course Outcomes (CO)

Student will be able to

1.	Describe Basics of Antenna system	L2
2.	Illustrate Micro strip Smart Antenna & it's working mechanism	L2
3.	Apply Characteristics of Antenna array to various applications	L3
4.	Explain the fundamentals of Microwave Components	L2
5.	Analyze the performance of Microwave Solid state devices	L4
6.	Apply the MMIC design steps	L4

	Course Contents	Hours
Unit 1	**Fundamentals of Antenna:** Basic antenna radiation mechanism (single & double wire), parameters-radiation resistance, pattern , beam area, radiation intensity, beam efficiency, directivity, gain and resolution, antenna aperture, effective height, radio communication link, field from oscillating dipole, field zones, shape impedance consideration.	**(08)**
Unit 2	**Antenna Array:** Array of two isotropic point sources, non-isotropic but similar point source and the principleofpatternmultiplication,examplesofpatternsynthesisbypatternmultiplication,non-isotropic and dissimilar point sources, linear array of isotropic point source of equal amplitude and spacing,null directions for array of isotropic point sources of equal amplitude and spacing effect.	**(08)**
Unit 3	**Microstrip Antenna ,Smart Antenna:** **Microstrip Antenna:-**Introduction, Basic characteristics, Feeding methods, basic types – rectangular, circular & transmission line model. **Smart Antenna:**-Introduction, smart -antenna analogy, cellular radio systems evolution, signal propagation, smart antennas benefits, smart antenna drawbacks, antenna beam forming	**(07)**
Unit 4	**Microwave Components:** Scattering parameters, microwave cavities, microwave hybrid circuits, directionalcoupler,circulatorsandisolators,microwaveattenuators,slottedlines,parallel,coplanar& shielded micro strip lines. Power amplifier, Rectangular and circular wave guides: TE, TM and TEM modes in wave guides	**(07)**
Unit 5	**MicrowaveSolidStateDevices:**Microwavetunneldiodes,microwaveFETs,gunneffectdiodes,RWH Theory, LSA diodes, InP diodes, Impatt diodes, PIN diodes, ruby laser, MESFETs an dHEMT.	**(06)**
Unit 6	**MMIC And Microwave components design steps:** Materials, substrate, conductor dielectric & resistive MMIC growth, thin film formation, hybrid microwave I.C. fabrication microwave hazards. Design and development of: power amplifier, LNA, Power combiner/divider, directional coupler.	**(06)**

Text Books

1.	C Balanis, "Antenna Theory: Analysis and Design", Wiley, India, 4thEdition 2016.
2.	John D. Kraus And Ronald J. Marhefka, "Antennas for all application", TMH, 5thedition, 2017.
3.	Samul Liao, "Microwave Devices and Circuit", Prentice hall of India, 3rdEdition,2003
4.	David M. Pozer, "Microwave Engineering", Wiley Publications, 4thEdition, 2012

Reference Books

1.	Vincent F. Fusco, "Foundations of Antenna Theory and Technique", Pearson Education, 2ndEdition, 2007
2.	K.D. Prasad, "Antenna & Wave Propagation", Satypraskash Publications, 3rdEdition, 2003
3.	R.E.Collin, "Foundation for Microwave Engineering", Wiley Publications, 2ndEdition, 2001.
4.	Annapurna Das, "Microwave Engineering", TMH Publications, 4thEdition, 2020.

Useful Links

1.	https://nptel.ac.in/courses/117/107/117107035/
2.	http://www.antenna-theory.com/
3.	https://www.microwaves101.com/

Mapping of COs and POs

PO → CO ↓	PO 1	PO 2	PO3	PO4	PO 5	PO 6	PO7	PO8	PO 9	PO 10	PO11	PO12	PSO1	PSO2	PSO3
CO 1	2	2	2	-	-	-	2	1	1	1	1	1	2	2	2
CO2	2	2	2	2	2	1	2	-	-	-	-	-	2	2	2
CO 3	3	2	2	2	-	1	-	-	1	-	1	-	2	2	2
CO 4	2	2	-	2	3	1	-	-	-	-	-	1	2	2	2
CO 5	2	2	2	2	2	-	2	1	1	1	1	1	3	2	2
CO 6	2	2	2	2	2	1	2	-	1	-	-	-	3	2	2
Total	13	12	10	10	9	4	8	2	4	2	3	3	15	12	12
Avg	2.16	2	2	2	2.25	1	2	1	1	1	1	1	2.5	2	2
%	72.22	66.66	66.66	66.66	75	33.33	66.66	33.33	33.33	33.33	33.33	33.33	83.33	66.66	66.66

Assessment Pattern (with revised Bloom's Taxonomy)

Knowledge Level	CT 1	CT 2	TA	ESE
Remember	-	-	-	05
Understand	05	-	05	35
Apply	05	05	05	10
Analyze	05	05	-	05
Evaluate	-	05	-	05
Create	-	-	-	-
TOTAL	15	15	10	60

Government College of Engineering, Karad

Third Year (Semester – VI) B. Tech. Electronics andTelecommunication

EX2605: VLSI Design

Teaching Scheme			Examination Scheme	
Lectures	03Hrs/week		CT – 1	15
Tutorials	00 Hrs/week		CT – 2	15
Total Credits	03		TA	10
			ESE	60
			Duration of ESE	02 Hrs 30 Min

Course Outcomes (CO)

Student will be able to

1.	Explain concept of VHDL	L2
2.	Apply concepts of VHDL to design Digital Logic Circuits	L3
3.	Explain concept of Verilog	L2
4.	Analyze FSM design using Verilog	L4
5.	Analyze PLD, FPGA architecture for implementation of state machines, ALU etc.	L4
6.	Design MOS Transistor	L6

	Course Contents	Hours
Unit 1	**Introduction to VHDL**: Need of HDL, VLSI Design, VHDL, Features of VHDL, Elements of VHDL, Identifiers, literals, Data objects, data types, Operators, Attributes	**(06)**
Unit 2	**Digital Circuit Design using VHDL:** Adder, Subtractor, Decoder, Encoder, Tri-state Buffer, Multiplexer, De-multiplexes, Parity Generator, Parity Checker, Comparator	**(06)**
Unit 3	**Introduction to Verilog** : Verilog naming conventions, gate Level Modeling, Operators, data types, operands,Modules,Assignmentstatements,BehavioralModeling,timingControls,Procedures-Always and Initial blocks, Functions, Tasks, Component Interface	**(08)**
Unit 4	**FSM design using Verilog:** FSM, Melay and Moore Machine, Sequence Detector, Registers, Shift registers, Counters, RAM, Serial Adder, Module-8 Counter, FSM Design, Bus Arbiter	**(06)**
Unit 5	**PLD Architectures and Testing :** PLD, CPLD, FPGA, Xilinx 9500 series CPLD Families, Spartan IIIE FPGA, Testing, Fault Model, Path Sensitizing, random Testing of Sequential Circuits, Built In Self-Test, Boundary Scan, Barrel Shifter, Design of ALU	**(08)**
Unit 6	**MOS Transistor Theory** : Introduction, physical structure of MOS Transistor, Detail description of MOS transistor, Qualitative description of MOS transistor, DC Analysis of MOS, CMOS Inverter, Miscellaneous applications of CMOS Inverter, Overview of System Verilog.	**(08)**

Text Books

1.	J.F. Wakerly, “Digital Design: Principles and Practices“, Prentice Hall, 4th Edition, 2008.
2.	ZainalabedinNavabi, “Verilog Digital System Design”, Mc-Graw Hill, 2nd Edition, 2006.
3.	Samir Palnitkar, “Verilog HDL, a guide to digital design and synthesis”, Prentice Hall, 2nd Edition, 2003.

Reference Books

1.	Sung-Mo Kang and Yusuf Leblebici, “CMOS Digital Integrated Circuits Analysis and Design”, Tata McGraw Hill, Third Edition.
2.	Jan M. Rabaey, AnanthaChandrakasan and BorivojeNikolic, “Digital Integrated Circuits: A Design Perspective”, Pearson Education, Second Edition
3.	Debaprasad Das, “VLSI Design”, Oxford, Second Edition, 2013.

Useful Links

1.	http://www.xilinx.com
2.	https://nptel.ac.in/courses/117/106/117106092/

Mapping of COs and POs

PO → CO ↓	PO1	PO 2	PO3	PO4	PO 5	PO 6	PO7	PO8	PO 9	PO 10	PO11	PO12	PSO1	PSO2	PSO3
CO 1	2	1	-	-	1	-	1	-	1	1	1	-	1	-	-
CO 2	-	2	2	1	2	-	1	-	1	1	2	-	2	-	1
CO 3	-	2	3	1	1	-	1	-	2	-	2	1	2	-	2
CO 4	2	1	2	2	2	-	-	-	2	2	-	1	2	-	2
CO 5	2	1	2	2	1	-	-	-	2	2	-	-	3	-	2
CO 6	1	-	-	2	2	-	-	-	-	3	-	1	3	-	3
Total	7	7	9	8	9	-	3	-	8	9	5	3	13	-	10
Avg	1.75	1.4	2.25	1.6	1.5	-	1	-	1.6	1.8	1.6.6	1	2.16	-	2
%	58.33	46.66	75	53.33	50	-	33.33	-	53.33	0.6	53.33	33.33	72.00	-	66.66

Assessment Pattern (with revised Bloom's Taxonomy)

Knowledge Level	CT 1	CT 2	TA	ESE
Remember	-	-	-	05
Understand	05	-	05	35
Apply	05		05	10
Analyze	05	05	-	05
Evaluate	-	05	-	05
Create	-	05	-	-
TOTAL	15	15	10	60

Government College of Engineering, Karad

Third Year (Semester – VI) B. Tech. Electronics andTelecommunication

EX2616: Satellite Communication and Remote Sensing

Teaching Scheme			Examination Scheme	
Lectures	02 Hrs/week		CT – 1	15
Tutorials	01 Hrs/week		CT – 2	15
Total Credits	03		TA	10
			ESE	60
			Duration of ESE	02 Hrs 30 Min

Course Outcomes (CO)

Student will be able to

1.	Describe satellite system and different satellite services provided.	L2
2.	Architect, interpret, and select appropriate technologies for implementation of specified different components used in satellite communication different components used in satellite sub systems.	L4
3.	Identify different parameters of satellite antenna look angles, range for GEO.	L4
4.	Calculate satellite link parameters and suggest enhancements to improve the link performance.	L4
5.	Interpret the type of remote sensing technique / data for required purpose	L3
6.	Analyze the energy interactions in the atmosphere and earth surface features	L4

	Course Contents	Hours
Unit 1	**Introduction to Satellite Systems:** Introduction, Frequency Allocations, Satellite services, , Satellite Subsystem : Attitude and control system(AOCS), Telemetry, Tracking, Command and Monitoring, Power systems, Communication subsystem, Satellite antennas, Equipment reliability and space qualification..	**(06)**
Unit 2	**OrbitalMechanicsandGeostationarySatellite:**Introduction,Kepler'sLaws,OrbitalElements,Orbit Perturbations,InclinedOrbits,LocalMeanSolarTimeandSun-SynchronousOrbits,AntennaLook Angles determinations, Limits of Visibility, Earth Eclipse of Satellite, Sun Transit Outage, Polar Orbiting Satellites.	**(06)**
Unit 3	**SatelliteLinkDesign:**AtmosphericLosses,IonosphereEffects,RainAttenuation,transmissionlosses, link power budget equation, system Noise, carrier to noise ratio for uplink and downlink, combined uplink and downlink carrier to noise ratio, inter modulationnoise	**(04)**
Unit 4	**Satellite communication applications:** Introduction to DBS system: Orbital Spacing, Power Rating and Number of Transponders, Frequencies and Polarization, Transponder Capacity; Home DBSsystem : Bit Rates for Digital Television, MPEG Compression Standards, Home Receiver Outdoor Unit (ODU), Home Receiver Indoor Unit (IDU); The TCP Link, Enhancing TCP Over Satellite Channels; Satellite Mobile and Specialized Services: Introduction, Satellite Mobile Services, VSATs, Radarsat, Global Positioning Satellite System (GPS), Orbcomm, Iridium	**(06)**
Unit 5	**Physics of Remote Sensing**: Sources of Energy, Active and Passive Radiation, Electromagnetic Radiation - Reflectance, Transmission, Absorption, Thermal Emissions, Interaction with Atmosphere, Atmospheric windows, Spectral reflectance of Earth's surface features, Multi concept of Remote Sensing.	**(06)**
Unit 6	**DataAcquisitionPlatforms:**Varioustypesofplatforms,differenttypesofaircraft,mannedand unmanned space crafts used for data acquisition - characteristics of different types of platforms - LANDSAT, SPOT, IRS, ERS, INSAT and otherplatforms. Data Acquisition Sensors (Visible & Infrared): Photographic products, Resolving power of lenses and films, Opt mechanical / Electro optical sensors - spatial, spectral and radiometric resolution, Thermal sensors, Geometric Characteristics of thermal imagery, calibration of thermal scanner, signal to noise ratio.	**(06)**

Text Books

1.	Timothy Pratt, J E Allnutt, "Satellite Communications ", Hoboken, NJ: John Wiley & Sons, Ltd, 4th Edition, 2020.
2.	Dennis Roddy, "Satellite Communications", McGraw-Hill International, 4th Edition, 2017.
3.	James B. Campbell & Randolph H. Wynne., Introduction to Remote Sensing, The Guilford Press, 5thEdition, 2011.
4.	Charles Elach&Jakob van Zyl., Introduction to the physics and techniques of Remote Sensing, John Wiley & Sons publications, 2006.

Reference Books

1.	Gerard Maral and Michel Bousquet, "Satellite Communication", Wiley Publication, 5th Edition, 2009.
2.	Wilbur L. Prichard, Henry G. Suyerhood, Ropert A. Nelson, "Satellite Communication System Engineering", Pearson education,2nd Edition, 2003
3.	Rees,W.G.,PhysicalprinciplesofRemoteSensing,CambridgeUniversityPress,2001PaulCurranP.J.,Principlesof Remote Sensing, ELBS Publications, 3rdEdition2012.

Useful Links

1.	http://www.satellitetoday.com
2.	http://www.hughespace.com

3.	https://nptel.ac.in/courses/105/103/105103193/
4.	https://nptel.ac.in/courses/117/105/117105131/

Mapping of COs and POs

PO → CO ↓	PO 1	PO 2	PO3	PO4	PO 5	PO 6	PO7	PO8	PO 9	PO 10	PO11	PO12	PSO1	PSO2	PSO3
CO 1	2	2	-	-	-	2	2	1	-	1	1	1	2	1	1
CO2	2	1	-	2	2	2	2	-	-	1	1	1	2	2	3
CO 3	2	2	2	2	2	2	-	-	2	2	1	1	3	3	2
CO 4	3	3	2	3	2	2	-	-	2	2	1	1	3	3	3
CO 5	2	2	-	-	2	1	2	1	-	1	1	1	1	2	2
CO 6	2	1	2	2	2	1	2	-	1	-	1	-	2	1	3
	13	11	6	9	10	10	8	2	5	7	6	5	13	11	14
Avg	2.1	1.8	1	2.25	2	1.6	2	1	1.6	1.4	1	1	2.1	1.8	2.3
%	72.2	61.1	33.3	75	66.6	55.5	66.6	33.3	55.5	46.6	33.3	33.3	72.2	61.1	77.7

Assessment Pattern (with revised Bloom's Taxonomy)

Knowledge Level	CT 1	CT 2	TA	ESE
Remember	3	-	-	05
Understand	2	-	05	35
Apply	05	05	05	10
Analyze	05	05	-	05
Evaluate	5	05	-	05
Create	-	-	-	-
TOTAL	15	15	10	60

Government College of Engineering, Karad

Third Year (Semester – VI) B. Tech. Electronics andTelecommunication

EX2626:Broadband Communication

Teaching Scheme			Examination Scheme	
Lectures	02 Hrs/week		CT – 1	15
Tutorials	01 Hrs/week		CT – 2	15
Total Credits	3		TA	10
			ESE	60
			Duration of ESE	02 Hrs 30 Min

Course Outcomes (CO)

Upon successful completion of this course, the student will be able to:

1.	Illustrate the broadband technologies, protocols and technical challenge	L3
2.	Able to configure communications devices such as routers, switches, etc.	L2
3.	Compare the existing broadband packet switching technologies and networks.	L4
4.	To analyze the performance of broadband communication networks through simulations using Specialized software.	L2
5.	To solve problems related to the design, configuration and deployment of broadband communication networks.	L4
6.	To demonstrate the fundamental concepts of Wireless Broadband Technology, MIMO wireless systems, OFDMA techniques.	L2

Note for Instructor

- It is expected that the instructor will make students familiar with differentbroadband communicationtechniques.
- TutorialsconsistsofindustrialvisitstoTelephoneexchange,Mobiletower,Datacenters,studyofinstituteLAN

	Course Contents	Hours
Unit 1	**Introduction to Broadband Communication:** Telecommunication network-Switching technologies-Need for broadband communication-overview of broadband technologies, Computer communication network.	**(04)**
Unit 2	**Types of Broadband Connections** Comparisonbetweenbroadbandcommonlyreferstohigh-speedInternetaccess)andthetraditionaldial-up access. Broadband includes several high-speed transmission technologies such as: Digital, Cable, Fiber, Wireless, SatelliteBroadband over Power lines (BPL)	**(06)**
Unit 3	**Evolution of Broadband Communication Networks: Architecture and Applications** Broadband communication networks, Multiservice-broadband network architecture evolution, Triple play services: aggregated services using multicast, Architecture-supported functions, Service layers, Trend of fixed mobile convergence, Internet Telephony and voice over IP (VoIP) - RTP and RTCP. Cloud computing and virtualization support, Application-driven network evolution, Latest trends in broadband applications	**(06)**
Unit 4	**Broadband Switching and Transmission**: IP Switching & MPLS-Overview of IP over ATM and its evolutiontoIPSwitching,WebinQosdomain.ArchitectureforWebQos.,WebAccess–Intelligent web browsing and web caching. Packet scheduling Algorithms- requirements and choices. Broadband Transmission, Functional components, functions – Broadband network architecture.	**(06)**
Unit 5	**Broadband Network Design**: Broadband Access network Design- Requirements, and Broadband AccessNetworktopologies.BroadbandBackboneNetworkdesignrequirements-BroadbandBackbone Network Design. . Internet and web Traffic measurement and characterization. Prediction for network management.	**(04)**
Unit 6	**Wireless Broadband:** Technology & Speeds, Development of broadband Residential,BusinessWirelessInternet,Demand for spectrum,Mobile wireless broadband, Licensing Fundamentals of WiMAX MIMO Wireless Systems/ Diversity Techniques, OFDM/ 3G & 4G Systems. Optical communicationnetworks-DWDMbasedtransportnetwork.IssuesinIPoverDWDMopticalIProuters and switching, Metro Ethernet Access Networks	**(06)**

Text Books

1. Jeffrey G. Andrews, Arunabha Ghosh &RiasMuhamed, “Fundamentals of WiMAX: Understanding Broadband Wireless Networking”, Prentice Hall, 1 st Edition, 2007.
2. Balaji Kumar,” A professional guide to ATM, Frame relay, SMDS, SONET, BISDN”, Tata McGraw-Hill Publications.
3. “Wireless Broadband Networks Handbook”, Tata McGrawHill,1st Edition, 2001.

Reference Books

1. Robert C Newman, “Broadband Communications”, Prentice Hall, 1 st Edition,2002
2. Simon Haykin, “Communication Systems”, John Wiley & sons, 4 th Edition, 2001.

3.	Broadband: Bringing Home the bits (2002)THE NATIONAL ACADEMIES PRESS

4.	Space Time Codes and MIMO Systems, M. Janakiraman, Artech House
Useful Links	
1.	https://nptel.ac.in/courses/117/101/117101050/
2.	http://www.nptelvideos.in/2012/12/broadband-networks.html
3.	http://nptel.ac.in/downloads/117105076/
4.	http://nptel.ac.in/courses/117102062/
5.	http://nptel.ac.in/syllabus/117104099/
6.	http://nptel.ac.in/courses/117102062/36
7.	https://www.semanticscholar.org/author/J.-Guti%C3%A9rrez/147076594

Mapping of COs and POs

PO → CO ↓	PO 1	PO 2	PO3	PO4	PO 5	PO 6	PO7	PO8	PO 9	PO 10	PO11	PO12	PSO1	PSO2	PSO3
CO 1	3	2	2	-	-	-	1	1	1	-	-	-	2	1	-
CO2	2	3	2	-	2	-	-	-	-	-	-	-	2	2	1
CO 3	3	3	3	1	1	-	-	-	-	-	-	-	1	1	1
CO 4	2	3	2	1	2	-	-	-	-	-	-	-	2	2	2
CO 5	2	2	1	-	-	-	-	-	-	-	-	-	1	3	3
CO 6	2	3	3	-	2	-	-	-	-	-	-	-	2	2	3
Total	14	16	13	2	7	0	1	1	1	0	0	0	10	11	10
Avg	2.33	2.66	2.16	0.33	1.16	0	0.16	0.16	0.16	0	0	0	1.66	1.83	1.66
%	77.66	88.66	72	11	38.66	0	5.33	5.33	5.33	0	0	0	0.55	0.30	0.55

Assessment Pattern (with revised Bloom's Taxonomy)

Knowledge Level	CT 1	CT 2	TA	ESE
Remember	-	-	-	05
Understand	05	-	05	35
Apply	05	05	05	10
Analyze	05	05	-	05
Evaluate	-	05	-	05
Create	-	-	-	-
TOTAL	15	15	10	60

Government College of Engineering, Karad

Third Year (Semester – VI) B. Tech. Electronics andTelecommunication

EX2636 : Wireless and Mobile communication

Teaching Scheme			Examination Scheme	
Lectures	02 Hrs./week		CT – 1	15
Tutorials	01 Hrs./week		CT – 2	15
Total Credits	03		TA	10
			ESE	60
			Duration of ESE	02 Hrs. 30 Min

Course Outcomes (CO)

	Student will be able to	BL
1.	Understand and explain concepts of Wireless Communication.	L1
2.	Recognize various WPAN and WLAN technologies.	L2
3.	Apply design concept to MIMO, MIMO-OFDM, Smart Antenna models.	L3
4.	Analyze channel assignment strategies, handoff Strategies and Diversity techniques.	L4
5.	Evaluate WCDMA, LTE, MIMO, SDR , LIFI techniques in Wireless Communication.	L5
6.	Create solutions using Smart phone technology, IoT, VoIP , Android OS for Wireless Applications.	L6

	Course Contents	Hours
Unit 1	**Wireless Communications** Introduction to wireless communication: Evolution of wireless communication systems, Examples of wireless communication systems. Different generations and standardsincellularcommunicationsystem,satellitecommunicationincludingGPS,wirelesslocalloop, cordless phone, pagingsystems,RFID.	**(05)**
Unit 2	**WPAN and WLAN** : Wireless personal area networks (Bluetooth, UWB and ZigBee), wireless local areanetworks(IEEE802.11,networkarchitecture,mediumaccessmethods,WLANstandards),wireless metropolitan area networks (WiMAX), Infrared radio transmission infrastructure and adhoc networks-MANET , WSN, HIPER LAN, Bluetooth, Wireless ATM, LIFI Technology.	**(05)**
Unit 3	**Recent wireless technologies**: multicarrier modulation, OFDM, MIMO system, diversity-multiplexing trade-off, MIMO-OFDM system, smart-antenna; beam forming and MIMO, cognitive radio, software defined radio, communication relays, spectrum sharing.	**(04)**
Unit 4	**Cellular Communication and GSM**: Frequency reuse, channel assignment strategies, handoff Strategies, Interference and System Capacity, Co-channel Interference (CCI), Adjacent Channel Interference (ACI) , interference reduction techniques, improving coverage and capacity in cellular system, Call Setup Processes. Diversity techniques, **GSM**-services and features, system architecture, radio system, GSM channel types, frame structure, signal processing in GSM.	**(05)**
Unit 5	**CDMA Digital Cellular Standard**s: Introduction, frequency and channel, specifications, forward CDMA channel, reverse DMA channel. Green technology, energy optimization, **Higher Generation cellular Standards**: Ultra wideband technology, Wi-max, 3G, 4G, 5G systems. WCDMA, LTE, MIMO, software defined radio (SDR), LIFI Technology.	**(05)**
Unit 6	**Mobile Applications**: Smart phone technology, Internet of Things (IoT) Communication protocols in IoT, Voice over Internet Protocol (VoIP), and Android OS. Phone Gap technology.	**(04)**

Text Books

1. TheodoreS.Rappaport,"WirelessCommunications:PrinciplesandPractice",Pearson/PHIPublication,2ndEdition, reprintDecember 5, 2017.

2. Sanjay Kumar, "Wireless Communication the Fundamental and Advanced Concepts" River Publishers, Denmark, 2015 (Indian reprint).

Reference Books

1. William C. Y. Lee, "Mobile Cellular Telecommunications: Analog and Digital Systems", Tata McGraw Hill Publication, 2nd Edition, reprint May 2018

2. Dr. KamiloFeher, "Wireless and Digital Communications", PHI Publication, 1st Edition, , updated reprint Dec 2019.

3 John Schiller, Mobile Communications, Pearson Education, 2012.

Useful Links

1. https://www.youtube.com/watch?v=CUyF0YGIA5Y&list=PL1A4AFAC7AC1909C9

2. https://www.youtube.com/watch?v=CUyF0YGIA5Y&list=PL3607D4A9E70266F9

Mapping of COs and POs

PO → CO ↓	PO 1	PO 2	PO3	PO4	PO 5	PO 6	PO7	PO8	PO 9	PO 10	PO11	PO12	PSO1	PSO2	PSO3
CO 1	1	1	-	1	1	-	-	-	-	1	-	1	1	1	-
CO2	1	1	2	2	2	-	-	-	-	-	-	1	2	2	-
CO 3	1	2	2	2	2	-	-	-	-	1	-	-	2	2	1
CO 4	1	2	2	-	1	-	-	-	-	1	-	-	2	2	1
CO 5	1	1	2	-	1	-	-	-	-	2	1	1	3	2	1
CO 6	1	1	1	1	2	1	-	-	-	2	1	1	3	3	-
Average	1	1.33	1.8	1.5	1.5	1	-	-	-	1.4	1	1	2.1	2	1
Percentage	33.33	44.44	60	50	50	33.33	-	-	-	46.66	33.33	33.33	72.22	66.66	33.33

Assessment Pattern (with revised Bloom's Taxonomy)

Knowledge Level	CT 1	CT 2	TA	ESE
Remember	-	-	-	05
Understand	05	-	05	25
Apply	05	05	05	15
Analyze	05	05	-	05
Evaluate	-	05	-	05
Create	-	-	-	05
TOTAL	15	15	10	60

Government College of Engineering, Karad

Third Year (Semester – VI) B. Tech. Electronics and Telecommunication

EX2646: Information Theory, Coding and Compression Techniques

Teaching Scheme			Examination Scheme	
Lectures	02 Hrs/week		CT – 1	15
Tutorials	01 Hrs/week		CT – 2	15
Total Credits	03		TA	10
			ESE	60
			Duration of ESE	02 Hrs 30 Min

Course Outcomes (CO)

Student will be able to

1.	Illustrate the notion of information in a mathematically sound way.	L2
2.	Develop lossless/lossy source codes and a channel coding scheme.	L3
3.	Apply error control codes and convolution codes for performance analysis.	L3
4.	Inspect different cryptographic techniques.	L4
5.	Evaluate the compression ratio in audio and video signal.	L3
6.	Explain H.261, H.264 & MPEG Video standards.	L2

	Course Contents	Hours
Unit 1	**Information theory, Source and Channel Coding:** Concept of amount of information, channel capacity, Discrete channels – Symmetric channels, Binary Symmetric Channel, Noise-Free Channel, Encoding techniques, Purpose of encoding, Instantaneous codes, Kraft's inequality, Coding efficiency andredundancy,Sourcecodingtheorem,Dictionarycoding–LZ77,LZ78,LZW,Channelcoding, Channel coding theorem for DMC.	**(06)**
Unit 2	**Error Control Coding:** Introduction to BCH Codes, Primitive Elements, Generator Polynomials in Terms of Minimal Polynomials, Some Examples of BCH Code, Decoding of BCH Codes, Reed-Solomon Codes, Implementation of Reed-Solomon Encoders and Decoders.	**(05)**
Unit 3	**Convolutional codes:** Introduction, Tree Codes and Trellis Codes, polynomial Description, Distance Notions, The Generating Function, Matrix Description and Viterbi Decoding of Convolutional Codes, Turbo Codes, Turbo Decoding.	**(05)**
Unit 4	**Cryptographic Techniques:** Introduction to Cryptography: Symmetric Key and Asymmetric Key, Some well-known algorithms-DES, IDEA, PGP, Introduction to Physical Layer Security, Secrecy outage capacity.	**(04)**
Unit 5	**Compression Techniques**: Principles, Text compression, Static & Dynamic Huffman Coding, Arithmetic Coding, Image Compression, Graphics Interchange format, Tagged Image File Format, Digitized documents, Introduction to JPEG standards.	**(05)**
Unit 6	**AudioandVideoCoding:**LinearPredictivecoding,codeexcitedLPC,Perceptualcoding,MPEGaudio coders, Dolby audio Coders, Video compression, Principles – Introduction to H.261, H. 264 & MPEG Videostandards.	**(05)**

Text Books

1.	Ranjan Bose, "Information Theory, Coding & Cryptography", Tata McGraw-Hill Publishing Company Ltd, II nd Edition 2008.
2.	ArijitSaha, SurajitMandal, "Information Theory, Coding & Cryptography", Pearson Education, Ist Edition, 2013.
3.	Muralidhar Kulkarni, K.S. Shivprakasha, "Information Theory & Coding", Wiley (India) Publication 2014.
4.	J C Moreira, P G Farrell, "Essentials of Error-Control Coding", Wiley, Student Edition, 2006.

Reference Books

1.	Todd Moon, "Error Correction Coding: Mathematical Methods and Algorithms", Wiley Publication, 2005.
2.	Thomas Cover, Joy Thomas, "Elements of Information Theory".
3.	Watkinson J, "Compression in Video and Audio", Focal Press, London.
4.	Behrouz A. Forouzan, "Cryptography and Network Security", Tata McGraw-Hill.

Useful Links

1.	http://nptel.ac.in/courses/117101053
2.	https://nptel.ac.in/courses/108/102/108102117

Mapping of COs and POs

PO → CO ↓	PO 1	PO 2	PO3	PO4	PO 5	PO 6	PO7	PO8	PO 9	PO 10	PO11	PO12	PSO1	PSO2	PSO3
CO 1	3	1	-	-	-	-	-	-	-	1	-	-	-	1	-
CO 2	2	2	3	1	1	-	-	-	-	1	-	1	-	3	1
CO 3	2	2	3	1	1	-	-	-	-	1	-	1	-	3	1
CO 4	-	3	2	1	1	-	-	-	-	1	-	1	-	2	-
CO 5	2	2	3	1	1	-	-	-	-	1	-	1	-	3	1
CO 6	3	1	-	-	-	-	-	-	-	1	-	-	-	1	-
AVG	2.4	1.83	2.75	1	1	-	-	-	-	1	-	1	-	2.16	1
%	80	61.11	91.66	33.33	33.33	-	-	-	-	33.33	-	33.33	-	72.22	33.33

Assessment Pattern **(with revised Bloom's Taxonomy)**

Knowledge Level	CT 1	CT 2	TA	ESE
Remember	-	-	-	-
Understand	07	-	02	10
Apply	08	08	03	30
Analyze	-	07	05	20
Evaluate	-	-	-	-
Create	-	-	-	-
TOTAL	15	15	10	60

Government College of Engineering, Karad				
Third Year (Semester – VI) B. Tech. Electronics and Telecommunication Engineering				
EX2607 : Internet of Things Lab				
Laboratory Scheme			**Examination Scheme**	
Practical	2 Hrs/week		TA/CA	25
Total Credits	1		ESE	25

Course Outcomes (CO)

Student Will be able to

1.	Interpret of the role and importance of the Internet of Things in the enterprise, economy and society.	L2
2.	Describe the mechanisms used in the design of Internet of Things device.	L2
3.	Create software for devices equipped with sensors interfacing with environment.	L6
4.	Design the architecture and technologies needed to implement Internet of Things devices.	L6

	List of Experiment	
Experiment 1	Familiarization with Arduino/Raspberry Pi and perform necessary software installation.	
Experiment 2	To interface LED/Buzzer with Arduino/Raspberry Pi and write a program to turn ON LED for 1 sec after every 2 seconds.	
Experiment 3	To interface Push button/Digital sensor (IR/LDR) with Arduino/Raspberry Pi and write a program to turn ON LED when push button is pressed or at sensor detection.	
Experiment 4	To interface DHT11 sensor with Arduino/Raspberry Pi and write a program to print temperature and humidity readings.	
Experiment 5	To interface motor using relay with Arduino/Raspberry Pi and write a program to turn ON motor when push button is pressed.	
Experiment 6	To interface Bluetooth with Arduino/Raspberry Pi and write a program to send sensor data to smartphone using Bluetooth.	
Experiment 7	Write a program on Arduino/Raspberry Pi to upload temperature and humidity data to thingspeak cloud.	
Experiment 8	Write a program on Arduino/Raspberry Pi to retrieve temperature and humidity data from thingspeak cloud.	
Experiment 9	OPEN Ended problem: Students are required to submit an IOT based project using the Microcontroller or a Raspberry Pi and connecting various sensors and actuators. The data for the same should be displayed via a webpage or a web app.	
List of Submission		
1	Total number of Experiments: 8	
2	Total number of sheets: NA	
3	Project/Dissertation Report: 01	
4	Seminar report: NA	
5	Field Visit Report: NA	

Mapping of COs and POs

PO → CO ↓	PO 1	PO 2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO 1	-	1	-	-	1	3	-	-	1	1	-	1	2	-	-
CO 2	-	1	2	-	3	1	-	1	2	1	-	1	2	-	-
CO 3	-	-	2	-	2	-	-	-	1	-	-	1	1	-	-
CO 4	-	1	-	-	1	2	-	-	1	1	-	1	2	-	-
Total	-	3	4	-	7	6	-	1	5	3	-	4	7	-	-
Avg	-	1	2	-	1.75	2	-	1	1.25	1	-	1	1.75	-	-
%	-	33.3	66.6	-	58.3	66.6	-	33.3	41.6	33.3	-	33.3	58.3	-	-

Assessment Pattern (with revised Bloom's Taxonomy)

Knowledge Level	CA	ESE
Remember	-	-
Understand	5	5
Apply	5	5
Analyze	5	5
Evaluate	5	5
Create	5	5
TOTAL	25	25

Government College of Engineering, Karad				
Third Year (Semester – VI) B. Tech. Electronics and Telecommunication Engineering				
EX2608 : Computer Network Lab				
Laboratory Scheme			**Examination Scheme**	
Practical	2 Hrs/week		TA/CA	25
Total Credits	1		ESE	25

Course Outcomes (CO)		
Student Will be able to		
1.	Implement principles of computer networking:	L3
2.	Analyze performance of various computer network	L4
3.	Configure, Model and simulate Data Networks for LAN	L4
4.	Implement, analyze and evaluate networking protocols using Modern tools	L3

	List of Experiment	
Experiment 1	Construction of CAT 6/ CAT 7 Ethernet cable (straight/ cross-over).Layer 2 & 3 Switch Data Networking, PC Network TCP/IP configuration	
Experiment 2	Execution of Windows Networking Commands such s Ping, Netstat ARP, Netstat, Hostname, Tracert, Ipconfig, NSLookup, Route, PathPing, NetDiag, Telnet, FTP, Netsh Execution of Linux Networking Commands such as ifconfig, ip, trace route, tracepath, ping, netstat, ss, dig, nslookup, route, host, arp, iwconfig, hostname, curl or wget, mtr, whois, ifplugstatus, iftop, tcpdump	
Experiment 3	Implementation of Error Detection / Error Correction Techniques a] bit stuffing b] Character stuffing. c] CRC Code.	
Experiment 4	Implementation of Stop and Wait Protocol and sliding window.	
Experiment 5	Implementation of Go back-N and selective repeat protocols.	
Experiment 6	Create scenario and study IPIV and IPVI addressing scheme	
Experiment 7	Implementation of simple client server architecture	
Experiment 8	Configuration of Network topology using Packet Tracer.	
Experiment 9	Utilization of Wireshark network analyser, Network Simulation tools NS2/NS3	
Experiment 10	Modelling and Simulation of Network using modern tools Mini project for modelling and simulation of a customized network	
List of Submission		
1	Total number of Experiments: 10	
2	Total number of sheets: NA	
3	Project/Dissertation Report: NA	
4	Seminar report: NA	
5	Field Visit Report: NA	

Mapping of COs and POs

PO → CO ↓	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 6	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO 1	1	2	3	1	2	-	-	-	-	-	-	-	-	2	-
CO 2	2	1	3	1	1	-	-	-	-	-	-	-	-	2	-
CO 3	1	1	3	1	2	-	-	-	-	-	-	-	-	2	1
CO 4	2	1	3	1	3	-	-	-	-	-	-	-	-	2	1
Total	6	5	12	4	8	-	-	-	-	-	-	-	-	8	2
Avg	1.5	1.25	3	1	2	-	-	-	-	-	-	-	-	2	1
%	50	41.66	100	33.3	66.6	-	-	-	-	-	-	-	-	66.6	33.3

Assessment Pattern (with revised Bloom's Taxonomy)

Knowledge Level	CA	ESE
Remember	-	-
Understand	5	5
Apply	10	10
Analyze	5	5
Evaluate	-	-
Create	5	5
TOTAL	25	25

Government College of Engineering, Karad				
Third Year (Semester – VI) B. Tech. Electronics and Telecommunication Engineering				
EX2609 : Antenna & Microwave Lab				
Laboratory Scheme			**Examination Scheme**	
Practical	2 Hrs/week		TA/CA	25
Total Credits	1		ESE	-

Course Outcomes (CO)

Student Will be able to

1.	Illustrate various Antenna parameters	L2
2.	Analyze radiation patterns for performance comparison of different types of antenna	L3
3.	Apply Characteristics of Microwave devices to various applications	L3
4.	Inspect the performance of Microwave components	L4

	List of Experiment	
Experiment 1	Design of Yagi -antenna using Cad-Feko	
Experiment 2	Design of Microstrip Patch Antenna using Cad-Feko	
Experiment 3	Design of a MIMO elliptical ring antenna (characteristic modes) using Cad-Feko	
Experiment 4	Measurement of Distance -to- fault, VSWR, Cable loss and smith chart of Microstrip patch antenna using Cable Rider	
Experiment 5	Write a program to plot 3D pattern of rectangular apertures as a function of the independent variables Vx, Vy for aperture dimensions a =8 ƛ and b= 4 ƛ using MATLAB	
Experiment 6	Study of V-I characteristics of GUNN diode	
Experiment 7	Study of Directional Coupler and Magic Tee	
Experiment 8	To study the characteristics of the Reflex Klystron tube and to determine its Electronic tuning range.	
Experiment 9	To determine the frequency & wavelength in a rectangular waveguide working in TE10 Mode.	
Experiment 10	To study the ATTENUATOR (fixed and variable type).	
List of Submission		
1	Total number of Experiments: 10	
2	Total number of sheets: NA	
3	Project/Dissertation Report: NA	
4	Seminar report: NA	
5	Field Visit Report: NA	

Mapping of COs and POs

PO → CO ↓	PO 1	PO 2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO 1	2	2	2	-	-	-	-	1	-	1	-	1	2	1	1
CO 2	2	3	2	2	2	2	-	-	1	-	-	-	2	1	1
CO 3	3	2	3	2	-	2	-	-	1	1	-	-	2	1	1
CO 4	2	2	-	3	2	-	-	1	-	-	-	1	2	2	2
	9	9	7	7	4	4	-	2	2	2	-	2	8	5	5
Avg	2.25	2.25	2.33	2.33	2	2	-	1	1	1	-	1	2	1.25	1.25
%	75	75	77.77	77.77	66.66	66.66	-	33.33	33.33	33.33	-	33.33	66.66	41.66	41.66

Assessment Pattern (with revised Bloom's Taxonomy)

Knowledge Level	CA	ESE
Remember	-	-
Understand	5	5
Apply	5	5
Analyze	5	5
Evaluate	5	5
Create	5	5
TOTAL	25	25

Government College of Engineering, Karad

Third Year (Semester – VI) B. Tech. Electronics and Telecommunication Engineering

EX2610 : VLSI Design Lab

Laboratory Scheme			Examination Scheme	
Practical	2 Hrs/week		TA/CA	25
Total Credits	1		ESE	25

Course Outcomes (CO)

Student Will be able to

1.	Demonstrate various combinational and sequential circuits on FPGA/CPLD board	L2
2.	Analyze functionality of Register, Counter circuits in Microwind/DSCH software	L4
3.	Design ALU,MOS Transistor, Inverter circuits in Microwind /DSCH software	L6
4.	Design Differential Amplifier, Schimitt Trigger etc in Micro wind/DSCH software	L6

	List of Experiment	
Experiment 1	Examine functionality of VHDL programming of Adder, Subtractor using Xilinx ISE/Vivado software on FPGA/CPLD board.	
Experiment 2	Examine functionality of VHDL Programming of any combinational logic design using Multiplexers or De multiplexers using Xilinx ISE/Vivado software on FPGA/CPLD board.	
Experiment 3	Examine functionality of VHDL Programming of Encoder and Decoder using Xilinx ISE/Viva do software on FPGA/CPLD board.	
Experiment 4	Examine functionality of Verilog programming of any state logic using Melay machine using Xilinx ISE/Vivado software on FPGA/CPLD board.	
Experiment 5	Examine functionality of Verilog programming of any state logic Moore machine using Xilinx ISE/Vivado software on FPGA/CPLD board.	
Experiment 6	Examine functionality of Verilog programming of 4 bit Universal Shift Register using Xilinx ISE/Vivado software on FPGA/CPLD board.	
Experiment 7	Design of ALU using Xilinx ISE/Vivado software on FPGA/CPLD board.	
Experiment 8	Design of MOS Transistor using Micro wind/DSCH software	
Experiment 9	Design of Inverter using Micro wind/DSCH software	
Experiment 10	Examine functionality of 4 bit synchronous counter using Micro wind/DSCH software	
Experiment 11	Examine functionality of Ring Oscillator using Micro wind/DSCH software	
Experiment 12	Design Differential Amplifier in Micro wind/DSCH software	
Experiment13	Design Schimitt Trigger using Op-AMP in Micro wind/DSCH software	
Experiment14	Design Barrel Shifter using Op-AMP in Micro wind/DSCH software	
Mini Project work	Evaluate complete system in VLSI Viz.: Vending Machine, Automatic Hand Sanitizer Machine, DC Motor Controller, PLL etc.	
	Any Twelve Experiments to be conducted in laboratory for conduction of practical examination. Mini Project work will be done in the batch of 4 students each and will be assessed for term work.	
List of Submission		
1	Total number of Experiments: 14	
2	Total number of sheets: NA	
3	Project/Dissertation Report: NA	
4	Seminar report: NA	
5	Field Visit Report: NA	

Mapping of COs and POs

PO → CO ↓	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO 9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO 1	1	-	2	-	3	-	-	-	1	-	-	1	1	-	1
CO 2	1	2	-	-	1	1	-	-	1	1	-	1	2	-	2
CO 3	2	2	-	2	1	2	2	2	2	1	2	1	2	-	2
CO 4	2	3	2	2	2	2	2	3	2	2	3	2	3	-	2
Total	6	7	4	4	7	5	4	5	6	4	5	5	8	-	7
Avg	1.5	2.33	2	2	1.75	1.66	2	2.5	2	1.33	2.5	1.25	2	-	1.75
%	50	77.77	66.66	66.66	58.33	55.55	66.66	83.33	66.66	44.44	83.33	41.66	66.66	-	58.33

Assessment Pattern(with revised Bloom's Taxonomy)

Knowledge Level	CA	ESE
Remember	-	-
Understand	5	5
Apply	5	5
Analyze	5	5
Evaluate	5	5
Create	5	5
TOTAL	25	25

Government College of Engineering, Karad

Third Year (Semester – VI) B. Tech. Electronics and Telecommunication Engineering

EX2611: Technical Presentation

Teaching Scheme			Examination Scheme	
Tutorial	1 Hrs/week		TA/CA	25
Total Credits	1		ESE	-

Course Outcomes (CO)

Student Will be able to

1.	Illustrate the importance of presentations and their inherent problems and Identify the audience, purpose, organization, flow, style, and delivery of presentations.	L2
2.	Determine natural sounding linking phrases and expressions when navigating and explaining presentation content.	L3
3.	Demonstrate a presentation from notes with comprehensible pronunciation	L2
4.	Practice audience analysis and develop effective communication strategies for a variety of audiences,	L3
5.	Discover the reference presentation resources, data and use advanced presentation software packages.	L4
6.	Interpret how to deal with questions from the audience	L2

Course Contents

UNIT-1

Student Presentation Guidelines-

1. In this course, students will develop the oral presentation skills needed to present technical research findings in Electronics and Telecommunication field. Also Student should able to refer the IEEE paper for thePresentation.
2. Plan on approximately a 30 minute presentation with about 10 minutes related to their field of interests in Electronics and TelecommunicationEngineering.
3. Student should able to learn different types of software tools for audio, video and animated presentation. You can make your presentation with the help of any one of these software like Visme, Promo, Biteable, Animaker, Powtoon, PowerPoint, Keynote, Microsoft PowerPoint., Prezi, Sliderocket, Zoho Show, Prezi, Google Docs, Xtensio, sound 4, Genially, GoAnimate, TechSmithCamtasia, Zentation andMoovlyetc.
4. Student should create link in Webex platform, Set opinion poll and Record theevent.
5. The presentation should provide sufficient background describing the problem addressed in the research.Remember,a good portion of your audience will not be familiar with your work. Specifically, you should answer: 1.What is theproblem?
   2. Why is the problem important?
6. This presentation will be in English. Students will focus on the language needed during each part of the presentation (opening, outline, background, materials/methods, results, discussion, summary, and Q&A). By analyzing the language used in a model presentation given at a real- world engineeringconference.
7. Students will learn many of the common features of presentation language and develop confidence to deliver their ownpresentations.
8. Students will also practice the target language through a series of short pair and group activities, and work toward a final presentation related to their field of interests. It will accuratelyreflectthetypeofpresentationthatstudentswillneedtogiveatanacademic conference.
9. Presentation has to be given once in a month and evaluation will be done based on theviva.

Text Books

1. Brian Tracy; How to Present With Power in Any Situation, AmacomPublication,31 july,2019
2. Edward R. Tufte; The Visual Display of Quantitative Information, Graphic Press, 2nd Edition, January 2002.

Reference Books

1. Scott Berkun; Confessions of a Public Speaker; Oreilly Publication, April 2019
2. GarrReynolds;PresentationZen,SimpleIdeasonPresentationDesignandDelivery;New Riders publication, 3rd Edition, 14 Dec2019

Useful Links

1. http://buildingpublicunderstanding.org/assets/files/presentationzen.pdf
2. https://www.semanticscholar.org/paper/The-visual-display-of-quantitative-information-Tufte

Mapping of COs and POs

PO → CO ↓	PO1	PO2	PO3	PO4	PO 5	PO 6	PO7	PO8	PO 9	PO 10	PO11	PO12	PSO1	PSO2	PSO3
CO 1	3	-	-	-	3	1	2	-	3	3	2	3	1	1	-
CO 2	-	-	-	-	-	1	-	1	2	3	1	3	-	-	-
CO 3	3	-	-	-	2	-	-	1	2	3	-	3	3	-	-
CO 4	-	-	-	-	-	-	-	1	2	3	-	3	-	-	-
CO 5	-	-	-	-	3	1	-	1	2	3	1	3	-	1	-
CO 6	1	1	-	-	-	-	-	1	2	3	-	3	-	-	-
Avg	2.33	1	-	-	2.66	1	2	1	2.16	3	1.33	3	2	1	-
%	77.77	33.33	-	-	88.88	33.33	66.66	33.33	72.22	100	44.44	100	66.66	33.33	-

Assessment Pattern (with revised Bloom's Taxonomy)

Knowledge Level	TA/CA	ESE
Remember	05	03
Understand	05	07
Apply	03	00
Analyze	02	05
Evaluate	05	05
Create	05	05
TOTAL	25	25