KAKATIYA INSTITUTE OF TECHNOLOGY & SCIENCE
(An Autonomous Institute under Kakatiya University , Warangal)
(Approved by AICTE, New Delhi; Recognised by UGC under 2(f) & 12(B); Sponsored by EKASILA EDUCATION SOCIETY)
Opp : Yerragattu Gutta, Hasanparthy (Mandal), WARANGAL - 506 015, Telangana, INDIA.
काकतीय प्रैद्योगिकी एवं विज्ञान संस्थान, वरंगल - ५०६ ०१५
కాకతీయ సాంకేతిక విజ్ఞాన శాస్త్ర విద్యాలయం, వరంగల్ – ౫౦౬ ౦౧౫
website: www.kitsw.ac.in E-mail: principal@kitsw.ac.in ✆ : +91 9392055211, +91 7382564888

VISION OF THE INSTITUTE

- *To make our students technologically superior and ethically strong by providing quality education with the help of our dedicated faculty and staff and thus improve the quality of human life*

MISSION OF THE INSTITUTE

- *To provide latest technical knowledge, analytical and practical skills, managerial competence and interactive abilities to students, so that their employability is enhanced*
- *To provide a strong human resource base for catering to the changing needs of the Industry and Commerce*
- *To inculcate a sense of brotherhood and national integrity*

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

VISION OF THE DEPARTMENT

- *Develop the department into a full-fledged center of learning in various fields of Electronics and Communication Engineering in pursuit of excellence in Education, Research, Entrepreneurship and Technological services to the society*

MISSION OF THE DEPARTMENT

- *Imparting quality education to develop innovative and entrepreneurial professionals fit for globally competitive environment*
- *To nurture the students in the field of Electronics and Communication Engineering with an overall back-ground suitable for attaining a successful career in higher education, research and industry*

PROGRAM EDUCATIONAL OBJECTIVES (PEOs)

UG - ELECTRONICS COMMUNICATION AND INSTRUMENTATION ENGINEERING – ECI

PROGRAM EDUCATIONAL OBJECTIVES (PEOs)	**Within first few years after graduation**, the **Electronics Communication and Instrumentation Engineering** graduates will be able to …
PEO1: Technical Expertise	*apply the knowledge of core courses of electronics communication and instrumentation engineering for development of effective and innovative solutions to engineering problems*
PEO2: Successful Career	*excel in profession, higher education and entrepreneurship with updated technologies in communication, signal processing, vlsi, embedded systems, and instrumentation domains*

PEO3: Soft Skills and Life Long Learning	*exhibit professional ethics, effective communication, and teamwork in solving engineering problems by adapting contemporary research towards sustainable development of society.*

PROGRAM OUTCOMES (POs) & PROGRAM SPECIFIC OUTCOMES (PSOs)

UG - ELECTRONICS COMMUNICATION AND INSTRUMENTATION ENGINEERING – ECI

PROGRAM OUTCOMES (POs)	**At the time of graduation**, the **Electronics and Communication Engineering** graduates will be able to …
PO1: Engineering knowledge	*apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.*
PO2: Problem analysis	*identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences*
PO3:Design/ development of solutions	*design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.*
PO4: Conduct investigations of complex problems	*use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.*
PO5: Modern tool usage	*create, select, and apply appropriate techniques, resources, and modern engineering and it tools including prediction and modeling to complex engineering activities with an understanding of the limitations.*
PO6: The engineer and society	*apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.*
PO7: Environment and sustainability	*understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.*
PO8: Ethics	*apply ethical principles and commit to professional ethics, responsibilities, and norms of the engineering practice*
PO9: Individual and team work	*function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings*
PO10: Communication	*communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions*
PO11: Project management and finance	*demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments*
PO12: Life-long learning	*recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change*
PROGRAM SPECIFIC OUTCOMES (PSOs):	
PSO1	*Apply the fundamentals of Electronics, Communication Signal processing, VLSI, Embedded Systems and Instrumentation in development of hardware and software prototypes and systems for complex engineering problems.*
PSO2	*Apply appropriate methodology, contemporary hardware and software tools to solve complex engineering problems related to embedded systems.*

URR-18

(Applicable from the Academic Year 2018-19)

B.Tech. ELECTRONICS COMMUNICATION & INSTRUMENTATION ENGINEERING (ECI)

AUTONOMOUS – REVISED SCHEME & SYLLABI (URR'18)

(w.e.f. 2018-19)

Of

B.Tech ECI SYLLABI (I to VI SEMESTERS)

KAKATIYA INSTITUTE OF TECHNOLOGY & SCIENCE: WARANGAL-15

(*An Autonomous Institution under Kakatiya University*)

DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING

KAKATIYA INSTITUTE OF TECHNOLOGY & SCIENCE: WARANGAL-15

(An Autonomous Institute under Kakatiya University, Warangal)

BRANCH : B.Tech. – CE / EEE / ECE/ECI/CSE (AI &ML) (Stream – II)

SEMESTER : FIRST

[First year]

Sl.No	Category	Course Code	Course Title	Hour per week			Credits	Evaluation Scheme				
				L	T	P	C	CIE			ESE	Total Marks
								TA	MSE	Total		
1	BSC	U18MH101	Engineering Mathematics – I	3	1	-	4	10	30	40	60	100
2	ESC	U18CS102	Programming for Problem Solving using C	3	-	-	3	10	30	40	60	100
3	BSC	U18CH103	Engineering Chemistry	3	1	-	4	10	30	40	60	100
4	ESC	U18ME104	Engineering Drawing	2	-	4	4	10	30	40	60	100
5	ESC	U18CE105	Engineering Mechanics	3	1	-	4	10	30	40	60	100
6	ESC	U18CS107	Programming for Problem Solving using C Laboratory	-	-	2	1	40	-	40	60	100
7	BSC	U18CH108	Engineering Chemistry Laboratory	-	-	2	1	40	-	40	60	100
8	MC	U18CH109	Environmental Studies*	2	-	-	-	10	30	40	60	100
9	MC	U18EA110	EAA* : Sports/Yoga/NSS	-	-	2	_	100	-	100	-	100
10	MC	U18MH111	Universal Human Values –I (Induction program)	-	-	-	-	-	-	-	-	-
			Total	16	3	10	21	240	180	420	480	900

L - Lectures; T – Tutorials; P – Practicals C = Credits

EAA – Extra Academic Activity
*** indicates mandatory non-credit course**

Contact hours per Week : 29
Total Credits : 21

DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING

KAKATIYA INSTITUTE OF TECHNOLOGY & SCIENCE: WARANGAL-15

(An Autonomous Institute under Kakatiya University, Warangal)

BRANCH : B.Tech. – CE / EEE / ECE/ECI/CSE (AI &ML) (Stream – II)

SEMESTER : SECOND

[First year]

Sl.No	Category	Course Code	Course Title	Hour per week			Credits	Evaluation Scheme				
				L	T	P	C	CIE			ESE	Total Marks
								TA	MSE	Total		
1	BSC	U18MH201	Engineering Mathematics - II	3	1	-	4	10	30	40	60	100
2	ESC	U18CS202	Data Structures through C	3	-	-	3	10	30	40	60	100
3	BSC	U18PH203	Engineering Physics	3	1	-	4	10	30	40	60	100
4	HSMC	U18MH204	English for Communication	2	-	2	3	10	30	40	60	100
5	ESC	U18EE205	Basic Electrical Engineering	3	1	-	4	10	30	40	60	100
6	ESC	U18EE206	Basic Electrical Engineering Laboratory	-	-	2	1	40	-	40	60	100
7	ESC	U18CS207	Data Structures through C Laboratory	-	-	2	1	40	-	40	60	100
8	BSC	U18PH208	Engineering Physics Laboratory	-	-	2	1	40	-	40	60	100
9	ESC	U18ME209	Workshop Practice	-	-	2	1	40	-	40	60	100
10	MC	U18EA210	EAA* : Sports/Yoga/NSS	-	-	2	-	100	-	100	-	100
			Total	14	3	12	22	310	150	460	540	1000

L - Lectures; T – Tutorials; P – Practicals & Credits
EAA – Extra Academic Activity
*** indicates mandatory non-credit course**

Contact hours per Week : 29
Total Credits : 22

DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING
KAKATIYA INSTITUTE OF TECHNOLOGY & SCIENCE: WARANGAL-15
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SCHEME OF INSTRUCTION & EVALUATION
III - SEMESTER OF 4-YEAR B.TECH ECI DEGREE PROGRAM

[6+2+1M]

Sl.No	Category	Course Code	Course Title	Hour per week			Credits	Evaluation Scheme				
				L	T	P		CIE			ESE	Total Marks
								TA	MSE	Total		
1	BSC	U18MH301	Engineering Mathematics - III	3	1	-	4	10	30	40	60	100
2	HSMC	U18TP302	Soft and Interpersonal Skills	-	-	2	1	100	-	100	-	100
3	OE	U18OE303	Open Elective-I	3	-	-	3	10	30	40	60	100
4	PCC	U18CI304	Signals Systems and Random Processes	3	1	-	4	10	30	40	60	100
5	PCC	U18CI305	Electronic Devices and Applications	3	-	-	3	10	30	40	60	100
6	PCC	U18CI306	Electronic Measurements and Sensors	3	-	-	3	10	30	40	60	100
7	PCC	U18CI307	Digital Circuits and Logic Design	3	-	-	3	10	30	40	60	100
8	PCC	U18CI308	Electronic Measurements and Sensors Laboratory	-	-	2	1	40	-	40	60	100
9	OE	U18OE311	Open Elective-I based Laboratory	-	-	2	1	40	-	40	60	100
			Total:	18	2	6	23	240	180	420	480	900

L= Lecture, T = Tutorials, P = Practicals & C = Credits

Open Elective-I:	**Open Elective-I based Laboratory**
U18OE303A: Object Oriented Programming (CSE)	U18OE311A: Object Oriented Programming Lab (CSE)
U18OE303B: Fluid Mechanics and Hydraulic Machines (CE)	U18OE311B: Fluid Mechanics and Hydraulic Machines Lab (CE)
U18OE303C: Fundamentals of Mechatronics (ME)	U18OE311C: Mechatronics Lab (ME)
U18OE303D: Web Programming (IT)	U18OE311D: Web Programming Lab (IT)
U18OE303F: Strength of Materials (CE)	U18OE311F: Strength of Materials Lab (CE)

Contact hours per week : 26
Total Credits : 23

DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING
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SCHEME OF INSTRUCTION & EVALUATION
IV - SEMESTER OF 4-YEAR B.TECH ECI DEGREE PROGRAM

[5Th+3P+2M]

Sl.No	Category	Course Code	Course Title	Hour per week			Credits	Evaluation Scheme				
				L	T	P		CIE			ESE	Total Marks
								TA	MSE	Total		
1	OE	U18OE401	Open Elective-II	3	1	-	4	10	30	40	60	100
2	HSMC	U18MH402	Professional English	-	-	2	1	100	-	100	-	100
3	PCC	U18CI403	Electromagnetic Theory and Transmission Lines	3	1	-	4	10	30	40	60	100
4	PCC	U18CI404	Analog Electronic Circuits	3	-	-	3	10	30	40	60	100
5	PCC	U18CI405	Digital Signal Processing	3	-	-	3	10	30	40	60	100
6	PCC	U18CI406	Microprocessors Microcontrollers	3	-	-	3	10	30	40	60	100
7	MC	U18MH415	Essence of Indian Traditional Knowledge	2	-	-	-	10	30	40	60	100
8	PCC	U18CI407	Programming with Python Laboratory	-	-	2	1	40	-	40	60	100
9	PCC	U18CI408	Electronic Devices and Circuits Laboratory	-	-	2	1	40	-	40	60	100
10	PCC	U18CI409	Signal Processing and Applications Laboratory	-	-	2	1	40	-	40	60	100
			Total	17	2	8	21	280	180	460	540	1000
11	MC	U18CH416	Environmental Studies *	2	-	-	0	10	30	40	60	100

L= Lecture, T = Tutorials, P = Practicals & C = Credits

*** indicates Mandatory Non-Credit course for Lateral Entry Students Only**

Open Elective-II
U18OE401A: Applicable Mathematics (M&H)
U18OE401C: Elements of Mech. Engg. (ME)
U18OE401E: Computers Networks (IT)
U18OE401F: Renewable Energy Resources (EEE)

Contact hours per week : 27
Total Credits : 21

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SCHEME OF INSTRUCTION & EVALUATION
V - SEMESTER OF 4-YEAR B.TECH ECI DEGREE PROGRAM

[5Th+3P+1MC]

Sl.No	Category	Course Code	Course Title	Hour per week			Credits	Evaluation Scheme				
								CIE			ESE	Total Marks
				L	T	P		TA	MSE	Total		
1	MC	U18MH501	Universal Human Values - II	2	-	-	-	10	30	40	60	100
2	PE	U18CI502	Professional Elective - I / MOOCs – I	3	-	-	3	10	30	40	60	100
3	PCC	U18CI503	Analog and Digital Communications	3	1	-	4	10	30	40	60	100
4	ESC	U18EE511	Linear Control Systems	3	-	-	3	10	30	40	60	100
5	PCC	U18CI504	Embedded System Design	3	-	-	3	10	30	40	60	100
6	PCC	U18CI505	Linear Integrated Circuits and Applications	3	-	-	3	10	30	40	60	100
7	PCC	U18CI506	Embedded Firmware Development Laboratory	-	-	2	1	40	-	40	60	100
8	PCC	U18CI507	Analog and Digital Communications Laboratory	-	-	2	1	40	-	40	60	100
9	PCC	U18CI508	Linear and Digital Integrated Circuits Laboratory	-	-	2	1	40	-	40	60	100
10	PROJ	U18CI510	Seminar	-	-	2	1	100	-	100	-	100
			Total:	17	1	8	20	280	180	460	540	1000

L= Lecture, T = Tutorials, P = Practical's & C = Credits

Professional Elective-I / MOOCs-I:
U18CI502A: Internet of things
U18CI502B: Wireless and Data Communication
U18CI502C: Data Acquisition And Signal Conditioning
U18CI502M: MOOC Course

Contact hours per week : 26
Total Credits : 20

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SCHEME OF INSTRUCTION & EVALUATION
VI - SEMESTER OF 4-YEAR B.TECH ECI DEGREE PROGRAM

[5Th+3P+2MC]

Sl.No	Category	Course Code	Course Title	Hour per week			Credits	Evaluation Scheme				
				L	T	P		CIE			ESE	Total Marks
								TA	MSE	Total		
1	HSMC	U18TP601	Quantitative Aptitude and Logical Reasoning	2	-	-	1	10	30	40	60	100
2	HSMC	U18MH602	Management Economics and Accountancy	3	-	-	3	10	30	40	60	100
3	PE	U18CI603	Professional Elective -II / MOOCs-II	3	-	-	3	10	30	40	60	100
4	PCC	U18CI 604	Embedded Systems with ARM Processor	3	-	-	3	10	30	40	60	100
5	PCC	U18CI 605	VLSI System Design	3	-	-	3	10	30	40	60	100
6	PCC	U18CI 606	Artificial Intelligence and Machine Learning	3	-	-	3	10	30	40	60	100
7	PCC	U18CI 607	Digital Design Laboratory	-	-	2	1	40	-	40	60	100
8	PCC	U18CI 608	Embedded Systems with ARM Processor Laboratory	-	-	2	1	40	-	40	60	100
9	PCC	U18CI 609	Embedded networking and Application Laboratory	-	-	2	1	40	-	40	60	100
10	PROJ	U18CI610	Mini Project	-	-	2	1	100	-	100	-	100
			Total:	17	-	8	20	280	180	460	540	1000

L= Lecture, T = Tutorials, P = Practicals& C = Credits

Professional Elective-II / MOOCs-II:

U18CI 603A :Antennas and Wave Propagation
U18CI 603B: Wireless Sensor Networks and Applications
U18CI 603C: Biomedical Instrumentation
U18CI 603M: MOOC Course

Contact hours per week : 25
Total Credits : 20

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SCHEME OF INSTRUCTION & EVALUATION
VII - SEMESTER OF 4-YEAR B.TECH ECI DEGREE PROGRAM

[4Th+2P+1MC]

Sl.No	Category	Course Code	Course Title	Hour per week			Credits	Evaluation Scheme				
								CIE			ESE	Total Marks
				L	T	P		TA	MSE	Total		
1	OE	U18OE701	Open Elective- III	3	-	-	3	10	30	40	60	100
2	PE	U18CI 702	Professional Elective - III /MOOCs-III	3	-	-	3	10	30	40	60	100
3	PE	U18CI 703	Professional Elective - IV / MOOCs-IV	3	-	-	3	10	30	40	60	100
4	PCC	U18CI 704	Industrial Instrumentation and Process Control	3	-	-	3	10	30	40	60	100
5	PCC	U18CI 705	Industrial Instrumentation and Process Control Lab	-	-	2	1	40	-	40	60	100
6	PCC	U18CI 706	Real Time Embedded Systems Lab	-	-	2	1	40	-	40	60	100
7	PROJ	U18CI 707	Major Project Phase – I	-	-	6	3	100	-	100	-	100
8	MC	U18CI 708	Internship Evaluation	-	-	2	-	100	-	100	-	100
			Total:	12	-	12	17	320	120	440	360	800

L= Lecture, T = Tutorials, P = Practical's & C = Credits

Open Elective-III: U18OE701A: Disaster Management U18OE701B: Project Management U18OE701C: Professional Ethics in Engineering U18OE701D: Rural Technology and Community Development	**Professional Elective-III / MOOCs-III:** U18CI702A: Data Science U18CI702B: Microwave and Optical Fiber Communication U18CI702C: RTOS for Embedded System U18CI702M: MOOC course	**Professional Elective-IV / MOOCs-IV:** U18CI703A: Robotics U18CI703B: Digital Image Processing U18CI703C: FPGA-Based System Design U18CI703M: MOOC course

Contact hours per week : 24
Total Credits : 17

DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING

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SCHEME OF INSTRUCTION & EVALUATION

VIII - SEMESTER OF 4-YEAR B.TECH ECI DEGREE PROGRAM

[3Th+0P+0MC]

Sl.No	Category	Course Code	Course Title	Hour per week			Credits	Evaluation Scheme				
								CIE			ESE	Total Marks
				L	T	P		TA	MSE	Total		
1	PE	U18CI801	Professional Elective - V / MOOCs-V	3	-	-	3	10	30	40	60	100
2	PE	U18CI802	Professional Elective - VI /MOOCs-VI	3	-	-	3	10	30	40	60	100
3	OE	U18OE803	Open Elective - IV / MOOCs-VII	3	-	-	3	10	30	40	60	100
4	PROJ	U18CI804	Major Project - Phase – II	-	-	14	7	40	-	40	60	100
			Total:	9	-	14	16	70	90	160	240	400

L= Lecture, T = Tutorials, P = Practicals & C = Credits

Professional Elective-V / MOOCs-V: U18CI801A: Cognitive Radio U18CI801B: Radar and Satellite communication U18CI801C: Industrial Automation U18CI801M: MOOC course	**Professional Elective-VI/ MOOCs-VI:** U18 CI802A: Cellular Mobile Communication U18CI802B: Advanced Wireless Communication U18CI802C: VLSI Structural Design U18CI802M: MOOC course	**Open Elective-IV /MOOCs-VII:** U18OE803A: Operations Research U18OE803B: Management Information Systems U18OE803C: Entrepreneurship Development U18OE803D: Forex and Foreign Trade U18OE803M: MOOC course

Contact hours per week : 23
Total Credits : 16

DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING

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SCHEME OF INSTRUCTION & EVALUATION of 4-YEAR B.TECH ECI DEGREE PROGRAM

SEMESTER WISE CREDITS DISTRIBUTION

SEM	No. of Credits	Contact hours
I	21	29
II	22	29
III	23	26
IV	21	27
V	20	26
VI	20	25
VII	17	24
VIII	16	23
Total	**160**	**209**

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SEMESTER Vs COURSE CATEGORY WEIGHTAGE for 4-YEAR B.TECH ECI DEGREE PROGRAM

(in terms of Total No. of Courses / Total No. Credits)

Semester	Number of Courses / Number of Credits (*Course Category wise*)								
	BSC	**ESC**	**HSMC**	**PCC**	**OE**	**PE**	**PROJ**	**MC**	**TOTAL**
I	3/9	4/12	-	-	-	-	-	2/0	9/21
II	3/9	5/10	1/3	-	-	-	-	1/0	22
III	1/4	-	1/1	5/14	2/4	-	-	-	9/23
IV	-	-	1/1	7/16	1/4	-	-	2/0	11/21
V	-	1/3	1/0	6/13	-	1/3	1/1	-	10/20
VI	-	-	2/4	6/12	-	1/3	1/1	-	10/20
VII	-	-	-	3/5	1/3	2/6	1/3	1/0	8/17
VIII	-	-	-	-	1/3	2/6	1/7	-	4/16
Total	**7/22**	**10/25**	**6/9**	**27/60**	**5/14**	**6/18**	**4/12**	**6/0**	**71/160**
% Weightage of Course Category	13.75 % (22/160)	15.625 % (25/160)	5.625 % (9/160)	37.5 % (60/160)	8.75 % (14/160)	11.25 % (18/160)	7.5 % (12/160)	0 %	100 % (160/160)

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SCHEME OF INSTRUCTION & EVALUATION
III - SEMESTER OF 4-YEAR B.TECH ECI DEGREE PROGRAM

[6+2+1M]

Sl.No	Category	Course Code	Course Title	Hour per week			Credits	Evaluation Scheme				
				L	T	P		CIE			ESE	Total Marks
								TA	MSE	Total		
1	BSC	U18MH301	Engineering Mathematics - III	3	1	-	4	10	30	40	60	100
2	HSMC	U18TP302	Soft and Interpersonal Skills	-	-	2	1	100	-	100	-	100
3	OE	U18OE303	Open Elective-I	3	-	-	3	10	30	40	60	100
4	PCC	U18CI304	Signals Systems and Random Processes	3	1	-	4	10	30	40	60	100
5	PCC	U18CI305	Electronic Devices and Applications	3	-	-	3	10	30	40	60	100
6	PCC	U18CI306	Electronic Measurements and Sensors	3	-	-	3	10	30	40	60	100
7	PCC	U18CI307	Digital Circuits and Logic Design	3	-	-	3	10	30	40	60	100
8	PCC	U18CI308	Electronic Measurements and Sensors Laboratory	-	-	2	1	40	-	40	60	100
9	OE	U18OE311	Open Elective-I based Laboratory	-	-	2	1	40	-	40	60	100
			Total:	18	2	6	23	240	180	420	480	900

L= Lecture, T = Tutorials, P = Practicals & C = Credits

Open Elective-I:	**Open Elective-I based Laboratory**
U18OE303A: Object Oriented Programming (CSE)	U18OE311A: Object Oriented Programming Lab (CSE)
U18OE303B: Fluid Mechanics and Hydraulic Machines (CE)	U18OE311B: Fluid Mechanics and Hydraulic Machines Lab (CE)
U18OE303C: Fundamentals of Mechatronics (ME)	U18OE311C: Mechatronics Lab (ME)
U18OE303D: Web Programming (IT)	U18OE311D: Web Programming Lab (IT)
U18OE303F: Strength of Materials (CE)	U18OE311F: Strength of Materials Lab (CE)

Contact hours per week : 26
Total Credits : 23

U18MH301 ENGINEERING MATHEMATICS- III

Class: B. Tech. III-Semester **Branch:** Common to all branches

Teaching Scheme : **Examination Scheme :**

L	T	P	C
3	1	-	4

Continuous Internal Evaluation	40 marks
End Semester Exam	60 marks

Course Learning Objectives (LOs):
This course will develop students' knowledge in / on

***LO1*:** *Laplace transform and its use to find the solutions of certain initial and boundary value problems in engineering*

***LO2*:** *Fourier series and its application to solve engineering problems*

***LO3*:** *functions of complex variables, the property of analyticity of a function of complex variable and their applications*

***LO4*:** *integration of a function of complex variable, evaluation of certain real integrals using complex analysis*

UNIT-I (9+3)

Laplace Transforms: Integral transforms, Kernel of a transform, Laplace transform of a function, Inverse Transform-Existence and uniqueness of Laplace Transforms, S- plane and region of convergence (ROC), Laplace Transform of some commonly used signals- Dirac-delta (impulse) function $[\delta(t)]$,step $[u(t)]$,ramp $[tu(t)]$,parabolic $\left[t^2u(t)\right]$,real exponential $\left[e^{at}u(t)\right]$, complex exponential $\left[e^{j\Omega t}u(t)\right]$, sine and cosine functions, damped sine and cosine functions, hyperbolic sine and cosine functions, damped hyperbolic sine and cosine functions, rectangular pulse and triangle. Properties of Laplace Transforms- Linearity, First shifting theorem (Frequency shift property), Laplace transforms of derivatives and integrals, time scaling property, time reversal property, Laplace Transform of Heaviside unit step function, Second shifting theorem (time shift property), Initial value and final value theorems, Laplace transform of periodic functions- Convolution theorem.

Operational Calculus: Transfer functions, Solution of ordinary differential equations with constant coefficients and system of ordinary differential equations with constant coefficients using Laplace Transforms. Application of Laplace transforms to the first order and second order system subjected to impulse, step, periodic, rectangular, square, ramp, triangular and sinusoidal functions.

UNIT-II (9+3)

Fourier Series: Periodic functions, orthogonal and orthonormal functions and systems of orthogonal functions, representation of a function as Trigonometric Fourier series (FS) in a range of length 2π, Euler formulae, Conditions for the existence of Fourier series (Dirichlet's conditions), FS for typical wave forms- square wave, pulse train, impulse train(comb function), periodic rectangular wave, triangle, saw tooth, half wave rectified signal, full wave rectified signal, plotting FS coefficients - line spectrum (magnitude and Phase spectra), Fourier series on an arbitrary period, effects of symmetry of function on FS coefficients, half range series – half range cosine and sine series expansions, exponential FS .

UNIT-III (9+3)

Complex Variables: Functions of complex variables, Limit, Continuity, Differentiability, Analytic Functions, Cauchy-Riemann Equations in Cartesian and Polar coordinates. Elementary functions, Harmonic Functions, Construction of Analytic functions. Applications to find velocity potential and stream function of a flow, conformal mapping and bilinear transformation.

UNIT-IV (9+3)

Complex Integration: Line integration in complex plane, integral of a non analytic function, dependence on path of integration, *ML*-Inequality, Cauchy's integral theorem, Cauchy's integral formula, series expansion of complex functions: Taylor's series and Laurent's series, zeros and singularities, residues, Residue Theorem- Applications of Residue theorem to the properly chosen integrals around a unit circle and semi circle.

Text Books:

1. Grewal, B.S., "Higher Engineering Mathematics", *Khanna Publishers,* Delhi, 43/e, 2014.

Reference Books:

1. Kreyszig E., "Advanced Engineering Mathematics", *John Wiley & Sons, Inc.,* U.K, 9/e, 2013.
2. Churchill R.V., "Complex Variable and its Applications", McGraw Hill, New York, 9/e, 2013.

Course Outcomes (COs):

Course Code: **U18MH301** Course Name: **Engineering Mathematics- III**		
CO	**CO code**	Upon completion of this course, the student will be able to…
CO1	**U18MH301.1**	*apply Laplace transform to solve certain differential equations whose solutions cannot be computed using classical methods*
CO2	**U18MH301.2**	*describe a given function as Fourier series in an interval*
CO3	**U18MH301.3**	*construct analytic function; find velocity potential and stream function of a fluid flow using complex analytical methods*
CO4	**U18MH301.4**	*represent a given function in Taylor's and Laurent's series, evaluate certain real integrals using integral theorems*

Course Articulation Matrix (Mapping of COs with POs and PSOs):

Course code: **U18 MH301** Course Name: **Engineering Mathematics- III**														
CO Code	**PO 1**	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**
U18MH301.1	2	2	--	--	--	--	--	--	--	--	--	1	2	--
U18MH301.2	2	2	--	--	--	--	--	--	--	--	--	1	2	--
U18MH301.3	2	2	--	--	--	--	--	--	--	--	--	1	2	--
U18MH301.4	2	1	--	--	--	--	--	--	--	--	--	1	2	--
U18MH301	**2**	**1.75**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**2**	**--**

U18TP302 SOFT AND INTERPERSONAL SKILLS

Class: B.Tech III semester **Branch:** ME, CSE, IT

Teaching Scheme :

L	T	P	C
-	-	2	1

Examination Scheme :

Continuous Internal Evaluation	100 marks
End Semester Examination	-

Course Learning Objectives (LOs):

This course will develop students' knowledge in/on….

LO1: analyzing self and learning to overcome possible threats

LO2: group dynamics to demonstrate respect for the opinions and beliefs of group

LO3: effective presentations using visual aids and analyzing the videos

LO4: communicating professionally, making resume in line with industry expectations

LIST OF ACTIVITIES

Introduction

Activity 1	Team interaction
Activity 2	SWOT analysis
Activity 3	Debate
Activity 4	Group Discussion

Activity 5	Presentations through PPTs
Activity 6	Video Synthesis
Activity 7	Resume Writing
Activity 8	Email Etiquette

Activity 9 : My interview Plan: Self Introduction & FAQs
Activity 10 : "My Career Plan" Oral presentation
} Comprehensive Presentation

Text Books:

- Developing Communications Skills – Krishna Mohan & Meera Benerji, Mcmillan Publications, New Delhi, 2005
- Soft Skills - Alex.K, S. Chand Publications, New Delhi, 2010
- Soft skills Cornerstone of Professional success – Raman & Meenakshi, Jain Brothers Publications, New Delhi, 2009

References:

- https://onlinecourses.nptel.ac.in/noc19_hs20/preview
- https://onlinecourses.nptel.ac.in/noc18_hs30/preview

Course Outcomes (COs):

Course code: **U18TP302**		Course Name: **Soft and Interpersonal Skills**
CO	**CO code**	*Upon completion of this course, the student will be able to…*
CO1	**U18TP302.1**	introspect to convert strengths into opportunities, identify weaknesses, bypass threats
CO2	**U18TP302.2**	present views on various issues confidently in a group
CO3	**U18TP302.3**	make effective PPT presentations, synthesize videos
CO4	**U18TP302.4**	prepare a professional resume, communicate effectively to attain better opportunities

Course Articulation Matrix (Mapping of COs with POs and PSOs):

Course code: **U18TP302**								Course Name: **Soft and Interpersonal Skills**					
CO Code	**PO 1**	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**
U18TP302.1	-	-	-	-	-	-	-	-	2	3	-	-	-	-
U18TP302.2	-	-	-	-	-	-	-	2	3	3	-	-	-	-
U18TP302.3	-	-	-	-	-	-	-	-	2	3	-	-	-	-
U18TP302.4	-	-	-	-	-	-	-	1	2	3	-	-	-	-
U18TP302	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**1.5**	**2.25**	**3**	**-**	**-**	**-**	**-**

U18OE303A OBJECT ORIENTED PROGRAMMING

Class: B. Tech III-Semester **Branch:** Computer Science & Engineering

Teaching Scheme:

L	T	P	C
3	-	-	3

Examination Scheme:

Continuous Internal Evaluation	40 marks
End Semester Examination	60 marks

Course Learning Objectives(LOs):

This course will develop students' knowledge in/on…

LO1: fundamentals of object oriented and java programming.

LO2: classes, objects and inheritance for implementing object oriented concepts.

LO3: polymorphism, interfaces and packages for realizing object oriented programming.

LO4: manage Exceptional and I/O operations in application developments.

UNIT- I (9)

Fundamentals of Object Oriented Programming: Programming paradigms, Basic concepts of Object Oriented paradigm (OOP), benefits and applications of OOP.

Basics of Java Language: Java language Features, Java Programming Structure, Java Tokens, JVM, Constants, Variables, Data types, Scope of variable, Type Casting, Operators and Expressions, Branching and looping statements, Arrays.

UNIT – II (9)

Classes and Objects: Defining a class, Field declaration, Method declaration, Creating object, Accessing Class Members, Constructors, garbage collection, Static members, Nested and inner classes, Command line arguments, Wrapper classes.

Inheritance: Extending a class, Defining subclasses, Subclass constructor, Multilevel inheritance, Hierarchical inheritance, Access controls, *this* and *super* keywords.

UNIT-III (9)

Polymorphism: Overloading methods, Overloading constructors, Overriding Methods, Dynamic method dispatch, Abstract classes, Final Keyword.

Interfaces: Defining an interface, Implementing interfaces, Nested Interfaces, Variables in interfaces, Extending interfaces

Packages: Packages, java API packages, Using System Packages, Naming Conventions, Creating Packages, Accessing Packages, Adding a class to package, Hiding classes, Static Import.

UNIT – IV (9)

Exception handling: Fundamentals, Exception types, Uncaught exceptions, Using try and catch, Multiple catch clauses, Explicit exceptions with *throw, throws* and *finally* keywords.

String Handling: String constructors, String length, String operations, Character extraction, String comparison, Searching string, Modifying string, Changing string cases, Joining strings**.**

Using I/O: I/O Basics, Reading console Input, Writing console output, Reading and writing files.

Text Books:

1. Herbert Schildt,"JAVA The Complete Reference", 9th Edition, McGraw-Hill Education India Pvt.Ltd , ISBN: 9781259002465, 2014.

2. E.Balgurusamy, "Programming with JAVA a primer", 5e Edition, McGraw-Hill Publication Ltd, ISBN: 9351343200, 2014.

References Books:

1. P Radha Krishna, "Object Oriented Programming through JAVA", Universities Press, ISBN: 9788173715723,2011.
2. Herbert Schildt,"JAVA The Complete Reference", McGraw-Hill Education India Pvt.Ltd , 9th Edition, ISBN: 9781259002465, 2011.
3. Kathy Sierra, Bert Bates, "Head First Java", O'Reilly Publictions, 2nd Edition, ISBN-13: 978-0596009205.
4. Uttam K.Roy, "Advanced JAVA Programming", Oxford Publications; First edition, ISBN-13: 978-0199455508.

Course Code: **U18OE303A** Course Name: **Object Oriented Programming**		
CO	**CO code**	*Upon completion of this course, the student will be able to…*
CO1	**U18OE303A.1**	*demonstrate object oriented concepts and java programming features.*
CO2	**U18OE303A.2**	*solve computing problems using object orientation and inheritance concepts.*
CO3	**U18OE303A.3**	*use polymorphism, interfaces and Packages for effective object oriented programming*
CO4	**U18OE303A.4**	*handle Exceptions and I/O operations in application development.*

Mapping of the Course Learning Outcomes with Program Outcomes:

CO/PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
U18OE303A.1	2	2	2	1	2	1	-	1	2	1	2	1	2	2	2
U18OE303A.2	2	2	2	1	2	1	-	-	2	1	2	1	2	2	2
U18OE303A.3	2	2	2	1	2	1	-	-	2	1	2	1	2	2	2
U18OE303A.4	2	2	2	1	2	1	1	1	2	1	2	1	2	2	2
U18OE303A	**2**	**2**	**2**	**1**	**2**	**1**	**1**	**1**	**2**	**1**	**2**	**1**	**2**	**2**	**2**

U18OE303B FLUID MECHANICS AND HYDRAULIC MACHINES

Class: B.Tech. III -Semester **Branch:** Common to all branches

Teaching Scheme :

L	T	P	C
3	-	-	3

Examination Scheme :

Continuous Internal Evaluation	40 marks
End Semester Examination	60 marks

Course Learning Objectives (LOs):

This course will develop students' knowledge in /on

LO1*: various Properties of fluids and fluid statics*
LO2*: application of Bernoulli's equation and dimensional analysis*
LO3*: flow through pipes and working principles of hydraulic turbines*
LO4*: performance of reciprocating and centrifugal pumps*

UNIT-I(9)

Fluid fundamentals: Classification of fluids, fluid properties - density, specific weight, specific gravity, specific volume, viscosity, capillarity, vapor pressure, compressibility, surface tension, cohesion and adhesion.

Fluid statics:Pascal's Law, hydrostatic Law, measurement of pressure, manometers, Piezometer, U-tube differential manometer, inverted differential manometer, hydrostatic forces on submerged plane and curved surfaces, buoyancy, metacenter, stability of floating and submerged bodies

UNIT-II (9)

Fluid dynamics: Classification of fluid flow, continuity equation in one, two and three dimensional flow, velocity potential and stream function, forces causing motion, Euler's equation of motion, Bernoulli's Equation, applications of Bernoulli's equation, venturi meter, orifice meter, pitot tube, linear momentum equation ,application of linear momentum equation to forces on pipe bend.

Dimensional analysis: Dimensional analysis by Rayleigh's method and Buckingham π's theorem, dimensionless numbers and model laws, Reynolds law and Froude's law.

UNIT-III(9)

Flow through pipes: Loss of head in pipes, expression for head loss due to major and minor losses in pipes, HGL and TEL lines, pipes in series and parallel, equivalent pipe.

Hydraulic turbines: Concept of impact jets, classification, head, losses and various efficiencies, Pelton turbines, components, velocity triangles, power and efficiencies, reaction turbines, Francis and Kaplan turbines, efficiencies and characteristics, unit quantities, specific speed, draft tube theory.

UNIT-IV (9)

Reciprocating pumps: Working of single and double acting pumps, work done and efficiencies, slip, negative slip, performance characteristics of pumps, air vessel.

Centrifugal pumps: Principle, components, work done and efficiency, pumps in series and in parallel, multi stage pumps, characteristics, cavitation and priming.

Text Books:

1. P.N.Modi and S.M. Seth, "*Hydraulics and Fluid Mechanics Including Hydraulic Machines*", Standard Book House, Rajsons Publications Private Limited, 21thedn., 2017

Reference Books:

1. R.K.Bansal, "*Fluid Mechanics and Hydraulic Machines*", Periodicals Private Ltd.,2018
2. Victor Streeter and E. Benjamin Wylie, "*Fluid Mechanics*", McGraw Hill, Singapore, 9thedn., 2017.
3. Frank M. White, "*Fluid Mechanics*", Special Indian Edition, Tata McGraw Hill, New Delhi, 2011.
4. A.K. Jain, "*Fluid Mechanics Including Hydraulic Machines*", Khanna Publications, 12thedn, 2018.

Course Outcomes (COs):

Course Code:**U18OE303B** Course Name: **Fluid mechanics and hydraulic machines**		
CO	**CO code**	Upon completion of this course, the student will be able to…
CO1	**U18CE303B.1**	*summarize fluid properties using fundamental laws of fluid statics.*
CO2	**U18CE303B.2**	*analyse fluid flows using Bernoulli's equation and model laws.*
CO3	**U18CE303B.3**	*estimate losses in pipes and characterize hydraulic turbines.*
CO4	**U18CE303B.4**	*discuss the working principle and characteristics of pumps.*

Course Articulation Matrix (Mapping of COs with POs and PSOs):

Course Code:**U18OE303B** Course Name: **Fluid mechanics and hydraulic machines**

CO Code	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
U18CE303B.1	2	1	-	-	-	-	-	-	1	1	-	1	2	-	1	1
U18CE303B.2	2	1	-	1	-	-	-	-	1	1	-	1	2	-	1	1
U18CE303B.3	2	1	-	1	-	-	-	-	1	1	-	1	2	-	1	1
U18CE303B.4	2	1	-	1	-	1	-	-	1	1	-	1	2	-	1	2
U18CE303B	**2**	**1**	**-**	**1**	**-**	**1**	**-**	**-**	**1**	**1**	**-**	**1**	**2**	**-**	**1**	**1.25**

U18OE303C MECHATRONICS

Class: B.Tech. III-Semester **Branch:** Common to all branches

Teaching Scheme : **Examination Scheme :**

L	T	P	C
3	-	-	3

Continuous Internal Evaluation	40 marks
End Semester Exam	60 marks

Course Learning Outcomes (LOs):
This course will develop students' knowledge in /on
LO1: *role of mechatronics based technology, sensors and transducers used in industry*
LO2: *various types of actuation systems, working principles and their applications*
LO3: *mathematical models for various types of systems*
LO4: *various transfer functions and control modes*

UNIT-I (9)

Introduction to Mechatronics: Measuring system, Control systems, Microprocessor based controllers. Mechatronics approach.

Sensors and Transducers: Performance, terminology. displacement, position, proximity, velocity and motion.

UNIT-II (9)

Actuation Systems: working principles of pneumatic and hydraulic systems, directional control valves, pressure control valves, process control valves and rotary actuators.

Electrical Actuation Systems: working principles of electrical system, mechanical switches, solid-state switches solenoids, DC motors, AC motors and stepper motors.

UNIT-III (9)

Basic Models: Mathematical models, mechanical system building blocks, electrical system building blocks, fluid system building blocks and thermal system building blocks.

System Models: Engineering system, rotational-translational system and electro- mechanical systems and hydraulic-mechanical system.

UNIT-IV (9)

System Transfer functions: Transfer function, first order system, second order system, system in series and systems with feedback loops.

Closed Loop Controllers: Continuous and discrete processes. Control modes. Two step mode and proportional mode. Derivative control, integral control, PID controller, digital controllers, velocity controllers and adaptive control.

TEXT BOOK:

1. Bolton W., Mechatronics, *Pearson Publications*, 6/e, ISBN: 9788131732533, 2015.

REFERENCE BOOKS:

1. Nitaigour Premchand Mahalik, Mechatronics: Principles Concepts and Applications, *Tata McGraw Hill, 2/e,* ISBN-13: 978-0070483743, 2017.
2. HMT, Mechatronics, *Tata McGraw-Hill, ISBN*9788415700272 New Delhi, 2000.
3. Devdas Shetty, Richard and Kilk, Mechatronics System and Design, *Cenage Learning*, Inc. 2/e, ISBN-13: 978-1439061985, 2010.

Course Outcomes (COs):

Course Code: **U18OE303C** Course Name: **MECHATRONICS**		
CO	**CO code**	Upon completion of this course, the student will be able to…
CO1	**U18OE303C.1**	*apply the mechatronics approach ad select suitable sensors and transducers for a given application.*
CO2	**U18OE303C.2**	*explain working principles of mechanical, hydraulic, pneumatic and electrical actuators and their applications.*
CO3	**U18OE303C.3**	*develop basic building blocks for mechanical, electrical, fluid and thermal systems and build mathematical models and analyze.*
CO4	**U18OE303C.4**	*explain various system transfer functions and select an appropriate closed loop controller for a given application*

Course Articulation Matrix (Mapping of COs with POs and PSOs):

Course Code: **U18OE303C** Course Name: **MECHATRONICS**														
CO Code	**PO 1**	**PO2**	**PO 3**	**PO 4**	**PO 5**	**PO6**	**PO7**	**PO 8**	**PO9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**
U18OE303C.1	2	2	1	-	2	2	-	-	-	1	-	1	2	1
U18OE303C.2	2	2	1	-	2	-	-	-	-	1	-	1	2	1
U18OE303C.3	2	2	1	3	2	-	-	-	-	1	-	1	2	1
U18OE303C.4	2	2	1	1	2	-	-	-	-	1	-	1	2	1
U18OE303C	2	2	1	2	2	2	-	-	-	1	-	1	2	1

U18OE303D WEB PROGRAMMING

Class: B.Tech. III-Semester **Branch:** Common to all branches

Teaching Scheme : **Examination Scheme :**

L	T	P	C
3		-	3

Continuous Internal Evaluation	40 marks
End Semester Exam	60 marks

Course Learning Objectives (LOs):
This course will develop students' knowledge in /on

LO1: designing static webpage using HTML Tags, CSS properties, interactivity with JavaScript
LO2: creating dynamic webpage using JSP.
LO3: developing server-side scripts for web applications using PHP.
LO4: building databases applications using PHP, MYSQL and XML.

UNIT-I (9)

HTML: Document Structure, Basic Tags, Creating Headings, Working with Links, Creating Paragraph, Working with Images, Tables, Frames. Introduction to Forms and Controls: Creating HTML Form, Specifying Action URL and Method to Send the Form, Using HTML Controls.
CSS: *CSS* (Cascading style sheet) rules and properties, Types: Inline, External and Internal Style Sheets, Style Classes, Multiple Styles.
JAVASCRIPT: JavaScript syntax, Embedding JavaScript in HTML Page. Usage of variables, Working with Operators, Control-Flow Statements, Functions and Array, Creating Objects, Handling Events.

UNIT-II (9)

JSP: Syntax and Semantics, JSP Development Model, Components of JSP page: Directives, Comments, Expressions, Scriptlets, Declarations, Implicit Objects, Standard Actions, Tag Extensions, A Complete JSP Example. Session and Thread Management: Session Tracking, Session API, Thread Management. Application Event Listeners.
JDBC: Database access with JDBC, Overview, JDBC drivers, connecting to database with DriverManager, Statement Interfaces: Statement, Prepared statement, Callable statement, Result Sets.

UNIT-III (9)

Introduction to PHP: Overview of PHP, Advantages of PHP over scripting languages, Creating and running a PHP script, handling errors. Working with Variables and Constants: Variables, Data Types and Operators. Controlling Program Flow: Conditional Statements, Looping Statements, Break, Continue and Exit Statements. Working with Functions, Arrays, Files and Directories.
Working with Forms: Web Forms and Form Elements, Processing a Web Form, Validating a Web Form.

UNIT-IV (9)

Database using PHP: Exploring Relational Database Model, Records and Primary Keys. Working with SQL Statements. Using PHP and MySql: Checking Configuration, Connecting to Database, Selecting a Database, Adding and Altering a Table in a Database, Inserting and modifying Data in a Table, Retrieving Data from a Table.
XML : Introduction to XML, XML Basics: Syntax, Declaration, Elements, Attributes, Valid XML Documents, Viewing XML, XML Parser, XML Technologies, Document Object Model(DOM).

Text Books:

1. Kogent, "Web Technologies HTML, CSS, JavaScript, ASP.NET, Servlets, JSP, PHP, ADO.NET, JDBC and XML", *1st Edition, Dreamtech Press (Black Book),* ISBN-13:9789351192510, 2013.
2. Phil Hanna, "JSP: The Complete Reference", *2ndEdition, McGraw-Hill,* ISBN: 007-212768-6, 2001.

Reference Books:

1. Ivan Bayross, "Web Enabled Commercial Application Development Using HTML, JavaScript, DHTML and PHP", *4th Edition,BPB Publications,*ISBN-13: 978-8183330084, 2009,
2. UttamK.Roy, "Web Technologies", *7th Edition*, *Oxford Higher Education,* ISBN-10: 0-19-806622-8, ISBN-13: 978-0-19-806622-4, 2010
3. Luke Welling, Laura Thomson,"PHP and MySQL Web Development", *3rd Edition, Sams Publications,* ISBN: 0-672-32672-8, 2005
4. Jayson Falkner, Kevin Jones, "Servlets and Java Server Pages", *1st Edition, Pearson,* ISBN: 0-321-13649-7, 2003

Course Outcomes (COs):

Course Code: **U18OE303D**		Course Name: **Web Programming**
CO	**CO code**	Upon completion of this course, the student will be able to…
CO1	**U18OE303D.1**	*create static web pages using HTML Tags, CSS properties and Java scripts*
CO2	**U18OE303D.2**	*create dynamic web pages using java server page concepts.*
CO3	**U18OE303D.3**	*develop web server side applications using PHP concepts*
CO4	**U18OE303D.4**	*develop enterprise databases for web-based applications using PHP and MySQL.*

Course Articulation Matrix (Mapping of COs with POs and PSOs):

Course Code: **U18OE303D**									Course Name: **Web Programming**					
CO Code	**PO 1**	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PS O1**	**PS O2**	**PS O3**
U18OE303D.1	2	2	2	1	2	1	-	1	2	1	2	1	2	2	2
U18OE303D.2	2	2	2	1	2	1	-	1	2	1	2	1	2	2	2
U18OE303D.3	2	2	2	1	2	1	-	1	2	1	2	1	2	2	2
U18OE303D.4	2	2	2	1	2	1	1	1	2	1	2	1	2	2	2
U18OE303D	**2**	**2**	**2**	**1**	**2**	**1**	**1**	**1**	**2**	**1**	**2**	**1**	**2**	**2**	**2**

U18OE303F STRENGTH OF MATERIALS

Class: B.Tech. III -Semester **Branch:** Common to all branches

Teaching Scheme :

L	T	P	C
3	-	-	3

Examination Scheme :

Continuous Internal Evaluation	40 marks
End Semester Examination	60 marks

Course Learning Objectives (LOs):
This course will develop students' knowledge in /on
LO1*: behaviour of bodies subjected to various types of stresses and strains*
LO2*: shear force and bending moment for determinate beams*
LO3*: bending and shearing stresses for beams in flexure*
LO4*: behaviour of circular shafts, springs and thin cylinders*

UNIT-I(9)

Simple stresses and strains: Types of stresses, strains, stress–strain diagram, elastic limit, Hooke's law, bars of varying sections, uniformly tapering circular and rectangular sections, elongation of bars due to self weight, temperature stresses in uniform bars.

Elastic modulii: Elastic constants, longitudinal strain, lateral strain, Poisson's ratio, complimentary shear stress, state of simple shear, modulus of elasticity (E), modulus of rigidity (N), bulk modulus (K), relation between E, N & K, strain energy, resilience, impact loading.

UNIT-II (9)

Principal stresses: Definition, normal and shear stress, principal stresses, principal planes and their graphical representation by Mohr's circle.

Shear force and bending moment: Types of supports, classification of beams, concept of shear force and bending moment, shear force diagram and bending moment diagram for simply supported, cantilever and overhanging beams, loading from shear force and bending moment diagram, principle of superposition.

UNIT-III(9)

Bending stresses in beams: Assumptions, theory of simple bending, application of bending equation and calculation of bending stresses in beams of homogeneous and flitched beam material, beams of uniform strength.

Shearing stresses in beams: Shearing stress due to bending, variation of flexural shear stress distribution across rectangular, triangular, circular, flanged section, shear resilience.

UNIT-IV (9)

Circular shafts and springs: Theory of pure torsion in solid and hollow circular shafts, shear stresses, angle of twist, power transmitted by shaft, close-coiled and open-coiled helical spring subjected to axial load and axial twist, springs in series and parallel.

Thin cylinders: Analysis of thin walled pressure vessels, hoop stress, longitudinal stress.

Text Books:

[1] Rajput R.K., "*Strength of Materials*", *7th Edition,* S Chand and Company.

[2] Gunneswara Rao T. D.and MudimbyAndal,"*Strength of Materials", 1st edn.2018*, Cambridge University Press.

Reference Books:

1. Timoshenko and Gere, "*Mechanics of Materials", 1st Edition* Mc Graw Hill International.
2. Punmia B.C., Arun K. Jain, Ashok K. Jain, "*Mechanics of Materials", 2nd Edition,* Laxmi Publications, New Delhi.
3. Subramanian R., "*Strength of Materials*", *3rd Edition,* Oxford University Press.
4. Ramamrutham S.,"*Strength of Materials", 2nd Edition,* Dhanpat Rai & Sons, New Delhi.

Course Outcomes (COs):

Course Code:**U18OE303F**		Course Name: **Strength of Materials**
CO	**CO code**	*Upon completion of this course, the student will be able to…*
CO1	**U18CE303F.1**	*estimate various types of stresses and strains*
CO2	**U18CE303F.2**	*construct Mohr's circle, shear force and bending moment diagrams for determinate beams*
CO3	**U18CE303F.3**	*determine the bending and shearing stresses for beams subjected to pure bending*
CO4	**U18CE303F.4**	*analyze stresses in thin cylinders, circular shafts and springs by theory of pure torsion*

Course Articulation Matrix (Mapping of COs with POs and PSOs):

Course code: **U18OE303F** Course Name: **Strength of Materials**

CO Code	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
U18CE303F.1	2	2	1	1	-	-	-	-	-	1	-	2	2	1	-	1
U18CE303F.2	2	2	1	-	-	-	-	-	-	1	-	1	2	1	-	1
U18CE303F.3	2	2	1	1	-	-	-	-	-	-	-	1	2	1	-	1
U18CE303F.4	2	2	1	2	-	-	-	-	-	1	-	1	2	1	-	1
U18CE303F	**2**	**2**	**1**	**1.33**	**-**	**-**	**-**	**-**	**-**	**1**	**-**	**1.25**	**2**	**1**	**-**	**1**

U18CI304 SIGNALS SYSTEMS AND RANDOM PROCESSES

Class: B.Tech. III – Semester **Branch:** Electronics Communication & Instrumentation Engineering (ECI)

Teaching Scheme:

L	T	P	C
3	1	-	4

Examination Scheme:

Continuous Internal Evaluation	**40 marks**
End Semester Examination	**60 marks**

Course Learning Objectives (LOs):
This course will develop students' knowledge on/in…

LO1: *continuous-time (CT) and discrete-Time (DT) signals & systems and convolution*
LO2**:** *continuous-time & discrete time Fourier transforms and analysis of LTI systems*
LO3**:** *z-Transform, stability of LTI systems and realizations of IIR systems*
LO4**:** *statistical parameters of a random variable and random processes*

UNIT – I (9+3)

Signals and Systems: Continuous-time (CT) and Discrete-Time (DT) signals, Sampling theorem (statement only), Transformations of independent variable, Exponential and sinusoidal signals, Singularity functions, Classification of signals, CT & DT Systems, Basic system properties

Linear Time–Invariant (LTI) Systems: DT-LTI systems, Convolution sum, CT-LTI systems, Convolution integral, Properties of LTI systems, LTI systems described by differential and difference equations, FIR and IIR systems

UNIT – II (9+3)

Continuous-Time Fourier Transform (CTFT): CTFT for representation of aperiodic signals, CTFT for periodic signals; Properties of the CTFT - Convolution property, Multiplication property; Systems characterized by linear constant–coefficient differential equations (LCCDE)

Discrete Time Fourier Series (DTFS): DTFS for periodic signals, analysis and synthesis equations, few examples

Discrete-Time Fourier Transform (DTFT): DTFT for aperiodic signals, properties for the DTFT, Convolution property, Multiplication property, Systems characterized by linear constant-coefficient difference equations (LCCDE)

UNIT – III (9+3)

z-Transform: Representing DT signals by complex exponentials, Definition of *z*-transform, Region of convergence (ROC), Properties of *z*-transform, Inverse *z*-transform by partial fractions and long division methods, Analysis and characterization of LTI system using *z*-transform

Block Diagram Representations: Structures for IIR systems - Direct, cascade and parallel form realizations of IIR systems

UNIT – IV (9+3)

Random Variables & Processes – Review of probability theory, Random variables – continuous and discrete, cumulative distribution function, probability density function, operations on single and multiple random variables – mean, variance, characteristic function, moment generating function, Gaussian probability density function, mean & variance of the sum of random variables, correlation between random variables, central limit theorem (statement only)

Random Processes: Random Process Concept - Classification; Distribution and Density Functions, Concept of Stationarity and Statistical Independence, Wide-Sense and Strict-Sense Stationarity, Autocorrelation Function, Cross-Correlation Function, Power Density Spectrum

Text Book:

[3] Alan Oppenheim and Alan S.Willsky with S. Hamid Nawab, *Signals & Systems*, 2nd ed. New Delhi: Prentice Hall of India, 2010. *(Chapters 1, 2, 3, 4, 5, 10)*

[4] Peyton Z. Peebles, *Probability, Random Variables and Random Signal Principles*, 4th ed. New Delhi: Tata McGraw Hill, 2001. (*Chapters 1, 2,3,4,5,6,7*)

Reference Books:

[1] Simon Haykin and Barry Van Veen, *Signals and Systems*, 2nd ed. New Delhi: Wiley India, 2008.

[2] Mrinal Mandal and Amir Asif, *Continuous and Discrete Time Signals and Systems*, 1st ed. United Kingdom: Cambridge University Press, 2008.

[3] M.J. Roberts and Govind Sharma, *Fundamentals of Signals and Systems*, 2nd ed. McGraw Hill, 2010.

[4] H.P. Hsu, *Signals and Systems Schaum's Outlines,* 2nd ed. McGraw Hill, 2009.

[5] R.P. Singh and S.D. Sapre, *Communication Systems Analog and Digital*, 2nd ed. New Delhi: Tata McGraw Hill, 2008.

Course Learning Outcomes (COs):

On completion of this course, students will be able to…

CO1: *classify CT and DT signals & systems and perform convolution for finding response of an LTI system to any arbitrary signal*

CO2: *evaluate CTFT& DTFT of standard signals and apply properties of CTFT & DTFT for solving LCCDE*

CO3: *determine the z-transform of standard DT signals with ROC, use properties of z-transform to solve difference equations, evaluate stability of an LTI system and realize the DT systems in direct, cascade & parallel forms*

CO4: *evaluate various statistical parameters of a random variable and interpret random processes*

Course Articulation Matrix (CAM): U18CI304 SIGNALS SYSTEMS AND RANDOM PROCESSES

CO		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO1	PSO 2
CO1	U18CI304.1	**2**	**1**	**1**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**1**	**2**	**1**
CO2	U18CI304.2	**2**	**1**	**1**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**1**	**2**	**1**
CO3	U18CI304.3	**2**	**1**	**1**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**1**	**2**	**1**
CO4	U18CI304.4	**2**	**1**	**1**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**1**	**2**	**1**
U18CI304		**2**	**1**	**1**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**1**	**2**	**1**

U18CI305 ELECTRONIC DEVICES AND APPLICATIONS

Class: B.Tech. III – Semester
Branch: Electronics Communication and Instrumentation (ECI)

Teaching Scheme:

L	T	P	C
3	–	–	3

Examination Scheme:

Continuous Internal Evaluation	40 marks
End Semester Examination	60 marks

Course Learning Objectives:
This course will develop students' knowledge in/on
LO1: *conduction in semiconductors and semiconductor diode characteristics*
LO2: *half wave - full wave rectifiers with and without filters*
LO3: *transistor characteristics, biasing and thermal stabilization*
LO4: *FET characteristics, FET biasing and special devices like SCR, UJT, DIAC,TRIAC & LED*

UNIT-I (9)

Conduction in Semiconductors: Conductivity of a Semiconductor, Carrier Concentrations in an Intrinsic Semiconductor, Donor and Acceptor Impurities, Charge densities in a semiconductor, Fermi level in a Semiconductor having Impurities, Diffusion, Carrier life time, Continuity equation, The Hall effect

Semiconductor Diode Characteristics: Qualitative theory of P-N junction, p-n Junction as a Diode, Band Structure of an Open Circuited p-n Junction, Quantitative theory of P-N diode currents, The Volt - Ampere Characteristics, Temperature dependence of P-N Characteristics, Diode Resistance, Space Charge or Transition Capacitance, Diffusion capacitance, Breakdown Mechanisms, Zener Diodes, Zener diode as voltage regulator

UNIT-II (9)

Rectifiers: A Half Wave Rectifier, Ripple Factor, A Full wave Rectifier, Harmonic Components in Rectifier Circuits, Inductor Filters, Capacitor Filters, Approximate Analysis of Capacitor Filters, L-Section Filter, Multiple L- Section Filter, л-Section Filter

UNIT-III (9)

Transistor Characteristics: The Junction Transistor, Transistor Current Components, Transistor as an Amplifier, Common Base (CB) Configuration, Common Emitter (CE) Configuration, Common Collector (CC) Configuration

Transistor Biasing & Thermal Stabilization: Operating Point, Transistor as a switch, Bias Stability, Collector to Base Bias, Self-Bias, Stabilization against variations in Vbe and β for the Self Bias Circuit, Bias Compensation, Thermistor & Sensistor Compensation, Thermal Runaway and Thermal Stability.

UNIT- IV (9)

Field Effect Transistors: Construction and Characteristics of JFETs, Transfer Characteristics, Depletion-type MOSFET and Enhancement-type MOSFET

FET Biasing: Fixed Bias Configuration, Self-Bias Configuration, Voltage Divider Biasing, Common Gate Configuration, Common Drain Configuration, Depletion-type MOSFETs, Enhancement- type MOSFETs

Special Devices: Operation and characteristics of Tunnel Diode, Silicon Controlled Rectifier, Uni-Junction Transistor (UJT), Light Emitting Diode (LED), Photo Diode and Photo Transistor

Text Books:

[1] S Salivahanan and N Suresh Kumar: *Electronic Devices and Circuits*, 2nd ed. New Delhi: Mc Graw Hill, 2011. (*Chapters 1 to 8*)

[2] Jacob Milliman and Christos Halkias: Electronic Devices and Circuits, 3rd ed. New Delhi: Mc GrawHill. (*Chapters 2, 3, 5 ,6 ,9 ,10 and 19*)

Reference Books:

[1] David A Bell: *Electronic Devices and Circuits*, 1st ed. New Delhi: OXFORD Higher Education, 2015.

[2] Robert L Boylested and Louis Nashelsky, *Electronic Devices and Circuit Theory*, 10th ed. New Jersey: Pearson Prentice Hall, 2013.

Course Learning Outcomes (COs):

On completion of this course, students will be able to…

CO1: analyze conduction in semiconductors and estimate the diode parameters from its characteristics
CO2: examine the performance characteristics of rectifiers without & with filters
CO3: analyze I/O characteristics of BJT configurations and apply biasing & bias compensation techniques for BJT amplifiers
CO4: interpret the working principles of FET, Tunnel Diode, SCR ,UJT, LED, photo diode & photo transistor

Course Articulation Matrix (CAM): U18CI305 ELECTRONIC DEVICES AND APPLICATIONS

CO		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PSO 2
CO1	U18CI305.1	1	1	1	-	-	-	-	-	-	-	-	1	1	-
CO2	U18CI305.2	1	1	1	-	-	-	-	-	-	-	-	1	1	-
CO3	U18CI305.3	1	1	1	-	-	-	-	-	-	-	-	1	1	1
CO4	U18CI305.4	1	1	1	-	-	-	-	-	-	-	-	1	1	1
U18CI305		**1**	**1**	**1**	-	-	-	-	-		-	-	1	1	1

U18CI306 ELECTRONIC MEASUREMENTS AND SENSORS

Class: B.Tech. III – Semester **Branch:** Electronics Communication & Instrumentation Engineering (ECI)

Teaching Scheme:

L	T	P	C
3	-	-	3

Examination Scheme:

Continuous Internal Evaluation	40 marks
End Semester Examination	60 marks

Course Learning Objectives (LOs):
This course will develop students' knowledge on /in…
LO1: measurement system, PMMC type analog meter, DMM, oscilloscopes and analyzers
LO2: DC & AC bridge circuits and transducer classification & system transfer function
LO3: sensing principles of passive & active transducers and their applications
LO4: advanced sensors and sensor data acquisition & data transmission

UNIT – I (9)

Measurement System: Measurement system – Block diagram, Example, Definitions of static & dynamic characteristics, Types of errors

Indicating Devices: Analog meter – PMMC principle, I/p–O/p expression of PMMC ammeter, Measurement of current & voltage using PMMC meter; Digital meter – Resolution & accuracy of digital meter, Block diagram & working principle of Digital multimeter (DMM)

Display Devices (*Block diagram approach*)**:** Principle of operation of oscilloscopes – Cathode ray oscilloscope (CRO), Digital storage oscilloscope (DSO); Principle of operation of analyzers – Frequency selective wave analyzer, Spectrum analyzer

UNIT – II (9)

DC & AC Bridge circuits: Measurement of R, L, C & frequency using bridge circuits – Wheatstone bridge, Maxwell's bridge, Schering bridge, Wien's bridge

Transducers: Definition & ideal requirements of transducer, Transducer classification, Generalized system transfer functions of zero, first & second order transducers (*Laplace domain*), Examples of transducers – Potentiometer, Thermocouple, Spring mass damper system

UNIT – III (9)

Passive Transducers and Applications *(Schematic approach)***:** Strain gauge (SG) transducer – Piezoresistive effect, SG type force transducer, SG full bridge configuration circuit; Resistive type temperature transducer – RTD, RTD Callenders circuit, Thermistor; Optical type displacement transducer – Light dependent resistor (LDR), Photodiode; Linear variable differential transformer (LVDT) type displacement transducer, Differential capacitance type pressure transducer (DP cell), AC bridge circuit for differential type capacitive transducer, Proximity type turbine flow meter

Active Transducers and Applications *(Schematic approach)*: Thermocouple (TC) transducer – Seebeck effect, Types of TCs, TC cold junction compensation circuit; Piezoelectric transducer (PZT) – Piezoelectric effect, PZT type acceleration transducer; Hall-effect transducer, Photovoltaic transducer, Electromagnetic flow meter

UNIT – IV (9)

Advanced Sensors (*Schematic approach*)**:** Humidity & moisture sensors – Capacitive & Electrical conductivity types; Acoustic sensors – Fiber-optic & Piezoelectric microphones; Water level sensors - Thin-Film, Capacitive & Ultrasonic sensors; Occupancy & motion detectors - Capacitive occupancy & PIR

motion detectors; Gyroscope sensors - Optical & Monolithic silicon types; Image sensors - Active-pixel sensor, Charge-coupled device

Sensor Data Acquisition and Data Transmission *(Block diagram approach)***:** Data acquisition (DAQ) system, Two-wire & four-wire types of data transmission

Text Books:

1] D. V. S. Murty, *Transducers and Instrumentation*, 2nd ed. New Delhi: PHI Learning Pvt. Ltd., 2008. (*Chapters 1,4,6,7&10*)

2] Jacob Fraden**,** *Hand book of modern sensors physics, designs, and applications***,** 3rd ed**.** New York: AIP Press, 2004. *(Chapters 5,6,7,8,12&13)*

3] Albert D. Helfrick, Cooper William D, *Modern Electronic Instrumentation and Measurement Techniques*, 2nd ed. New Delhi: PHI Learning Pvt. Ltd., 1997. (*Chapters 4,5,6,7,8&9*)

Reference Books:

1] B.C. Nakra and K.K Choudhary, *Instrumentation Measurement and Analysis*, 2nd ed. New Delhi: Tata McGraw Hill, 2006.

2] P. Pruthviraj, B. Bhudaditya, S. Das and K. Chiranjib, *Electrical and Electronic Measurement and Instrumentation*, 2nd ed. New Delhi: McGraw Hill Education, 2011.

3] Arun K. Ghosh, *Introduction to Transducers,* 4th ed. New Delhi: Prentice Hall of India, 2015.

4] Sawhney A.K, *Electrical and Electronic Measurement and Instrumentation*, 10th ed. New Delhi: Dhanpat Rai & Sons, 1994.

5] B.G. Liptak, *Instrument Engineers Hand Book, Vol. I & Vol. II*, 4th ed. Philadelphia: Chilton book co., 2006.

Course Learning Outcomes (COs):

On completion of this course, students will be able to…

CO1: describe the principle of operation of measurement system, PMMC type analog meter & DMM and distinguish the significant features of CRO, DSO, frequency selective wave analyzer & spectrum analyzer

CO2: utilize DC & AC bridge circuits and develop system transfer function for a given transducer based on transducer order

CO3: identify passive & active transducers based on the sensing principles and select appropriate transducer for measurement of displacement, force, temperature, pressure, acceleration & flow

CO4: identify the advanced sensors based on sensing principles and utilize DAQ system & data transmission techniques for sensor applications

Course Articulation Matrix (CAM): U18CI306 ELECTRONIC MEASUREMENTS AND SENSORS

CO		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	U18CI306.1	1	-	-	-	-	-	-	-	-	-	-	1	1	-
CO2	U18CI306.2	1	1	1	1	-	-	-	-	-	-	-	1	1	-
CO3	U18CI306.3	1	1	1	1	-	-	1	-	-	-	-	1	1	1
CO4	U18CI306.4	1	2	1	1	-	-	1	-	-	-	-	1	2	1
U18CI306		**1**	**1.33**	**1**	**1**	**-**	**-**	**1**	**-**	**-**	**-**	**-**	**1**	**1.25**	**1**

U18CI307 DIGITAL CIRCUITS AND LOGIC DESIGN

Class: B.Tech. III – Semester **Branch:** Electronics Communication & Instrumentation Engineering (ECI)

Teaching Scheme:

L	T	P	C
3	-	-	3

Examination Scheme:

Continuous Internal Evaluation	40 marks
End Semester Examination	60 marks

Course Learning Objectives (LOs):

This course will develop students' knowledge in/on…

LO1: switching algebra and minimization techniques of switching functions
LO2: combinational circuits & their applications
LO3: flip flops and their use in the design of sequential circuits
LO4: characteristics & performance of logic family circuits

UNIT – I (9)

Number Systems and Codes: Representation of number systems, conversion of numbers from one radix to other, binary arithmetic, signed binary numbers, r's and (r-1)'s complements, 1's and 2's complement subtraction, binary weighted and non-weighted codes – BCD, self-complementing, Excess-3, Gray; BCD and Excess-3 arithmetic; error detecting & correcting codes - parity checking, even parity, odd parity, Hamming code (single error correction)

Boolean Algebra and Minimization: Postulates and theorems; logic gates – symbols and truth tables, realization of switching functions - AOI, NAND-NAND and NOR-NOR realizations; minimization of switching functions-using theorems, standard SOP & POS forms, Karnaugh map and Quine - McClusky techniques

UNIT – II (9)

Combinational circuits: Design of combinational circuits using logic gates – half adder, full adder, half subtractor, full subtractor, parallel adder, serial adder, carry look ahead adder, BCD adder and 1's & 2's complement adder/subtractors; Decoders - BCD to 7 segment, BCD to decimal; encoders, priority encoders; multiplexers, demultiplexers, realization of switching functions using multiplexers and decoders; code converters, parity generators, comparators

UNIT – III (9+3)

Sequential circuits: NAND RS latch, NOR RS latch; flip flops - SR, JK, D and T, preset and clear inputs, truth tables, excitation tables, race around condition, master slave flip flop, conversion of one flip flop to other; binary counters – design of asynchronous (ripple) and synchronous counters; shift registers – modes of operation, bidirectional & universal types, Ring andJohnson counters

Synchronous sequential circuits: State table, state diagram, state assignment, design of synchronous binary counters and sequence detectors

UNIT – IV (9+3)

Logic families: Introduction to logic families, characteristics– fan in, fan out, noise margin, propagation delay, current sourcing, current sinking; Study of RTL, DCTL, DTL, HTL, TTL, ECL and MOS families, their characteristics and comparison

Text Books:

[1] Zvi Kohavi, *Switching and Finite Automata Theory*, 2nd ed. New Delhi: Tata McGraw-Hill, 2008,. (Chapter 3,4,5 and 9)

[2] M. Morris Mano, *Digital Design,* 3rd ed. New Delhi: PHI, 2003. (Chapters 2 to 6 and 10)

Reference Books:

[1] R.P. Jain, *Modern Digital Electronics*, 3rd ed. New Delhi: Tata Mc Graw-Hill, 2003,

[2] A. Anand Kumar, *Switching Theory and Logic Design,* 1st ed. New Delhi: PHI, 2013(Reprint).

[3] Herbert Taub and Donald Schilling, *Digital Integrated Circuits*, New Delhi: Tata McGraw-Hill, 2008.

Course Learning Outcomes (COs):

On completion of this course, students will be able to…

CO1: simplify boolean expressions and minimize SOP/POS forms of switching functions using Karnaugh Map & Tabulation methods

CO2: design adders, subtractors, code converters, encoders, decoders, multiplexers, demultiplexers, parity generators & comparators

CO3: examine the operation of flip flops and design sequential circuits like counters, shift registers & sequence detectors

CO4: analyze the operation & transfer characteristics of logic family circuits

Course Articulation Matrix (CAM):U18EI307 DIGITAL CIRCUITS AND LOGIC DESIGN

CO		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	U18EI307.1	2	2	1	1	-	-	-	-	-	-	-	1	2	1
CO2	U18EI307.2	2	2	2	1	-	-	-	-	-	-	-	1	2	2
CO3	U18EI307.3	2	2	2	1	-	-	-	-	-	-	-	1	2	2
CO4	U18EI307.4	2	2	2	1	-	-	-	-	-	-	-	1	2	1
U18EI307		**2**	**2**	**2**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**1**	**2**	**1.5**

U18CI308 ELECTRONIC MEASUREMENTS AND SENSORS LABORATORY

Class: B.Tech. III - Semester
Engineering (ECI)

Branch: Electronics Communication & Instrumentation

Teaching Scheme:

L	T	P	C
-	-	2	1

Examination Scheme:

Continuous Internal Evaluation	40 marks
End Semester Examination	60 marks

Course Learning Objectives (LOs):

This course will develop students' knowledge on/in…

LO1: conversion of ammeter to voltmeter & measurement of A.C. voltage using PMMC meter and measurement of resistance & frequency using bridge circuits
LO2: measurement of frequency & phase using Lissajous patterns in CRO and strain measurement using strain gauge transducer
LO3: measurement of displacement using LVDT & capacitive type transducers and temperature measurement using RTD & Thermocouple
LO4: flow measurement using turbine flow meter and pressure measurement using Hall transducer

LIST OF EXPERIMENTS

1. (i) Conversion of PMMC type ammeter to voltmeter
   (ii) Measurement of A.C. voltage using PMMC meter
2. Measurement of resistance using Wheatstone bridge circuit setup
3. Measurement of frequency using Wien's bridge circuit setup
4. Measurement of frequency & phase using Lissajous patterns in CRO
5. Measurement of strain using Strain gauge transducer setup
6. Measurement of linear displacement using LVDT type inductive transducer setup
7. Measurement of angular displacement using Variable area type capacitive transducer setup
8. Measurement of temperature using RTD & Thermocouple transducer setups
9. Measurement of flow using Turbine flow meter setup
10. Measurement of pressure using Hall transducer setup
11. Demonstration on sensor signal conditioning circuits
12. Demonstration on interfacing of optical sensor using LabVIEW
13. Measurement of frequency & phase using Lissajous patterns in DSO
14. Measurement of speed using Tachometer & Stroboscope setup

Laboratory Manual:

[1] *Electronic Measurements and Sensors Laboratory Manual,* Dept of EIE, KITSW.

Reference Books:

[1] Albert D. Helfrick, Cooper William D, *Modern Electronic Instrumentation and Measurement Techniques*, 2nd ed. New Delhi: PHI Learning Pvt. Ltd., 1997. (*Chapters 4,5,6,7 & 9*)

[2] D. V. S. Murty, *Transducers and Instrumentation*, 2nd ed. New Delhi: PHI Learning Pvt. Ltd., 2008. (*Chapters 1,4,6,7 & 10*)

Course Learning Outcomes (COs):

On completion of this course, students will be able to…

CO1: utilize PMMC meter for conversion of ammeter to voltmeter & for A.C. voltage measurement and determine resistance & frequency using Wheatstone & Wien's bridge circuits

CO2: utilize CRO for measurement of frequency & phase using lissajous patterns and examine strain gauge transducer for strain measurement

CO3: utilize LVDT & capacitive transducers to measure displacement and examine RTD & thermocouple transducers for temperature measurement

CO4: utilize turbine flow meter to measure flow rate and examine Hall transducer for pressure measurement and examine RTD & thermocouple transducers for temperature measurement

CO4: utilize turbine flow meter to measure flow rate and examine Hall transducer for pressure measurement

Course Articulation Matrix (CAM): U18CI308 ELECTRONIC MEASUREMENTS AND SENSORS LABORATORY

CO		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	U18CI308.1	1	1	1	-	-	-	-	-	1	1	-	-	1	-
CO2	U18CI308.2	1	1	1	-	-	-	-	-	1	1	-	1	1	1
CO3	U18CI308.3	1	1	1	-	1	-	-	-	1	1	-	1	1	1
CO4	U18CI308.4	1	1	1	-	-	-	-	-	1	1	-	1	1	1
U18CI308		**1**	**1**	**1**	**-**	**1**	**-**	**-**	**-**	**1**	**1**	**-**	**1**	**1**	**1**

U18OE311A OBJECT ORIENTED PROGRAMMING LABORATORY

Class: B. Tech III-Semester **Branch:** Common to all branches

Teaching Scheme:

L	T	P	C
-	-	2	1

Examination Scheme:

Continuous Internal Evaluation	40 marks
End Semester Examination	60 marks

Course Learning Objectives(LO):

This course will develop students' knowledge in/on…

LO1: implementing concepts of object oriented programming
LO2: debug and test java applications effectively
LO3: effective use of exception handling, interfaces and packages during applications development
LO4: I/O and applet programming in java

List Of Experiments

Experiment-I

1. Write a program to demonstrate operators of java.
2. Write a program to demonstrate type casting and operator precedence.
3. Write a program to demonstrate different types of if-statements.
4. Write a program to demonstrate switch-case.

Experiment-II

1. Write a program to demonstrating loop control statements.
2. Write a program to demonstrate for-each control loop.
3. Implement programs using single dimensional arrays.
4. Write a program to define a two dimensional array where each row contains different number of columns.

Experiment -III

1. Write a program to demonstrate creating object to a class for accessing variables and methods.
2. Write a program to demonstrate creating multiple object.
3. Write a program to demonstrate passing objects to methods.
4. Write a program to demonstrate constructors and garbage collector by invoking it explicitly.

Experiment -IV

1. Write a program to demonstrate static members.
2. Write a program to demonstrate command line argument.
3. Write a program to demonstrate variable length argument.
4. Write a program to demonstrate wrapper classes.

Experiment -V

1. Write a program to demonstrate inheritance using extends keyword.
2. Write a program to demonstrate multilevel inheritance.
3. Write a program to demonstrate hierarchical inheritance.
4. Write a program to demonstrate access controls.

Experiment -VI

1. Write program to demonstrate *this* and *supper* keywords.
2. Write program to demonstrate dynamic method dispatch.
3. Write a program to demonstrate final variable and methods.
4. Write a program to demonstrate use of abstract class.

Experiment -VII

1. Write a program to define an Interface and implement it into a class.
2. Write a program to implement multiple interfaces into single class.
3. Write a program to extend interfaces.
4. Write a program to implement nested interfaces.

Experiment -VIII

1. Write a program to create a package, and demonstrate to import a package to a class.
2. Write a program to demonstrate access protection of packages.
3. Write a program to demonstrate static import of package.

Experiment-IX

1. Write a program to demonstrate *try* and *catch* statement for exception handling
2. Handle *ArrayIndexOfBoundsException*, *NumberFormatException* and *DivideByZeroException* using multiple catch blocks.
3. Write a program to demonstrate user defined exception with *throw keyword*
4. Write a program to demonstrate *finally* block.

Experiment-X

1. Write a program to demonstrate string handling functions.
2. Write a program to demonstrate string searching functions.
3. Write a program to demonstrate string comparison functions.
4. Write a program to demonstrate string modification functions.

Experiment-XI

1. Write a program to demonstrate reading and writing input using byte stream classes
2. Write a program to demonstrate reading and writing input using character stream classes
3. Write a program to demonstrate data input and output streams
4. Write a program to demonstrate array input and output streams

Experiment-XII

1. Write a program to create a file using byte stream classes
2. Write a program to create a file using character stream classes
3. Write a program to open the specific file
4. Write a program to copy the content of one file to another.

Laboratory Manual:

1. Java Programming laboratory manual, *prepared by faculty of Dept. of CSE.*

Text Book:

1. Herbert Schildt,"JAVA The Complete Reference", 9th Edition, McGraw-Hill Education India Pvt.Ltd , ISBN: 9781259002465, 2014.

Course Outcomes (COs):

Course Code: U18OE311A		**Course Name: Object Oriented Programming Laboratory**
CO	**CO code**	Upon completion of this course, the student will be able to…
CO1	**U18OE311A.1**	*implement OOP concepts using Java*
CO2	**U18OE311A.2**	*use the concepts like inheritance, polymorphism, packages and interfaces in application development*
CO3	**U18OE311A.3**	*handle runtime exceptions in object oriented programming*
CO4	**U18OE311A.4**	*build effective I/O interfaces for software applications*

Mapping of the Course Learning Outcomes with Program Outcomes:

Course Code: U18OE311A					**Course Name: Object Oriented Programming Laboratory**								
CO/PO	**PO 1**	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**
U18OE311A.1	2	2	2	1	2	1	-	1	2	1	2	1	-	1
U18OE311A.2	2	2	2	1	2	1	1	-	2	1	2	1	-	1
U18OE311A.3	2	2	2	1	2	1	-	-	2	1	2	1	-	1
U18OE311A.4	2	2	2	1	2	1	1	1	2	1	2	1	-	1
U18OE311A	**2**	**2**	**2**	**1**	**2**	**1**	**1**	**1**	**2**	**1**	**2**	**1**	**-**	**1**

U18OE311B FLUID MECHANICS AND HYDRAULIC MACHINES LABORATORY

Class: B.Tech. III -Semester **Branch:** Common to all branches

Teaching Scheme :

L	T	P	C
-	-	2	1

Examination Scheme :

Continuous Internal Evaluation	40 marks
End Semester Examination	60 marks

Course Learning Objectives (LOs):

This course will develop students' knowledge in /on

LO1: *determining the hydraulic coefficient for various flow measuring devices*
LO2: *implementing Bernoulli's equation and application of Bernoulli's theorem in estimating various losses in pipe*
LO3: *studying the various parameters which effects the impact of jet*
LO4: *studying the characteristics of hydraulic machines*

LIST OF EXPERIMENTS

1. Determination of Coefficient of Discharge for given Orifice meter and Venturi meter.
1. Determination of Coefficient of Discharge for given notches (triangular/rectangular)
2. Determination of Coefficient of Discharge for given orifice and mouth piece.
3. Verification of Bernoulli's theorem.
4. Estimation of coefficients of various head losses in pipes due to major and minor losses (sudden enlargement, sudden contraction and bend).
5. Determination of Reynolds's number using Reynolds's apparatus.
6. Determination of coefficient of impact for a jet on given vane.
7. Determination of performance characteristics of Francis Turbine
8. Determination of performance characteristics of Pelton Wheel.
9. Determination of performance characteristics of Centrifugal Pump.
10. Determination of performance characteristics of Submersible Pump.
11. Determination of performance characteristics of Reciprocating Pump.

Laboratory Manual:

1. "Fluid Mechanics Laboratory Manual", prepared by the faculty of Department of Civil Engineering.

Reference Books:

1. N. Kumara Swamy, "*Fluid Mechanics and Machinery Laboratory Manual"*,Charotar Publishing House Pvt., Ltd., 1st edn., 2008.
2. Sarbjit Singh, "*Experiments in Fluid Mechanics*", PHI Learning Private Limited, New Delhi, 2009.

Course Outcomes (COs):

Course Code: **U18OE311B**		Course Name: **Fluid Mechanics and Hydraulic Machines Laboratory**
CO	**CO code**	*Upon completion of this course, the student will be able to…*
CO1	**U18OE311B.1**	*determine the hydraulic coefficient for various flow measuring devices*
CO2	**U18OE311B.2**	*apply Bernoulli's equation in estimating head lossin pipes*
CO3	**U18OE311B.3**	*apply the principles of impact of jet on different vanes*
CO4	**U18OE311B.4**	*demonstrate the characteristics of hydraulic machines.*

Course Articulation Matrix (Mapping of COs with POs and PSOs):

Course Code: **U18OE311B**				Course Name: **Fluid Mechanics And Hydraulic Machines Laboratory**									
CO Code	**PO 1**	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**
U18OE311B.1	2	1	-	1	-	-	-	-	1	-	-	1	1	1
U18OE311B.2	2	1	-	1	-	-	-	-	1	-	-	1	1	1
U18OE311B.3	2	1	-	1	-	-	-	-	1	-	-	1	1	1
U18OE311B.4	2	1	-	1	-	-	-	-	1	1	-	1	1	1
U18OE311B	**2**	**1**	**-**	**1**	**-**	**-**	**-**	**-**	**1**	**1**	**-**	**1**	**1**	**1**

U18OE311C MECHATRONICS LAB

Class: B.Tech. III- Semester **Branch:** Mechanical Engineering

Teaching Scheme : **Examination Scheme :**

L	T	P	C
-	-	2	1

Continuous Internal Evaluation	:	40 marks
End Semester Examination	:	60 marks

Course Learning Outcomes (LOs):

This course will develop students' knowledge in /on

LO1: *basic elements underlying mechatronic systems: analog electronics, digital electronics, sensors, transducers, actuators, microcontrollers and embedded software.*

LO2*: interface of various systems to a PLC.*

LO3*: integration of various systems through programming.*

LO4*: design and simulation of hydraulic and pneumatic circuits.*

LIST OF EXPERIMENTS

1. Controlling A.C. Non servomotor clockwise and anti clockwise with time delay.
2. Controlling A.C. Non servo motor using digital inputs proximity sensors.
3. Controlling of Single acting Pneumatic Cylinder with time delay
4. Controlling of double acting Pneumatic Cylinder with time delay and sequencing
5. Control of D.C servomotor (rotating table clockwise and counter clockwise)
6. Integration of AC Non servo motors, single acting pneumatic cylinder and double acting pneumatic cylinder.
7. Integration of AC Non- servomotor and pneumatic cylinders with digital inputs.
8. Controlling of X table and Y table.
9. Controlling of various systems using manual inputs.
10. Controlling of traffic lights with time delay.
11. Controlling of lift operations with time delay.
12. Hydraulic and Pneumatic simulation.

Laboratory Manual:

1. Mechatronics Lab Manual, prepared by faculty of Mechanical Engineering, KITSW

REFERENCE BOOKS:

1. *ATS Manual of L.S. Mechatronics 2000.*
2. Bolton W., Mechatronics, *Pearson Publications,* 5/e, ISBN-13: 978-0273742869, 2011.

Course Outcomes (COs):

Course Code: **U18 OE311C**		Course Name: **MECHATRONICS LAB**
CO	**CO code**	*Upon completion of this course, the student will be able to…*
CO1	**U18OE311C.1**	*Develop PLC program to control AC non servomotors, single acting and double acting pneumatic cylinders with different operation conditions*
CO2	**U18OE311C.2**	*Develop PLC program to control various systems.*
CO3	**U18OE311C.3**	*Integrate various mechanical and electrical systems and operate them.*
CO4	**U18OE311C.4**	*Design and simulate the hydraulic and pneumatic circuits.*

Course Articulation Matrix (Mapping of COs with POs and PSOs):

Course Code: **U18OE311C** Course Name: **MECHATRONICS LAB**

CO Code	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
U18OE311C.1	1	2	1	2	-	-	-	-	-	1	-	1	1	1
U18OE311C.2	1	2	1	2	2	-	-	-	-	1	-	1	1	1
U18OE311C.3	1	2	1	2	2	-	-	-	-	1	-	1	1	1
U18OE311C.4	1	2	1	2	2	-	-	-	-	1	-	1	1	1
U18OE311C	1	2	1	2	2	-	-	-	-	1	-	1	1	1

U18OE311D WEB PROGRAMMING LABORATORY

Class: III Semester **Branch:** Common to all branches

Teaching Scheme :

L	T	P	C
-	-	3	2

Examination Scheme :

Continuous Internal Evaluation :	40 marks
End Semester Exam :	60 marks

Course Learning Objectives:
This course will develop students' knowledge in /on
CO1: implementing HTML Tags, CSS and JavaScripts for creating static web pages.
CO2: usage of JSP in designing dynamic web pages.
CO3: usage of PHP in designing a web base application.
CO4: accessing different web data servers using JSP and PHP

Experiment-1

1. Design the following static web pages with the following attributes:
   a. Basic Tags.
   b. Heading Tags.
   c. List (Ordered and Un-Ordered).
   d. Textbox, Buttons.

Experiment-2

2. HTML

AIM: Design the following static web pages required for an online book store web site.

a. **HOME PAGE:**
b. **LOGIN PAGE**
c. **CATALOGE PAGE**

DESCRIPTION:

a. HOME PAGE

The static home page must contain three **frames**.

- ***Top frame*:** Logo and the college name and links to Home page, Login page, Registration page, Catalogue page and Cart page (the description of these pages will be given below).
- ***Left frame*:** At least four links for navigation, which will display the catalogue of respective links. For e.g.: When you click the link **"CSE"** the catalogue for **CSE** Books should be displayed in the Right frame.
- ***Right frame*:** The *pages to the links in the left frame must be loaded here*. Initially this page contains description of the web site.

Logo	Web Site Name			
Home	Login	Registration	Catalogue	Cart
CSE ECE EEE CIVIL	Description of the Web Site			

b. LOGIN PAGE: This page looks like below:

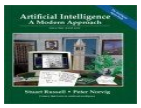
Logo	Web Site Name			
Home	Login	Registration	Catalogue	Cart
CSE ECE EEE CIVIL	Login : Password: Submi Reset			

Experiment-3

c. CATOLOGUE PAGE:

The catalogue page should contain the details of all the books available in the web site in a table. The details should contain the following:

- Snap shot of Cover Page.
- Author Name and Publisher.
- Price and Add to cart button.

Logo	Web Site Name			
Home	Login	Registration	Catalogue	Cart
CSE		Book : XML Bible Author : Winston Publication : Wiely	$ 40.5	Add to cart
ECE		Book : AI Author : S.Russel Publication : Princeton hall	$ 63	Add to cart
EEE		Book : Java 2 Author : Watson Publication : BPB publications	$ 35.5	Add to cart
CIVIL		Book : HTML in 24 hours Author : Sam Peter Publication : Sam publication	$ 50	Add to cart

Experiment-4

3. VALIDATION

AIM: To do validation for registration page using JavaScript.

DESCRIPTION: Write *JavaScript* to validate the following fields of the above registration page.

a. Name (Name should contains alphabets and the length should not be less than 6 characters).
b. Password (Password should not be less than 6 characters length).
c. E-mail id (should not contain any invalid and must follow the standard pattern ***(****name@domain.com****)***
d. Phone number (Phone number should contain 10 digits only).

Note: You can also validate the login page with these parameters.

4. CSS

AIM: Write a program illustrating various methods in cascading style sheets.

a. Use different font, styles and set a background image
b. Control the repetition of the image
c. Define styles for links
d. Work with layers and add a customized cursor

DESCRIPTION: Design a web page using **CSS (C**ascading **S**tyle **S**heets**)** which includes the following:

a. Use different font, styles: In the style definition you define how each selector should work (font, color etc.).Then, in the body of your pages, you refer to these selectors to activate the styles.
b. Set a background image for both the page and single elements on the page. You can define the background image for the page like this:
c. Control the repetition of the image with the background-repeat property. As background-repeat: repeat
d. Define styles for links
e. Work with layers:
f. Add a customized cursor:

Selector {cursor:value}
.xlink {cursor:crosshair}
.hlink{cursor:help}

5. Embedding JavaScript in HTML pages.
6. Design a registration form and validate its field by using JavaScript.

Experiment-5

7. To design the scientific calculator and make event for each button using JavaScript.
8. WAP to create popup boxes in JavaScript.
9. Program to create a class calculator that contains an overloaded method called "add" to calculate the sum of two integers, two float numbers and, one integer and one float.

Experiment-6

10. Print current date & time
11. JSP Program to auto refresh a page
12. JSP Program to count no. of visitors on website
13. JSP program for error handling
14. Demonstrate expression tag
15. Detect locale, language settings & local specific time
16. Demonstrate JSP implicit object
17. JSP Program to display given number in words

Experiment-7

18. Display the contents of Employee table in a neat format.
19. Insert ***N,*** no. of records into Employee table using ***Prepared Statement.***
20. Enhance the salaries of Employee by 10% who are earning salary greater than 5000 using ***Callable Statement.***
21. Delete all students whose marks are below 50% and also display the count.

Experiment-8

22. Write a HTML file to create a simple form with 5 input fields ***(Name, Password, Email, Pin code, Phone No. and a Submit button)*** and demonstrate required field validations to validate that all input fields are required and display error messages if the above validations do not hold.
23. Create a JSP Page with and run in JSP Engines.
24. Demonstrate Session Tracking in JSP.
25. JSP Program to validate username and password

Experiment-9

26. Create Database Connectivity with JSP page with different JDBC Drivers.
27. JSP Program to Select record from database
28. JSP Program to Insert a record into the database
29. Create a CRUD operation for JSP Page using MySQL
30. JSP Program to upload file into server.

Experiment-10

31. Create a form for your college library entering student details for each student in the college. Validate the form using PHP valuators and display error messages.
32. Write a PHP which does the following job:
Insert the details of the 3 or 4 users who register with the web site by using registration form. Authenticate the user when he submits the login form using the UserName and Password from the database (instead of cookies).

Experiment-11

33. Create tables in the database which contain the details of items (books in our case like Book name, Price, Quantity, Amount) of each category. Modify your catalogue page in such a way that you should connect to the database and extract data from the tables and display them in the catalogue page using PHP.
34. Create and delete MYSQL database using PHP.

Experiment-12

35. Create a PHP program to demonstrate opening and closing a file.
36. Create a PHP program to demonstrate reading a file and writing in a file.

Course Code: **U18OE311D** Course Name: **Web Programming Laboratory**		
CO	**CO code**	*Upon completion of this course, the student will be able to…*
CO1	**U18OE311D.1**	create the static web pages using HTML Tags and CSS and JavaScripts
CO2	**U18OE311D.2**	design dynamic web page for web applications using JSP
CO3	**U18OE311D.3**	develop server side scripts for web base applications using PHP
CO4	**U18OE311D.4**	design web applications for effective storage and retrieval of data in MySQL using PHP.

Mapping of the course outcome with program outcomes

Course outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	P10	P11	P12	PSO1	PSO2
U18OE311D.1	2	2	2	1	2	1	-	1	2	1	2	1	-	1
U18OE311D.2	2	2	2	1	2	1	-	1	2	1	2	1	-	1
U18OE311D.3	2	2	2	1	2	1	-	1	2	1	2	1	-	1
U18OE311D.4	2	2	2	1	2	1	1	1	2	1	2	1	-	1
U18OE311D	2	2	2	1	2	1	1	1	2	1	2	1	-	1

U18OE311F STRENGTH OF MATERIALS LABORATORY

Class: B.Tech. III -Semester **Branch:** Common to all branches

Teaching Scheme :

L	T	P	C
-	-	2	1

Examination Scheme :

Continuous Internal Evaluation	40 marks
End Semester Examination	60 marks

Course Learning Objectives (LOs):

This course will develop students' knowledge in /on

LO1: *testing of civil engineering materials*
LO2: *mechanical properties of civil engineering materials*
LO3:*behavior of civil engineering materials when tested*
LO4:*codal specifications of various engineering materials*

LIST OF EXPERIMENTS

1. Determination of Stress–Strain characteristics of (a) Mild steel and (b) TOR steel.
2. Determination of the compressive strength of wood and punching shear strength.
3. Determination of the Brinell's hardness numbers for steel, brass and aluminum.
4. Determination of the modulus of rigidity by conducting torsion test on solid shaft or hollow shaft.
5. Determination of the modulus of rigidity by conducting compression test on spring.
6. Determination of the Young's modulus of the given material by conducting flexural test on simply supported beam.
7. Determination of the Young's modulus of the given material by conducting flexural test on continuous beam.
8. Determination of the Young's modulus of the given material by measuring conducting flexural test on propped cantilever beam.
9. Bend and rebend test on steel specimen.
10. Shear test for Mild steel specimen.
11. Impact test on Metal Specimens using Izod test.
12. Impact test on Metal Specimens using Charpy test.
13. Demonstration of measuring strains using strain gauges, LVDTs

Laboratory Manual:

1. *Strength of MaterialsLaboratory Manual*, prepared by faculty ofCivil Engineering, KITSW

Reference Books:

1. Harmer E. Davis and George Earl Troxell, "*Testing and Inspection of Engineering Materials*",McGraw-Hill book company, inc, 2nd edn.,1955.
2. A.V.K. Suryanarayana, "*Testing of Metallic Materials*", Prentice-Hall of India, 2nd edn., 2007.
3. IS 1786:2008 "*High strength deformed steel bars and wires for concrete reinforcement-specification.* Bureau of Indian standards, New Delhi, 2008.
4. IS 432(Part-I):1982 "*Specification for mild steel and medium tensile steel bars and Hard drawn steel wires for concrete reinforcement*". Bureau of Indian standards, New Delhi, 1992.
5. IS 432(Part-II):1982 "*Specification for mild steel and medium tensile steel bars and Hard drawn steel wires for concrete reinforcement*". Bureau of Indian standards, New Delhi, 2004.

Course Outcomes (COs):

Course Code: **U18OE311F**		Course Name: **Strength of Materials Laboratory**
CO	**CO code**	*Upon completion of this course, the student will be able to…*
CO1	**U18OE311F.1**	correlate theory with the testing of engineering materials for quality assessment.
CO2	**U18OE311F.2**	evaluate the mechanical properties of civil engineering materials.
CO3	**U18OE311F.3**	appraise the behavior of civil engineering materials when tested under loads.
CO4	**U18OE311F.4**	realize the specifications recommended by codes to civil engineering materials.

Course Articulation Matrix (Mapping of COs with POs and PSOs):

Course Code: **U18OE311F** Course Name: **Strength of Materials Laboratory**

CO Code	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O 1	PS O 2	PS O 3	PS O 4
U18OE311F.1	1	-	-	1	-	1	-	-	2	1	1	1	1	1	1	1
U18OE311F.2	1	-	-	1	-	1	-	-	2	-	-	1	1	1	1	-
U18OE311F.3	1	-	-	1	-	1	-	-	2	-	-	1	1	1	1	-
U18OE311F.4	1	-	-	1	-	1	-	2	1	1	1	1	1	1	1	1
U18OE311F	**1**	**-**	**-**	**1**	**-**	**1**	**-**	**2**	**1.75**	**1**	**1**	**1**	**1**	**1**	**1**	**1**

DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING
KAKATIYA INSTITUTE OF TECHNOLOGY & SCIENCE: WARANGAL-15
(An Autonomous Institute under Kakatiya University, Warangal)
SCHEME OF INSTRUCTION & EVALUATION
IV - SEMESTER OF 4-YEAR B.TECH ECI DEGREE PROGRAM

[5Th+3P+2M]

Sl.No	Category	Course Code	Course Title	Hour per week			Credits	Evaluation Scheme				
				L	T	P		CIE			ESE	Total Marks
								TA	MSE	Total		
1	OE	U18OE401	Open Elective-II	3	1	-	4	10	30	40	60	100
2	HSMC	U18MH402	Professional English	-	-	2	1	100	-	100	-	100
3	PCC	U18CI403	Electromagnetic Theory and Transmission Lines	3	1	-	4	10	30	40	60	100
4	PCC	U18CI404	Analog Electronic Circuits	3	-	-	3	10	30	40	60	100
5	PCC	U18CI405	Digital Signal Processing	3	-	-	3	10	30	40	60	100
6	PCC	U18CI406	Microprocessors Microcontrollers	3	-	-	3	10	30	40	60	100
7	MC	U18MH415	Essence of Indian Traditional Knowledge	2	-	-	-	10	30	40	60	100
8	PCC	U18CI407	Programming with Python Laboratory	-	-	2	1	40	-	40	60	100
9	PCC	U18CI408	Electronic Devices and Circuits Laboratory	-	-	2	1	40	-	40	60	100
10	PCC	U18CI409	Signal Processing and Applications Laboratory	-	-	2	1	40	-	40	60	100
			Total	17	2	8	21	280	180	460	540	1000
11	MC	U18CH416	Environmental Studies *	2	-	-	0	10	30	40	60	100

L= Lecture, T = Tutorials, P = Practicals & C = Credits

*** indicates Mandatory Non-Credit course for Lateral Entry Students Only**

Open Elective-II
U18OE401A: Applicable Mathematics (M&H)
U18OE401C: Elements of Mech. Engg. (ME)
U18OE401E: Computers Networks (IT)
U18OE401F: Renewable Energy Resources (EEE)

Contact hours per week : 27
Total Credits : 21

U18OE401A APPLICABLE MATHEMATICS

Class: B.Tech. IV-Semester **Branch:** Common to all branches

Teaching Scheme :

L	T	P	C
3	1	-	4

Examination Scheme :

Continuous Internal Evaluation	40 marks
End Semester Exam	60 marks

Course Learning Objectives (LOs):
This course will develop students' knowledge in / on

LO1: *application of Fourier series to solve wave equation, heat conduction equation and Laplace equation*

LO2: the methods of fitting curves by the method of least squares, statistical methods and probability distributions with applications to engineering disciplines.

LO3: finite difference operators; the concept of interpolation and numerical integration.

LO4: *numerical methods and application to find numerical solutions of differential equations.*

UNIT-I (9+3)

Applications of Partial Differential Equations: Basic concepts of partial differential equations, classification of second order partial differential equations, solution of a partial differential equation, solution through the method of separation of variables.

Vibrating String: Wave equation and its solution by the method of separation of variables, D'Alembert's solution of wave equation, solutions of various boundary value problems based on vibrating string.

One Dimensional Heat Flow: Transient heat flow equation, heat flow through a bar of finite length with homogeneous and non homogeneous boundary conditions, heat flow through a bar with insulated ends.

Two Dimensional Heat Flow: Equation of two dimensional heat flow (Laplace's equation) under steady state / the electrostatic potential of electrical charges in any region that is free of these charges (problems based on Trigonometric FS only),solution of Laplace's equation in Cartesian and polar form, heat flow through infinite rectangular plates, finite square plate and semi circular and circular plates.

UNIT-II (9+3)

Statistics: Statistical data: Review of measures of central tendency and measures of dispersion, correlation coefficient, rank correlation, regression – Linear regression equations.

Curve Fitting: Method of least squares –fitting of (i) Straight line (ii) Second degree parabola (iii) Exponential curves, most plausible solution of a system of linear algebraic equations.

Probability: Review of the concepts of probability, random variables, Discrete and continuous probability distributions, mean and variance of a distribution, Binomial distribution, Poisson distribution, and Normal distribution, fitting of these probability distributions to the given data.

UNIT-III (9+3)

Numerical Analysis: Finite differences and difference operators.

Interpolation: Newton's forward and backward interpolation formulae. Lagrange interpolation

Numerical Differentiation: First and second derivatives using forward and backward interpolation polynomials at the tabulated points.

Numerical Integration: Gaussian quadrature formula, Trapezoidal rule, Simpson's 1/3rd rule and Simpson's 3/8th rule.

UNIT-IV (9+3)

Solution to System of Linear Equations: Gaussian elimination method, Jacobi Method and Guass-Siedel Iteration Method.

Numerical Solution of Algebraic and Transcendental Equations: Bisection method, Regula-Falsi method and Newton Raphson's method.

Numerical Solution of Ordinary Differential Equations: Taylor's method, Picard's method, Euler's method and Runge - Kutta methods of second and fourth order**.**

Text Books:

2. Grewal, B.S., "Higher Engineering Mathematics", *Khanna Publishers,* Delhi, 43/e, 2014.

Reference Books:

3. Gupta and Kapoor, "Fundamentals of Mathematical Statistics", *Sulthan Chand and & sons,* New Delhi, 11th edition, 2010.
4. Kreyszig E.," Advanced Engineering Mathematics", John wiely *& sons, Inc.,U.K.,*9th edition,2013.
5. Sastry S.S, "Introduction to numerical Analysis", *Prentice Hall of India Private Limited*,New Delhi.4th edition,2005.

Course Outcomes (COs):

Course Code: **U18OE401A** Course Name: **APPLICABLE MATHEMATICS**		
CO	**CO code**	*Upon completion of this course, the student will be able to…*
CO1	**U18OE401A.1**	*solve wave equation, heat conduction equation and Laplace equation using Fourier series*
CO2	**U18OE401A.2**	*find correlation regression coefficients, fit curves using method of least squares for given data and apply theoretical probability distributions in*
CO3	**U18OE401A.3**	*estimate value of a function by applying interpolation formulae*
CO4	**U18OE401A.4**	*apply numerical methods to solve simultaneous algebraic equations, differential equations, find roots of algebraic and transcendental equations*

Course Articulation Matrix (Mapping of COs with POs and PSOs):

Course code: **U18OE401A** Course Name: **APPLICABLE MATHEMATICS**

CO Code	PO	PO	PO 3	PO 4	PO	PO	PO	PO	PO	PO 10	PO 11	PO 12	PSO 1	PSO 2
U18OE401A.1	2	2	--	--	--	--	--	--	--	--	--	1	1	--
U18OE401A.2	2	2	--	--	--	--	--	--	--	--	--	1	1	--
U18OE401A.3	2	2	--	--	--	--	--	--	--	--	--	1	1	--
U18OE401A.4	2	2	--	--	--	--	--	--	--	--	--	1	1	--
U18OE401	**2**	**2**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	1	**1**	**--**

U18OE401C ELEMENTS OF MECHANICAL ENGINEERING

Class: B.Tech., IV-Semester **Branch:** Common to all branches

Teaching Scheme :

L	T	P	C
3	1	-	4

Examination Scheme :

Continuous Internal Evaluation :	40 marks
End Semester Exam :	60 marks

Course Learning Objectives (LOs):
This course will develop students' knowledge in/on
LO1*: types of materials, design methodology and elements of power transmission*
LO2: *different manufacturing processes and their applications.*
LO3: *laws of thermodynamics and types of systems*
LO4: *principle and applications of SI &CI engines.*

UNIT- I (12)

Engineering Materials: Classification, properties and applications
Design Criterion: Discrete steps in engineering design process
Power Transmission: Classification;flat belt drives - length of open and cross belts, belt tensions and power transmitted; Gears-types and applications; spur gear-nomenclature
Bearings: Types – sliding& rolling contact bearings and applications;

UNIT- II (12)

Manufacturing Processes: Classification; Foundry- steps in sand casting process; pattern-types, materials and allowances, mould cross section,moulding sand-composition and properties; Machining: lathe machine-line diagram and operations;Welding-classification; principle of arc welding- AC and DC welding, principle of gas welding, principle of brazing and soldering;
Metal forming process: forging, rolling, extrusion.

UNIT- III (12)

Thermodynamics: System-types, state, property, process and cycle; Energy-property; Zeroth law,thermodynamic equilibrium,laws of perfect gases.
Law of Thermodynamics: First law- applied to a cycle, change of state, Internal energy, Enthalpy;Work and Heat in closed systems- Isobaric, Isochoric, Isothermal, Adiabatic and Polytropic; PMM-I,limitations of first law of thermodynamics.

UNIT- IV (12)

Second Law of Thermodynamics: Kelvin-Planck and Clausius Statements and their equivalence; Carnot cycle, Carnot theorem, heat engine, heat pump and refrigerator; working principle of domestic air conditioner-line diagram.
IC Engines: Classification; working principle of four and two stroke SI and CI engines.

Text Book:

1. Mathur, Mehta and Tiwari, "Elements of Mechanical Engineering", *Jain Brothers*, New Delhi,2017.

Reference Books:

1. Hazra Chowdary. S. K and Bose, "Basic Mechanical Engineering", *Media Promoters and Publishers Pvt. Ltd,* India, 2010.
2. P. K. Nag, "Engineering Thermodynamics", *Tata McGraw Hill*, New Delhi.
3. Hazra Chowdary. S. K and Bose, "Workshop Technology, Vol. I & II", *Media Promoters and publishers Pvt Ltd,* India.

Course Outcomes (COs):

Course Code:**U18OE401C** Course Name: **Elements of Mechanical Engineering**		
CO	**CO code**	Upon completion of this course, the student will be able to…
CO1	**U18OE401C.1**	*explain mechanical properties of an engineering materials and learn the steps in design methodology.*
CO2	**U18OE401C.2**	*describe the principles of manufacturing processes*
CO3	**U18OE401C.3**	*apply first law of thermodynamics to various processes to calculate work and heat for a closed system.*
CO4	**U18OE401C.4**	*define second law of thermodynamics and demonstrate the working principle of IC engines.*

Course Articulation Matrix (Mapping of COs with POs and PSOs):

Course code:**U18OE401C**Course Name: **Elements of Mechanical Engineering**													
CO Code	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO 12**	**PSO 1**	**PSO 2**
U18OE401C.1	2	2	-	-	-	-	-	-	-	-	-	-	1	1
U18OE401C.2	2	-	-	-	-	-	-	-	-	-	-	-	1	-
U18OE401C.3	2	2	-	-	-	-	-	-	-	-	-	-	1	1
U18OE401C.4	2	2	-	-	-	-	-	-	-	-	-	-	1	1
U18OE401C	**2**	**2**	**-**	**-**	**-**	**-**		**-**	**-**	**-**	**-**	**-**	**1**	**1**

U18OE401E FUNDAMENTALS OF COMPUTER NETWORKS

Class: B.Tech. IV- Semester **Branch:** Common to all branches

Teaching Scheme :

L	T	P	C
3	-	-	3

Examination Scheme :

Continuous Internal Evaluation	40 marks
End Semester Exam	60 marks

Course Learning Objectives (LO) :

This course will develop students' knowledge in/on

LO1: network topologies, network reference models, network architecture and data transmission

LO2: design issues and protocols of data link layer, error detection and correction, MAC protocols and ethernet standards

LO3: principles and design issues of network layer and internet protocols

LO4: transport layer design issues, protocols and application layer services

UNIT - I (9)

Introduction: History of Computer Networks and The Internet, Principles of Computer Network Design, Network Architecture, Network Types.

Physical Layer: Factors Affecting Data Transmission, Data Transmission, Data Transmission Codes: Non-return to Zero, Manchester Encoding, Digital modulation & Modems, Transmission Media.

UNIT- II (9)

Data Link Layer: Functions of Data Link Layer, Framing Techniques, Error Detection and Correction, Elementary Data Link Layer Protocols for Flow Control.

Local Area Networks: Medium Access Protocols, LAN Protocol Stack, Ethernet Protocols, IEEE 802.11 LAN Standard: IEEE 802.11 Protocol Stack, Wireless LAN Topologies, Frames in IEEE 802.11.

UNIT - III (9)

The Network Layer: Network Layer Services, Packet Switching Networks, The Internet Protocol(IP): IP Header in IPv4, IP Addressing in IPv4, Subnet addressing and Classless Inter-Domain Routing (CIDR), Address Resolution Protocol, Dynamic Host Configuration Protocol, Internet Layer Protocols, Fragmentation and Reassembly, IP Version 6: Motivation for IPv6 Development, Features of IPv6, IPv6 Address Representation.

Routing Protocols: Elements of Routing Protocol Performance, Flooding, Distance-Vector and Link State Routing Protocols, Hierarchical Routing.

UNIT - IV (9)

The Transport Layer: User Datagram Protocol, Transmission Control Protocol, TCP State Transition Diagram, Other TCP Timers, TCP Congestion Control.

The Application Layer: World Wide Web, Domain Name System, Electronic Mail.

Network Security: Threats and Vulnerabilities in Computer Networks, Cryptographic Algorithms, Data Encryption Standard.

Text Books:

1. Mayank Dave, "Computer Networks", Second Edition, Cengage Learning, ISBN-13:978-81-315-0986-9, 2014.

Reference Books:

1. Forouzan, "Data Communication and Networking", Fifth Edition, *TMH*, *ISBN*978-0-07-296775-3, 2012.
2. William Stallings, "Data and Computer Communications", Ninth Edition, *Prentice-Hall India*, ISBN-81-203-1240-6, 2011.
3. Andrew S.Tanenbaum , David J. Wetherall, "Computer Networks", Fifth Edition, *Pearson Education*, ISBN-13: 978-0-13-212695-3, 2011.

Course Outcomes (COs):

Course Code: **U18OE401E** Course Name: **Fundamentals of Computer Networks**		
CO	**CO code**	Upon completion of this course, the student will be able to…
CO1	**U18OE401E.1**	*describe various network topologies, architecture and techniques for data transmission modes*
CO2	**U18OE401E.2**	*outline various design issues in data link layer and develop protocols to handle data link layer operation*
CO3	**U18OE401E.3**	*describe various design issues and develop protocols for network Layer.*
CO4	**U18OE401E.4**	*explain various design issues , protocols of transport layer & application layer services*

Course Articulation Matrix (Mapping of COs with POs and PSOs):

Course code: **U18OE401E** Course Name: **Fundamentals of Computer Networks**														
CO Code	**PO 1**	**PO2**	**PO 3**	**PO 4**	**PO 5**	**PO6**	**PO7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO1**	**PSO2**
U18OE401E.1	2	1	-	1	-	1	-	-	-	-	-	1	-	1
U18OE401E.2	3	3	2	1	1	1	-	-	-	-	-	1	-	1
U18OE401E.3	3	3	2	2	1	1	-	-	-	-	-	1	-	1
U18OE401E.4	3	3	2	2	1	1	-	-	-	-	-	1	-	1
U18OE401E	**2.75**	**2.5**	**2**	**1.5**	**1**	**1**	**-**	**-**	**-**	**-**	**-**	**1**	**-**	**1**

U18OE401F RENEWABLE ENERGY SOURCES

Class: B.Tech, IV Semester **Branch:** Common to all branches

Teaching Scheme:

L	T	P	C
3	-	-	3

Examination Scheme:

Continuous Internal Evaluation	40 marks
End Semester Examination	60 marks

Course Learning Objectives (LOs) :

This course will develop student's knowledge in/on

LO1 *different renewable energy sources and principle of solar energy systems*

LO2 *wind energy, geothermal energy and MHD power generation systems*

LO3 *harnessing energy from oceans and biomass*

LO4 *working of fuel cells and different energy storage systems*

UNIT-I (9)

Introduction: Conventional and non-conventional sources of energy – Brief Description of different Renewable energy sources

Solar Energy: Introduction to prospects of solar photovoltaic (SPV) systems, principle of a PV cell, large scale SPV systems, economic considerations of SPV systems, PV cell technology, merits and limits of SPV systems, applications of SPV systems-street lighting, domestic lighting, Battery charging, SPV pumping systems

UNIT-II (9)

Wind Energy: Principles of wind power- Operation of a wind turbine- Site Characteristics.

Geothermal Energy: Origin and types of geothermal energy- Operational Difficulties- Vapor dominated systems- Liquid dominated systems- Petro- thermal systems.

Magneto-Hydro Dynamic (Mhd) Power Generation: MHD system- Open and Closed systems- Advantages of MHD systems.

UNIT-III (9)

Energy from Oceans: Ocean temperature differences, ocean waves-Wave motions and tides-Energy from the waves; Introduction of tidal power, basic principle of tidal power, components of tidal power plants, advantages and disadvantages

Bio-Energy: Introduction-bio-mass conversion, technologies-wet process, dry process, photo synthesis; Biogas generation- biogas from power plant wastes, methods of maintaining biogas production, utilization of biogas, biogas gasification, applications of gasifiers

UNIT-IV (9)

Chemical Energy Sources: Introduction of fuel cells, Principle of Operation of fuel cell, Classification of Fuel cells, Advantages and disadvantages of fuel cells.

Types of Energy Storage Systems: Introduction, Different types of Batteries, Ultra Capacitors, Flywheels, Super Conducting Magnetic storage

TEXT BOOKS:

1. Rai G.D "*Non-Conventional Energy Sources*", Khanna Publishers, New Delhi
2. Felix A. Farret, M. Godoy Simoes, —Integration of Alternative Sources of Energy, John Wiley & Sons, 2006
3. Bansal N.K, Kaleeman and M.Miller, "Renewable *Energy Sources and Conversion Technology*", TATA Mc Graw-Hill, New Delhi

REFERENCE BOOKS:

1. EL-Wakil M.M, "Power Plant Technology", Mc Graw-Hill, New York
2. Duffie and Beckman, "Solar Energy Thermal Process", John Wiley & Sons, New York

Course code: **U18OE401F**		Course Name: **Renewable Energy Sources**
CO	**CO code**	Upon completion of this course, the student will be able to…
CO1	**U18OE401F.1**	*compare conventional and non-conventional energy resources; explain the working principle of solar energy harnessing and its applications*
CO2	**U18OE401F.2**	*explain the working principles of wind energy, geothermal energy and MHD power generation systems*
CO3	**U18OE401F.3**	*describe the harnessing of electric power from oceans and biomass*
CO4	**U18OE401F.4**	*explain the principle of operation of fuel cells and different types of energy storage systems*

Course Articulation Matrix (Mapping of COs with POs and PSOs):

Course code: **U18OE401F**														
CO Code	**PO 1**	**PO 2**	**PO**	**PO**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO**	**PO**	**PO**	**PO**	**PSO1**	**PSO2**
U18OE401F.1	3	-	-	-	-	-	1	-	-	-	-	-	1	1
U18OE401F.2	3	-	-	-	-	-	1	-	-	-	-	-	1	1
U18OE401F.3	3	-	-	-	-	-	1	-	-	-	-	-	1	1
U18OE401F.4	3	-	-	-	-	-	1	-	-	-	-	-	1	1
U18OE401F	**3**	**-**	**-**	**-**	**-**	**-**	**1**	**-**	**-**	**-**	**-**	**-**	**1**	**1**

U18MH402 PROFESSIONAL ENGLISH

Class: B.Tech IV Semester **Branch:** Common to all branches

Teaching Scheme :

L	T	P	C
-	-	2	1

Examination Scheme :

Continuous Internal Evaluation :	100 marks
End Semester Exam :	-

Course Learning Objectives (LOs):

This course will develop the student's knowledge in/on

LO1: reading skill and sub skills to comprehend the text
LO2: vocabulary and using it appropriately to describe situations
LO3: using phrasal verbs in speech and writing
LO4: grammar and improve language ability to write effectively

Week	Topic Name
I	**I. Reading Comprehension-** Significance of Reading Skimming **II. Verbal Ability-** Synonyms **III. Grammar-** Articles
II	**I. Reading Comprehension-** Scanning **II. Verbal Ability-** Antonyms **III. Grammar-** Articles
III	**I. Reading Comprehension-** Critical Reading **II. Verbal Ability-** Sentence completion with correct alternative word/group **III. Grammar-** Prepositions
IV	**I. Reading Comprehension-** Intensive Reading **II. Verbal Ability-** Sentence completion with correct alternative word/group **III. Grammar-** Reported Speech
V	**I. Reading Comprehension-** Intensive Reading **II. Verbal Ability-** Jumbled Sentences **III. Grammar-** Error Detection
VI	**I. Reading Comprehension-** Inferential Reading **II. Verbal Ability-** Jumbled Sentences **III. Grammar-** Error Detection
VII	**I. Reading Comprehension-** Lexical Reading **II. Verbal Ability-** Phrasal Verbs **III. Grammar-** Tenses, Structures
VIII	**I. Reading Comprehension-** Read to Interpret **II. Verbal Ability-** Single Word Substitutes **III. Grammar-** Tenses, Uses
IX	**I. Reading Comprehension-** Read to Analyze **II. Verbal Ability-** Collocations **III. Grammar-** Tenses, Uses
X	**I. Reading Comprehension-** Read to Summarize

	II. Verbal Ability- Spellings **III. Grammar,** Agreement between Subject & verb (concord)

Text Books:

1. Professional English *Manual prepared by the faculty of English, KITSW*
2. Arun Sharma & Meenakshi Upadhyay, "Verbal Ability and Reading Comprehension for CAT & Other Management Examinations", 8th Edition *McGraw Hill Education (India) Private Ltd*, Chennai, 2018

Reference Books:

1. Nishit K. Sinha, " Verbal Ability and Reading Comprehension for the CAT", 3rd Edition Pearson India Education Services Pvt. Ltd., Chennai
2. Harper Collins, "Collins COBUILD English Grammar" Third Edition, *Harper Collins Publishers Ltd.*
3. Rosemary & Courtney, "Longman-English-Chinese Dictionary of Phrasal Verbs"

Course Outcomes (COs):

Course Code: U18MH402 Course Name: Professional English		
CO	**CO Code**	*Up on completion of this course, the students will be able to…*
CO1	**U18MH402.1**	analyze the passage using skill and sub skill to solve different types of questions related to reading comprehension
CO2	**U18MH402.2**	identify grammatical errors in the given sentences and correct them
CO3	**U18MH402.3**	select correct synonyms/antonyms/phrasal verbs and complete sentences with suitable words or phrases
CO4	**U18MH402.4**	keep the given jumbled sentences in proper sequence to make a coherent paragraph

Course Articulation Matrix (Mapping of COs with POs and PSOs):

Course Code: U18MH402						**Course Name: PROFESSIONAL ENGLISH**								
Course Outcomes	**PO 1**	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO1**	**PSO2**
U18MH402.1	-	-	-	-	-	-	-	-	1	2	-	1	-	1
U18MH402.2	-	-	-	-	-	-	-	-	1	2	-	1	-	1
U18MH402.3	-	-	-	-	-	-	-	-	1	2	-	1	-	1
U18MH402.4	-	-	-	-	-	-	-	-	1	2	-	1	-	1
U18MH402	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**1**	**2**	**-**	**1**	**-**	**1**

U18CI403 ELECTROMAGNETIC THEORY AND TRANSMISSION LINES

Class: B.Tech. IV-Semester **Branch:** Electronics Communication and Instrumentation (ECI)

Teaching Scheme :

L	T	P	C
3	-	-	3

Examination Scheme :

Continuous Internal Evaluation	40 marks
End Semester Exam	60 marks

Course Learning Objectives (LOs):

This course will develop students' knowledge on /in...

LO1: *electric field due to charge distribution, energy stored in electrostatic field*

LO2: *magnetic field due to current distribution, wave propagation in different medium*

LO3: *Poynting theorem and field components in parallel plate & rectangular waveguides*

LO4: *transmission line equations, distortion-less transmission line, Smith chart and Stub-matching*

UNIT-I (9)

Review of Vector calculus, Co-ordinate systems - Cartesian, Cylindrical and Spherical, Statements of Stoke's theorem and Divergence theorem

Electrostatics: Coulomb's law, Electric field intensity, Electric field due to Point charge, Line charge and Sheet charge, Electric flux density, Gauss's law and its applications, Relation between E & V, Poisson's and Laplace's Equations, Capacitance – Parallel plate, Coaxial and Spherical Capacitances, Energy stored in Electrostatic field, Boundary conditions

UNIT-II (9)

Magnetostatics: Biot–Savart's law, Magnetic field intensity, Magnetic flux density, Ampere's circuit law, Magnetic potential, Energy stored in magnetic field, Magnetic boundary conditions

Time-varying fields: Faraday's law of Electromagnetic Induction, Continuity of current equation, Inconsistency of Ampere's circuit law, Maxwell's Equations in differential & integral forms

Electromagnetic waves: Wave propagation in lossy dielectric, loss-less dielectric, free space and good conductor, Skin effect, Polarization, Reflection of EM waves

UNIT-III (9)

Poynting vector, Poynting theorem, Instantaneous, Average & Complex Poynting vectors and Power loss in a plane conductor

Waveguides: Parallel plate Waveguide – Field components in TE, TM & TEM mode propagation, Characteristics of parallel plate waveguide, Rectangular waveguides – Field components in TE & TM mode propagation, Impossibility of TEM mode in rectangular waveguides, Characteristics of Rectangular waveguide, Introduction to circular wave guides

UNIT-IV (9)

Transmission Lines: Primary & Secondary constants, Transmission Line Equations, Infinite length transmission line, Phase velocity & Group velocity, Loss-less transmission line, Condition for distortion-less transmission line, Input impedance of a transmission line,

Short-circuit & Open-circuit transmission lines, Quarter wave transformer, Smith chart – Construction, Properties and Applications, Single-stub matching

Text Books:

[1] Mathew N.O. Sadiku, *Principles of Electromagnetics*, 4th ed. New Delhi: Oxford University Press, , 2014. *(Chapters - 1,2,3,4,6,7,9,10,11,12,13)*
[2] Umesh Sinha, *Transmission Lines and Networks*, 2nd ed. New Delhi: Satya Prakashan Publication, 1999. *(Chapters - 1,2,3,4,5,6,7)*

Reference Books:

[1] Nathan Ida, *Engineering Electromagnetics*, 3rd ed. Akron, USA: Springer, 2015.
[2] Edward C. Jordan, Keith G. Balmain, *Electromagnetic Waves and Radiating Systems*, 2nd ed. New Delhi: Prentice Hall, 2001.
[3] W H Hayt, J A Buck, *Engineering Electromagnetics*, 6th ed. New Delhi: The McGraw-Hill Companies, 2001.

Course Learning O/utcomes (COs):
After completion of this course, the students will be able to
CO1 : determine the electric field at any given point due to charge distribution and measure the energy stored in a given electrostatic field
CO2 : apply Biot-Savart's law for determining magnetic field intensity and examine the wave propagation in different medium
CO3: prove Poynting theorem and determine the field components in parallel plate and rectangular waveguides
CO4: evaluate voltage & current of a transmission line and utilize Smith chart for impedance calculation

Course Articulation Matrix (CAM): ELECTROMAGNETIC THEORY AND TRANSMISSION LINES

CO		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	U18CI403.1	**2**	**2**	**-**	**-**	**-**	**1**	**-**	**-**	**-**	**-**	**-**	**1**	**2**	-
CO2	U18CI403.2	**2**	**2**	**-**	**-**	**-**	**1**	**-**	**-**	**-**	**-**	**-**	**1**	**2**	-
CO3	U18CI403.3	**2**	**2**	**-**	**-**	**-**	**1**	**-**	**-**	**-**	**-**	**-**	**1**	**2**	-
CO4	U18CI403.4	**2**	**2**	**-**	**-**	**-**	**1**	**-**	**-**	**-**	**-**	**-**	**1**	**2**	-
U18CI403		**2**	**2**	**-**	**-**	**-**	1	-	-	-	-	-	**1**	2	**-**

U18CI404 ANALOG ELECTRONIC CIRCUITS

Class: B.Tech. IV-Semester **Branch:** Electronics Communication and Instrumentation (ECI)

Teaching Scheme:

L	T	P	C
3	-	-	3

Examination Scheme:

Continuous Internal Evaluation	40 marks
End Semester Examination	60 marks

Course Learning Objectives (LOs):
This course will develop students' knowledge in/on
LO1: analysis of BJT amplifiers at low & high frequencies
LO2: analysis of multistage BJT amplifiers & FET amplifier
LO3: negative feedback amplifiers & oscillator circuits
LO4: large signal & tuned amplifiers

UNIT-I (9)

Small Signal Low Frequency Transistor Amplifier Circuits: Review of BJT biasing and operating point, BJT small signal low frequency h-parameter model, Analysis of Single Stage transistor amplifier circuits using h-parameter CE, CB and CC configurations, Simplified analysis of these configurations

High Frequency Transistor Amplifier Circuits: The Hybrid- n (pi) Common Emitter Transistor model, Hybrid-n Conductance, CE short Circuit Current gain, High frequency model of a transistor a and þ cut-off frequencies, Frequency response analysis of single stage amplifier at mid band gain, Gains at low and high frequency, Calculation of Gain-bandwidth product.

UNIT-II (9)

Multistage Amplifiers: Classification of Multistage Amplifiers based on Coupling, RC coupled Amplifier, Direct and Transformer Coupled Amplifiers, cut-off frequencies for n^{th}Stage, Effect of cascading on gain and bandwidth, Darlington Pair, Cascode amplifier, Differential amplifiers, Bootstrap amplifier

FET Amplifiers: Review - Biasing of FET, FET low frequency models, Low frequency response of amplifier circuits, Analysis of single stage amplifier

UNIT-III (9)

Feedback Amplifiers: Concept of Feedback, Classification of Feedback amplifiers, General characteristics of negative feedback amplifiers, Effect of negative feedback on amplifier characteristics, Analysis of Voltage Series, Voltage Shunt, Current Series and Current Shunt Feedback amplifiers

Oscillators: Conditions for oscillations, RC and LC oscillators, Generalized analysis of LC oscillators, Crystal Oscillator, Frequency and Amplitude stability of oscillations.

UNIT-IV (9)

Large Signal Amplifiers: Classification, Series fed and Transformer coupled Class A, Class-B power amplifier, Push-Pull amplifiers and Complementary Symmetry, Class-AB power amplifiers, Cross over and Harmonic distortion, Heat sinks.

Tuned Amplifiers: Introduction, Q-factor, Class C tuned amplifiers, Single tuned, Double tuned and Stagger tuned Voltage amplifier, Effect of Cascading Double tuned amplifiers on Bandwidth, Stability of Tuned amplifiers.

Text Books:

[1] Jacob Millman and C.C.Halkias, *Integrated Electronics*, 2nd ed. New Delhi: Tata McGraw-Hill, 1991.

[2] Donald A Neamen, *Electronic Circuits Analysis and Design*, 3rd ed. New Delhi: Tata McGraw-Hill, 2009.

Reference Books:

[1] Robert L. Boylestad, Louis Nashelsky, *Electronic Devices and Circuit Theory*, 9th ed. Pearson education,
2008.

[2] Sedra, Kenneth, Smith, *Microelectric circuits*, 5th ed. New Delhi: Oxford University Press, 2011.

[3] Mohammad H. Rashid, *Electronic Circuit and Applications*, CENGAGE Learning.

Course Learning Outcomes (COs):

On completion of this course, students will be able to…

CO1: examine single stage BJT amplifiers at low & high frequencies using h-parameter, hybrid- π models respectively

CO2: analyze the frequency response of multistage BJT amplifiers & FET amplifiers

CO3: analyze the negative feedback amplifiers & oscillator circuits

CO4: determine the efficiency of large signal amplifiers, Q-factor & bandwidth of tuned amplifiers

Course Articulation Matrix (CAM): U18CI404 ANALOG ELECTRONIC CIRCUITS

CO		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	U18CI404.1	2	2	2	1	-	-	-	-	-	-	-	1	2	1
CO2	U18CI404.2	2	2	2	1	-	-	-	-	-	-	-	1	2	1
CO3	U18CI404.3	2	2	2	1	-	-	-	-	-	-	-	1	2	1
CO4	U18CI404.4	2	2	2	1	-	-	-	-	-	-	-	1	2	1
U18CI404		2	2	2	1	-	-	-	-	-	-	-	1	2	1

U18CI405 DIGITAL SIGNAL PROCESSING

Class: B.Tech. IV-Semester **Branch:** Electronics Communication and Instrumentation (ECI)

Teaching Scheme :

L	T	P	C
3	-	-	3

Examination Scheme :

Continuous Internal Evaluation	40 marks
End Semester Exam	60 marks

Course Learning Objectives (LOs):

This course will develop students' knowledge on/in…

LO1: DFT, computational complexity and efficient implementation of DFT using FFT
LO2: characteristics of frequency selective filters and design of linear-phase FIR filters
LO3: design of analog Butterworth & Chebyshev filters, conversion of analog filter into equivalent digital filters using different mapping techniques
LO4: correlation, basic theory of adaptive signal processing and its applications

UNIT-I (9)

Discrete Fourier Transform (DFT): Frequency domain sampling and reconstruction of discrete-time signals, DFT, properties of DFT, Circular convolution, Inverse DFT (IDFT), Frequency analysis of signals using DFT, Relation between DFT, DTFT and Z-Transform, Discrete cosine transform (DCT)

Fast Fourier Transform (FFT): Computational complexity of DFT, Introduction to FFT, Radix-2 FFT algorithms, Decimation-in-time FFT algorithm, Decimation-in-frequency FFT algorithm, Inverse DFT using FFT

UNIT-II (9)

Filter concepts: Causality and its implications, Paley-Wiener theorem, Magnitude characteristics of physically realizable filters, Phase delay, Group delay, Zero phase filter, Linear phase filters, Desirability of linear phase, Filter specifications

Finite Impulse Response (FIR) filters*:* Introduction to FIR filters, Inherent stability, Symmetric and anti-symmetric filters , Design of linear phase FIR filters - Windowing method (rectangular window, triangular window, hamming window & Hanning window) and frequency sampling method; Design of FIR differentiators, Design of Hilbert transformers

UNIT-III (9)

Infinite Impulse Response (IIR) Filters: Reliability of ideal filter, Introduction to IIR filters, Design of IIR digital filters from analog filter specifications, Mapping techniques - Impulse invariance and bilinear transformation; IIR digital filter design using Butterworth and Chebyshev approximations, Frequency transformations, Comparison of Butterworth and Chebyshev filters, Comparison of IIR and FIR filters

UNIT-IV (9)

Correlation: Correlation of discrete time signals, Auto correlation, Properties of auto correlation function, Cross correlation, Matrix form representation, Example problems for computation of correlation functions

Adaptive Filters: Concepts of adaptive filtering, configurations, Basic wiener filter theory, Cost function, Error performance surface, Basic LMS algorithm & its implementation, Practical limitations of basic LMS algorithm, RLS algorithm, Limitations of RLS algorithm

Applications of Adaptive filters: Fetal monitoring - Cancelling of maternal ECG during labor; Adaptive telephone echo cancellation.

Text Book:

[1] John G.Proakis & D.G.Manolakis, *Digital Signal Processing: Principles, Algorithms and Applications*, 4th ed. New Delhi: Pearson education, 2007. *(Chapters 2, 7, 8, 10)*

[2] Ifeachor, *Digital Signal Processing-A practical Approach*, 4th ed. New Delhi: Pearson Education , 2013. *(Chapter 10)*

Reference Books:

[1] A. V. Oppenheim & R. W. Schafer, *Discrete-Time Signal Processing*, 2nd ed .New Delhi:PHI, 1999.

[2] Sanjit K. Mitra, *Digital Signal Processing – A Computer Based Approach*, 2nd ed.New Delhi: TMH., 2002.

[3] Johnny R. Johnson, *Introduction to Digital Signal Processing*, 1st ed. New Delhi: PHI, 2001.

[4] Adreas Antanio, *Digital filter Analysis and Design*, 4th ed. New Delhi: *TMH,* 1988.

Course Learning Outcomes (COs):

On completion of this course, students will be able to

CO1: solve problems on DFT of a DT sequence, circular convolution using DFT & IDFT, 2, 4 & 8-point FFT using radix-2 DIT & DIF algorithms

CO2: design a linear-phase FIR filter with a prescribed magnitude response using windowing & frequency-sampling methods.

CO3: design an IIR Butterworth/Chebyshev digital filters for the given specifications by performing impulse invariance /bilinear transformation

CO4: analyze the performance of LMS & RLS algorithms for updating weight vectors and utilize adaptive filters for noise cancellation applications

Course Articulation Matrix (CAM): U18CI405 DIGITAL SIGNAL PROCESSING

CO		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO 11	PO 12	PSO 1	PSO 2
CO1	U18CI405.1	2	2	1	1	-	-	-	-	-	-	-	1	2	2
CO2	U18CI405.2	2	2	2	1	-	-	-	-	-	-	-	1	2	2
CO3	U18CI405.3	2	2	2	1	-	-	-	-	-	-	-	1	2	2
CO4	U18CI405.4	2	2	2	1	-	-	-	-	-	-	-	1	2	2
U18CI405		2	2	1.75	1	-	-		-	-	-		1	2	2

U18CI406 MICROPROCESSORS MICROCONTROLLERS

Class: B.Tech. IV – Sem **Branch:** Electronics Communication and Instrumentation (ECI)

Teaching Scheme:

L	T	P	C
3	–	–	3

Examination Scheme:

Continuous Internal Evaluation	40 marks
End Semester Examination	60 marks

Course Learning Objectives (LOs):

This course will develop students' knowledge on /in…

LO1: features of 8086 microprocessor (MP), architecture, addressing modes & instruction set

LO2: assembly language programming (ALP) concepts, delay subroutine, string manipulation, macros, procedures, 8086MP pin configuration & timing diagrams

LO3: programmable peripheral devices viz. 8255 (PPI), 8259 (PIC), 8257 (DMA), 8254 (PIT) for interfacing I/O and memory

LO4: architectural feature of 8051 microcontroller (MC), addressing modes, instruction set, programming concepts and interfacing LEDs, switches, stepper motor with 8051

UNIT–I (9)

Introduction to Microprocessors: Evolution of microprocessors;

8086 Microprocessor: Features, Organization of CPU, Architecture, General purpose registers, Segment registers, Concept of memory segmentation, Physical & Logical addressing, Addressing modes, Instruction formats, Instruction set

UNIT – II (9)

8086 Assembly Language Programming: Assembler directives, Simple programming of 8086, Structures, Time delays, Delay subroutines, Strings, Procedures, Macros, Pin configuration, Minimum/Maximum modes, Timing diagrams

UNIT – III (9)

Interfacing with 8086: 8255 Programmable Peripheral Interface (PPI) and its operational modes, Interfacing of 8086 MP with Analog to Digital Converters(ADC), Digital to Analog Converters(DAC), Switches, Seven Segment LEDs, Matrix keyboard, Stepper motor; Interfacing through devices like 8257 Direct Memory Access (DMA), 8254 Programmable Interval Timer (PIT) & 8259 Priority interrupt controller (PIC)

UNIT – IV (9)

8051 Microcontroller: Architecture, Instruction set, Addressing modes, Assembly language programming, Timers, Input-Output Ports, Interrupts, Serial ports, Interfacing 8051MC with LEDs, Switches, Stepper motor & Real Time Clock (RTC)

Text Books:

[1] D.V.Hall, *Microprocessors & Interfacing,* 3rd ed. New Delhi: Tata McGraw Hill, 2012 (*Chapter 3, 4, 5, 6, 7, 8, 9, 10, 11).*

[2] Muhammed Ali Mazidi, *The 8051 Microcontrollers and Embedded systems using Assembly and C*, 2nd ed. New Delhi: Pearson, 2006.

Reference Books:

[1] Kenneth J Ayala, *8086 Microprocessor: Programming & Interfacing with PC,* Noida Uttar Pradesh:

Delmar/ Cengage Learning India, 2007.
[2] A. K. Ray and K M Burchandi, *Advanced microprocessors and Peripherals,* 3rd ed. New Delhi: Tata McGraw Hill, 2013.
[3] Kennet Ayala, *The 8051 Microcontroller: Architecture, Programming and Applications*, 2nd ed. Mumbai: Penram Publications, 1996.
[4] Krishnakaant *Microprocessors and Microcontrollers,* 2nd ed. New Delhi: PHI learning, 2014.

Course Learning Outcomes (COs):

On completion of this course, students will be able to…

CO1: discuss the architectural features, addressing modes & instructions of 8086 MP

CO2: develop 8086ALPs for data processing problems using strings, procedures, macros & delays and distinguish minimum/maximum modes of 8086

CO3: design hardware circuits for interfacing I/O & memory devices with 8086 MP through 8255 (PPI), 8259 (PIC), 8257 (DMA), 8254 (PIT)

CO4: discuss architectural features of 8051 MC and develop ALPs for interfacing LEDs, stepper motor & real time clock

Course Articulation Matrix (CAM): U18CI406 MICROPROCESSRS MICROCONTROLLERS

CO		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	U18CI406.1	1	2	1	1	-	-	-	-	-	-	-	1	2	1
CO2	U18CI406.2	1	2	2	1	1	-	-	-	-	-	-	1	2	1
CO3	U18CI406.3	1	2	2	1	-	-	-	-	-	-	-	1	2	1
CO4	U18CI406.4	1	2	2	1	1	-	-	-	-	-	-	2	2	1
U18CI406		**1**	**2**	**1.75**	**1**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**1.25**	**2**	**1**

U18MH415 ESSENCE OF INDIAN TRADITIONAL KNOWLEDGE

Class : **B.Tech. IV Semester** Branch : **Common to all branches**

Teaching Scheme:

L	T	P	C
2	-	-	-

Examination Scheme:

Continuous Internal Evaluation	40 marks
End Semester Exam	60 marks

Course Learning Objectives (LOs):
This course will develop the student's knowledge in/on
LO1: basic structure of Indian knowledge system
LO2: Indian perspective of modern science
LO3: basic principles of yoga and holistic health care
LO4: benefits of yoga practice

Unit – I (6)

Basic Structure of Indian Knowledge System: Introduction, Vedas – Origin, Classification, Structure, Rig Veda, Sama Veda, Yajur Veda, Atharva Veda; Upavedas – Dhanurveda, Sthapatveda, Gandharvaveda, Ayurveda; Vedang – Shiksha, Chanda, Vyakarna, Nirukta, Kalpa, Jyothisha; Upanga – Dharmashastra, Mimamsa, Tarkashastra, Purvana.

Unit – II (6)

Modern Science and Indian Knowledge System: Introduction – Vedas as Basis for Modern Science – Architectural Developments – Medicine and its relevance – Mathematical Sciences in Vedas – Space and Military related developments – Chemical Sciences

Unit – III (6)

Yoga and Holistic Health Care: Healthy mind in healthy body – Yoga: Definition, types; Yoga to keep fit: Diet, Yoga Asanas – Fundamentals; Breathing techniques in Patanjali Yoga tradition – Pranayama; chakras; meditation; Benefits of Yoga – Physical Health, Emotional Health, Prevention of Disease, Reducing or Alleviating Symptoms of Problems

Unit – IV (6)

Case studies – Yoga Practice: Yoga as an effective tool for management of human crisis – Depression, Self – Concept & Mental health, Yoga for stress management; Yoga : A way to cure for Insomnia.

Requisite:
Yoga practice sessions are to be conducted for all the students taking this course by the time they complete Unit 1 and Unit 2.

Text Books:

1. Sathish Chandra Chaterjee, Dhirendramohan Datta, "An Introduction to Indian Philosophy", Rupa Publications Pvt. Ltd. New Delhi. (Chapter 2, 3)
2. Priyadaranjan Ray, S.N. Sen, "The Cultural Heritage of India", Vol. 6, Science and Technology, The Ramakrishna Mission Institute of Culture, Calcutta
3. Yoga Sutra of Patanjali, Ramakrishna Mission, Kolkatta
4. RN Jha, Science of Consciousness Psychotherapy and Yoga Practices, Vidyanidhi Prakasham Delhi, 2016 (Chapter 4, 5, 6, 7, 8)

Reference Books:

1. Swami Jitatmananda, "Holistic Science and Vedanta", Bharatiya Vidya Bhavan Bombay. (Chapter 2, 3)

Course Outcomes (COs):

Course Code:**U18MH415**		Course Name: **Essence Of Indian Traditional Knowledge**
CO	**CO code**	*Upon completion of this course, the student will be able to…*
CO1	**U18MH415.1**	summarize the basic structure of Vedas, Upavedas, Vedanga, Upanga
CO2	**U18MH415.2**	explain Vedas as principal source of knowledge for scientific inventions
CO3	**U18MH415.3**	describe different yogasanas, breathing techniques, chakras, meditation and their benefits
CO4	**U18MH415.4**	discuss the benefits of yoga as an effective tool for management of human crisis

Course Articulation Matrix (Mapping of COs with POs and PSOs):

Course code: **U18MH415**				Course Name: **Essence Of Indian Traditional Knowledge**									
CO Code	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
U18MH415.1	-	-	-	-	-	1	-	2	1	1	-	-	-	-
U18MH415.2	-	-	-	-	-	1	1	2	1	1	-	-	-	1
U18MH415.3	-	-	-	-	-	1	-	2	2	1	-	2	-	-
U18MH415.4	-	-	-	-	-	1	1	2	2	1	-	2	-	-
U18MH415	**-**	**-**	**-**	**-**	**-**	**1**	**1**	**2**	**1.5**	**1**	**-**	**2**	**-**	**1**

U18CI407 PROGRAMMING WITH PYTHON LABORATORY

Class: B.Tech.IV-Semester **Branch:** Electronic Communication & Instrumentation (ECI)

Teaching Scheme:

L	T	P	C
-	–	2	1

Examination Scheme:

Continuous Internal Evaluation	40 marks
End Semester Examination	60 marks

Course Learning Objectives (LOs):

This course will develop students' knowledge on /in…

LO1: Python scripting tool editor and program development environment
LO2: basic data types, arrays, lists, tuples, dictionaries and control functions in Python
LO3: implementation of data structures viz. sets, stacks & queues, searching & sorting algorithms and OOP concepts using Python programming
LO4: implementation of socket programming, GUIs, web pages and data base management services in Python

LIST OF EXPERIMENTS

1. Downloading and installing Python, Python version 2.7 vs. 3.5, system requirements, my first Python program (GCD, Prime Numbers, etc.)
2. Write and execute Python program using
   i assignment statements, basic data types, strings, lists
   ii control flow, functions
3. Write and execute Python program on
   i range, manipulation of lists, breaking out of a loop
   ii arrays vs. lists
4. Write and execute Python program on
   i Tuples and dictionaries
   ii function definition and list comprehension
5. Write and execute Python program for
   i Exception handling
   ii Accessing standard IO
   iii Handling files
6. Write and execute Python program for
   i String functions and formatting printed output (Pass, Del and None)
   ii Print the string data type items using slicing
   iii Sets, Stacks and Queues
7. Write and execute Python program on
   i Binary search trees
   ii Graph searching,
   iii Sorting sequences
8. Write and execute Python program for
   i Abstract data types, classes and objects
   ii user defined lists and search trees
9. Write and execute Python program on
   i Internet scripting, socket programming
   ii Transferring files over internet, processing internet Email
10. Write and execute Python program for
    i Basic GUI development

ii GUI development using Tkinter (Menus, list box, scroll box, canvas, grid, time tools, threads and animation)

11. Write and execute Python program using
    i Zope: a web publishing framework ii HTMLgen, JPython
12. Write and execute Python program on
    i DBM files, Pickled objects ii Shelve files, SQL DB interface

Lab Manual

[1] *Programming with Python Laboratory manual*, Dept. of ECE, KITSW.

Reference Books:

[1]Michael Dawson, *Python Programming for absolute beginners,* 3rd ed. USA: CENGAGE Learning Publications, 2018. (Chapters: 1,2,3,4)

[2]Martin C. Brown, *The Complete Reference Python*, 4th ed. New Delhi: Tata McGrawHill,2018.

[3]John V. Guttag, *Introduction to Computation and Programming using Python*, 2nd ed. New Delhi: PHI Publications, MIT Press, 2015.

[4]Mark Lutz, *Programming Python*, 3rd ed. USA: O'Reilly Media 2006

Course Learning Outcomes (COs):

On completion of this course, students will be able to…

CO1: utilize Python programming environment for implementation of basic arithmetic algorithms

CO2: develop Python programs using basic data types, arrays, lists, tuples, dictionaries and control functions for solving typical problems

CO3: utilize Python programming for implementation of data structures viz. sets, stacks & queues, searching & sorting algorithms and OOP concepts

Course Articulation Matrix (CAM):U18CI407 PROGRAMMING WITH PYTHON LABORATORY

CO		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	U18CI407.1	1	2	2	1	2	-	-	-	-	-	-	-	1	1
CO2	U18CI407.2	1	2	2	1	2	-	-	-	-	-	-	-	-	1
CO3	U18CI407.3	1	2	2	1	2	-	-	-	-	-	-	-	2	1
CO4	U18CI407.4	1	2	2	1	2	-	-	-	-	-	-	-	-	1
U18CI407		**1**	**2**	**2**	**1**	**2**	**-**	**-**	**-**	**-**	**-**		**-**	**1.5**	**1**

U18CI408 ELECTRONIC DEVICES AND CIRCUITS LABORATORY

Class: B.Tech. IV-Semester **Branch:** Electronic Communication & Instrumentation (ECI)

Teaching Scheme:

L	T	P	C
-	–	2	1

Examination Scheme:

Continuous Internal Evaluation	40 marks
End Semester Examination	60 marks

Course Learning Objectives (LOs):
This course will develop students' knowledge in/on…
LO1: characteristics of diodes, rectifiers, BJT & FET
LO2: single stage & multi stage amplifiers design & analysis
LO3: feedback amplifiers & oscillator circuits analysis
LO4: tuned voltage amplifiers & large signal amplifiers

LIST OF EXPERIMENTS

1) Study of Cathode Ray Oscilloscope (CRO)
2) V-I Characteristics of P-N junction diode and Zener diode
3) Rectifiers with & without Filters
4) I/O Characteristics of BJT in Common Base (CB) Configuration
5) I/O Characteristics of BJT in Common Emitter (CE) Configuration
6) Drain and Transfer Characteristics of Field Effect Transistor (FET)
7) Design of Fixed bias and Self bias circuits for BJT/FET
8) Design of single stage CE Amplifier
9) Analysis of Two Stage RC Coupled Amplifier
10) Analysis of Voltage Series Feedback Amplifier
11) Design of RC Phase Shift Oscillator
12) Design of Hartley and Colpit's Oscillator
13) Analysis of Single Tuned Voltage Amplifier
14) Analysis of Series fed Class A Power Amplifier

Lab Manual

[1] *Analog Circuits Laboratory Manual*, Department of ECE, Branch ECI

Reference Books:

[1] Miliman and Halkies, *Electronic Devices and Circuits*, 5th ed. New Delhi: Tata McGraw, 2010.

Course Learning Outcomes (CO):

On completion of this course, students will be able to…

CO1: examine the characteristics of diode, BJT & FET and determine rectifier circuit parameters
CO2: design single stage & multi stage BJT, FET amplifiers and analyze circuits for the given specifications
CO3: evaluate the parameters of feedback amplifier and design RC & LC oscillator circuits for a specified frequency
CO4: determine the performance parameters of tuned & large signal amplifiers

Course Articulation Matrix (CAM): U18CI408 ELECTRONIC DEVICES AND CIRCUITS LABORATORY

CO		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	U18CI408.1	1	1	2	-	-	-	-	-	1	1	-	1	1	1
CO2	U18CI408.2	1	1	2	-	-	-	-	-	1	1	-	1	1	1
CO3	U18CI408.3	1	1	2	-	-	-	-	-	1	1	-	1	1	1
CO4	U18CI408.4	1	1	2	-	-	-	-	-	1	1	-	1	1	1
U18CI408		**1**	**1**	**2**	**-**	**-**	**-**	**-**	**-**	**1**	**1**	**-**	**1**	**1**	**1**

U18CI409 SIGNAL PROCESSING AND APPLICATIONS LABORATORY

Class: B.Tech. IV-Semester **Branch:** Electronic Communication and Instrumentation (ECI)

Teaching Scheme :

L	T	P	C
-	-	2	1

Examination Scheme :

Continuous Internal Evaluation	40 marks
End Semester Exam	60 marks

Course Learning Objectives:

This course will develop students' knowledge in/on

LO1: commands and functions of MATLAB programming
LO2: time & frequency analysis of signal & systems using MATLAB
LO3: implementation & testing of FIR and IIR filters using MATLAB
LO4: DSP starter kit as integrated development environment

LIST OF EXPERIMENTS

Write a MATLAB Program to

1. Generate - Unit step, Ramp, Impulse, Exponential and Sinusoidal Signals and
    a. perform mathematical operations on signals.
    b. perform scaling, shifting and delay operations on the sequences
2. Perform the Correlation and Convolution of two sequences
3. Compute DFT and 4-pt FFT. (with and without using the command 'FFT')
4. Observe the spectrum of a given signal.
5. Perform decimation and sampling rate conversions.
6. Study the given system .(impulse response, poles and zeros, frequency response and linear phase characteristics)
7. Design all types of Butterworth IIR Filters to meet the given specifications.
8. Design all types of Chebyshev IIR filters to meet the given specifications.
9. Study the types of FIR filters.
10. Design FIR Filters using windows.

(MATLAB Simulink & DSK6711)

11. Implement convolution and FFT algorithms on Digital Signal Processor (DSK 6711) board using Code Composer Studio (CCS)
12. Perform mathematical operations on signals and real time Audio Filtering on DSK 6711 using MATLAB Simulink and CCS
13. Real time case studies and applications

Laboratory Manual:

[1] Laboratory Manual for Digital Signal Processing Laboratory, *prepared by the department of ECE*

Text Books:

[1] Rudra Pratap, *Getting Started with MATLAB: A Quick Introduction for Scientists and Engineers*, New Delhi: Oxford University Press, 2002.

[2] Ifeachor, *Digital Signal Processing-A practical Approach*, 2nd ed. New Delhi Pearson Education, 01-Sep-2002

[3] Proakis, *Digital Signal Processing using MATLAB*, Cangage Learning, 3rd ed. New Delhi:Book Ware Compare Series

Course Learning Outcomes (COs):

On completion of this course, students will be able to

CO1: utilize MATLAB tool to write typical programs for representation of signals

CO2: develop MATLAB code for implementation of convolution, DFT & other operations on signals

CO3: develop FIR & IIR filters with required specifications using MATLAB

CO4: build Simulink models for implementation of convolution, DFT & other operations on signals using IDE

Course Articulation Matrix (CAM): U18CI409 SIGNAL PROCESSING AND APPLICATIONS LABORATORY

CO		PO1	PO2	PO3	PO4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	U18CI409.1	2	2	1	2	2	-	-	-	1	1	-	1	2	2
CO2	U18CI409.2	2	2	2	2	2	-	-	-	1	1	-	1	2	2
CO3	U18CI409.3	2	2	2	2	2	-	-	-	1	1	-	1	2	2
CO4	U18CI409.4	2	2	2	2	2	-	-	-	1	1	-	1	2	2
U18CI409		**2**	**2**	**1.75**	**2**	**2**	**-**	**-**	**-**	**1**	**1**	**-**	**1**	**1**	**2**

U18CH416 ENVIRONMENTAL STUDIES

Class: B. Tech. IV -Semester **Branch:** Common to all branches

Teaching Scheme :

L	T	P	C
2	-	-	2

Examination Scheme :

Continuous Internal Evaluation	:	40 marks
End Semester Exam	:	60 marks

Course Learning objectives (LOs):
This course will develop students' knowledge in/on
LO1: *necessity to use natural resources more equitably*
LO2 : *concepts of ecosystem and the importance of biodiversity conservation*
LO3 : *causes, effects and control measures of various environmental issues*
LO4 : *issues involved in enforcement of environmental legislation*

UNIT-I (6)

Introduction - The multidisciplinary nature of environmental studies - definition, scope and importance.
Natural Resources: Forest Resources - Use and over–exploitation of forests, deforestation, timber extraction, mining, dams - their effects on forests and tribal people; **Water Resources -** Use and over-utilization of surface and ground water, floods, drought, conflicts over water; **Mineral Resources -** Environmental effects of extracting and using mineral resources; **Agricultural Land -** Land as a resource, land degradation, soil erosion and desertification; **Food Resources** - World food problems, effects of modern agriculture, fertilizer-pesticide problems, water logging and salinity; **Energy Resources -** Renewable and non-renewable energy sources, use of alternate energy sources.

UNIT-II (6)

Ecosystem and Biodiversity: Ecosystem - Concepts of an ecosystem, food chain, food webs, ecological pyramids, energy flow in the ecosystem and ecological succession;
Biodiversity and its Conservation – Introduction, definition, genetic, species and ecosystem diversity, value of biodiversity, biodiversity in India, hot spots of biodiversity, man-wildlife conflicts, endangered and endemic species of India, in-situ and ex-situ conservation.

UNIT-III (6)

Environmental Pollution: Global climatic change, green house gases, effects of global warming, ozone layer depletion; International conventions/protocols - Earth summit, Kyoto protocol and Montreal protocol; causes and effects of air, water, soil, marine and noise pollution with case studies; solid and hazardous waste management, effects of urban industrial and nuclear waste; natural disaster management - flood, earthquake, cyclone and landslides.

UNIT-IV (6)

Social Issues and the Environment: **Role of Individual and Society** - Role of individual in prevention of pollution, water conservation, Rain water harvesting and watershed management; **Environmental Protection / Control Acts** - Air (Prevention and control of Pollution) Act- 1981, water (Prevention and Control of Pollution) Act-1974, water Pollution Cess Act-1977, Forest conservation Act (1980 and 1992), wildlife Protection Act 1972 and environment protection Act 1986, issues involved in enforcement of environmental

legislations; **Human Population and Environment** - Population growth, family welfare programmes, women and child welfare programmes, role of information technology in environment and human health.

TEXT BOOKS:

1.Erach Bharucha, "Text Book of Environmental Studies for Under Graduate Courses
(2nd edn.)", *Universities Press (India) Private Limited,* 2013.

REFERENCE BOOKS:

1. Y. Anjaneyulu, "Introduction to Environmental Science", *B.S. Publications*, 2004.
2. Gilbert M. Masters, "Introduction to Environmental Engineering & Science ", *Prentice Hall of India,*Third Edition,1991.
3. Anubha Kaushik, C.P. Kaushik, "Environmental Studies", 4/e, *New Age nternational Publishers,* 2014.
4. R.Rajagopalan, "Environmental Studies from crisis to cure", *Oxford University Press*, Second Edition, 2011.

Course Outcomes (COs):

Course Code: **U18CH416**		Course Name: **Environmental Studies**
CO	**CO code**	Upon completion of this course, the student will be able to…
CO1	**U18CH416.1**	*investigate any environmental issue using an interdisciplinary framework*
CO2	**U18CH416.2**	*formulate an action plan for sustainable alternatives and conserving biodiversity that integrates science, humanist, social and economic perspective*
CO3	**U18CH416.3**	*identify and explain the complexity of issues and processes which contribute to an environmental problem*
CO4	**U18CH416.4**	*participate effectively in analysis and problem-solving through knowledge in environmental legislations*

Course Articulation Matrix (Mapping of COs with POs and PSOs):

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
U18CH416.1	2	1	2	1	-	2	1	-	1	-	-	-	1	-
U18CH416.2	-	-	2	-	-	1	2	-	1	-	-	-	1	-
U18CH416.3	1	2	1	-	-	1	2	1	1	-	-	-	1	-
U18CH416.4	-	-	1	-	-	1	2	-	1	-	-	-	1	-
U18CH416	**1.5**	**1.5**	**1.5**	**1**	**-**	**1.25**	**1.75**	**1**	**1**	**-**	**-**	**-**	**1**	**-**

DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING
KAKATIYA INSTITUTE OF TECHNOLOGY & SCIENCE: WARANGAL-15
(An Autonomous Institute under Kakatiya University, Warangal)

SCHEME OF INSTRUCTION & EVALUATION
V - SEMESTER OF 4-YEAR B.TECH ECI DEGREE PROGRAM

[5Th+3P+1MC]

Sl.No	Category	Course Code	Course Title	Hour per week			Credits	Evaluation Scheme				
								CIE			ESE	Total Marks
				L	T	P		TA	MSE	Total		
1	MC	U18MH501	Universal Human Values – II	2	-	-	-	10	30	40	60	100
2	PE	U18CI502	Professional Elective - I / MOOCs – I	3	-	-	3	10	30	40	60	100
3	PCC	U18CI503	Analog and Digital Communications	3	1	-	4	10	30	40	60	100
4	ESC	U18EE511	Linear Control Systems	3	-	-	3	10	30	40	60	100
5	PCC	U18CI504	Embedded System Design	3	-	-	3	10	30	40	60	100
6	PCC	U18CI505	Linear Integrated Circuits and Applications	3	-	-	3	10	30	40	60	100
7	PCC	U18CI506	Embedded Firmware Development Laboratory	-	-	2	1	40	-	40	60	100
8	PCC	U18CI507	Analog and Digital Communications Laboratory	-	-	2	1	40	-	40	60	100
9	PCC	U18CI508	Linear and Digital Integrated Circuits Laboratory	-	-	2	1	40	-	40	60	100
10	PROJ	U18CI510	Seminar	-	-	2	1	100	-	100	-	100
			Total:	17	1	8	20	280	180	460	540	1000

L= Lecture, T = Tutorials, P = Practicals & C = Credits

Professional Elective-I / MOOCs-I:
U18CI502A: Internet of things
U18CI502B: Wireless and Data Communication
U18CI502C: Data Acquisition And Signal Conditioning
U18CI502M: MOOC Course

Contact hours per week : 26
Total Credits : 20

U18MH501 UNIVERSAL HUMAN VALUES - II

Class: B.Tech. V – Semester **Branch:** Electronics Communication and Instrumentation (ECI)

Teaching Scheme:

L	T	P	C
2	-	-	-

Examination Scheme:

Continuous Internal Evaluation	40 marks
End Semester Examination	60 marks

* Pre-requisite: U18MH111 Universal Human Values - I (*Induction Programme)*

Course Learning Objectives (LOs):

This course will develop students' knowledge on /in…

LO1: self-exploration, happiness and prosperity as the process of value education
LO2: harmony in the human being - self & family
LO3: co-existence of human being with society & nature
LO4: professional ethics, commitment and courage to act

UNIT – I (6)

Introduction - Need, Basic Guidelines, Content and Process for Value Education: Purpose and motivation for the course, Recapitulation from Universal Human Values - I (Induction programme)

Self-Exploration: Its content and process, Natural acceptance and experiential validation – As the process for self-exploration

Continuous Happiness and Prosperity: A look at basic human aspirations, Right understanding, Relationship and physical facility - The basic requirement for fulfillment of aspirations of every human being with their correct priority

Understanding Happiness and Prosperity correctly: A critical appraisal of the current scenario, Method to fulfill the above human aspirations - Understanding and living in harmony at various levels

UNIT – II (6)

Understanding Harmony in the Human Being- Harmony in Myself & Family:

Harmony in Myself: Understanding human being as a co-existence of the sentient 'I' and the material 'Body', Understanding the needs of Self ('I') and 'Body' - Happiness and physical facility; Understanding the 'Body' as an instrument of 'I' (I being the doer, seer and enjoyer), Understanding the characteristics and activities of 'I' and harmony in 'I', Understanding the harmony of 'I' with the 'Body' - Sanyam and Health; Correct appraisal of physical needs, Meaning of prosperity in detail, Programs to ensure Sanyam and Health.

Harmony in Family: Understanding values in human - Human relationship; Meaning of justice (Nine universal values in relationships), Program for its fulfillment to ensure mutual happiness, Trust and respect as the foundational values of relationship, Understanding the meaning of trust, Difference between intention and competence; Understanding the meaning of respect, Difference between respect and differentiation, The other salient values in relationship

UNIT – III (6)

Understanding Harmony with Society, Nature & Existence:

Understanding the harmony in the society (society being an extension of family): Resolution, Prosperity, Fearlessness (trust) and Co-existence as comprehensive human goals, visualizing a universal harmonious order in society – Undivided society; Universal order - From family to world family

Understanding the harmony in the nature: Interconnectedness and mutual fulfillment among the four orders of nature - Recyclability and self-regulation in nature

Whole Existence as Co-existence: Understanding existence as co-existence of mutually interacting units in all-pervasive space, Holistic perception of harmony at all levels of existence

UNIT – IV (6)

Implications of Holistic Understanding of Harmony on Professional Ethics:

Natural acceptance of human values, Definitiveness of ethical human conduct, Basis for Humanistic education, Humanistic constitution and Humanistic universal order Competence in professional ethics: a) Ability to utilize the professional competence for augmenting universal human order b) Ability to identify the scope and characteristics of people friendly and eco-friendly production systems and c) Ability to identify and develop appropriate technologies and management patterns for above production systems

Case studies: Case studies of typical holistic technologies, Management models and production systems, Strategy for transition from the present state to Universal human order – a) At the level of individual: As socially and ecologically responsible engineers, technologists and managers b) At the level of society: As mutually enriching institutions and organizations

Text Book:

[1] R .R. Gaur, R. Sangal and G. P. Bagaria, *Human Values and Professional Ethics*, New Delhi: Excel Books, 2010.

Reference Books:

[1] A. Nagaraj, JeevanVidya: Ek Parichaya, Raipur: Jeevan Vidya Prakashan, Amarkantak, 2018.
[2] A.N. Tripathi, Human Values, 3rd ed. New Delhi: New Age International Publisher, 2019.
[3] M. Govindrajran, S. Natrajan & V.S. Senthil Kumar, Engineering Ethics (includes Human
[4] Values), 12th ed. Haryana: PHI Learning Pvt. Ltd., 2011.
[5] Jayshree Suresh, B. S. Raghavan, Human Values & Professional Ethics, 4th ed. New Delhi: S. Chand & Co. Ltd., 2012.

Additional Resources:

[1] R.R Gaur, R Sangal, G P Bagaria, A foundation course in Human Values and professional Ethics (Teacher's Manual), New Delhi: Excel books, 2010.
[2] A set of DVDs containing - Video of Teachers' Orientation Program - PPTs of Lectures and Practice Sessions (Audio-visual material for use in the practice sessions)

Course Research Papers: Research papers (Journal/Conference papers) relevant to the course content will be posted by the course faculty in Course Web page

Course Patents: Patents relevant to the course content will be posted by the course faculty in Course Web page

Course Projects: Course project is an independent project carried out by the student during the course period, under the supervision of course faculty. Course faculty will post few course projects titles in Course Web page. Students are encouraged to come up and experiment with the ideas that interest them.

Course Learning Outcomes (COs):

On completion of this course, students will be able to…

- *CO1: interpret the importance of continuous happiness & prosperity through self exploration and imbibe skills to examine harmony*
- *CO2: appraise the concept of sentience, distinguish between intention & competence and prioritize human values in relationships*
- CO3: *build fearlessness & co-existence as comprehensive human goal and agree upon interconnectedness & mutual fulfillment*
- CO4: *assess the understanding of harmony, adapt professional ethics and take part in augmenting universal human order*

Course Articulation Matrix (CAM): U18MH501 UNIVERSAL HUMAN VALUES – II

CO		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	U18MH501.1	-	-	-	-	-	1	-	2	1	1	-	2	-	-
CO2	U18MH501.2	-	-	-	-	-	1	-	2	1	1	-	2	-	-
CO3	U18MH501.3	-	-	-	-	-	1	-	2	1	1	-	2	-	-
CO4	U18MH501.4	-	-	-	-	-	1	-	2	1	1	-	2	-	-
U18MH501		**-**	**-**	-	**-**	-	**1**	**-**	**2**	**1**	**1**	**-**	**2**	-	-

U18CI502A INTERNET OF THINGS

Class: B.Tech. V– Semester
Branch: Electronics Communication and Instrumentation (ECI)

TeachingScheme:

L	T	P	C
3	–	–	3

ExaminationScheme:

Continuous Internal Evaluation	40 marks
End Semester Examination	60 marks

Course Learning Objectives (LOs):
This course will develop students' knowledge in/on

LO1: logical design, network and communication aspects of IoT
LO2: IoT devices and its interfacing with Raspberry Pi
LO3: advance IoT devices applications and IoT wireless network and devices
LO4: IoT cloud computing platforms

UNIT – I (9)

Fundamentals of IoT: Introduction to Internet of Things (IoT) and its characteristics. Physical design, Logical design, IoT Communication APIs, IoT levels and Deployment Templates.IoT Protocols-IoT protocol stack, 6LoWPAN adaptation layer, Application layer protocols - HTTP, CoAP, MQTT, AMQP, XMPP; REST architectures.

IoT Architecture & Design Methodology- IoT platform design methodology. IoT Reference Architecture- Functional View, Information View, Deployment and Operational View, Other Relevant architectural views.

UNIT –II (9)

Building Blocks of IoT Devices: Introduction to Raspberry Pi 4 board, GPIO concepts, InstallingOS using Raspbian Image, Remote Control of Raspberry Pi 4 using VNC Viewer, Programming Raspberry Pi 4 with Python, Interfacing with different Sensors, Inter-Integrated Circuit based Sensor Interfacing.

IoT Design using Raspberry Pi 4: Introduction to Node-RED, Installation process, MQTT brokers, Publishing the messages to MQTT broker, Home Automation using RPi.

UNIT– III (9)

Advanced IoT Applications: Introduction to STM Nucleo boards-STM32 Nucleo-64 board architecture, Principal components, GPIO pin hardware, LED test demonstration. InterfacingDTH-11 temperature sensor,Smart home application, Motion sensing using Accelerometer sensor.

IoT Wireless Network Devices and applications: Introduction to NodeMCU 8266 Wi-Fi board-architecture, LED Controlling. ZigBee S2C Pro Chip-Architecture and types. LoRa SX1278-architecture. Coverage range test between ZigBee and LoRa devices.

UNIT - IV (9)

Cloud Application Architecture: Fundamental of Cloud Computing, Mechanism, Architecture, Working with Clouds, Security Mechanism. Cloud services for IoT, Accessing the web services, Controlling a servo through command line, Controlling servo using weather data, Setting up a Raspberry Pi web server using python web frame work, Creating a home security dashboard, Displaying sensory data on the dashboard.

Text Book(s):

[1] Bahga and V. Madisetti, *Internet of Things, A Hands-on Approach*, 1st ed., Atlanta: Universities Press, 2015. *(Chapters 1,5,6,7)*

[2] Colin Dow, *Internet of Things Programming Projects*, Birmingham: Packt Publishing, 2018. *(Chapters 1,2,5)*

Reference Book(s):

[1] E. Upton and G. Halfacree, *Raspberry Pi user guide,* 4th ed., USA: Wiley, 2016.

[2] Donald Norris, *Programming with STM32: Getting Started with the Nucleo Board and C/C++,* 1st ed., USA:McGraw-Hill Education, 2018. *(Chapters 1,5)*

[3] M. Bauer et al., *Enabling Things to Talk: IoT Reference Architecture*, Springer, Berlin, Heidelberg, 2013. https://doi.org/10.1007/978-3-642-40403-0_8.

Course Research Papers: Research papers (Journal/Conference papers) relevant to the course content will be posted by the course faculty in Course Web page

Course Patents: Patents relevant to the course content will be posted by the course faculty in Course Web page

Course Projects: Course project is an independent project carried out by the student during the course period, under the supervision of course faculty. Course faculty will post few course projects titles in Course Web page. Students are encouraged to come up and experiment with the ideas that interest them.

Course Learning Outcomes (COs):

On completion of this course, students will be able to ...

CO1: examine the various categories of IoT enabling technologies

CO2: implement an IoT based applications on embedded platform using Python

CO3: build and control IoT applications using advanced IoT devices

CO4: develop the cloud computing environment for IoT solutions

Course Articulation Matrix (CAM): U18CI502A Internet of Things

CO		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	U18CI502A.1	2	2	-	-	-	-	-	1	1	1		1	2	1
CO2	U18CI502A.2	2	2	-	-	-	-	-	1	1	1		1	2	1
CO3	U18CI502A.3	2	2	-	-	-	-	1	1	1	1		1	2	1
CO4	U18CI502A.4	2	2	-	-	-	-	1	1	1	1		1	2	1
U18CI502A		**2**	**2**	**-**	**-**	-	-	1	**1**	1	**1**		**1**	**2**	**1**

U18CI502B WIRELESS AND DATA COMMUNICATION

Class: B.Tech. V – Semester **Branch:** Electronics Communication and Instrumentation (ECI)

Teaching Scheme:

L	T	P	C
3	–	–	3

Examination Scheme:

Continuous Internal Evaluation	40 marks
End Semester Examination	60 marks

Course Learning Objectives (LOs):

This course will develop students' knowledge on /in…

LO1: introduction to wireless communication, empirical path-loss models and shadow fading techniques

LO2: narrow band fading models, wideband fading models and discrete time models

LO3: data communication networks, topology, transmission modes and different protocols

LO4: error correction techniques, data link control and data link protocols

UNIT–I (9)

Path Loss and Shadowing: Introduction to wireless systems, radio wave propagation, transmit and receive signal models, free-space path loss, ray tracing-two-ray model, ten-ray model (Dielectric Canyon), general ray tracing, local mean received power, empirical path-loss models-okumura model, hata model, cost 231 extension to hata model, piecewise linear (Multislope) model, indoor attenuation factors, simplified path-loss model, shadow fading, combined path loss and shadowing, outage probability under path loss and shadowing, cell coverage area

UNIT – II (9)

Statistical Multipath Channel Models: Time-varying channel impulse response, narrowband fading models-autocorrelation, cross-correlation, and power spectral density, envelope and power distributions, level crossing rate and average fade duration, finite-state markov channels, wideband fading Models- power delay profile, coherence bandwidth, doppler power spectrum and channel coherence time, transforms for autocorrelation and scattering functions, discrete-time model, space-time channel models

UNIT – III (9)

Basic Concepts of Data Communications, Interfaces and Modems: Data communication networks, protocols and standards, UART, USB, I2C, I2s, line configuration, topology, transmission modes, DTE-DCE interface, categories of networks – TCP/IP protocol suite and comparison with OSI model

UNIT – IV (9)

Error Correction: Types of errors, vertical redundancy check (VRC), longitudinal redundancy check (LRC), cyclic redundancy check (CRC), checksum, error correction using hamming code

Data Link Control: Line discipline, flow control, error control

Data Link Protocols: Asynchronous protocols, synchronous protocols, character oriented protocols, bit-oriented protocol

Text Books:

[1]. Andrea Goldsmith, Wireless Communications, New York: Cambridge University Press, 2005 (Chapters 1,2,3)
[2]. B. A.Forouzan, Data Communication and Computer Networking, 4th Ed., 2007, TMH (Chapters 1, 2, 10, 11)
[3]. W. Tomasi, Advanced Electronic Communication Systems, 5 ed., 2008, PEI

Reference Books:

[1]. David Tse, Pramod Viswanath, Fundamentals of Wireless Communication, Cambridge University, press, 2005
[2]. J. H. Schiller, Mobile Communication, 2nd ed., Berlin: Pearson Education, 2012
[3]. Prakash C. Gupta, Data Communications and Computer Networks, 2006, PHI
[4]. William Stallings, Data and Computer Communications, 8th ed., 2007, PHI

Course Research Papers: Research papers (Journal/Conference papers) relevant to the course content will be posted by the course faculty in Course Web page

Course Patents: Patents relevant to the course content will be posted by the course faculty in Course Web page

Course Projects: Course project is an independent project carried out by the student during the course period, under the supervision of course faculty. Course faculty will post few course projects titles in Course Web page. Students are encouraged to come up and experiment with the ideas that interest them.

Course Learning Outcomes (COs):

On completion of this course, students will be able to…

CO1: identify the evolution of wireless communications empirical path-loss models and shadow fading techniques
CO2: analyze the narrow band fading models, wideband fading models and discrete time models
CO3: compare the various data communication networks and protocols
CO4: examine the performance of various error correction techniques, data link control and data link protocols

Course Articulation Matrix (CAM): U18CI502B Wireless and Data Communication

CO		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PSO 2
CO1	U18CI502B.1	1	1	1	1	-	-	-	1	1	1		1	2	1
CO2	U18CI502B.2	1	1	1	1	-	-	-	1	1	1		1	2	1
CO3	U18CI502B.3	1	2	1	2	1	-	-	1	1	1		2	2	2
CO4	U18CI502B.4	1	2	1	2	1	-	-	1	1	1		2	2	2
U18CI502B		**1**	**1.5**	**1**	**1.5**	**1**	**-**	-	1	1	1		1	**2**	**1.5**

UI8CI502C DATA ACQUISITION AND SIGNAL CONDITIONING

Class: B.Tech. V – Semester **Branch:** Electronics Communication and Instrumentation (ECI)

Teaching Scheme: **Examination Scheme:**

L	T	P	C
3	–	–	3

Continuous Internal Evaluation	40 marks
End Semester Examination	60 marks

Course Learning Objectives:

This course will develop students' knowledge in/on

LO1: elements of data acquisition and Parameters of a DAQ
LO2: digital to analog and analog to digital conversion techniques
LO3: architecture of a DSP & Communication Bus
LO4: design of Data Acquisition Systems

UNIT – I(9)

Introduction: Fundamentals of a data acquisition system, review of sensors and transducers - temperature sensors, magnetic field sensors, potentiometers, light detection, DAQ hardware, DAQ software, communications cabling, parameters of a DAQ system

UNIT – II (9)

Data Acquisition Systems Hardware: Introduction, plug-in DAQ systems, signal conditioning, A/D converters- parameters, successive approximation ADC, flash ADC, 8-bit, 500 Msps flash ADC of maxim; D/A converters- parameters, binary-weighted-input DAC, R-2R DAC, 8-bit DACs with 2-wire serial interface of maxim

UNIT – III (9)

Digital Signal Processing: Architecture of a DSP - microcontrollers- CPU structure, microcontroller MAXQ612/622, amplifier- design of low-noise pre-amplifier- multiplexer, demultiplexer - maxim integrated MAX4638/4639, power management, timing system, filtering, memory board, bus interface

Communication Bus: Bus USB and fire wire, serial communications, wireless, ethernet, bluetooth, and GSM, PCI and PCI express, standard VME

UNIT – IV (9)

Design of Data Acquisition Systems: Introduction, functional design of high-speed computer-based DAS, portable DAS

Software for Data Acquisition Systems: Introduction, design of firmware, example of implementation of a software for data acquisition system via VME bus

Smart Data Acquisition System: General description of MAX1329, circuit application, complete DAQ

Textbook:

[1]. Maurizio Di Paolo Emilio, *Data Acquisition Systems From Fundamentals to Applied*

Design, New York, London: Springer,2013

Reference Books:

[1]. John Park and Steve Mackay, *Practical Data Acquisition for Instrumentationand Control Systems*, Elsevier, USA

[2]. Nikolay V. Kirianaki and Sergey Y. Yurish, Nestor 0. Shpak, Vadim P. Deynega, *Data Acquisition and Signal Processing for Smart Sensors*, England: John Wiley & Sons

Course Research Papers: Research papers (Journal/Conference papers) relevant to the course content will be posted by the course faculty in CourseWeb page

Course Patents: Patents relevant to the course content will be posted by the course faculty in CourseWeb page

Course Projects: Course project is an independent project carried out by the student during the course period, under the supervision of course faculty. Course faculty will post few course projects titles in CourseWeb page. Students are encouraged to come up and experiment with the ideas that interest them.

Course Learning Outcomes (COs):

On completion of this course, the students will be able to…

CO1: list transducers, and identify elements in communication cabling, and DAQ system configurations

CO2: describes different hardware aspects of the data acquisition systems, such as signal conditioning, A to D & D to A converters

CO3: depict the suitable DSP processor and design a bus communication system

CO4: develop a design approach for Data Acquisition Systems

Course Articulation Matrix: U18CI502C Data Acquisition and Signal Conditioning

CO		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PS O 2
CO1	U18CI502C.1	2	2	-	-	-	-	-	1	1	1		1	2	**1**
CO2	U18CI502C.2	2	2	2	-	-	-	-	1	1	1		1	2	**1**
CO3	U18CI502C.3	2	2	2	-	-	-	-	1	1	1		1	2	**1**
CO4	U18CI502C.4	2	2	2	-	-	-	-	1	1	1		1	2	**1**
U18CI502C		**2**	**2**	**1.5**	**-**	-	-	-	**1**	**1**	**1**		**1**	**2**	**1**

U18CI503 ANALOG AND DIGITAL COMMUNICATIONS

Class: B.Tech. V – Semester **Branch:** Electronics Communication and Instrumentation (ECI)

Teaching Scheme: **Examination Scheme:**

L	T	P	C
3	1	–	4

Continuous Internal Evaluation	40 marks
End Semester Examination	60 marks

Course Learning Objectives (LOs):

This course will develop students' knowledge on /in…

LO1: linear modulation strategies that constitute the amplitude modulation

LO2: angle modulation &analog pulse modulation

LO3: source coding & digital pulse modulation techniques

LO4: bandpass data transmission systems

UNIT–I (9)

Amplitude Modulation: Introduction, elements of communication system, amplitude modulation, double sideband-suppressed carrier modulation, costas receiver, single-sideband modulation, vestigial sideband modulation, noise in communication systems-sources of noise-shot noise, white noise, band-pass receiver structures-super heterodyne receiver-intermediate frequency-AGC, delayed AGC.

UNIT–II (9)

Angle Modulation: Basic definitions-frequency modulation-phase modulation, relationship between pm and FM waves, narrow-band frequency modulation, wide-band frequency modulation, transmission bandwidth of FM waves, generation of FM waves, demodulation of fm signals-phase discriminator, phase locked loop, noise in fm-threshold effect, pre-emphasis and de-emphasis.

Pulse Modulation: Transition from analog to digital communications**,** sampling process, pulse-amplitude modulation, pulse width modulation, pulse-position modulation.

UNIT–III (9)

Digital Modulation: Elements of digital communication system, source coding, discrete memoryless source (DMS), measure of information, entropy, information rate, source coding- shannonfano, huffman coding, gaussian channel capacity – shannon bound, pulse-code modulation (PCM), quantization, quantization error, signal to quantization noise ratio, delta modulation (DM), adaptive delta modulation (ADM), comparison of PCM and DM.

UNIT – IV (9)

Band-pass Data Transmission: Band pass data transmission system, gram schmidt orthogonalization procedure, geometric interpretation of signals, optimum receiver for binary digital modulation schemes, coherent binary phase shift keying (BPSK), differential phase shift keying (DPSK), coherent binary frequency shift keying (BFSK), quadrature phase shift keying (QPSK), minimum shift keying (MSK), power and bandwidth requirements of above schemes.

Text Books:

[1] Simon Haykin and Michael Moher *Introduction to Analog and Digital Communications*, 2nd ed. United States of America:John Wiley & sons, inc., 2007. *(Chapters: 3,4,5,7,9)*

Reference Books:

[1] Herbart Taub, Donald L Schilling, *Principles of Communication Systems*, 3rd ed, 2007

[2] R.P.Singh and S.D.Sapre, *Communication Systems (Analog and Digital)*, McGraw-Hill Education, 2nd ed, 2008

[3] Bhattacharya, *Digital Communication*, Tata McGraHill Education, 2014.

[4] K. Sam Shanmugam, *Digital and Analog Communication Systems*, New *Delhi:John Wiley*& Sons, 2008.

Course Research Papers: Research papers (Journal/Conference papers) relevant to the course content will be posted by the course faculty in CourseWeb page

Course Patents: Patents relevant to the course content will be posted by the course faculty in CourseWeb page

Course Projects: Course project is an independent project carried out by the student during the course period, under the supervision of course faculty. Course faculty will post few course projects titles in CourseWeb page. Students are encouraged to come up and experiment with the ideas that interest them.

Course Learning Outcomes (COs):

On completion of this course, students will be able to…

CO1: estimate the performance of AM systems, its generation and reception

CO2: evaluate the performance of FM system in the presence of noise and discuss pulse modulation techniques

CO3: determine code efficiency of source coding algorithms and different digital modulation techniques

CO4: examine the performance of coherent band pass data transmission systems.

Course Articulation Matrix (CAM): U18CI503 ANALOG & DIGITAL COMMUNICATIONS

CO		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	U18CI503.1	2	2	1	1	-	-	-	1	1	1		1	1	2
CO2	U18CI503.2	2	2	1	1	-	-	-	1	1	1		1	1	2
CO3	U18CI503.3	2	2	1	1	-	-	-	1	1	1		1	1	2
CO4	U18CI503.4	2	2	1	1	-	-	-	1	1	1		1	1	2
U18CI503		**2**	**2**	**1**	**1**	-	**-**	**-**	**1**	**1**	**1**		**1**	1	**2**

U18EE511 LINEAR CONTROL SYSTEMS

Class: B.Tech, V Semester **Branch:** EIE & ECI (Common Syllabus)

Teaching Scheme: **Examination Scheme:**

L	T	P	C
3		–	3

Continuous Internal Evaluation	40 marks
End Semester Examination	60 marks

Course Learning Objectives (LOs):

This course will develop student's knowledge in/on

LO1: transfer function representation of physical systems

LO2: assessing the system performance using time domain analysis and methods for improving it

LO3: assessing the system's stability and performance using time and frequency domain analysis

LO4: state space modeling of physical systems and the compensation techniques

UNIT-I (9)

Introduction: Concepts of Control Systems- Classification of control systems, open loop and closed loop control systems, Effects of feedback, Mathematical modeling – Linear differential equations- Translational and Rotational mechanical systems, Analogous Systems, Electrical Systems; Block diagram reduction technique – Signal flow graph method.

UNIT-II (9)

Time Response Analysis: Introduction, Standard test signals – Type & Order, Time response of first order systems, Classification of second order systems, Transient response of second order systems – Time domain specifications – Steady state response – Steady state errors and error constants; Controllers - P, I, D, PI, PD & PID.

UNIT-III (9)

Stability Analysis: Introduction, Routh-Hurwitz stability criteria – qualitative stability and conditional stability. Root Locus Technique– construction of root loci-effects of adding poles and zeros to G(s)H(s) on the root loci.

Frequency Response Analysis: Introduction, Frequency domain specifications -Correlation between frequency and time domain specifications- Bode plots- transfer function from the Bode plot- Phase margin and Gain margin-Stability Analysis from Bode Plots, Stability analysis through polar plots, Nyquist stability criteria.

UNIT-IV (9)

Control System Analysis using State Variable Method: Introduction- State variable representation- Conversion of state models to transfer functions- Conversion of transfer functions to state models- Deriving state models from physical systems, State transition matrix, Solution of state equations- Concepts of Controllability and Observability.

Compensation: Introduction, Elementary treatment of Lag, Lead, Lead-Lag Compensation.

Textbooks:

[1] I.J. Nagrath & M. Gopal, *Control Systems Engineering*, 4th ed., New Delhi: New Age International Pvt. Ltd., 2012.

Reference books:

[1] S. Palani, *Control Systems Engineering*, 2nd ed., New Delhi: Tata McGraw Hill Education (India) Pvt. Ltd., 2010.

[2] A. Anand Kumar, *Control Systems*, 2nd ed., New Delhi: Prentice Hall of India, 2014.

[3] K. Alice Mary, P. Ramana, *Control Systems*, 1st ed., Hyderabad: Universities Press, 2016.

[4] Benjamin C. Kuo, *Automatic Control Systems*, 7th ed., New Delhi: Prentice Hall of India, 1995.

[5] A. Nagoorkani, *Control Systems*,2nd ed., New Delhi: RBA Publications.

Course Learning Outcomes (COs):

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

CO1: develop transfer function models for different physical systems

CO2: compute time domain specifications of first & second order systems; compare the performance of different controllers

CO3: examine stability of systems in time and frequency domains

CO4: *develop state space model of a given physical system; develop the transfer functions of compensators*

Course Articulation Matrix: U18EE511 LINEAR CONTROL SYSTEMS

CO		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	U18EE511.1	2	2	-	-	-	-	-	-	-	-	-	1	1	1
CO2	U18EE511.2	2	2	-	1	-	-	-	-	-	-	-	1	1	1
CO3	U18EE511.3	2	2	-	1	1	-	-	-	1	-	-	1	1	2
CO4	U18EE511.4	2	2	-	1	-	-	-	-	1	-	-	1	1	2
U18EE511		**2**	**2**	**-**	**1**	**1**	**-**	**-**	**-**	**1**	**-**	**-**	**1**	**1**	**1.5**

U18CI504 EMBEDDED SYSTEM DESIGN

Class: B.Tech. V – Semester **Branch:** Electronics Communication and Instrumentation (ECI)

Teaching Scheme:

L	T	P	C
3	-	-	3

Examination Scheme:

Continuous Internal Evaluation	40 marks
End Semester Examination	60 marks

Course Learning Objectives (LOs):
This course will develop students' knowledge on /in…
LO1: components of embedded systems
LO2: issues related to embedded system's hardware-software codesign
LO3: firmware development through embedded C
LO4: RTOS based embedded system design

UNIT – I (9)

Introduction to Embedded Systems: Definition of embedded system, embedded systems Vs general gomputing Systems, history of embedded systems, classification, major application areas, purpose of embedded Systems, core of the embedded system, memory, sensors and actuators, communication interface, other system components

UNIT – II (9)

Characteristics and Quality Attributes of Embedded Systems: Characteristics of an embedded system, quality attributes of an embedded system.
Hardware Software Codesign: Fundamental issues in hardware software codesign, computational models in Embedded design.
Embedded Firmware Design and Development: Embedded firmware design approaches, embedded firmware design languages.

UNIT – III (9)

Programming in Embedded C: 'C' vs. embedded C, compiler vs. cross compiler, using 'C' in embedded C – data types, arrays, structures and unions; data types for 8051 supported by Cx51 Compiler, additional data types for the 8051, accessing memory areas of the 8051, bit addressable variables, interrupt service routines 'using' attribute, pointers, performance comparison between assembly and embedded 'C' programming

UNIT – IV (9)

RTOS Based Embedded System Design: Operating system basics, types of operating systems, tasks, process and threads, multiprocessing and multitasking, task scheduling, task communication, task synchronization, task communication/synchronization issues, task synchronization techniques, device drivers, how to choose an RTOS.

Text Books:

[1]. Shibu K V, *Introduction to Embedded Systems,* New Delhi: McGraw Hill Education (India) Pvt. Ltd., 2009. *(Chapter 1, 2, 5, 6, 7, 9 and 10)*

[2]. Manish K Patel, *The 8051 Microcontroller Based Embedded Systems*, New Delhi: McGraw Hill Education (India) Pvt. Ltd., 2014. *(Chapter 12)*

Reference Books:

[1]. Raj Kamal, *Embedded Systems, Architecture Programming and Design*, 2nd ed., New Delhi: TMH, 2008.
[2]. Frank Vahid, Tony Givargis, *Embedded System Design, A Unified Hardware / Software Introduction,* 3rd ed., New Delhi: John Wiley India, 2002.
[3]. Lyla B. Das,*Embedded Systems, An Integrated Approach,* New Delhi: Pearson Education,2013.
[4]. David E. Simon, *An Embedded Software Primer,* Boston: Addison-Wesley, 1999.

Course Research Papers: Research papers (Journal/Conference papers) relevant to the course content will be posted by the course faculty in Course Web page

Course Patents: Patents relevant to the course content will be posted by the course faculty in Course Web page

Course Projects: Course project is an independent project carried out by the student during the course period, under the supervision of course faculty. Course faculty will post few course projects titles in Course Web page. Students are encouraged to come up and experiment with the ideas that interest them.

Course Learning Outcomes (COs):
On completion of this course, the students will be able to…

CO1: choose various components to build embedded systems
CO2: make use of various models for hardware software codesign of embedded systems
CO3: *utilize embedded C for developing embedded firmware*
CO4: *select suitable RTOS for the development an embedded system*

Course Articulation Matrix (CAM):U18CI504 EMBEDDED SYSTEM DESIGN

CO		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	U18CI504.1	1	1	1	1	-	-	-	1	1	1		1	2	1
CO2	U18CI504.2	1	2	2	1	1	-	-	1	1	1		1	2	1
CO3	U18CI504.3	1	2	2	1	-	-	-	1	1	1		1	2	1
CO4	U18CI504.4	1	2	2	1	1	-	-	1	1	1		2	2	1
U18CI504		**1**	**1.75**	**1.75**	**1**	**1**	**-**	**-**	**1**	**1**	**1**		**1**	**2**	**1**

U18CI505 LINEAR INTEGRATED CIRCUITS AND APPLICATIONS

Class: B.Tech. V – Semester **Branch:** Electronics Communication and Instrumentation (ECI)

Teaching Scheme: **Examination Scheme:**

L	T	P	C
3	–	–	3

Continuous Internal Evaluation	40 marks
End Semester Examination	60 marks

Course Learning Objectives:

This course will develop students' knowledge in/on

LO1: building blocks & characteristics of Op-Amp
LO2: linear and non-linear applications of Op-Amps
LO3: active filters using Op-Amps and operation of IC 555 timer & its applications
LO4: operation of PLL, voltage regulators and data converters

UNIT – I(9)

Integrated circuits (ICs): Introduction, Classification of ICs

Operational Amplifier (Op-Amp): Differential amplifier, Dual input balanced output differential amplifier, Dual input unbalanced output differential amplifier, Building blocks of Op-Amp, Analysis of basic inverting & non-inverting amplifier configurations and Voltage follower

DC Characteristics of Op-Amp: Input offset voltage, Input bias current, Input offset current, Total output offset voltage, Thermal drift, Supply voltage rejection ratio (SVRR), Common mode rejection ratio (CMRR)

AC Characteristics of Op-Amp: Open loop and closed loop frequency response, Stability of Op-Amp, Slew rate, Ideal and practical characteristics of IC μA741

UNIT – II (9)

Applications of Operational Amplifiers: Summing and difference amplifiers, Integrator and differentiator, Voltage to Current converter, Current to Voltage converter, Instrumentation amplifier, Sample and hold circuit

Non-linear Applications: Precision rectifiers–Half and full wave rectifiers; Log & Antilog amplifiers

Comparators and Waveform Generators: Op-Amp comparators, Regenerative comparators (Schmitt Trigger), RC phase shift and Wien's bridge oscillators

UNIT – III (9)

Active filters: Introduction, Ideal and realistic frequency responses of various filters, First & second order filters, Analysis and design of VCVS configured low pass, High pass, Band pass and band stop filters, IGMF configured narrow band pass and narrow band reject filters, Twin T-notch filter

IC 555 timer: Introduction, Functional diagram, Design of astable and monostable multivibrators using 555timer, Applications of astable multivibrator - FSK generator, Pulse-Position modulation, Schmitt trigger Applications of monostable multivibrator - Missing pulse detector, Linear ramp generator, Pulse-width modulation

UNIT – IV (9)

Phase Locked Loops (PLLs) (*Qualitative treatment only):* Voltage controlled oscillator, Basic PLL operation, Definitions related to PLL, Transient response of PLL, Monolithic PLL and design considerations, PLL applications – FSK and AM detectors

Voltage Regulators: Basic voltage regulator using Op-Amps, General purpose IC regulator, μA723 - Functional diagram, specifications, Design of low and high voltage regulators, three terminal voltage (fixed) regulators- General features and IC series of three terminal regulators

Data Converters: DAC types - Weighted resistor and R-2R ladder; ADC types - Flash, Successive approximation & Dual slope

Textbook:

[1]. D. Roy Choudhury and Shail B. Jain, *Linear Integrated Circuits*, 4th ed., New Delhi: New Age International Pvt. Ltd., 2010.

Reference Books:

[1]. RamakantGayakwad, *Op-Amps and Linear Integrated Circuits*, 4th ed. New Delhi: Pearson Education, 2015.

[2]. George B. Clayton, *Linear Integrated Circuits and Applications*, London: The Macmillan Press Ltd., 1975.

[3]. RodertF.Coughlin and Frederick F.Driscoll, *Operational Amplifiers and Linear Integrated Circuits*, 6th ed. New Delhi: Pearson Education, 2000.

[4]. S. Salivahanan and V S Kanchana Bhaaskaran, *Linear Integrated Circuits,* 3rd ed. Chennai: McGraw Hill Education (India) Pvt. Ltd., 2019.

Course Research Papers: Research papers (Journal/Conference papers) relevant to the course content will be posted by the course faculty in Course Web page

Course Patents: Patents relevant to the course content will be posted by the course faculty in Course Web page

Course Projects: Course project is an independent project carried out by the student during the course period, under the supervision of course faculty. Course faculty will post few course projects titles in Course Web page. Students are encouraged to come up and experiment with the ideas that interest them.

Course Learning Outcomes (COs):

On completion of this course, the students will be able to…

CO1: analyze characteristics of Op-Amp IC741 using fundamental concepts

CO2: design Op-amp based simple linear & non-linear circuits for the given specifications

CO3: design Op-Amp based active filters using VCVS & IGMF topologies and IC 555 timer based multivibrator circuits for the given specifications

CO4: design IC PLL based application circuits, IC 723 based voltage regulators for the given specifications and choose suitable data converter for given design specifications

Course Articulation Matrix: U18CI505 Linear Integrated Circuits and Applications															
CO		**PO 1**	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**
CO1	U18CI505.1	1	2	2	1	-	-	-	1	1	1		1	2	2
CO2	U18CI505.2	1	2	2	1	-	-	-	1	1	1		1	2	2
CO3	U18CI505.3	1	2	2	1	-	-	-	1	1	1		1	2	2
CO4	U18CI505.4	1	2	2	1	-	-	-	1	1	1		1	2	2
U18CI505		**1**	**2**	**2**	**1**	**-**	-	-	**1**	**1**	**1**		**1**	**2**	2

U18CI506 EMBEDDED FIRMWARE DEVELOPMENT LABORATORY

Class: B.Tech. V – Semester **Branch:** Electronics Communication and Instrumentation (ECI)

Teaching Scheme:

L	T	P	C
	–	2	1

Examination Scheme:

Continuous Internal Evaluation	40 marks
End Semester Examination	60 marks

Course Learning Objectives (LOs):

This course will develop students' knowledge on/in…

LO1: microprocessor/microcontroller based computer systems and integrated development environments (IDEs) used for system development

LO2: implementation of simple arithmetic, logical & data processing algorithms using assembly language programs (ALPs) for 8086 and ALPs & embedded C programs (ECPs) for 8051

LO3: ALPs and ECPs for interfacing simple input and output devices with 8051 microcontroller

LO4: ALPs and ECPs for interfacing data converters and motors with 8051 microcontroller

LIST OF EXPERIMENTS

1. Study of 8086 Trainer Board
2. 8086 based ALPs (Assembly language programs) for simple Arithmetic operations (Addition, Subtraction, Multiplication and Division) on Single and Double Precision data
3. 8051 based ALPs for
    a. Finding Largest / Smallest Number
    b. Arranging in Ascending/ Descending order
4. ALPs for String manipulation
5. ALPs / ECPs (Embedded C Programs) for implementing arithmetic operations (Multiplication, Division) on single and double precision binary data
6. ALP / ECP for searching largest / smallest numbers in an array
7. ALP / ECP for matrix key board interfacing
8. ALP / ECP for 7-Segment display interfacing
9. ALP / ECP for LCD interfacing
10. ALP / ECP for DAC interfacing
11. ALP / ECP for ADC interfacing
12. ALP / ECP for stepper / DC motor interfacing

Laboratory Manual:

[1] *Microprocessors & Microcontrollers Laboratory manual,* Department of ECE, KITSW.

Reference Books:

[1] D.V.Hall, *Microprocessors & Interfacing,* 3rd ed.,NewDelhi:Tata McGraw Hill, 2012.

[2] Manish K Patel, *The 8051 Microcontroller Based Embedded Systems*, New Delhi: McGraw Hill Education (India) Pvt. Ltd., 2014.

Course Projects: Course project is an independent project carried out by the student during the course period, under the supervision of course faculty. Course faculty will post few course projects titles in Course Web page. Students are encouraged to come up and experiment with the ideas that interest them.

Course Learning Outcomes (COs):
On completion of this course, students will be able to…

CO1: utilize development boards and integrated development environments (IDEs) for implementation of ALPs for 8086MP & ECPs for 8051MC
CO2: develop arithmetic, logical & data processing algorithms using assembly language programs (ALPs) for 8086 and ALPs & embedded C programs (ECPs) for 8051
CO3: develop ALPs & ECPs for interfacing input output devices with 8051MC
CO4: develop ALPs & ECPs for interfacing data converters & motors with 8051MC

Course Articulation Matrix (CAM): U18CI506 EMBEDDED FIRMWARE DEVELOPMENT LABORATORY

CO		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	U18CI506.1	2	2	1	1	1	-	-	1	1	1		1	1	2
CO2	U18CI506.2	2	2	2	1	1	-	-	1	1	1		1	1	1
CO3	U18CI506.3	2	2	2	1	1	-	-	1	1	1		1	2	2
CO4	U18CI506.4	2	2	2	1	1	-	-	1	1	1		1	1	2
U18CI506		**2**	**2**	**1.75**	**1**	**1**	**-**	**-**	**1**	**1**	**1**		**1**	**1.25**	**1.75**

U18CI507 ANALOG AND DIGITAL COMMUNICATIONS LABORATORY

Class: B.Tech. V – Semester **Branch:** Electronics Communication and Instrumentation (ECI)

Teaching Scheme:

L	T	P	C
-	–	2	1

Examination Scheme:

Continuous Internal Evaluation	40 marks
End Semester Examination	60 marks

Course Learning Objectives (LOs):

This course will develop students' knowledge on /in…

LO1: calculating the modulation index in AM practically
LO2: calculating the modulation index and frequency deviation in FM practically
LO3: experimental method for converting analog signal into digital signal
LO4: generation and demodulation of digital signals.

LIST OF EXPERIMENTS

1. Generation of AM Signal, find the modulation index and percentage of modulation with different modulation signals
2. Study of Modulation and demodulation of DSB-SC signal
3. Calculate the modulation index, frequency deviation of FM signal
4. Observe the effects of Pre-emphasis and De-emphasis on given input signal
5. Study the characteristics of PLL
6. Generation and demodulation of Analog Pulse Modulation Signals
   - 6.1 Pulse Amplitude Modulation
   - 6.2 Pulse Width modulation
   - 6.3 Pulse Position Modulation
7. Interpretation of modulated and demodulated waveforms of a PCM system for different sampling frequencies
8. Study of DeltaModulation & Demodulation and observe the effect of slope overload
   - 8.1 AdaptiveDelta modulation and demodulation
   - 8.2 Sigma Delta modulation and demodulation
9. Study of Digital modulation techniques
   - 9.1 Amplitude Shift Keying
   - 9.2 Phase Shift Keying
   - 9.3 Frequency Shift Keying
10. Modulation and demodulation of Differential Phase Shift Keying (DPSK) signal
11. Study of QPSKmodulationanddemodulation for different data rates

Experiments beyond the Syllabus:

12. Study of M-ary Quadrature Amplitude Modulation (QAM)
13. MATLAB and Simulink implementations of Amplitude modulation
14. MATLAB and Simulink implementations of Frequency modulation

LaboratoryManual:

[1]. *Communication Systems laboratory Manual,* Dept. of ECE, KITSW

Reference Book:

[1] Simon Haykin, *Communications Systems*, 4th ed. Singapore: John Wiley & Sons, Inc. 2004.

Course Projects: Course project is an independent project carried out by the student during the course period, under the supervision of course faculty. Course faculty will post few course projects titles in Course Web page. Students are encouraged to come up and experiment with the ideas that interest them.

Course Learning Outcomes (COs):

On completion of this course, students will be able to…

CO1: *determine the modulation index and percentage modulation of an AM carrier from the time domain curve plot*

CO2: *determine the modulation index and also measure the frequency deviation of an FM signal*

CO3: *test sampling theorem & observe the quantization process of the input analog signal in PCM, DM and analyze the effect of sampling rate on Quantization noise & step-size*

CO4: *analyze the amplitude, frequency and phase in different shift keying techniques*

Course Articulation Matrix (CAM): U18CI507 ANALOG & DIGITAL COMMUNICATIONS LABORATORY															
CO		**PO 1**	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**
CO1	U18CI507.1	2	1	1	1	-	-	-	1	1	1		1	1	2
CO2	U18CI507.2	2	1	1	1	-	-	-	1	1	1		1	2	2
CO3	U18CI507.3	2	1	1	1	-	-	-	1	1	1		1	1	2
CO4	U18CI507.4	2	1	1	1	-	-	-	1	1	1		1	1	1
U18CI507		**2**	**1**	**1**	**1**	**-**	**-**	**-**	**1**	1	**1**		**1**	**1.25**	**1.75**

U18CI508 LINEAR AND DIGITAL INTEGRATED CIRCUITS LABORATORY

Class: B.Tech. V – Semester **Branch:** Electronics Communication and Instrumentation (ECI)

Teaching Scheme:

L	T	P	C
-	–	2	1

Examination Scheme:

Continuous Internal Evaluation	40 marks
End Semester Examination	60 marks

Course Learning Objectives:

This course will develop students' knowledge in/on

LO1: static & dynamic parameters of operational amplifier
LO2: operational amplifier applications
LO3: logic gates & Combinational circuits
LO4: flip flops & sequential circuits

LIST OF EXPERIMENTS ON LINEAR ICS

1. Measurement of static and dynamic parameters of Op-Amp IC 741
2. Design and testing of differentiator and integrator using Op-Amp IC 741
3. Design and testing of Instrumentation Amplifier using 3-Op-Amps IC 741
4. Design and testing of log amplifier and precision rectifier using Op-Amp IC 741
5. Design of a Wien's bridge oscillator for specified frequency using Op-Amp IC 741
6. Design and testing of second order active low pass filter using Op-Amp IC 741
7. Design and testing of Astable and Monostable multivibrators using IC 555

LIST OF EXPERIMENTS ON DIGITAL ICs

1. Implementation of Boolean functions using basic and universal logic gates.
2. Implementation and functional verification of adders and subtractors using logic gates.
3. Implementation and functional verification of BCD to Excess-3 and Binary to Gray code converter
4. Implementation and functional verification of 4x1 Multiplexer and 1x4 Demultiplexer.
5. Implementation and functional verification of Flip-flops using NAND gates.
6. Implementation and functional verification of shift registers.
7. Implementation and functional verification of Ring counter and Johnson Counter.

Laboratory Manual:

[1] *Linear and Digital Integrated circuits laboratorymanual,* Department of ECE, KITSW.

References:

[1]. D. Roy Choudhury and Shail B Jain, *Linear Integrated Circuits*, 4th ed. New Delhi:New Age International, 2010.

[2]. Moris Mano, M.D. Cillett, Digital *Design,* 4thed.New Delhi: Prentice Hall of India, 2006.

Course Projects: Course project is an independent project carried out by the student during the course period, under the supervision of course faculty. Course faculty will post few course projects titles in Course Web page. Students are encouraged to come up and experiment with the ideas that interest them.

Course Learning Outcomes (COs):

On completion of this course, the students will be able to…

CO1: determine AC & DC characteristics of operational amplifier
CO2: design application circuits using IC741 OP-AMP and test their functionality
CO3: test the functionality of logic gates & combinational circuits
CO4: test the functionality of flip flops & implement sequential circuits

Course Articulation Matrix: U18CI508 Linear and Digital Integrated Circuits Laboratory														
CO		**PO 1**	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**
CO1	U18CI508.1	2	2	1	1	-	-	-	1	1	1		1	2	2
CO2	U18CI508.2	2	2	1	1	-	-	-	1	1	1		1	2	2
CO3	U18CI508.3	2	2	1	1	-	-	-	1	1	1		1	2	2
CO4	U18CI508.4	2	2	1	1	-	-	-	1	1	1		1	2	2
U18CI508		**2**	**2**	**1**	**1**	**-**	**-**	**-**	**1**	**1**	**1**		**1**	**1**	**2**

U18CI510 SEMINAR

Class: B.Tech. V - Semester **Branch:** Electronics Communication and Instrumentation (ECI)

Teaching Scheme:

L	T	P	C
-	-	2	1

Examination Scheme:

Continuous Internal Evaluation	100 marks
End Semester Examination	-

Course Learning Objectives (LOs):

This course will develop students' knowledge on /in…

LO1: selecting topic, referring to peer reviewed journals / technical magazines / conference proceedings
LO2: literature review and well-documented report writing
LO3: creating PPTs and effective technical presentation
LO4: preparing a technical paper in scientific journal style & format

Student has to give independent seminar on the state-of-the-art technical topics relevant to their program of study, which would supplement and complement the program assigned to each student.

Guidelines:

1. The HoD shall constitute a Department Seminar Evaluation Committee (DSEC)
2. DSEC shall allot a faculty supervisor to each student for guiding on (i) selection of topic (ii) literature survey and work to be carried out (iii) preparing a report in proper format and (iv) effective seminar presentation
3. There shall be only Continuous Internal Evaluation (CIE) for seminar
4. The CIE for seminar is as follows:

Assessment	Weightage
Seminar Supervisor Assessment	20%
Seminar Report	30%
Seminar Paper	20%
DSEC Assessment: *Oral presentation with PPT and viva-voce*	30%
Total Weightage:	100%

Note: It is mandatory for the student to appear for oral presentation and viva-voce to qualify for course evaluation

(a) **Seminar Topic**: The topic should be interesting and conducive to discussion. Topics may be found by looking through recent issues of peer reviewed Journals / Technical Magazines on the topics of potential interest

(b) **Report:** Each student is required to submit a well-documented report on the chosen seminar topic as per the format specified by *DSEC.*

(c) **Anti-Plagiarism Check:** The seminar report should clear plagiarism check as per the Anti-Plagiarism policy of the institute.

(d) **Presentation:** Each student should prepare PPT with informative slides and make an effective oral presentation before the *DSEC* as per the schedule notified by the department

(e) The student has to register for the Seminar as supplementary examination in the following cases:
   i) he/she is absent for oral presentation and viva-voce
   ii) he/she fails to submit the report in prescribed format
   iii) he/she fails to fulfill the requirements of seminar evaluation as per specified guidelines

(f) i) The CoE shall send a list of students registered for supplementary to the HoD

concerned

ii) The DSEC, duly constituted by the HoD, shall conduct seminar evaluation and send the award list to the CoE within the stipulated time

Course Learning Outcomes (COs):

On completion of this course, students will be able to…

CO1: select current topics in their engineering discipline & allied areas from peer reviewed journals / technical magazines/ conference proceedings

CO2: demonstrate the skills for performing literature survey, identify gaps, analyze the technical content and prepare a well-documented seminar report

CO3: create informative PPT and demonstrate communication skills through effective oral presentation showing knowledge on the subject & sensitivity towards social impact of the seminar topic

CO4: write a "seminar paper" in scientific journal style & format from the prepared seminar report

Course Articulation Matrix (CAM): U18CI510 SEMINAR

CO		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	U18CI510.1	1	1	-	1	1	-	1	2	2	2	1	2	-	2
CO2	U18CI510.2	1	1	-	-	-	-	-	2	2	2	-	2	1	2
CO3	U18CI510.3	-	-	-	-	-	-	1	2	2	2	-	2	2	2
CO4	U18CI510.4	-	-	-	-	-	-	-	2	2	2	-	2	-	1
U18CI510		**1**	**1**	**-**	**1**	**1**	**-**	1	2	2	2	1	**2**	**1.5**	**1.75**

DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING
KAKATIYA INSTITUTE OF TECHNOLOGY & SCIENCE: WARANGAL-15
(An Autonomous Institute under Kakatiya University, Warangal)

SCHEME OF INSTRUCTION & EVALUATION
VI - SEMESTER OF 4-YEAR B.TECH ECI DEGREE PROGRAM

[5Th+3P+2MC]

Sl.No	Category	Course Code	Course Title	Hour per week			Credits	Evaluation Scheme				
				L	T	P		CIE			ESE	Total Marks
								TA	MSE	Total		
1	HSMC	U18TP601	Quantitative Aptitude and Logical Reasoning	2	-	-	1	10	30	40	60	100
2	HSMC	U18MH602	Management Economics and Accountancy	3	-	-	3	10	30	40	60	100
3	PE	U18CI603	Professional Elective -II / MOOCs-II	3	-	-	3	10	30	40	60	100
4	PCC	U18CI604	Embedded Systems with ARM Processor	3	-	-	3	10	30	40	60	100
5	PCC	U18CI605	VLSI System Design	3	-	-	3	10	30	40	60	100
6	PCC	U18CI606	Artificial Intelligence and Machine Learning	3	-	-	3	10	30	40	60	100
7	PCC	U18CI607	Digital Design Laboratory	-	-	2	1	40	-	40	60	100
8	PCC	U18CI608	Embedded Systems with ARM Processor Laboratory	-	-	2	1	40	-	40	60	100
9	PCC	U18CI609	Embedded Networking and Application Laboratory	-	-	2	1	40	-	40	60	100
10	PROJ	U18CI610	Mini Project	-	-	2	1	100	-	100	-	100
			Total:	17	-	8	20	280	180	460	540	1000

L= Lecture, T = Tutorials, P = Practicals& C = Credits

Professional Elective-II / MOOCs-II:

U18CI 603A : Antennas and Wave Propagation
U18CI 603B : Wireless Sensor Networks and Applications
U18CI 603C : Biomedical Instrumentation
U18CI 603M : MOOC Course

Contact hours per week : 25
Total Credits : 20

U18TP601 QUANTITATIVE APTITUDE AND LOGICAL REASONING

Class: B.Tech. VI – Semester **Branch:** Electronics Communication and Instrumentation (ECI)

Teaching Scheme:

L	T	P	C
2	–		1

Examination Scheme:

Continuous Internal Evaluation	40 marks
End Semester Examination	60 marks

Course Learning Objectives (LOs):

This course will develop students' knowledge on /in…

LO1: quantitative aptitude & problem solving skills

LO2: computing abstract quantitative information

LO3: application of basic mathematics skills & critical thinking to draw conclusions

LO4: evaluating the validity & possible biases in arguments presented in authentic contexts

UNIT - I (6)

Quantitative Aptitude-I: Number system, Averages, Percentages, Ratios & proportions, Time, Speed & distance, Time and work, Data interpretation

UNIT - II (6)

Quantitative Aptitude-II: Simple Interest, Compound Interest, Profit & loss, Ages, Permutations & Combinations, Probability

UNIT - III (6)

Logical Reasoning-I: Series completion, Analogy, Coding and decoding, Blood relations, Number, Ranking & Time sequence test, Linear & Circular arrangements

UNIT - IV (6)

Logical Reasoning-II: Data sufficiency, Logical Venn diagram, Syllogisms, Statement & Arguments, Statement & Assumptions, Direction sense test

Text Books:

[1] R S Agarwal, *Quantitative Aptitude for Competitive Examinations*, 3rd ed. New Delhi: S. Chand Publications, 2019. *(Chapters 1,6,7,8,10,11,12,15,17,21,22,30,31)*

[2] R S Agarwal, *A Modern Approach to Verbal and Non-Verbal Reasoning*, 3rd ed. New Delhi: S. Chand Publications, 2019. *(Chapters Section I: 1,3,4,5,6,8,16, Section II: 2,3)*

Reference Books:

[1] Dinesh Khattar, *Quantitative Aptitude for Competitive Examinations*, New Delhi: Pearson India, 2019.

[2] Nishit K Sinha, *Reasoning for Competitive Examinations*, New Delhi: Pearson India, 2019.

[3] R.N.Thakur , *General Intelligence and Reasoning*, New Delhi: McGraw Hill Education, 2017.

Course Learning Outcomes (COs):

On completion of this course, students will be able to…

CO1: solve arithmetic relationships and interpret data using mathematical models

CO2: compute abstract quantitative information

CO3: apply basic mathematics & critical thinking skills to draw conclusions and solve problems

CO4: evaluate the validity & possible biases in arguments presented in authentic contexts logically & sensibly

Course Articulation Matrix (CAM): U18TP601 QUANTITATIVE APTITUDE AND LOGICAL REASONING

CO		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	U18TP601.1	1	2	-	1	-	-	-	-	-	-	-	1	1	1
CO2	U18TP601.2	1	2	-	1	-	-	-	-	-	-	-	1	1	1
CO3	U18TP601.3	-	1	-	2	-	2	-	-	-	-	-	1	1	1
CO4	U18TP601.4	-	1	-	2	-	2	-	-	-	-	-	1	1	1
U18TP601		**1**	**1.5**	**-**	**1.5**	**-**	**2**	**-**	**-**	**-**	**-**	**-**	**1**	**1**	**1**

U18MH602 MANAGEMENT ECONOMICS AND ACCOUNTANCY

Class: B.Tech. VI – Semester **Branch:** Electronics Communication and Instrumentation (ECI)

Teaching Scheme: **Examination Scheme:**

L	T	P	C
3	–		3

Continuous Internal Evaluation	40 marks
End Semester Examination	60 marks

Course Learning Objectives (LOs):

This course will develop students' knowledge on /in…

LO1: basic concepts of management.
LO2: concepts of economics and forms of business organizations.
LO3: fundamentals of accountancy and journalizing.
LO4: preparation of final accounts.

UNIT-I (9)

Management: Meaning and definition, Scientific Management - Definition, Characteristics, Principles of management

Functions of Management: Planning - Definition, Characteristics; Organizing - Definition, Characteristics; Staffing - Meaning, Functions of personnel management; Directing- Leadership, Nature; Motivation – Nature, Types (financial, non-financial, intrinsic and extrinsic), Communication- Process, Types, Co- ordination- Definition, Steps to achieve effective coordination, Controlling- Definition, process.

UNIT-II (9)

Economics: Meaning and definition, Scope, Micro and Macro Economics, Methods of Economics, Laws of Economics

Forms of Business Organization: Sole Proprietor ship, Partnership firm - Types of Partners, Cooperative society, Joint Stock Company - Features, Types, Merits and demerits

UNIT-III (9)

Double Entry System and Book Keeping: Accounting concepts and conventions, Overview of accounting cycle, Journal-meaning, Journalizing, Ledger - Meaning, Ledger posting, Balancing; Cash book (Single column), Preparation of Trial balance

UNIT-IV (9)

Final Accounts: Trading Account, profit and loss account and Balance Sheet with simple adjustments

Text Books:

[1] Y. K. Bhushan, *Fundamentals of Business Organization and Management*, 20th ed. New Delhi: Sultan Chand & Sons, 2017. (Units 1,2)
[2] T. S. Grewal, S.C. Gupta, *Introduction to Accountancy*, 8th ed. New Delhi: S. Chand Publications, 2014. (Units 3 ,4)

Reference Books:

[1] L.M. Prasad, *Principles and Practice of Management*, 9th ed., New Delhi: Sultan Chand, 2016.
[2] R.L. Gupta & V.K. Gupta, *Principles and Practice of Accountancy*, 14th ed., New Delhi: Sultan Chand and Sons, 2018.

Course Learning Outcomes (COs):
On completion of this course, students will be able to…
CO1: comprehend the basic concepts of management
CO2: distinguish between micro &macro economics& forms of business organizations
CO3: pass journal entries & post them into ledgers
CO4: prepare profit & loss accounts and assess the financial position through the balance sheet

Course Research Papers: Research papers (Journal/Conference papers) relevant to the course content will be posted by the course faculty in Course Web page

Course Case Study: Case studies relevant to the course content will be posted by the course faculty in Course Web page

Course Projects: Course project is an independent project carried out by the student during the course period, under the supervision of course faculty. Course faculty will post few course projects titles in Course Web page. Students are encouraged to come up and experiment with the ideas that interest them.

Course Articulation Matrix: U18MH602 MANAGEMENT ECONOMICS AND ACCOUNTANCY

CO		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	U18MH602.1	-	-	-	-	-	-	-	-	1	1	1	1	-	-
CO2	U18MH602.2	-	-	-	-	-	-	-	-	1	1	2	1	-	-
CO3	U18MH602.3	-	-	-	-	-	-	-	-	1	1	1	1	-	-
CO4	U18MH602.4	-	-	-	-	-	-	-	-	1	1	1	1	-	-
U18MH602		**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**1**	**1**	**1.25**	**1**	**-**	**-**

U18CI603A ANTENNAS AND WAVE PROPAGATION

Class: B.Tech.VI-Semester **Branch:** Electronics Communication and Instrumentation (ECI)

Teaching Scheme :

L	T	P	C
3	-	-	3

Examination Scheme :

Continuous Internal Evaluation	40 marks
End Semester Examination	60 marks

Course Learning Objectives (LOs):

This course will develop students' knowledge on /in…

LO1: radiation mechanism & antenna properties

LO2: linear antenna arrays & its radiation patterns

LO3: antennas used at different frequencies- VHF, UHF, Microwave frequencies

LO4: wave propagations-surface, space & sky wave

UNIT-I (9)

Linear Wire Antennas : Introduction to antennas and radiation mechanism, retarded potentials, radiation from small dipole, half wave dipole and quarter wave monopole, current distribution, electric and magnetic field components, radiated power, radiation resistance.

Antenna Properties: Radiation pattern, beam width, radiation intensity, gain and directivity, bandwidth, polarization, antenna impedance, effective length, aperture concepts and types, efficiency, front to back ratio, reciprocity theorem applied to antennas, friis transmission equation.

UNIT-II (9)

Linear Antenna Arrays: Two-element arrays –different cases; N-element uniform linear array- broadside and end fire arrays, characteristics -directivity and BWFN, comparison, principle of pattern multiplication, binomial array, concept of phased array.

Non-Resonant Radiators: Introduction, travelling wave radiators - basic concepts, V and inverted V-antennas, rhombic antenna- construction details &design considerations

UNIT-III (9)

VHF, UHF and Microwave Antennas: Yagi-Uda antenna- parasitic elements & folded dipole, plane sheet and corner reflectors, paraboloidal reflectors - characteristics, types of feeds- offset feed and cassegrain feeds, horn antennas- types, design considerations, optimum horns, helical antenna, concept of microstrip antenna-introduction to rectangular microstrip antenna, advantages, disadvantages and applications.

UNIT-IV (9)

Wave Propagation: Introduction, factors involved in wave propagation, ground wave propagation-characteristics, wave tilt, flat earth considerations, ionosphere formation of layers and mechanism of propagation, reflection and refraction mechanisms, critical

frequency, maximum usable frequency, optimum working frequency, skip distance, virtual height, space wave propagation- M curves and duct propagation, tropospheric scattering.

Text Books:

[1] John D Kraus, Ronald J Marhefka and Ahmad Khan. Kraus, *Antennas and Wave Propagation*, 4th ed., New Delhi: Tata McGraw Hill Education, 2011.(*Chapters 2,4 to 9,14,22,23,24,25)*

[2] E.C. Jordan and K.G. Balmain, *Electromagnetic Waves and Radiating Systems*, 2nd ed., New Delhi:Prentice Hall of India(PHI), 2001.*(Chapters 10,11,12)*

Reference Books:

[1] Constantine A.Balanis, *Antenna Theory,* 2nd ed., New York: John Wiley & Sons, 1997.

[2] K.D.Prasad, *Antenna and Wave Propagation*, 3rd ed., New Delhi: Satya Prakashan, 1996.

[3] F.E.Terman, *Electronic and Radio Engineering*, 4th ed., New York: McGraw-Hill, 1955.

[4] R.L.Yadav, *Antennas and Wave Propagation,* 2nd ed., NewDelhi: Prentice Hall of India(PHI),2013

Course Research Papers: Research papers (Journal/Conference papers) relevant to the course content will be posted by the course faculty in Course Web page

Course Patents: Patents relevant to the course content will be posted by the course faculty in Course Web page

Course Projects: Course project is an independent project carried out by the student during the course period, under the supervision of course faculty. Course faculty will post few course projects titles in Course Web page. Students are encouraged to come up and experiment with the ideas that interest them.

Course Learning Outcomes (COs):

On completion of this course, students will be able to….

CO1: discuss radiation mechanism & fundamental characteristics of antennas

CO2: design two element & n-element arrays

CO3: build VHF, UHF & microwave antennas

CO4: distinguish ground wave, space wave & sky wave propagation

Course Articulation Matrix (CAM):U18CI603A ANTENNAS AND WAVE PROPAGATION

CO		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	U18CI603A.1	2	1	2	1	-	-	-	1	1	1		1	1	1
CO2	U18CI603A.2	2	1	2	1	-	-	-	1	1	1		1	1	1
CO3	U18CI603A.3	2	1	2	1	-	-	-	1	1	1		1	1	1
CO4	U18CI603A.4	2	1	2	1	-	-	-	1	1	1		1	1	1
U18CI603A		**2**	**1**	**2**	**1**	**-**	**-**	**-**	**1**	**1**	**1**		**1**	**1**	**1**

U18CI603B WIRELESS SENSOR NETWORKS AND APPLICATIONS

Class: B.Tech. VI – Semester
Branch: Electronics Communication & Instrumentation (ECI)

Teaching Scheme:

L	T	P	C
3	–	–	3

Examination Scheme:

Continuous Internal Evaluation	40 marks
End Semester Examination	60 marks

Course LearningObjectives (LOs):

This course will develop students' knowledge on /in…

LO1: wireless sensor networks and applications
LO2: different MAC protocols for WSNs
LO3: network layer protocols for WSNs
LO4: power management and time synchronization strategies in WSNs

UNIT–I (9)

Introduction: Definitions and Background: Sensing and Sensors, Wireless Sensor Networks. Challenges and Constraints: Energy, Self-Management, Wireless Networking, Decentralized Management, Design Constraints, Security.

Applications: Structural Health Monitoring: Sensing Seismic Events, Single Damage Detection Using Natural Frequencies, Multiple Damage Detection Using Natural Frequencies, Multiple Damage Detection Using Mode Shapes, Coherence. Traffic Control, Health Care, Pipeline Monitoring, Precision Agriculture

UNIT – II (9)

Medium Access Control: Overview: Contention-Free Medium Access, Contention-Based Medium Access. Wireless MAC Protocols: Carrier Sense Multiple Access, Multiple Access with Collision Avoidance (MACA) and MACAW, MACA By Invitation. Characteristics of MAC Protocols in Sensor Networks. Contention-Free MAC Protocols-Characteristics, Traffic-Adaptive Medium Access, Y-MAC, DESYNC-TDMA. Contention-Based MAC Protocols: Power Aware Multi-Access with signalling, Sensor MAC, Timeout MAC, Pattern MAC.

UNIT – III (9)

Network Layer: Overview, Routing Metrics, Flooding Gossiping, Data-Centric Routing-Sensor Protocols for Information via Negotiation, Directed Diffusion, Rumor Routing, Gradient-Based Routing. Proactive Routing-Destination-Sequenced Distance Vector, Optimized Link State Routing. On-Demand Routing-Ad Hoc On-Demand Distance Vector, Dyanamic Source Routing. Hierarchical Routing, Location-Based Routing-Unicast, Multicast and Geocasting.

UNIT – IV (9)

Node and Network Management: Power Management-Local power management aspects, Dynamic Power Management. Time Synchronization: Clocks and the Synchronization Problem. Time Synchronization in Wireless Sensor Networks, Basics of Time Synchronization, Time Synchronization Protocols-Reference Broadcasts Using Global

Sources of Time, Lightweight Tree-Based Synchronization, Timing-sync Protocol for Sensor Networks, Flooding Time synchronization Protocol, Reference-Broadcast Synchronization

Text Books:

[1]. WaltenegusDargie and Christian Poellabauer, *Fundamentals of Wireless Sensor Networks: Theory and Practice, WILEY,*2005.

Reference Books:

[1]. Mohammad S. Obaidat, Sudip Misra, *Principles of Wireless Sensor Networks,* Cambridge, 2014.

[2]. Iam F. Akyildiz, Mehmet Can Vuran, *Wireless Sensor Networks,* Wiley, 2010

[3]. Fei Hu, Xiaojun Cao, *Wireless Sensor Networks,* CRC Press, 2013

Course Research Papers: Research papers (Journal/Conference papers) relevant to the course content will be posted by the course faculty in Course Web page

Course Patents: Patents relevant to the course content will be posted by the course faculty in Course Web page

Course Projects: Course project is an independent project carried out by the student during the course period, under the supervision of course faculty. Course faculty will post few course projects titles in Course Web page. Students are encouraged to come up and experiment with the ideas that interest them.

Course Learning Outcomes(COs):

On completion of this course, students will be able to…

CO1: elaborate the characteristics and applications of WSNs

CO2: classify various MAC protocols in WSNs

CO3: compare different network layer protocols for WSNs

CO4: analyze the performance of time synchronization, power management in WSNs

Course Articulation Matrix (CAM):U18CI603B Wireless Sensor Networks and Applications

CO		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	U18CI603B.1	1	1	1	-	-	-	-	1	1	1		1	1	1
CO2	U18CI603B.2	1	2	2	2	-	-	-	1	1	1		1	1	1
CO3	U18CI603B.3	1	1	1	1	-	-	-	1	1	1		1	1	1
CO4	U18CI603B.4	1	1	1	1	-	-	-	1	1	1		1	1	1
U18CI603B		**1**	**1.25**	**1.25**	**1**				**1**	**1**	**1**		**1**	**1**	**1**

U18CI603C BIOMEDICAL INSTRUMENTATION

Class: B.Tech VI-Semester **Branch:** Electronics Communication and Instrumentation (ECI)

Teaching Scheme:

L	T	P	C
3	-	-	3

Examination Scheme:

Continuous Internal Evaluation:	40 marks
End Semester Examination:	60 marks

Course Learning Objectives:

This course will develop students' knowledge in/on…

LO1: origin of bio-potentials and electrodes for bio-potential sensing
LO2: origin and recording of bio-electric signals
LO3: bioelectric amplifiers, measurement of blood pressure and respiration
LO4: imaging instruments, wearable devices and electrical safety medical environment

UNIT- I (9)

Introduction: The human body an overview, generalized medical instrumentation system, medical measurement constraints

Origin of Bio-Potentials: Electrical activity of cells, volume conductor fields, functional organization of the peripheral nervous system, electroneurogram (ENG), electromyogram (EMG), electroretinogram (ERG), electrodes for biophysical sensing surface electrodes, microelectrodes.

UNIT- II (9)

Electrocardiography: Physiology of heart and circulatory system, electro conduction system of the heart, ECG waveform, standard lead system, block diagram of electrocardiograph, ECG preamplifier, isolation amplifier, chopper stabilized amplifier problems frequently encountered in ECG design, common mode and other interference reduction circuits, physiological signals input guarding, abnormal ECG waveforms

Blood Pressure Measurement: Sphygmomanometer, ultrasonic method, systolic, diastolic and mean detector circuits, practical problems in pressure monitoring

UNIT- III (9)

Electro encephalography: Anatomy and function of brain, EEG10-20 electrode system, EEG amplitude and frequency bands, EEG recording modes, EEG diagnostic uses and sleep patterns

Respiratory Measurements: Mechanics of breathing, respiratory system measurements, impedance pneumograph, spirometer, pulse oximetry, blood glucose sensors

UNIT- IV (9)

Biomedical Imaging Techniques: X-Ray, ultrasonic imaging, CTscan, MRIscan

Biomedical Wearable Devices (*Block diagram approach):* Introduction, wearable health monitors, design considerations for wireless implanted devices, examples of wireless implanted devices-pacemakers and implanted cardioverter defibrillator, combining data from multiple sensors, continuous glucose monitors

Electrical Safety: Physiological effects of electricity, macro shock hazards, micro shock

hazards, protection

TextBooks:

[1] JohnG. Webster, *Medical Instrumentation: Application and Design*, 3rdedn., Wiley India Edition, 2008. (Chapters1,4,5,6,7,8,9,14).

[2] JosephJ. Carrand John M.Brown, *Introduction to Biomedical Equipment Technology*, 4thedn., Pearson Education, 2000. (Chapters1,2,6,7,8,9,10,13)

ReferenceBooks:

[1] Andrew G.Webb, *Principles of Biomedical Instrumentation*, Cambridge University Press,2018.

[2] Cromwell Leslie, Weibell FredJ., and Pfeiffer EricA., *Biomedical Instrumentation and Measurements,* 2ndedn., PHI Learning, 1990.

[3] Mandeep Singh, *Introduction to Biomedical Instrumentation*, PHI Learning, 2010.

[4] R.S Khandpur and Raghbir Khandpur, *Biomedical Instrumentation,* TMH, Professional. 2004.

Course Research Papers: Research papers (Journal/Conference papers) relevant to the course content will be posted by the course faculty in Course Web page

Course Patents: Patents relevant to the course content will be posted by the course faculty in Course Web page

Course Projects: Course project is an independent project carried out by the student during the course period, under the supervision of course faculty. Course faculty will post few course projects titles in Course Web page. Students are encouraged to come up and experiment with the ideas that interest them.

CourseLearningOutcomes(COs):

On completion of this course, students will be able to…

CO1: discuss the origin of bio potentials, constructional features of sensing electrodes and their usage for measurement of bio potentials

CO2: build ECG &blood pressure recording systems and analyze ECG waveforms

CO3: build EEG & respiration recording systems and interpret EEG waveforms

CO4: discuss X-Ray, ultrasonic, CT, MRI imaging techniques, wearable devices and electrical safety precautions used in biomedical field

CourseArticulationMatrix:U18CI603C BIOMEDICAL INSTRUMENTATION

CO		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO2
CO1	U18CI603C.1	2	1	2	-	-	1	-	1	1	-	1	1	2	2
CO2	U18CI603C.2	2	2	2	1	1	1	1	1	1	1	1	1	2	2
CO3	U18CI603C.3	2	2	2	1	1	1	1	1	1	1	1	1	2	2
CO4	U18CI603C.4	2	2	2	1	1	1	1	1	1	1	1	1	2	2
U18CI603C		**2**	**2**	**2**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**2**	**2**

U18CI604 EMBEDDED SYSTEMS WITH ARM PROCESSOR

Class: B.Tech VI-Semester **Branch:** Electronics Communication and Instrumentation (ECI)

Teaching Scheme:

L	T	P	C
3	-	-	3

Examination Scheme:

Continuous Internal Evaluation:	40 marks
End Semester Examination:	60 marks

Course Learning Objectives (LOs):

This course will develop students' knowledge in/on…

LO1: architectural features of TM4C123 microcontroller development board.

LO2: architectural features of ARM cortex-M Processor.

LO3: assembly language programming for ARM Cortex-M4.

LO4: cortex-M4 memory systems, interrupts & exceptions.

UNIT – I (9)

Introduction to ARM Processors: Introduction to ARM processors, Evolution of ARM processors, pipeline organization, ARM Processor cores and CPU cores. Introduction to ARM Cortex-M Processors, ARM Cortex-M4 processor's architecture, Programmer's model, Special registers, Operation Modes.

UNIT – II (9)

ARM Cortex-M4 programming: Assembly basics, Instruction set, Data transfer, Data processing, conditional and branch instructions, barrier and saturation operations, Cortex-M4-specific instructions, Thumb2 instructions, Keil Microcontroller Development Kit for ARM, Typical program compilation flow, Sample arithmetic and logical assembly language programs

UNIT – III (9)

ARM cortex-M4 Memory Systems and interrupts: Overview of memory system features, Memory map, Memory access attributes and permissions, Data alignment and unaligned data access support, Bit-band operations, Overview of exceptions and interrupts, Exception types, Overview of interrupt management, Definitions of priority, Vector table and vector table relocation, Software interrupts, Exception Handling.

UNIT – IV (9)

TM4C123 Microcontroller: TM4C123 Microcontroller Block Diagram, The hardware development board for TM4C123, Microcontroller peripherals, Configuring microcontroller pins as GPIOs, Input – output interfacing for LED and Switch, Methods for input-output synchronization Configuration of interrupts and exceptions, UART ,I2C , SPI , CAN and ADC configuration.

Text Books:

[1] Joseph Yiu, *The Definitive Guide to ARM Cortex-M3 and Cortex-M4 Processors*, 3rd ed., Oxford: Newnes Publications, 2013. *(Chapters 1 to 8 & 15)*
[2] Muhammad Tahir and Kashif Javed, *ARM Microprocessor Systems – Cortex-M Architecture, programming and Interfacing*, Florida: CRC Press, 2017. *(Chapters 8 to 12)*

Reference Books:

[1] Andrew N Sloss, Dominic Symes, Chris Wright, ARM System Developer's Guide - Designing and Optimizing System Software, San Francisco: Morgan Kaufmann Publishers, 2014.
[2] Jonathan W Valvano,Embedded Systems: Real time interfacing to ARM Cortex-M Microcontrollers, 5th ed., Cambridge: Self Published, 2017.
[3] Furber, Stephen Bo. ARM system-on-chip architecture, New Delhi: Pearson Education, 2000.

Course Research Papers: Research papers (Journal/Conference papers) relevant to the course content will be posted by the course faculty in Course Web page
Course Patents: Patents relevant to the course content will be posted by the course faculty in Course Web page
Course Projects: Course project is an independent project carried out by the student during the course period, under the supervision of course faculty. Course faculty will post few course projects titles in Course Web page. Students are encouraged to come up and experiment with the ideas that interest them.

Course Learning Outcomes (COs):
On completion of this course, students will be able to…
CO1: identify architectural features of ARM processors.
CO2: develop firmware for ARM based embedded systems.
CO3: utilize memory, interrupts & exceptions in firmware development.
CO4: make use of TM4C123 microcontroller board for embedded system development.

Course Articulation Matrix (CAM): U18CI604 Embedded Systems with ARM Processor

CO		PO1	PO2	PO 3	PO 4	PO 5	PO 6	PO7	PO 8	PO9	PO1 0	PO1 1	PO 12	PSO 1	PSO2
CO1	U18CI604.1	2	2	1	1	1	-	-	1	1	1		2	1	2
CO2	U18CI604.2	2	2	2	1	1	-	-	1	1	1		1	1	2
CO3	U18CI604.3	2	2	2	1	1	-	-	1	1	1		2	1	2
CO4	U18CI604.4	2	2	2	1	1	-	-	1	1	1		1	2	2
U18CI604		**2**	**2**	**1.75**	**1**	**1**	**-**	**-**	**1**	**1**	**1**		**1**	**1.25**	**2**

U18CI605 VLSI SYSTEM DESIGN

Class: B.Tech.VI – Semester **Branch:** Electronics Communication and Instrumentation (ECI)

Teaching Scheme:

L	T	P	C
3	–	–	3

Examination Scheme:

Continuous Internal Evaluation	40 marks
End Semester Examination	60 marks

Course Learning Objectives:

This course will develop students' knowledge in/on

LO1: fabrication process and electrical properties of MOS transistors

LO2: stick diagrams, design rules, layout diagrams and basic circuit concepts of MOS transistors

LO3: scaling and subsystem design with Structured Approach

LO4: basic concepts of Verilog and description of various levels of abstraction

UNIT – I(9)

Introduction to MOS Technology: Introduction to VLSI, Basic MOS transistor, Process steps in fabricating MOSFET, Fabrication process of nMOS, CMOS and BiCMOS transistors

Basic Electrical Properties of MOS Transistor: Drain to source current and voltage relation, Threshold voltage, Transconductance, Pass transistor, nMOS inverter, Pull up/Pull down ratios, Alternate forms of pull up, CMOS inverter, BiCMOS inverter, Latch-up in CMOS circuits

UNIT – II (9)

MOS Circuit Design Processes: MOS layers, Stick diagrams - nMOS design style and CMOS design style, Lambda based design rules and Layout diagrams

Basic Circuit Concepts: Sheet resistance, Area capacitances of layers, Delay unit, Inverter delays, Rise time and Fall time estimation

UNIT – III (9)

Scaling of MOS Circuits: Scaling Models and Scaling Factors, Scaling factors for device parameters and Limitations of scaling

Subsystem Design and Layout: Architectural Issues, Switch Logic, Gate Logic, Examples of Structured Design, Clocked Sequential Circuits and System Considerations

UNIT – IV (9)

Verilog HDL: Hierarchical Modeling Concepts, Basic concepts - Data types, Modules and ports, Gate level modeling, Dataflow modeling, Behavioral modeling, Design examples of Combinational and Sequential circuits, Switch level modeling, Tasks and Functions

Textbook:

[1]. Douglas A Pucknell and Kamran Eshraghian, *Basic VLSI Design,* 3rd ed., New Delhi: PHI, 2008. *(Chapters 1 to 6)*

[2]. Samir Palnitkar, Peter Flake, *Verilog HDL –Guide to Digital Design and Synthesis*, Pearson Education,3rd Edition, 2003. *(PART-I: Chapters 2 to 8)*

Reference Books:

[1]. Neil H. E. Weste, David Harris and Ayan Banerjee, *CMOS VLSI Design – A Circuits and Systems Perspective*, 3rd ed., New Delhi: Pearson Education, 2005.

[2]. John P Uyemura, *Chip Design for Submicron VLSI: CMOS Layout and Simulation*, 2nd ed., Thomson/Nelson, 2010.

Course Research Papers: Research papers (Journal/Conference papers) relevant to the course content will be posted by the course faculty in Course Web page

Course Patents: Patents relevant to the course content will be posted by the course faculty in Course Web page

Course Projects: Course project is an independent project carried out by the student during the course period, under the supervision of course faculty. Course faculty will post few course projects titles in Course Web page. Students are encouraged to come up and experiment with the ideas that interest them.

Course Learning Outcomes (COs):

On completion of this course, the students will be able to…

CO1: discuss the concepts of oxidation, photolithography & deposition techniques used in the fabrication process and assess the basic electrical properties of MOS transistors

CO2: construct the stick diagrams & mask layouts using design rules and estimate the sheet resistance, area capacitances of layers & time delays of MOS transistors

CO3: determine the scaling factors for various device parameters and apply the structured design approach for several example circuits

CO4: develop Verilog programs for digital circuits using behavioral, dataflow, gate and switch levels of abstraction

Course Articulation Matrix: U18CI605 VLSI SYSTEM DESIGN

CO		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	U18CI605.1	2	2	1	1	-	1	1	1	1	1		1	2	2
CO2	U18CI605.2	2	2	1	1	-	1	1	1	1	1		1	2	2
CO3	U18CI605.3	2	2	1	1	-	1	1	1	1	1		1	2	2
CO4	U18CI605.4	2	2	1	1	1	1	1	1	1	1		1	2	2
U18CI605		**2**	**2**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**		**1**	**2**	**2**

U18CI606 ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING

Class:B.Tech.VI – Semester **Branch:**Electronics Communication and Instrumentation (ECI)

TeachingScheme: **ExaminationScheme:**

L	T	P	C
3	–	–	3

Continuous Internal Evaluation	40 marks
End Semester Examination	60 marks

Course Learning Objectives (LOs):

This course will develop students' knowledge on /in…

LO1: fundamentals of AI, Problem solving, search methods and applications of expert system

LO2: machine learning-supervised, unsupervised and reinforcement learning and its applications and feature section

LO3: machine learning models, regression techniques, clustering techniques and classification techniques

LO4: neural networks, object detection, facial recognition, video analytics using open CV library for image processing and natural language processing, and ML for signal processing.

UNIT–I (9)

Artificial Intelligence (AI): Introduction, History, Intelligent Systems, Foundations of AI, Sub areas of AI, Applications, Ethics in AI Problem Solving – State-Space Search and Control Strategies: Introduction, General Problem Solving, Characteristics of Problem, Exhaustive Searches, Heuristic Search Techniques. Expert System and Applications: Introduction, Phases in Building Expert Systems, Expert System Architecture. Expert Systems Vs Traditional Systems, Truth Maintenance Systems, Application of Expert Systems.

UNIT – II (9)

Introduction to Machine Learning: Introduction, Classic and Adaptive machines, learning types- supervised, semi supervised, unsupervised and reinforcement learning, computational neuroscience, deep learning, bio-inspired adaptive systems. Elements of Machine Learning. Feature Selection and Feature Engineering: Data sets, Creating training and test sets, managing categorical data, missing features, data scaling and normalization, Withering, Feature selection and filtering, Principle Component Analysis, Visualization of high-dimensional datasets

UNIT-III(9)

Linear Classification Algorithms: Linear classification, Regression techniques – simple and multi linear regression, Polynomial regression, logistic regression, grid search, classification metrics, ROC curve.Naïve Bayes and Discriminant Analysis: Bayes theorem, Naïve Bayes classifiers, Discriminant analysis;Support Vector Machines: Linear SVM, Kernel-based classification; Decision Trees : Binary Decision trees,Introduction to Ensemble Learning-Random Forests, AdaBoost, Gradient Tree Boosting, Voting classifier Clustering: Basics, k-NN, Gaussian mixture, K-means, Evaluation methods, DBSCAN, Spectral Clustering, Hierarchical Clustering

UNIT – IV(9)

Artificial Neural Networks: Introduction, Artificial Neural Networks, Single-Layer Feed-Forward Networks, Multi-Layer Feed-Forward Networks, MLPs with Keras, deep learning model layers, introduction to Tensor Flow.

Applications: Image Processing- Convolution, Pooling, Padding ,open CV library for image processing, object detection facial recognition, Signal Processing- Natural language Processing-NLTK Library- Speech to text, text to speech; applications of ML for Communications, Smart devices.; Machine learning in biomedical signal processing with ECG applications.

Text Books:

[1]. Giuseppe Bonaccorso, *Machine Learning Algorithms,* 2nd Edition, Packt, 2018,(Chapters 1,2,3,4,,5,6,7,8,9,10,11,13,15)

[2]. Stuart Russel, Peter Norvig, *Artificial intelligence, A modern Approach* , 2nded, , PEA (Chapter 1 2,3)

Reference Books:

[1]. U Dinesh Kumar and Manaranjan Pradhan, *Machine Learning using Python, New Delhi: John Wiley & sons, 2019.* (*Chapters 1,2,3,4,5,,6,7,8,9,10)*

[2]. Saroj Kaushik. Artificial Intelligence. Cengage Learning. 2011

[3]. John Paul Mueller and Luca Massaron, *Machine Learning (in Python and R) For Dummies*, United States of America: *John Wiley & sons, 2016*

[4]. Aurélien Géron, *Hands-On Machine Learning with Scikit-Learn, Keras, and TensorFlow*, 2nd edn., Canada: O'Reilly Media, Inc, 2019. *(Chapters 1,2, 6,7,9,10,11,14,18)*

[5]. Steven Bird, Ewan Klein and Edward Loper, *Natural Language Processing with Python*, Canada: O'Reilly Media, Inc., 2009. (*Chapters 1, 2, 3,4,5,6)*

Course Research Papers: Research papers (Journal/Conference papers) relevant to the course content will be posted by the course faculty in Course Web page

Course Patents: Patents relevant to the course content will be posted by the course faculty in Course Web page

Course Projects: Course project is an independent project carried out by the student during the course period, under the supervision of course faculty. Course faculty will post few course projects titles in Course Web page. Students are encouraged to come up and experiment with the ideas that interest them.

Course Learning Outcomes (COs):

On completion of this course, students will be able to…

CO1: elaborate various types of artificial intelligence techniques

CO2: analyze different ML techniques like learning models- supervised, semi supervised, unsupervised and reinforcement learning

CO3: use ML models for regression, classification and clustering applications

CO4: Apply neural networks algorithms, open CV for object detection, facial recognition & natural language processing

Course Articulation Matrix (CAM) U18CI606 ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING

CO		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	U18CI606.1	2	1	2	1	1	1		1	1	1		1	2	2
CO2	U18CI606.2	2	2	2	2	2	1			1	1		1	2	2
CO3	U18CI606.3	2	2	2	2	2	1			1	1		1	2	2
CO4	U18CI606.4	2	1	2	2	2	1			1	1		1	2	2
U18EC606		**2**	**1.5**	**2**	**1.75**	**1.75**	1		1	1	1		**1**	**2**	**2**

U18CI607 DIGITAL DESIGN LABORATORY

Class: B.Tech.VI – Semester **Branch:** Electronics Communication & Instrumentation (ECI)

Teaching Scheme:

L	T	P	C
-	–	2	1

Examination Scheme:

Continuous Internal Evaluation	40 marks
End Semester Examination	60 marks

Course Learning Objectives:

This course will develop students' knowledge in/on

LO1: *electronic Computer Aided Design (ECAD) tools, Design flow of Xilinx ISE*

LO2: *fundamentals of Verilog HDL*

LO3: *design and simulation of digital circuits using Verilog HDL*

LO4: *design and verification of digital circuits using Verilog HDL*

LIST OF EXPERIMENTS

1. Design and simulation of all the logic gates using Verilog HDL
2. Design and simulation of half adder and full adder using Verilog HDL
3. Design and simulation of 4-bit Adder using Verilog HDL
4. Design and simulation of flip-flops (SR, D, JK & T) using Verilog HDL
5. Design and simulation of 4-bit counter using Verilog HDL
6. Design and verification of gate-level binary decoder using System Verilog.
7. Design and verification of gate-level greater-than circuit using System Verilog.
8. Design and verification of programmable square wave generator using System Verilog.
9. Design and verification of BCD to Binary conversion circuit using System Verilog.
10. Design and verification of shift register with blocking and non-blocking assignments using System Verilog.
11. Design and simulation of a sequence detector using Verilog HDL
12. Design and simulation of a basic traffic light controller using Verilog HDL

Laboratory Manual:

[1]. *Digital Design laboratorymanual,* Prepared by department of ECE, KITSW.

Reference book:

[1]. Samir Palnitkar, *Verilog HDL – Guide to Digital Design and Synthesis*, Pearson Education, 3rd Edition, 2003.

Course Projects: Course project is an independent project carried out by the student during the course period, under the supervision of course faculty. Course faculty will post few course projects titles in CourseWeb page. Students are encouraged to come up and experiment with the ideas that interest them.

Course Learning Outcomes(Cos)

On completion of this course, the students will able to..

CO1: demonstrate the the types of Electronic Computer Aided Design (ECAD) tools and the design flow of Xilinx ISE

CO2: interpret the fundamentals of Verilog HDL

CO3: design and test the functionality of digital circuits using Verilog HDL

CO4: design and test the functionality of digital circuits using System Verilog

Course Articulation Matrix: U18CI607 DIGITAL DESIGN LABORATORY

CO		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	U18CI607.1	2	2	1	1		-	-	1	1	1		1	2	2
CO2	U18CI607.2	2	2	1	1		-	-	1	1	1		1	2	2
CO3	U18CI607.3	2	2	1	1		-	-	1	1	1		1	2	2
CO4	U18CI607.4	2	2	1	1		-	-	1	1	1		1	2	2
U18CI607		**2**	**2**	**1**	**1**		**-**	**-**	**1**	**1**	**1**		**1**	**2**	**2**

U18CI608 EMBEDDED SYSTEMS WITH ARM PROCESSOR LABORATORY

Class: B.Tech. VI – Semester **Branch:** Electronics Communication and Instrumentation (ECI)

Teaching Scheme:

L	T	P	C
-	–	2	1

Examination Scheme:

Continuous Internal Evaluation	40 marks
End Semester Examination	60 marks

Course Learning Objectives (LOs):

This course will develop students' knowledge in/on…

LO1: programming ARM Cortex-M4 microcontroller, through assembly language / embedded C

LO2: use of SysTick counter on ARM Cortex-M4 microcontrollers

LO3: use of the interrupts on ARM Cortex-M4 microcontrollers in firmware development

LO4: *interfacing sensors with ARM Cortex-M4 microcontrollers*

List of Experiments

The following experiments are to be performed on ARM Cortex-M4 microcontroller using TM4C123 development board through embedded C programs (ECPs):

1. Reading switches and displaying on LEDs
2. Initializing and displaying message on LCD display
3. Transmitting data using UART
4. Receiving data using UART
5. Toggling LED using SysTick counter
6. Implementing delay function using Timers
7. Using GPIOF interrupt
8. Using SysTick interrupt
9. Interrupt priority demonstration
10. Interfacing LM34 temperature sensor
11. Communicating with Real time clock using I^2C
12. Using PWM module to control LED intensity

Laboratory Manual:

[1] *Embedded Networking and Application Laboratory Manual*, Dept. of ECE, KITSW.

Reference Book:

[1] Muhammad Ali Mazidi, Shujen Chen, Sarmad Naimi, SepehrNaimi, *TI ARM Peripherals Programming and Interfacing Using C Language for ARM Cortex*, Texas: Mazidi and Naimi, 2014.

Course Projects: Course project is an independent project carried out by the student during the course period, under the supervision of course faculty. Course faculty will post few course projects

titles in Course Web page. Students are encouraged to come up and experiment with the ideas that interest them.

Course Learning Outcomes (COs):

Upon completion of this course, students will be able to…

CO1: develop embedded C programs for ARM microcontrollers to interface display devices.

CO2: develop embedded C programs for transmit & receive serial data using UART.

CO3: develop embedded C programs for implementing accurate time delay using counters.

CO4: develop embedded C programs for interfacing temperature sensor with ARM Microcontrollers

Course Articulation Matrix (CAM): U18CI608 Embedded Systems with ARM Processor Laboratory

CO		PO1	PO2	PO3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	U18CI608.1	2	2	1	2	2	-	-	1	1	1		1	1	2
CO2	U18CI608.2	2	2	2	2	2	-	-	1	1	1		1	1	2
CO3	U18CI608.3	2	2	2	2	2	-	-	1	1	1		1	1	2
CO4	U18CI608.4	2	2	2	2	2	-	-	1	1	1		1	2	2
U18CI608		**2**	**2**	**1.75**	**2**	**2**	**-**	**-**	**1**	**1**	**1**		**1**	**1.25**	**2**

U18CI609 EMBEDDED NETWORKING AND APPLICATION LAB

Class:B.Tech.VI – Semester
Teaching Scheme:

L	T	P	C
–	–	2	1

Branch: Electronics Communication and Instrumentation (ECI)
Examination Scheme:

Continuous Internal Evaluation	40 marks
End Semester Examination	60 marks

Course Learning Objectives (LOs):

This laboratory course will develop students' knowledge on /in…

LO1: basic CAN communication with MATLAB Simulink
LO2: host Target CAN communication with MATLAB Simulink
LO3: filtering CAN messages and Periodic CAN communication using MATLAB
LO4: setup Communication between Host and Target Models using MATLAB

LIST OF EXPERIMENTS

[1]. Basic CAN Communication with Simulink

[2]. Log and Replay CAN Messages with Simulink

[3]. Host Target CAN Communication

[4]. Transmit and Receive CAN Messages

[5]. Using CAN FD Channels and Messages

[6]. Using CAN Database Files

[7]. Periodic CAN Communication

[8]. Event-Based CAN Transmission in Simulink

[9]. Set up Communication between Host and Target Models

[10]. Filtering CAN Messages

Laboratory Manual:

[1] *Embedded Networking and Application Laboratory Manual*, Dept. of ECE, KITSW.

Reference Books:

[1]. GlafP.Feiffer, Andrew Ayre and Christian Keyold, Embedded *Networking with CAN and CAN open*, Embedded System Academy, 1st edition, 2008.

[2]. Mohammad Farsi, Manuel Bernardo Barbosa, *CANopen: Implementation Made Simple*, Research Studies,1999

Course Projects: Course project is an independent project carried out by the student during the course period, under the supervision of course faculty. Course faculty will post few course projects titles in Course Web page. Students are encouraged to come up and experiment with the ideas that interest them.

Course Learning Outcomes (COs):

On completion of this course, students will be able to…

CO1: implement CAN using MATLAB
CO2: interpret CAN communication using Simulink
CO3: develop the programs for implementation of Basic CAN algorithms
CO4: design a project based on CAN on MATLAB

Course Articulation Matrix (CAM): U18CI609 EMBEDDED NETWORKING AND APPLICATION LAB

CO		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	U18CI609.1	1	1	1	1	1	-	-	1	1	1		1	2	2
CO2	U18CI609.2	1	1	1	1	1	-	-	1-	1-	1-		1	2	2
CO3	U18CI609.3	1	1	1	1	1	-	-	1	1	1		1	2	2
CO4	U18CI609.4	1	1	1	1	1	-	-	1	1	1		1	2	2
U18CI609		**1**	**1**	**1**	**1**	**1**			**1**	1	**1**		**1**	**2**	**2**

U18CI610 MINI PROJECT

Class: B.Tech. VI - Semester **Branch:** Electronics Communication and Instrumentation (ECI)

Teaching Scheme:

L	T	P	C
-	-	2	1

Examination Scheme:

Continuous Internal Evaluation	100 marks
End Semester Examination	-

Course Learning Objectives (LOs):

This course will develop students' knowledge on /in…

LO1: implementing a project independently by applying knowledge to practice
LO2: literature review and well-documented report writing
LO3: creating PPTs and effective technical presentation skills
LO4: writing technical paper in scientific journal style & format and creating video pitch

Student has to take up independent mini project on innovative ideas, innovative solutions to common problems using their knowledge relevant to courses offered in their program of study, which would supplement and complement the program assigned to each student.

Guidelines:

1. The HoD shall constitute a *Department Mini Project Evaluation Committee (DMPEC)*
2. DMPEC shall allot a faculty supervisor to each student for guiding on (i) selection of topic (ii) literature survey and work to be carried out (iii) preparing a report in proper format and (iv) effective mini project oral presentation
3. There shall be only Continuous Internal Evaluation (CIE) for mini project
4. The CIE for seminar is as follows:

Assessment	Weightage
Mini Project Supervisor Assessment	20%
Working model / process / software package / system developed	20%
Mini Project report	20%
Mini Project paper	10%
Video pitch	10%
DMPEC Assessment: *Oral presentation with PPT and viva-voce*	20%
Total Weightage:	100%

Note: It is mandatory for the student to appear for oral presentation and viva-voce to qualify for course evaluation

(a) **Mini Project Topic**: The topic should be interesting and conducive to discussion. Topics may be found by looking through recent issues of peer reviewed Journals / Technical Magazines on the topics of potential interest

(b) **Working Model**: Each student is requested to develop a working model / process / system on the chosen work and demonstrate before the *DMPEC* as per the dates specified by *DMPEC*

(c) **Report:** Each student is required to submit a well-documented report on the chosen seminar topic as per the format specified by *DMPEC*

(d) **Anti-Plagiarism Check:** The seminar report should clear plagiarism check as per the Anti-Plagiarism policy of the institute

(e) **Presentation:** Each student should prepare PPT with informative slides and make an effective oral presentation before the *DMPEC* as per the schedule notified by the department

(f) **Video Pitch:** Each student should create a pitch video, which is a video presentation on his / her mini project. Video pitch should be no longer than 5 minutes by keeping the

pitch concise and to the point, which shall also include key points about his / her business idea / plan (*if any*) and social impact

(g) The student has to register for the Mini project as supplementary examination in the following cases:
   iv) he/she is absent for oral presentation and viva-voce
   v) he/she fails to submit the report in prescribed format
   vi) he/she fails to fulfill the requirements of Mini project evaluation as per specified guidelines

(h) i) The CoE shall send a list of students registered for supplementary to the HoD concerned
   ii) The DSEC, duly constituted by the HoD, shall conduct Mini project evaluation and send the award list to the CoE within the stipulated time

Course Learning Outcomes (COs):

On completion of this course, students will be able to…

CO1: apply knowledge to practice to design & conduct experiments and utilize modern tools for developing working models / process / system leading to innovation & entrepreneurship

CO2: demonstrate the competencies to perform literature survey, identify gaps, analyze the problem and prepare a well-documented Mini project report

CO3: make an effective oral presentation through informative PPTs, showing knowledge on the subject & sensitivity towards social impact of the Mini project

CO4: write a "Mini project paper" in scientific journal style & format from the prepared Mini project report and create a video pitch on Mini project

Course Articulation Matrix (CAM): U18CI610 MINI PROJECT

CO		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	U18CI610.1	1	1	2	2	1	1	1	2	2	2	1	2	2	-
CO2	U18CI610.2	1	1	-	2	-	-	-	2	2	2	-	2	1	2
CO3	U18CI610.3	-	-	-	-	-	-	1	2	2	2	-	2	2	2
CO4	U18CI610.4	-	-	-	-	-	-	-	2	2	2	-	2	-	1
U18CI610		**1**	**1**	**2**	**2**	**1**	**1**	**1**	**2**	**2**	**2**	**1**	**2**	**1.66**	**1.66**