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

DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING

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

URR18 SYLLABI (III to VIII SEMESTERS)

(Applicable from the Academic Year 2018-19)

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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.*

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DEPARTMENT OF ELELCTRONICS & COMMUNICATION ENGINEERING

SCHEME OF INSTRUCTION & EVALUATION

I - SEMESTER OF 4-YEAR B.TECH ECI DEGREE PROGRAMME

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				
								CIE			ESE	Total Marks
				L	T	P	C	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 – PracticalsC = Credits

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

Contact hours per Week : 29
TotalCredits : 21

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DEPARTMENT OF ELELCTRONICS & COMMUNICATION ENGINEERING

SCHEME OF INSTRUCTION & EVALUATION

II - SEMESTER OF 4-YEAR B.TECH ECI DEGREE PROGRAMME

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				
								CIE			ESE	Total Marks
				L	T	P	C	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

Internship: *All Students should plan for mandatory 6-8 weeks internship, from end of II semester to commencement of VII semester, at industry/R&D organizations/ institutes of national importance (IITs/IIITs/NITs). As part of Internship evaluation in VII semester, students are expected to submit a well-documented internship report and give an informative PPT presentation.*

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DEPARTMENT OF ELELCTRONICS & COMMUNICATION ENGINEERING

SCHEME OF INSTRUCTION & EVALUATION

III - SEMESTER OF 4-YEAR B.TECH ECI DEGREE PROGRAMME

[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

Internship: *All Students should plan for mandatory 6-8 weeks internship, from end of II semester to commencement of VII semester, at industry/R&D organizations/ institutes of national importance (IITs/IIITs/NITs). As part of Internship evaluation in VII semester, students are expected to submit a well-documented internship report and give an informative PPT presentation.*

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DEPARTMENT OF ELELCTRONICS & COMMUNICATION ENGINEERING

SCHEME OF INSTRUCTION & EVALUATION

IV - SEMESTER OF 4-YEAR B.TECH ECI DEGREE PROGRAMME

[5Th+3P+2M]

S.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	U18CI410	Microprocessor Systems and Interfacing	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 Sources (EEE)

Contact hours per week 27
Total Credits 21

Internship: *All Students should plan for mandatory 6-8 weeks internship, from end of II semester to commencement of VII semester, at industry/R&D organizations/ institutes of national importance (IITs/IIITs/NITs). As part of Internship evaluation in VII semester, students are expected to submit a well-documented internship report and give an informative PPT presentation.*

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SCHEME OF INSTRUCTION & EVALUATION

V - SEMESTER OF 4-YEAR B.TECH ECI DEGREE PROGRAMME

[5Th+3P+1MC]

Sl.No	Category	CourseCode	Course Title	Hourper week			Credits	Evaluation Scheme				
				L	T	P		CIE			ESE	Total Marks
								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	U18CI509	Microcontrollers and Embedded Systems	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
11	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-II: (*offered by department*)		**SWAYAM - NPTEL Equivalent course**
U18CI502A:	Internet of things	Introduction to Internet of things
U18CI502B:	Wireless and Data Communication	Introduction to Wireless and Cellular communications
U18CI502C:	Data Acquisition And Signal Conditioning	--
MOOC-II: **U18CI603M SWAYAM -MOOC course**		(i) Fabrication Techniques for MEMS based sensors – Clinical perspective (ii) Programming, Data Structures And Algorithms Using Python

Contact hours per week : 26
Total Credits : 20

MOOCs: *Students are encouraged to do Massive Open Online Courses (MOOCs) on SWAYAM platform (https: //www.swayam.gov.in) offered by NPTEL, CEC, IIM-B, IGNOU. Students shall contact the HoD to get their interested MOOCs approved by the HoD/ Dean Academic Affairs for proper transfer the credits for the MOOCs.*

Internship: *All Students should plan for mandatory 6-8 weeks internship, from end of II semester to commencement of VII semester, at industry/R&D organizations/ institutes of national importance (IITs/IIITs/NITs). As part of Internship evaluation in VII semester, students are expected to submit a well-documented internship report and give an informative PPT presentation.*

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SCHEME OF INSTRUCTION & EVALUATION

VI - SEMESTER OF 4-YEAR B.TECH ECI DEGREE PROGRAMME

[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	**U18CS 611**	**Advanced Data Structures**	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	**U18CS612**	**Advanced Data Structures 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	IoT and Data Acquisition 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: (*offered by department*)		SWAYAM - NPTEL Equivalent course
18CI603A:	Antennas and Wave Propagation	Antennas
U18CI603B:	Wireless Sensor Networks and Applications	--
U18CI603C:	Biomedical Instrumentation	--
MOOC-II: U18CI603M SWAYAM -MOOC course		(i) Fuzzy sets, logic & Systems and Applications (ii) Fundamentals of MIMO wireless communication

Contact hours per week : 25

Total Credits : 20

MOOCs: *Students are encouraged to do Massive Open Online Courses (MOOCs) on SWAYAM platform (https: //www.swayam.gov.in) offered by NPTEL, CEC, IIM-B, IGNOU. Students shall contact the HoD to get their interested MOOCs approved by the HoD/ Dean Academic Affairs for proper transfer the credits for the MOOCs.*

Internship: All Students should plan for mandatory 6-8 weeks internship, from end of II semester to commencement of VII semester, at industry/R&D organizations/ institutes of national Importance (IITs/IIITs/NITs). As part of Internship evaluation in VII semester, students are expected to submit a well-documented internship report and give an informative PPT presentation.

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DEPARTMENT OF ELELCTRONICS & COMMUNICATION ENGINEERING

SCHEME OF INSTRUCTION & EVALUATION

VII - SEMESTER OF 4-YEAR B.TECH ECI DEGREE PROGRAMME

[4Th+2P+1MC]

S. No	Category	Course Code	Course Title	Hour per week			Credits	Evaluation Scheme				
				L	T	P		CIE			ESE	Total Marks
								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 Process Control	3	-	-	3	10	30	40	60	100
5	PCC	U18CI 705	Industrial Process Control Laboratory	-	-	2	1	40	-	40	60	100
6	PCC	U18CI 709	Digital Design Laboratory	-	-	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:		**Professional Elective-III:** (*offered by department*)		**SWAYAM - NPTEL Equivalent course**	**Professional Elective-IV:** (*offered by department*)		**SWAYAM - NPTEL Equivalent course**
18OE701A: *offered by CED*)	Disaster Management	18CI702A:	Digital Image Processing Techniques	Digital Image Processing	U18CI703A:	Embedded and Real time Operating Systems	-
18OE701B: *offered by ECED*)	Project Management	18CI702B:	Microwave and Optical Fiber Communication	(i) Microwave Engineering (ii) Fibre Optic Communication Technology	**U18CI703B:**	**VLSI System Design**	-
18OE701C: *offered by EEED*)	Professional Ethics in Engineering	18CI702C:	Satellite communications	-	U18CI703C:	Cyber Security	-
18OE701D: *offered by MED*)	Rural Technology and Community Development	**MOOC-III: U18CI702M SWAYAM -MOOC course**		(i) Introduction to Biomedical Imaging systems (ii) Artificial Intelligence: Search methods for problem solving	**MOOC-IV: U18CI703M SWAYAM -MOOC course**		(i) Introductory Neuroscience & Neuro-Instrumentation (ii) Python for Data Science

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Internship: *All Students should plan for mandatory 6-8 weeks internship, from end of II semester to commencement of VII semester, at industry/R&D organizations/ institutes of national importance (IITs/IIITs/NITs). As part of Internship evaluation in VII semester, students are expected to submit a well-documented internship report and give an informative PPT presentation.*

Contact hours per week: 24; Total Credits: 17

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DEPARTMENT OF ELELCTRONICS & COMMUNICATION ENGINEERING

SCHEME OF INSTRUCTION & EVALUATION

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

[3Th+0P+0MC]

S. No	Category	Course Code	Course Title	Hour per week			Credits	Evaluation Scheme				
				L	T	P		CIE			ESE	Total Marks
								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: (*offered by department*)		**SWAYAM - NPTEL Equivalent course**	**Professional Elective-VI:** (*offered by department*)		**SWAYAM - NPTEL Equivalent course**	**Open Elective-IV:**		**SWAYAM - NPTEL Equivalent course**
18CI801A:	IoT Industrial Applications	Introduction to Industry 4.0 and Industrial Internet of Things	18CI802A:	Cloud Computing	Cloud Computing	J18OE803A: (*offered by M&HD*)	Operations Research	Operations Research
18CI801B:	Low Power VLSI Design	VLSI Interconnects	J18CI802B:	Mobile and Wireless Networks	-	J18OE803B: (offered by MBAD)	Management Information Systems	Management Information System
18CI801C:	FPGA Design	-	J18CI802C:	Robotics	Robotics	U18OE803C: (*offered by ECED*)	Entrepreneurship Development	Innovation, Business Models and Entrepreneurship/ Entrepreneurship/ Entrepreneurship and IP practice
-	-	-	-	-	-	U18OE803D: (*offered by MBAD*)	Forex and Foreign Trade	International Trade – Theory and Empirics
IOOCs-V: **18CI801M** **WAYAM -MOOC course**		(i) VLSI Signal Processing (ii) Computer Vision and Image – Fundamentals and Applications	**MOOCs-VI:** **U18CI802M** **SWAYAM -MOOC course**		(i) Optical fiber sensors (ii) Deep learning	**MOOCs-VI:** **U18CI803M** **SWAYAM -MOOC course**		(i) Patent Search and Analysis (ii) Numerical Methods for Engineers

MOOCs: *Students are encouraged to do Massive Open Online Courses (MOOCs) on SWAYAM platform (https: //www.swayam.gov.in) offered by NPTEL, CEC, IIM-B, IGNOU. Students shall contact the HoD to get their interested MOOCs approved by the HoD/ Dean Academic Affairs for proper transfer the credits for the MOOCs.*

Contact hours per week : 23; Total Credits : 16

URR-18 R22

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DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING

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

URR18 SYLLABI (III to VIII SEMESTERS)

(Applicable from the Academic Year 2018-19)

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DEPARTMENT OF ELELCTRONICS & COMMUNICATION ENGINEERING

SCHEME OF INSTRUCTION & EVALUATION

III - SEMESTER OF 4-YEAR B.TECH ECI DEGREE PROGRAMME

[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

Internship: *All Students should plan for mandatory 6-8 weeks internship, from end of II semester to commencement of VII semester, at industry/R&D organizations/ institutes of national importance (IITs/IIITs/NITs). As part of Internship evaluation in VII semester, students are expected to submit a well-documented internship report and give an informative PPT presentation.*

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 $[t^2u(t)]$,real exponential $[e^{at}u(t)]$, complex exponential $[e^{j\Omega t}u(t)]$, 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, *12*thedn, 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 FUNDAMENTALS OF 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: **FUNDAMENTALS OF 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: **FUNDAMENTALS OF 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	PSO1	PSO2
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							-							
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:

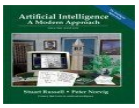
Logo	Web Site Name			
Home	Login	Registration	Catalogue	Cart
CSE ECE EEE CIVIL	Login : Password: Submi Reset			

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	PSO 1	PSO 2	PSO 3	PSO 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**

ISO 9001:2015 AICTE-CII: GOLD Category Institute NAAC-'A' Grade Institute (CGPA: 3.21) NIRF-2020 Rank Band: 201-250
KAKATIYA INSTITUTE OF TECHNOLOGY & SCIENCE
Opp : Yerragattu Gutta, Hasanparthy (Mandal), WARANGAL - 506 015, Telangana, INDIA.
काकतीय प्रैद्योगिकी एवं विज्ञान संस्थान, वरंगल - ५०६ ०१५ तेलंगाना, भारत
కాకతీయ సాంకేతిక విజ్ఞాన కాక్షి విద్యాలయం, వరంగల్ - ౫౦౬ ౦౧౫ తెలంగాణా, భారతదేశము
(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)
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DEPARTMENT OF ELELCTRONICS & COMMUNICATION ENGINEERING

SCHEME OF INSTRUCTION & EVALUATION

IV - SEMESTER OF 4-YEAR B.TECH ECI DEGREE PROGRAMME

[5Th+3P+2M]

S.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	U18CI410	Microprocessor Systems and Interfacing	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 Sources (EEE)

Contact hours per week : 27
Total Credits : 21

Internship: *All Students should plan for mandatory 6-8 weeks internship, from end of II semester to commencement of VII semester, at industry/R&D organizations/ institutes of national importance (IITs/IIITs/NITs). As part of Internship evaluation in VII semester, students are expected to submit a well-documented internship report and give an informative PPT presentation.*

U18OE401A APPLICABLE MATHEMATICS

Class: B.Tech. IV-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: *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 COMPUTERS 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: **Computers 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: **Computers 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** Course Name: **RENEWABLE ENERGY SOURCES**														
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

U18CI410 MICROPROCESSOR SYSTEMS AND INTERFACING

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: *architectural features of 8086 microprocessor*

LO2: *programming concepts of 8086 microprocessor*

LO3: *interfacing of peripheral devices to 8086 through 8255 (PPI), 8257 (DMA), 8259 (PIC)*

LO4: *serial data communication types and RS232 &IEEE 488 bus standards*

UNIT–I (9)

Introduction to Microprocessors - Evolution, Overview of 8085 MPU architecture

8086 Family Architecture: Organization of 8086 CPU, Concept of memory segmentation, Segment registers, Physical and Logical addressing, Addressing modes, Instruction formats, Instruction set

UNIT–II (9)

Assembly Language Programming: Assembler directives, Simple programming of 8086, Arithmetic, Logical and Data processing programs; Implementation of control loops, Structures, Strings, Procedures, Macros

Pin configuration, Minimum / Maximum modes, Timing diagrams, Delay subroutines

UNIT–III (9)

Interfacing with 8086: 8086 Interrupts, Interrupt service routines, Priority interrupt controller 8259,Programmable peripheral interface 8255, Interfacing of switches, Keyboards, LEDs, Stepper motor, ADCs and DACs

UNIT–IV (9)

DMA Controller 8257, Programmable Timer/Counter 8254

Serial Data Communication through 8086: Types of serial communication, Synchronous and Asynchronous communication, Serial data communication through USART 8251, Serial data communication standards, RS-232, IEEE 488 Bus (GPIB)

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).*

[2] Yuchang Liu and Glen A. Gibson, *Microcomputer Systems - The 8086/8088 FamilyArchitecture, Programming and Design,* 2nded.New Delhi: PHI, 1995. (Chapters 2 to 11)

Reference Books:

[1] Ramesh Gaonkar, *Microprocessor Architecture, Programming and Applications with the 8085*, 6th ed. Mumbai: Penram International Publishing (I) Pvt. Ltd., 2013.

[2] Kenneth J. Ayala, Ayala Kenneth, *The 8086 Microprocessor: Programming and Interfacing the PC*, Minnesota: West Publishing Company, 1994.

[3] Barry B. Brey**, *The Intel Microprocessors: Architecture, Programming and Interfacing*,** 2nd ed**.** New

Delhi: PHI, 1998..

Course Learning Outcomes (COs):

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

CO1: Analyze architectural and programming features of 8086

CO2: develop assembly language programs (ALPs) to solve data processing problems

CO3: design hardware circuits for interfacing of i/o devices with 8086 µp through PPI / PIC

CO4: utilize serial communication standards USART&RS232 and IEEE 488 bus standards for data transfer

Course Articulation Matrix (CAM): U18CI410 MICROPROCESSOR SYSTEMS AND INTERFACING

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	U18CI410.1	1	1	1		-	-	-	-	-	-	-	2	2	2
CO2	U18CI410.2	1	2	2		1	-	-	-	-	-	-	2	2	2
CO3	U18CI410.3	1	2	2		-	-	-	-	-	-	-	2	2	2
CO4	U18CI410.4	1	2	2		1	-	-	-	-	-	-	2	2	2
U18CI410		**1**	**1.75**	**1.75**		**1**	**-**	**-**	**-**	**-**	**-**	**-**	**2**	**2**	**2**

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	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
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**	**-**

ISO 9001:2015 AICTE-CII: GOLD Category Institute NAAC-'A' Grade Institute (CGPA:3.21) NIRF-2020 Rank Band: 201-250
KAKATIYA INSTITUTE OF TECHNOLOGY & SCIENCE
Opp : Yerragattu Gutta, Hasanparthy (Mandal), WARANGAL - 506 015, Telangana, INDIA.
काकतीय प्रौद्योगिकी एवं विज्ञान संस्थान, वरंगल - ५०६ ०१५ तेलंगाना, भारत
కాకతీయ సాంకేతిక విజ్ఞాన కాజ్రు విద్యాలయం, వరంగల్ - ౫౦౬ ౦౧౫ తెలంగాణ, భారత
(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)
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DEPARTMENT OF ELELCTRONICS & COMMUNICATION ENGINEERING

SCHEME OF INSTRUCTION & EVALUATION

V - SEMESTER OF 4-YEAR B.TECH ECI DEGREE PROGRAMME

[5Th+3P+1MC]

Sl.No	Category	Course Code	Course Title	Hour per week			Credits	Evaluation Scheme				
				L	T	P		CIE			ESE	Total Marks
								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	U18CI509	Microcontrollers and Embedded Systems	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
11	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-II: (*offered by department*)		**SWAYAM - NPTEL Equivalent course**
U18CI502A:	Internet of things	Introduction to Internet of things
U18CI502B:	Wireless and Data Communication	Introduction to Wireless and Cellular communications
U18CI502C:	Data Acquisition And Signal Conditioning	--
MOOC-II: **U18CI603M SWAYAM -MOOC course**		(i) Fabrication Techniques for MEMS based sensors – Clinical perspective (ii) Programming, Data Structures And Algorithms Using Python

Contact hours per week : 26
Total Credits : 20

MOOCs: *Students are encouraged to do Massive Open Online Courses (MOOCs) on SWAYAM platform (https://www.swayam.gov.in) offered by NPTEL, CEC, IIM-B, IGNOU. Students shall contact the HoD to get their interested MOOCs approved by the HoD/ Dean Academic Affairs for proper transfer the credits for the MOOCs.*

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	PSO 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**

U18CI509 MICROCONTROLLERS AND EMBEDDED SYSTEMS

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 (LOs):
This course will develop students" knowledge on /in…

LO1: *architecture, interrupts and addressing modes of 8051*

LO2: *hardware and software for interfacing keyboards, display and data converters with 8051*

LO3: *the issues related to overall design issues related to hardware and software of an embedded system and programming in "Embedded C"*

LO4: *basic functions of OS, multiprocessing and multitasking, task scheduling, synchronization and choosing the proper RTOS for an embedded system development*

UNIT–I (9)

Overview of 8051 Microcontroller, 8051 Architecture, Hardware units of 8051, Memory organization, I/O ports, Timers and counters, Serial data input and output, Interrupts of 8051, 8051 Assembly language programming concepts, Addressing modes

UNIT – II (9)

Programming model, Instruction set of 8051 and programming, Microcontroller interfacing with keyboard & display Units (LED and LCD), Interfacing of DAC and ADC, Serial data communication, Use of interrupts & service routines

UNIT – III (9)

Embedded System: Introduction, Characteristics and components of an embedded system, Fundamental issues in hardware software co-design, Embedded firmware design approaches

Programming in "Embedded C": C vs Embedded C, Data types and storage classes, Arrays, pointers & I/O operations, Structures & bit fields, Volatile qualifier, Coding interrupt service routines, Reentrant and recursive functions

UNIT – IV (9)

Real-Time Operating System (RTOS) based Embedded System Design: Operating system basics, Types of operating systems, Tasks, Process & threads, Multiprocessing and multitasking, Task scheduling, Task communication, Task synchronization, Device drivers, Selection of 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 2 to 21)*

Reference Books:

[1]. Kenneth J. Ayala, *The 8051 Microcontroller*, 3rd ed. Noida: Cengage learning, 2007.

[2]. Md. Ali Mazidi, Janice G Mazidi and Rolin D. McKinlay, *The 8051 Microcontroller and Embedded Systems Using Assembly and C*, 2nd ed. New Delhi: Pearson Education India, 2011.

[3]. Sriram V. Iyer & Pankaj Gupta, *Embedded Real Time Systems Programming,* New Delhi: TMH, 2003.

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 the architectural features, viz. memory organization, interrupts and addressing modes of 8051*

CO2: design required hardware interface and implement required software for interfacing keyboards, display units and data converters with 8051

CO3: develop embedded firmware using Embedded C for embedded applications

CO4: Interpret the fundamental issues in task scheduling, communication and synchronization in an RTOS

Course Articulation Matrix (CAM):U18CI509 MICROCONTROLLERS AND EMBEDDED 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	U18CI509.1	1	1	2	1	2	-	-	-	-	-	-	2	2	2
CO2	U18CI509.2	1	1	2	1	2	-	-	-	-	-	-	2	2	2
CO3	U18CI509.3	1	1	2	1	2	-	-	-	-	-	-	2	2	2
CO4	U18CI509.4	1	1	2	1	2	-	-	-	-	-	-	2	2	2
U18CI509		1	1	1	2	1	-	-	-	-	-	-	2	2	2

U18CI505 LINEAR INTEGRATED CIRCUITS AND APPLICATIONS

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:

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**

ISO 9001:2015 AICTE-CII: GOLD Category Institute NAAC-'A' Grade Institute (CGPA:3.21) NIRF-2020 Rank Band: 201-250
KAKATIYA INSTITUTE OF TECHNOLOGY & SCIENCE
Opp : Yerragattu Gutta, Hasanparthy (Mandal), WARANGAL - 506 015, Telangana, INDIA.
काकतीय प्रैद्योगिकी एवं विज्ञान संस्थान, वरंगल - ५०६ ०१५ तेलंगाना, भारत
కాకతీయ సాంకేతిక మరియు శాస్త్ర విజ్ఞాన సంస్థ, వరంగల్ - ౫౦౬ ౦౧౫ తెలంగాణ, భారతదేశము
(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)
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DEPARTMENT OF ELELCTRONICS & COMMUNICATION ENGINEERING

SCHEME OF INSTRUCTION & EVALUATION

VI - SEMESTER OF 4-YEAR B.TECH ECI DEGREE PROGRAMME

[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	**U18CS 611***	**Advanced Data Structures**	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	**U18CS612***	**Advanced Data Structures 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	IoT and Data Acquisition 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: (*offered by department*)		**SWAYAM - NPTEL Equivalent course**
18CI603A:	Antennas and Wave Propagation	Antennas
U18CI603B:	Wireless Sensor Networks and Applications	--
U18CI603C:	Biomedical Instrumentation	--
MOOC-II: **U18CI603M SWAYAM -MOOC course**		(i) Fuzzy sets, logic & Systems and Applications (ii) Fundamentals of MIMO wireless communication

Contact hours per week : 25
Total Credits : 20

MOOCs: *Students are encouraged to do Massive Open Online Courses (MOOCs) on SWAYAM platform (https://www.swayam.gov.in) offered by NPTEL, CEC, IIM-B, IGNOU. Students shall contact the HoD to get their interested MOOCs approved by the HoD/ Dean Academic Affairs for proper transfer the credits for the MOOCs.*

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 accountingcycle, 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 postedby 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,* 2nded., 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,* 2nded., 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	PO 7	PO 8	PO 9	PO1 0	PO 11	PO 12	PSO 1	PSO 2
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**

U18CS611 ADVANCED DATA STRUCTURES

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: organizing and retrieving the data using binary tree, binary search trees.
LO2: organizing and retrieving the data using AVL trees, B-Trees, Red black trees and Splay trees.
LO3: organizing and retrieving the data using Interval tree, Hash tree, Tries, sorting and searching.
LO4: organizing and retrieving the data using graphs and spanning trees.

UNIT – I(9)

Trees: Introduction, types of trees.
Binary Tree: Creating a binary tree, traversing a binary tree: preorder, in order, post order and spiral order recursive traversals.
Binary Search Tree: Operations- Insertion, deletion, search, recursive and non-recursive traversal. Threaded binary trees.

UNIT – II (9)

AVL Trees: AVL trees operations–Insertion, Deletion and Traversal.
Multiway Search Trees: Introduction tom-way search trees. Operations on B-Trees-Insertion, deletion, search. B+-trees **Red-Black Trees**: Properties, operations, applications, Splay trees

UNIT – III (9)

Interval Tree, Hash tree
Tries: Trie structure, Operations on Tries, Applications of Tree indexing
Searching and Internal Sorting: Fibonacci search, quick sort, merge sort, heap sort, bitonicgenerator sort; time complexities of above searching and sorting techniques

UNIT – IV (9)

Graphs: Introduction, graph terminology, representation of graphs.
Application of Graph Structures: Topological sorting. Minimum Spanning Trees**:** Prim's algorithm, Kruskal's algorithm. Graphs traversal methods- breadth first search, depth first search. Kosaraju's algorithm
String manipulations, String compression -Run Length Encoding.
String Matching Algorithms-Naive Algorithm, (Knuth Morris Pratt) Algorithm, Boyer Moore Algorithm, Rabin Karp Algorithm

Textbook:

[1]. DebasisSamanta, *Classic Data Structures*, 2nd ed., New Delhi: Prentice Hall India, 2009.

(*Chapters 3 to 8*)

Reference Books:

[1]. Reema Thareja, *Data Structures Using C,* 2nded., New Delhi: Oxford University Press,2014.
[2]. E Balagurusamy, *Data Structure Using C,* 1st ed.,New Delhi: McGraw Hill Education, 2017.
[3] Richard F. Gilberg and Behrouz A. Forouzan, *Data Structures: A Pseudo code Approach with C*, 2nd ed., New Delhi: Cengage Learning 2007

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: develop programs using binary trees, binary search trees to optimize database queries.
CO2: utilize balanced search trees such as B-trees, B+-trees, Red black and Splay trees in solving the problems on Database management.
CO3: organize and retrieve the data using Interval tree, Hash tree, Tries, sorting and searching in solving the problems like auto-complete.
CO4: organize and retrieve the data using Graphs and different types of spanning trees used for GPS navigation.

Course Articulation Matrix (CAM):U18CS611 ADVANCED DATA STRUCTURES															
Course Outcomes		**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	U18CS611.1	2	2	2	2	1	1	-	1	1	1	-	1	1	-
CO2	U18CS611.2	2	2	2	2	1	1	-	1	1	1	-	1	1	-
CO3	U18CS611.3	2	2	2	2	1	1	-	1	1	1	-	2	1	-
CO4	U18CS611.4	2	2	2	2	1	1	-	1	1	1	-	2	1	-
U18CS611		2	2	2	2	1	1	-	1	1	1	-	1.5	1	-

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: artificial neural network based algorithms and its analysis for data types

LO3: standard concepts, supervised & unsupervised machine learning algorithms for classification

LO4: applications of machine learning in fields of image processing, biomedical signal processing & speech processing

UNIT–I (9)

Artificial Intelligence (AI): Introduction, fundamentals of artificial intelligence, history of artificial intelligence, state of the art, intelligent agents, agents and environments, concept of rationality, nature of environments, structure of agents, solving problems by searching, problem-solving agents, example problems, searching for solutions, uninformed search strategies, informed (heuristic) search strategies, heuristic functions

UNIT – II (9)

Introduction to Machine Learning: Biological neuron structure, artificial neuron, implementations of boolean functions using Mc Pitts neuron, gradient based learning, hidden units, architecture design, back propagation algorithm, Convolution Neural Networks (CNN) - Introduction, data types, efficient convolution algorithm, activation functions, Recurrent Neural Networks (RNN), Deep Recurrent Neural Networks (DRNN), Long Short Term Memory (LSTM)

UNIT-III(9)

Machine Learning (ML): Introduction to ML, types of learning, applications of ML

Supervised learning: Linear regression, polynomial regression, classification methods– KNN classifier, decision trees, naïve bayes, support vector machines, logistic regression analysis

Unsupervised Learning: Clustering – K-means clustering, hierarchical clustering; dimensionality reduction – PCA (principal component analysis), Fischer‟s discriminant analysis, ensemble learning – boosting & bagging approaches

UNIT – IV(9)

Machine learning in Image processing: Fundamentals of image processing, feature mapping case study on image classification using artificial neural networks

Machine learning in biomedical signal processing: Fundamentals of biomedical signals, feature extraction from database of biomedical signals (ECG/EMG), case study on biomedical signal classification.

Introduction to Speech Processing: Process of speech production a block diagram approach, Classification of speech sounds, speech recognition using HMM

Text Books:

[1].Russell,S.&Norvig,*ArtificialIntelligence:AModernApproach*,4thed.NewYork:Pearson Education Publications,2010.*(Chapters: 1,2,3)*

[2]. Ian Goodfellow, YoshuaBengio, Aaron Courville - *Deep Learning*-MIT Press, 2016. (*Chapters: 9, 10)*

[3]. Giuseppe Bonaccorso, *Machine Learning Algorithms*, 2nd Edition, Packt, 2018. (Chapters1,2,3,4,5,6,7,8,9)

Reference Books:

[1]. 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]. Himanshu Singh, *Practical machine learning and image processing*, Apress, India, 2019.*(Chapters: 5, 6)*

[3]. Abdulhamit Subasi, *Practical guide for biomedical signal analysis using machine learning techniques*, Academic press, UK,2019. *(Chapters: 2, 3,4)*

[4]. Andreas C. Muellerand Sarah Guido, *Introduction to Machine Learning with Python*, Sebastopol, CA: O"Reilly Media, 2016.

[5]. Vinod Chandra S.S, Anand Hareendran S, *Artificial Intelligence and Machine Learning*, PrenticeHall, India, 2014.

[6]. Ethem Alpaydin, *Introduction to machine learning*, 2nded. Cambridge:MITPress,USA,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, 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		1	2	2
CO3	U18CI606.3	2	2	2	2	2	1		1	1	1		1	2	2
CO4	U18CI606.4	2	1	2	2	2	1		1	1	1		1	2	2
U18EC606		**2**	**1.5**	**2**	**1.75**	**1.75**	1		1	1	1		**1**	**2**	**2**

U18CS612 Advanced Data Structures Laboratory

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

Teaching Scheme: **Examination Scheme:**

L	T	P	C
-	–	2	1

Continuous Internal Evaluation	40 marks
End Semester Examination	60 marks

Course Learning Objectives:

This course will develop students" knowledge in/on

LO1: *organizing and retrieving the data using binary tree, binary search trees*

LO2: *organizing and retrieving the data using AVL trees, B-Trees, Red black trees and Splay trees.*

LO3: *organizing and retrieving the data using Interval tree, Hash tree, Tries, sorting and searching.*

LO4: *organizing and retrieving the data using graphs and spanning trees*

LIST OF EXPERIMENTS

Experiment-I

1. Program to perform following binary tree operations.

i) creation ii) insertion of a node iii) traversal using recursion.

Experiment-II

2. Program to perform following binary search tree operations.

i) creation ii) deletion of a node iii) traversal using recursion.

Experiment III

3. Program to perform following binary search tree traversal operations without recursion.

i) Inorder ii) Preorder iii) Postorder iv) Spiral order

Experiment-IV

4. Program to implement AVL tree construction.

Experiment-V

5. Program to implement B-tree construction.

Experiment-VI

6. Program to implement search and insert operationson Trie.
7. Program to implement Fibonacci search.

Experiment-VII

8. Program to implement Quick sort.
9. Program to implement Merge sort.

Experiment-VIII

10. Program to implement heap sort.
11. Program to implement Bitonic generator sort.

Experiment-IX

12. Program to implement Topological sort.
13. Program to implement the following graph traversal techniques.
14. a) Prim's algorithm b) Kruskal's algorithm

Experiment-X

15. Program to implement the following graph traversal techniques.
    a) Depth first search b) Breadth first search.
16. Program to implement Kosaraju's algorithm.

Experiment-XI

17. Program to implement Naive Algorithm.
18. Program to implement Knuth - Morris - Pratt (KMP) Algorithm ,

Experiment-XII

19. Program to implement Boyer Moore Algorithm
20. Program to implement Rabin Karp Algorithm:

Laboratory Manual:

[1] *Advanced Data Structures laboratory manual*, prepared byfaculty of Dept. of Computer Science & Engineering.

Reference Books:

[1] Debasis Samanta, *Classic Data Structures*, 2nd ed., New Delhi: Prentice Hall India, 2009.
[2] Reema Thareja, *Data Structures Using C,* 2nded., New Delhi: Oxford University Press, 2014
[3] E Balagurusamy, "Data Structure Using C", *McGraw Hill Education*, 1st Edn., ISBN-13: 978-125-902-9547, 2017.

Course Projects: A course project is an independent project carried out by the student during the course period, under the supervision of the course faculty. The course faculty will post a few course project titles on the CourseWeb 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 programs using binary trees, binary search trees.
CO2: utilize balanced search trees such as B-trees, B+-trees, Red black and Splay trees in solving the problems.
CO3: organize and retrieve the data using Interval tree, Hash tree, Tries , sorting and searching .
CO4:organize and retrieve the data using Graphs and different types of spanning trees.

Course Articulation Matrix: **U18CS612 Advanced Data Structures 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	U18CS612.1	1	1	3	1	1	1	1	1	1	1	-	2	1	-
CO2	U18CS612.2	1	1	2	2	1	1	1	1	-	1	-	2	1	-
CO3	U18CS612.3	1	1	3	3	2	1	1	1	-	1	-	3	1	-
CO4	U18CS612.4	1	1	3	2	3	2	2	2	-	2	-	3	1	-
U18CS612		**2**	**2**	**1**	**1**	**2.75**	**2**	**1.75**	**1.25**	**1.25**	**1.25**	**1**	**1.25**	**2.5**	**1**

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 IoT and Data Acquisition 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 laboratory course will develop students‟ knowledge on /in…

LO1: interfacing sensors to Raspberry Pi 3 using Python
LO2: visualize the sensor data using cloud service
LO3: measure and analyze the sensors characteristics using LabVIEW
LO4: building cloud-based dashboard for IoT applications using LabVIEW

LIST OF EXPERIMENTS

The following experiments are to be performed on Raspberry Pi 3 board by developing Python programs.

[1]. Reading Temperature and Humidity values into Raspberry Pi

[2]. Controlling a servo motor with Raspberry Pi

[3]. Visualizing Temperature and Humidity data on ThingSpeak cloud

[4]. Cloud based implementation of IoT using a MQTT Broker

[5]. Triggering an IFTTT applet from Raspberry Pi

[6]. Controlling LED brightness with IFTTT Applet using dweet.io service

[7]. Basic Programming in LabVIEW

[8]. Advance features in LabVIEW

[9]. Reading and writing an analog signal using NI-DAQ device

[10]. Recording an analog signal acquired in a spreadsheet

[11]. Triggering an alarm with temperature data fromNI - myDaq

[12]. Measuring Acceleration and Gyroscope data using NI - myRio

[13]. Data communication with TCP/IP Using LabVIEW

[14]. Communicating with Google Firebase cloud using LabVIEW

Laboratory Manual:

[1] *IoT and Data Acquisition Laboratory Manual, Dept. of ECE, KITSW*.

Reference Books:

[1]. Colin Dow, *Internet of Things Programming Projects,* Birmingham: Packt Publishing, 2018.

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 senors /actuoros interfacing using Raspberry Pi 3B
CO2: interpret cloud communication using IFTT service
CO3: develop the programs for analysis of analog signal characteristics using NI-DAQ
CO4: design a project based on LabVIEW tool and NI-DAQ

Course Articulation Matrix (CAM): U18CI609 IoT and Data Acquisition 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	U18CI609.1	2	2	2	1	1	-	1	1	1	1	-	1	2	**1**
CO2	U18CI609.2	2	2	2	1	1	-	1	1	1	1	-	1	2	**1**
CO3	U18CI609.3	2	2	2	1	2	-	1	1	1	1	-	1	2	**1**
CO4	U18CI609.4	2	2	2	1	2	-	1	1	1	1	-	1	2	**1**
U18CI609		**2**	**2**	**2**	**1**	**1.5**		**1**	**1**	**1**	**1**		**1**	**2**	**1**

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 toqualify 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 guideline

(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

(i) 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 developingworking 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 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**

ISO 9001:2015 AICTE-CII: GOLD Category Institute NAAC-'A' Grade Institute (CGPA: 3.21) NIRF-2020 Rank Band: 201-250
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DEPARTMENT OF ELELCTRONICS & COMMUNICATION ENGINEERING

SCHEME OF INSTRUCTION & EVALUATION

VII - SEMESTER OF 4-YEAR B.TECH ECI DEGREE PROGRAMME

[4Th+2P+1MC]

S. No	Category	Course Code	Course Title	Hour per week			Credits	Evaluation Scheme				
				L	T	P		CIE			ESE	Total Marks
								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 Process Control	3	-	-	3	10	30	40	60	100
5	PCC	U18CI 705	Industrial Process Control Laboratory	-	-	2	1	40	-	40	60	100
6	PCC	U18CI 709*	Digital Design Laboratory	-	-	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:		**Professional Elective-III:** (*offered by department*)		**SWAYAM - NPTEL Equivalent course**	**Professional Elective-IV:** (*offered by department*)		**SWAYAM - NPTEL Equivalent course**
U18OE701A: (*offered by CED*)	Disaster Management	U18CI702A:	Digital Image Processing Techniques	Digital Image Processing	U18CI703A:	Embedded and Real time Operating Systems	-
U18OE701B: (*offered by ECED*)	Project Management	U18CI702B:	Microwave and Optical Fiber Communication	(i) Microwave Engineering (ii) Fibre Optic Communication Technology	U18CI703B:	VLSI System Design	VLSI Interconnects
U18OE701C: (*offered by EEED*)	Professional Ethics in Engineering	18CI702C:	Satellite communications	-	U18CI703C:	Cyber Security	-
U18OE701D: (*offered by MED*)	Rural Technology and Community Development	**MOOC-III: U18CI702M SWAYAM -MOOC course**		(i) Introduction to Biomedical Imaging systems (ii) Artificial Intelligence: Search methods for problem solving	**MOOC-IV: U18CI703M SWAYAM -MOOC course**		(i) Introductory Neuroscience & Neuro-Instrumentation (ii) Python for Data Science

MOOCs: *Students are encouraged to do Massive Open Online Courses (MOOCs) on SWAYAM platform (https: //www.swayam.gov.in) offered by NPTEL, CEC, IIM-B, IGNOU. Students shall contact the HoD to get their interested MOOCs approved by the HoD/ Dean Academic Affairs for proper transfer the credits for the MOOCs.*

Internship: *All Students should plan for mandatory 6-8 weeks internship, from end of II semester to commencement of VII semester, at industry/R&D organizations/ institutes of national importance (IITs/IIITs/NITs). As part of Internship evaluation in VII semester, students are expected to submit a well-documented internship report and give an informative PPT presentation.*

Contact hours per week: 24; Total Credits: 17

U18OE701A DISASTER MANAGEMENT

Class: B. Tech. VII – Semester **Branch(s):** ME, CSE, IT & CSN CE, EIE, EEE, ECE& ECI

Teaching Scheme:

L	T	P	C
3	-	-	3

Examination Scheme:

Continuous Internal Evaluation	40
End Semester Examination	60

Course Learning Objectives (LOs):

This course will develop students,, knowledge in/on

LO1: disaster types, its impacts & national policy on disaster management
LO2: prevention, preparedness and mitigation measures for different disasters, emergency supportfunctions and relief camps
LO3: different types of vulnerability, macroeconomic, financial management of disaster and its related losses
LO4: disaster management for infrastructure, treatment of plants, geo spatial information in agriculture, multimedia technology in disaster risk management and training

UNIT - I (9)

Introduction & Principles of Disaster Management: Nature - Development, Hazards and disasters; Natural disasters - Earth quakes, Floods, Fire, Landslides, Cyclones, Tsunamis, Nuclear; Chemical dimensions and Typology of disasters - Public health disasters, National policy on disaster management

UNIT -II (9)

Prevention Preparedness and Mitigation Measures: Prevention, Preparedness & mitigation measures for various disasters, Post disaster reliefs and logistics management, Emergency support functions and their coordination mechanism, Resources and material management, Management of relief camp

UNIT– III (9)

Risk and Vulnerability: Building codes and land use planning, Social vulnerability, Environmental vulnerability, Macroeconomic management and sustainable development, Climate change, Risk rendition, Financial management of disaster and related losses

UNIT - IV (9)

Role of Technology in Disaster Management: Disaster Management for infrastructures, Taxonomy of infrastructure, Treatment plants and process facilities, Electrical sub stations, Roads and Bridges, Geo spatial information

in agriculture, Drought assessment, Multimedia technology in disaster risk management and training

Textbook:

[1] Rajib shah and R.R Krishnamurthy, *Disaster management – Global Challenges and local solutions,* Hyderabad: Universities Press (India) Pvt. Ltd., 2009.

Reference Book:

[1] Satish Modh, *Introduction to Disaster management,* Bengaluru: Macmillan India, 2010.

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

Course Patent: Patent 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: classify the disasters and discuss natural & non-natural disasters, their implications, the institutional & legal framework for national policy on disaster management in India

CO2: identify mitigation strategies, preparedness & prevention measures and prioritizes the rescue &relief operations to reduce the impact of a disaster

CO3: list the vulnerable groups in disaster; examine the concepts of macroeconomic & sustainability & impact of disaster on development

CO4: discuss disaster management for infrastructure, utilize geospatial information in agriculture and apply multimedia technology for disaster risk management & training

Course Articulation Matrix (CAM): U18OE701A DISASTER MANAGEMENT															
CO		**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	U18OE602A/ U18OE701A.1	-	-	-	-	-	2	2	1	-	1	1	1	-	-
CO2	U18OE602A/ U18OE701A.2	-	-	-	-	-	2	2	1	-	1	1	1	1	1
CO3	U18OE602A/ U18OE701A.3	-	-	-	-	-	2	2	1	-	1	1	1	-	-
CO4	U18OE602A/ U18OE701A.4	-	-	-	-	-	2	2	1	-	1	1	1	1	1
U18OE602A/ U18OE701A		**-**	**-**	-	-	-	**2**	**2**	**1**	**-**	**1**	**1**	**1**	**1**	1

U18OE701B PROJECT MANAGEMENT

Class: B. Tech.VII – Semester

Branch(s): ME, CSE, IT & CSN
CE, EIE, EEE, ECE & ECI

Teaching Scheme:

L	T	P	C
3	-	-	3

Examination Scheme:

Continuous Internal Evaluation	40
End Semester Examination	60

Course Learning Objectives (LOs):

This course will develop students knowledge in/on…

LO1: role of project manager, organization and management functions

LO2: effective time &conflict management, ethics & professional responsibilities

LO3: project planning, scheduling and budgeting

LO4: cost control, risk management and quality control techniques

UNIT - I (9)

Project Management: Understanding project management, Role of project manager, Classification of projects, Project management growth, Definitions and Concepts, Organizational structures - Organizing and staffing the project management office and team; Management functions

UNIT – II (9)

Time and Conflict Management: Understanding time management, Time management forms, Effective time management, Stress and burnout, Conflict environment, Conflict resolution, Management of conflicts, Performance measurement, Financial compensation and rewards, Morality, ethics, Corporate culture, Professional responsibilities, Success variables, Working with executives

UNIT – III (9)

Project planning: General planning, Life-cycle phases, Proposal preparation, Project planning, The statement of work, Project specifications, Milestone schedules, Work breakdown structure, Executive role in planning, The planning cycle, Handling project phase outs and transfers, Stopping projects, Scheduling techniques - CPM and PERT, Pricing and estimating

UNIT – IV (9)

Cost and quality control: Understanding cost control, Earned Value Measurement System, Cost control problems, Methodology for trade-off analysis, Risk management process, Risk analysis, Risk responses, Monitoring and control of risks, Contract management, Quality management concepts, Cost of quality, Quality control techniques

Textbook:

[1] Harold Kerzner, *Project Management: A Systems Approach to Planning, Scheduling and Controlling*, 10th ed. Hoboken, NJ: John Wiley & Sons Inc., 2009.

Reference Books:

[1] Jack R Meredith & Samuel J mantel Jr., *Project Management: A Managerial Approach*, 8th ed. Hoboken, NJ: John Wiley & Sons Inc., 2012.

[2] John M Nicholas & Herman Steyn, *Project Management for Business,Engineering and Technology*, 4th ed. Abingdon, UK: Taylor & Francis, 2012.

[3] Adedeji B. Badiru, *Project Management: Systems, Principles and Applications*, Florida, USA: CRC Press, 2012.

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

Course Patent: Patent 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 the course, the student will be able to…

CO1: evaluate the desirable characteristics of effective project managers
CO2: plan to resolve issues in conflicting environments
CO3: apply appropriate approaches to plan a new project in-line with project schedule & suitable budget
CO4: estimate the risks to be encountered in a new project and apply appropriate techniques to assess & improve ongoing project performance

Course Articulation Matrix (CAM): U18OE701B PROJECT MANAGEMENT															
CO		**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	U18OE602B/ U18OE701B.1	-	-	-	-	-	1	-	1	-	1	1	-	1	1
CO2	U18OE602B/ U18OE701B.2	-	-	-	-	-	1	-	2	-	1	1	-	1	1
CO3	U18OE602B/ U18OE701B.3	1	1	-	-	-	1	-	1	-	1	1	-	1	1
CO4	U18OE602B/ U18OE701B.4	1	1	-	-	-	1	-	1	-	1	1	-	1	1
U18OE602B/ U18OE701B		1	1	-	-	-	1	-	2	-	1	1	-	1	1

U18OE701C PROFESSIONAL ETHICS IN ENGINEERING

Class: B. Tech. VI – Semester
B. Tech. VII – Semester

Branch(s): ME, CSE, IT & CSN
CE, EIE, EEE, ECE & ECI

Teaching Scheme:

L	T	P	C
3	-	-	3

Examination Scheme:

Continuous Internal Evaluation	40
End Semester Examination	60

Course Learning Objectives (LOs):

This course will develop students" knowledge in/on …

LO1: human values and engineering ethics

LO2: professionalism, theory of virtues and code of ethics

LO3: safety & risk benefit analysis, professional and intellectual property rights

LO4: environmental & computer ethics and various roles of engineers in a company

UNIT - I (9)

Human Values: Morals, Values & ethics, Integrity, Work ethic, Service learning, Civic virtue, Respect for others, Living peacefully, Caring, Sharing, Honesty, Courage, Valuing time, Co- operation, Commitment, Empathy, Self-confidence, Character, Spirituality

Engineering Ethics: Senses of "Engineering Ethics", Variety of moral issues, Types of inquiry, Moral dilemmas, Moral autonomy, Kohlberg's theory, Gilligan's theory - Consensus and controversy

UNIT – II (9)

Profession and professionalism: Profession and its attributes, Models of professional roles **Theory of Virtues:** Definition of virtue and theories of virtues, Self-respect, Responsibility andsenses, Modern theories of virtues, Uses of ethical theories

Engineering as social experimentation: Engineering as experimentation, Engineers as responsible experimenters, Codes of ethics, A balanced outlook on law, The challenger case study

UNIT –III (9)

Safety, Responsibilities and Rights: Safety and risk, Assessment of safety and risk, Risk benefit analysis and reducing risk - Three Mile Island and Chernobyl case studies; Collegiality and loyalty, Respect for authority, Collective bargaining, Confidentiality, Conflicts of interest, Professional rights, Employee rights, Intellectual Property Rights (IPR), Discrimination

UNIT – IV (9)

Global Issues: Multinational corporations - Environmental ethics, Computer ethics, Engineers as managers, Consulting engineers, Engineers as expert witnesses and advisors, Moral leadership, Sample code of ethics (*Specific to a particular engineering discipline*)

Text Book:

[1] D.R. Kiran, *Professional Ethics and Human Values*, New York: McGraw Hill, 2013.

Reference Books:

[1] Govindarajan. M, Natarajan. S, Senthil Kumar. V.S, *Professional Ethics and Human Values,* New Delhi: Prentice Hall of India, 2013.

[2] Mike Martin and Roland Schinzinger, *Ethics in Engineering*, 4th ed. New York: McGrawHill, 2014.

[3] Charles D. Fleddermann, *Engineering Ethics*, 4th ed. New Delhi: Prentice Hall, 2004.

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

Course Patent: Patent 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: identify the need for human values, morals & ethics and apply Gilligan's & Kohlberg's theories for morale development

CO2: identify the desired characteristics of a professional & the need for code of ethics & balanced outlook on law

CO3: estimate the safety margin & threshold level and describe the procedure for obtaining a patent CO4: analyze the role of engineer in multinational companies as an advisor, consultant & manager

Course Articulation Matrix (CAM): U18OE701C PROFESSIONAL ETHICS IN ENGINEERING

CO		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	U18OE602C/ U18OE701C.1	-	-	-	-	-	1	-	2	1	1	-	1	-	-
CO2	U18OE602C/ U18OE701C.2	-	-	-	-	-	1	-	2	1	1	-	1	-	-
CO3	U18OE602C/ U18OE701C.3	-	-	-	-	-	1	-	2	1	1	-	1	1	1
CO4	U18OE602C/ U18OE701C.4	-	-	-	-	-	1	-	2	1	1	-	1	1	1
U18OE602C/ U18OE701C		**-**	**-**	**-**	**-**	**-**	**1**	**-**	**2**	**1**	**1**	**-**	**1**	**1**	**1**

U18OE701D RURAL TECHNOLOGY AND COMMUNITY DEVELOPMENT

Class: B. Tech. VII – Semester

Branch(s): ME, CSE, IT & CSN
CE, EIE, EEE, ECE & ECI

Teaching Scheme:

L	T	P	C
3	-	-	3

Examination Scheme:

Continuous Internal Evaluation	40
End Semester Examination	60

Course Learning Objectives (LOs):

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

LO1: building technologies, modern agricultural implements and food processing methods

LO2: medicinal & aromatic plants to fulfill the needs of pharmaceutical industries and rural energy for eradication of drudgery

LO3: purification of drinking water, rain water harvesting and employment generating technologies in rural areas

LO4: objectives & characteristics of community development, need for communitymobilization and approaches for community organization

UNIT - I (9)

Technologies and Process: Building materials and components - Micro concrete roofing tiles, Water & fire proof mud walls and thatch, Red mud/rice husk cement, Types of bricks, Ferro-cement water tanks and other products, Cement blocks, Preservation of mud walls, Agricultural implements - Naveen sickle, Animal drawn digger, Grubber weeder, Self propelled reaper, Seed drill, Improved bakhar

Food Processing: Fruit and vegetable preservation - Process flow sheet, Scale of operation, Economic feasibility, Source of technology; Soya milk - Process, Economics; Dehydration of fruits and vegetables, Cultivation of oyster mushroom - Preparation of beds, Spawning, Removal of bags for production of mushrooms, Harvesting and marketing, Economics, Process flow sheet, Source of technology

UNIT - II (9)

Medicinal and Aromatic plants: Plants and its use, Aromatic plants, Cymbopogons,

Geranium, Manufacturing of juice, Gel and powder, Rural energy - Cultivation ofjatrophacurcus and production of biodiesel, Low cost briquetted fuel, Solar cookers and oven, Solar drier, Bio-mass gasifier

Bio-fertilizers: Introduction, Vermicompost, Improvement over traditional technology/process, Techno economics, Cost of production, Utilization of fly ash for wasteland development and agriculture

UNIT - III (9)

Purification of Drinking water: Slow sand filtration unit, Iron removal plant connected to hand pump, Chlorine tablets, Pot chlorination of wells, Solar still, Fluoride removal, Rain

Employment Generating Technologies: Detergent powder and cake - Process, Process for liquid detergent, Carcass utilization - Improvement over traditional technology, Flow chart, Process, Capital investment; Indigo blue - Dye, Organic plant production, Dye extraction techniques, Aspects of indigo market, Economics; Modernization of bamboo based industries - Process for bamboo mat making, Machinery, Products, Agarbatti manufacturing; Vegetable tanning of leathers - Raw material, Soaking, Liming, Reliming, Deliming, Pretanning, Malani, Setting, Yield

UNIT – IV (9)

Community Development: Community organization - Definition, Need, Functions, Principles, Stages; Community development - Definition, Need, Objectives, Characteristics, Elements, Indicators; Differences between community organization and community development

Community Mobilization: Need, Benefits, Preparing, Initial contact with community, Coordinating, Functions of the community, Challenges, Techniques for mobilizing community, Community contributions, Leadership and capacity building, Community participation, Role of community worker in community mobilization, Models of community organization practice - Local development model, Social planning model, Social action model, Approaches to community organization

Textbooks:

[1] M.S. Virdi, *Sustainable Rural Technology*, New Delhi: Daya Publishing House, 2009.

[2] Asha Ramagonda Patil, *Community Organization and Development: An Indian Perspective*,New Delhi: Prentice Hall of India, 2013.

Reference Books:

[1] Punia Rd Roy, *Rural Technology*, New Delhi: Satya Prakashan Publishers, 2009.

[2] S.B. Verma, S.K. Jiloka, Kannaki Das, *Rural Education and Technology*, New Delhi: Deep& Deep Publications Pvt. Ltd., 2006.

[3] Edwards, Allen David and Dorothy G.Jones, *Community and Community Development*,The Hague, Netherlands: Mouton, 1976.

[4] Lean, Mary, *Bread, Bricks and Belief: Communities in Charge of Their Future*, West Hartford, US: Kumarian Press, 1995.

[5] Heskin, Allen David, *The Struggle for Community*, Colorado, US: West View Press,

1991
[6] Clinard, Marshall Barron, *Slums and Community Development: Experiments in Self-Help*,Mumbai: Free Press, 1970.

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

Course Patent: Patent 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: discuss various building technologies, modern agricultural implements and food processing methods which can be implemented in rural areas

CO2: identify major medicinal plants that are required for pharmaceutical companies & alternative fuel that meets substantial oil need in the country and the need and usage of bio- fertilizers

CO3: analyze several cost effective technologies for purification of water, rain water harvesting techniques for collection & storage of rain water and examine the employment generating technologies in tribal/ rural areas

CO4: distinguish between community organization and community development and identify techniques for community mobilization & approaches to community organization for social change

Course Articulation Matrix (CAM): U18OE701D RURAL TECHNOLOGY AND COMMUNITY DEVELOPMENT

CO		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	U18OE602D/ U18OE701D.1	-	-	-	-	-	1	-	2	1	1	-	1	-	-
CO2	U18OE602D/ U18OE701D.2	-	-	-	-	-	1	-	2	1	1	-	1	-	-
CO3	U18OE602D/ U18OE701D.3	-	-	-	-	-	1	-	2	1	1	-	1	1	1
CO4	U18OE602D/ U18OE701D.4	-	-	-	-	-	1	-	2	1	1	-	1	1	1
U18OE602D/ U18OE701D		**-**	**-**	**-**	**-**	**-**	**1**	**-**	**2**	**1**	**1**	**-**	**1**	**1**	**1**

U18CI702A DIGITAL IMAGE PROCESSING TECHNIQUES

Class: B.Tech.VII Semester

Branch: *Electronics Communication & Instrumentation Engineering*

Teaching Scheme:

L	T	P	C
3	-	-	3

Examination Scheme:

Continuous Internal Evaluation	40Marks
End Semester Examination	60Marks

Course Learning Objectives (LOs):

This course will develop students' knowledge in/on…

LO1: fundamentals and importance of various image transformations

LO2: enhancement, filtering and restoration techniques for various imaging applications

LO3: various image compression algorithms.

LO4: segmentation techniques and morphological operators for various imaging applications

UNIT-I (9)

Introduction: Fundamental steps and components of digital image processing, image sensing and acquisition, sampling and quantization, representation of digital images, relationships between pixels- neighborhood of a pixel, distance measures, arithmetic and logical operations on images, spatial transformations.

Image Transforms: Two dimensional DFT and its properties, DCT, unitary Transforms, walsh transform, Hadamard Transform, slant transform and KL transform.

UNIT-II (9)

Image Enhancement: Simple intensity transforms, Piecewise linear transforms and histogram processing.

Spatial Domain Filtering: Correlation and convolution, linear and nonlinear filters-smoothing and sharpening filters

Frequency Domain Filtering: Image smoothing and sharpening - ideal, butterworth, gaussian filters, unsharp masking and high-boost filtering, homomorphic filtering, selective filtering- band reject and band pass filters

Image Restoration and Degradation: Image restoration and degradation model, noise models, restoration in the presence of noise only- spatial filtering, inverse filtering, wiener filtering, constrained least square filtering.

UNIT-III (9)

Image Compression: Redundancy – coding redundancy, interpixel redundancy, psychovisual redundancy, fidelity criteria, image compression system model, lossless and lossy coding, huffman coding, LZW coding, arithmetic coding, run length coding, bit-plane coding, constant area coding, lossless and lossy predictive coding, JPEG 2000

UNIT-IV (9)

Morphological Image Processing: Structuring element, erosion and dilation, opening and closing, hit-or-miss transformation, basic morphological algorithms and grey-scale morphology.

Image Segmentation: Point, line and edge detection, image gradient and gradient operators, edge linking and boundary detection – local, regional and global processing; thresholding- global, multiple, variable and multi variable thresholding, region based segmentation; region growing, region splitting and merging.

Text Book:

[1] R.C. Gonzalez and R.E. Woods, *Digital Image processing,* 3rd ed., New Delhi: Pearson Education, 2009.

Reference Books:

[1] Rafael C. Gonzalez, Richard E. Woods, Steven Eddins, *Digital image processing using MATLAB*, 1st ed., New Delhi: Pearson Education, 2004.

[2] William K. Pratt, *Digital Image Processing*, 4th ed., New York: John Wiley and Sons, 2002

[3] Sridhar, *Digital image processing*, 1st ed., New Delhi: Oxford University press, 2013.

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

Course Patent: Patent 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):

After completion of this course, the students will be able to

CO1: discuss fundamental properties of an image & analyze relationships between pixels and transforms on image

CO2: apply different filtering techniques in spatial domain and frequency domain to enhance digital images.

CO3: analyze various image compression algorithms

CO4: formulate solutions to real world issues in image processing using segmentation techniques & morphological operations.

Course Articulation Matrix: U18CI702A DIGITAL IMAGE PROCESSING TECHNIQUES

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	U18CI702A.1	2	1	2	1	1	-	-	1	-	1	2	1	2	1
CO2	U18CI702A.2	2	1	2	2	2	-	-	1	-	1	2	2	2	2
CO3	U18CI702A.3	2	1	2	2	2	-	-	1	-	1	2	2	2	2
CO4	U18CI702A.4	2	1	2	2	2	-	-	1	-	1	2	2	2	2
U18CI702A		**2**	**1**	**2**	**1.75**	**1.75**	**-**	**-**	**-**	**-**	**1**	**2**	**1.75**	**2**	**2**

U18CI702B MICROWAVE AND OPTICAL FIBER COMMUNICATION

(*Professional Elective - III*)

Class: B.Tech. VII-Semester

Branch: Electronics Communication & Instrumentation Engineering (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 in /on

LO1: *applications of microwaves and microwave tubes which are useful in modern communication.*

LO2: *wave guide components and various measurements which can be done at microwave frequency.*

LO3: o*ptical fiber structures, fiber splicing, optical sources and detectors.*

LO4: o*ptical receivers, analog links and network concepts.*

UNIT-I (9)

Introduction: Microwave region and bands, applications, high frequency limitations of conventional tubes **Microwave tubes:** Classification of micro wave tubes, Two cavity klystron amplifier operation with applegate diagram, mathematical theory of bunching, principle of working, output power and efficiency; reflex klystron oscillator operation with applegate diagram, mathematical theory of bunching, and output power; cylindrical magnetron – construction, operation and hull's cut-off conditions, Gunn diode

UNIT-II (9)

Waveguide Components: Scattering matrix significance, properties; microwave hybrid circuits: E-plane tee, H-plane tee and magic tee, directional coupler, ferrites composition and characteristics, Faraday rotation, gyrator, isolator and circulator

Microwave Measurements: Description of microwave bench, frequency measurement, attenuation measurement, VSWR measurement, impedance measurement and power measurement (Bolometer method)

UNIT-III (9)

Optical Fibers structure and wave guiding: Major elements of an optical fiber link, nature of light, basic optical laws and definitions, fiber modes and configurations, single mode and multi-mode fibers, step index fiber and graded index fiber

Fiber Splicing, Optical Sources and Detectors: Splicing techniques, optical fiber connectors – connector types and connector return loss; light emitting diode, LASER diode, PIN photo detector and avalanche photodiode

UNIT-IV (9)

Optical Receiver: Fundamental receiver operation, digital signal transmission, error sources, digital receiver performance, probability of error, receiver

sensitivity, quantum limit, eye diagrams, eye pattern features, BER, Q factor measurements and coherent detection

Analog links and Network concepts: Carrier to noise ratio, carrier power, relative intensity noise, limiting conditions of RIN, WDM and dense WDM, network topology, network categories, network layers, optical layers, SONET and WDM network

Text Books:

[1] M. Kulkarni, *Microwave and Radar Engineering,* 4th ed., New Delhi: Umesh publications, 2009.

[2] Gerd Keiser, *Optical Fiber Communications*, 5th ed., New Delhi: McGraw Hill, 2017.

Reference Books:

[1] Samuel Y. Liao, *Micro wave devices and circuits*, 3rd ed., New Delhi: Pearson, 2003.

[2] Annapurna Das and S. K. Das, *Microwave Engineering,* 3rd ed., New Delhi: McGraw Hill Education, 2017.

[3] John M. Senior, *Optical Fiber Communications - Principles and practice*, 3rd ed., New Delhi: Pearson, 2010.

[4] P. Chakrabarti, *Optical Fiber Communications,* New Delhi: McGraw Hill, 2015.

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

Course Patent: 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):

After completion of this course, the students will be able to

CO1: *describe the applications of microwaves and microwave tubes which are useful in modern communication*

CO2: *explain the wave guide components and various measurements which can be done at microwave frequency*

CO3: *elaborate optical fiber structures, fiber splicing, optical sources and detectors*

CO4: *examine the features of optical receivers, analog links and network concepts*

Course Articulation Matrix: U18CI702B Microwave and Optical Fiber 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	PSO 1	PSO 2
CO1	U18CI702B.1	2	2	1	1	1	-	-	1	1	1	-	1.5	1	1
CO2	U18CI702B.2	2	2	1	1	1	-	-	1	1	1	-	1.5	1	1
CO3	U18CI702B.3	2	2	2	1	1	-	-	1	1	1	-	1.5	1	1
CO4	U18CI702B.4	2	2	2	1	1	-	-	1	1	1	-	1.5	1	1
U18CI702B		**2**	**2**	**1.5**	**1**	**1**	**-**	**-**	**1**	1	1	-	**1.5**	**1**	**1**

U18CI702C Satellite Communications

Class: B.Tech.VII Semester

Branch: *Electronics Communication & Instrumentation Engineering*

Teaching Scheme:

L	T	P	C
3	-	-	3

Examination Scheme:

Continuous Internal Evaluation	40Marks
End Semester Examination	60Marks

Course Learning Objectives (LOs):

This course will develop students' knowledge in/on…

LO1: key issues in satellite communications
LO2: various satellite subsystems and satellite link design
LO3: multiple access techniques such as FDMA, TDMA and CDMA & Impact of propagation effects onsatellite-earth links
LO4: Non geo-stationary orbit satellite system & satellite navigation and global positioning system

UNIT-I (9)

Introduction: Overview of satellite communications, GEO, MEO and LEO satellite systems, frequency bands.

Orbital Mechanics and Launchers: Achieving a stable orbit, locating the satellite with respect to the earth, orbital elements, look angle determination, orbital perturbations, placing satellites into geostationary orbit, orbital effects in communications systems performance-doppler shift, solar eclipse, sun transit outage; space launch vehicles and rockets.

UNIT-II (9)

Satellite Subsystems: Attitude and orbit control system (AOCS), telemetry, tracking, command and monitoring system (TTC&M), power systems: solar power systems and batteries; communications subsystems: description of the communication system, transponders; satellite antennas, equipment reliability and space qualification.

Satellite Link Design: Transmission theory, system noise temperature and G/T ratio, design of down links, uplink design, design for specified CNR: combining CNR and C/I values in satellite links, system design for specific performance.

UNIT-III (9)

Multiple Access Schemes: FDMA: Implementing FDMA, power sharing in FDMA; TDMA: TDMA frame structure, transmitter power in TDMA networks; on board processing, CDMA: spread spectrum transmission and reception, processing gain and CDMA system capacity.

Impact of Propagation Effects on Satellite-Earth Links: Propagation phenomena, propagation effects that is not associated with hydrometeors, rain and ice effects, and prediction of rain attenuation.

Text Books:

[1] Timothy Pratt and Jeremy Allnutt, *Satellite Communications*, 3rd ed., New Delhi: John Wiley & Sons Publications, 2020 (*Chapters 1-4, 6, 7, 9, 12*).

Reference Books:

[1] Dennis Roddy, *Satellite Communications*, 4th ed., New York: McGraw-Hill, 2006.
[2] D.C. Agarwal, *Satellite Communications*, 5th ed., New Delhi: Khanna Publications, 2014.
[3] Tri T. Ha, *Digital Satellite Communications*, 2nd ed., Singapore: Mc Graw-Hill, 1990.
[4] W. Pritchard and J Sciulli, *Satellite Communication Systems Engineering,* PHI learning, 1986

Web Resources:

[1] http://nptel.iitm.ac.in/courses.php?branch=Ece
[2] http://www.isro.org/satellites/satelliteshome.aspx
[3] www.intelsat.com
[4] www.asca.org.

Course Learning Outcomes (COs):

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

CO1: interpret the orbital elements to identify the location of satellite w.r.t. earth.
CO2: design satellite uplink and down link and examine the effect of various parameters on the respective link performance.
CO3: compare the performance of multiple access techniques such as FDMA, TDMA and CDMA & analyze the impact of propagation effects on satellite-earth links.
CO4: discuss the issues related to non geo-stationary orbit satellite system & satellite navigation and global positioning system

Course Articulation Matrix (CAM): U18CI801B SATELLITE COMMUNICATIONS

CO		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	U18CI801B.1	2	1	2	-	-	-	-	1	-	1	1	1	1	1
CO2	U18CI801B.2	2	1	2	-	-	-	-	1	-	1	1	1	1	1
CO3	U18CI801B.3	2	1	2	-	-	-	-	1	-	1	1	1	1	1
CO4	U18CI801B.4	2	1	2	-	-	-	-	1	-	1	1	1	1	1
U18CI801B		**2**	**1**	**2**	**-**	**-**	**-**	**-**	**1**	**1**	**1**	**1**	**1**	**1**	**1**

U18CI703A EMBEDDED AND REAL TIME OPERATING SYSTEMS

(Professional Elective-IV)

Class: B.Tech.VII-Semester

Branch: Electronics Communication & Instrumentation 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 on /in…

LO1: architecture of embedded Linux system and supported hardware processors

LO2: building tool chains and setting up of boot loaders

LO3: building kernel and root file systems

LO4: Linux device driver development and creating processes

UNIT-I (9)

General purpose embedded operating systems: Porting existing general-purpose operating system to embedded systems, Organization of embedded operating system (EOS), EOS source file Tree, EOS kernel files, Capabilities of EOS, Startup sequence of EOS

Embedded Real-Time Operating Systems (RTOS): Concepts of RTOS, Task scheduling in RTOS, Priority Inversion, Survey of RTOS - FreeRTOS, MicroC/OS (µC/OS), NuttX, VxWorks, QNX, Real-time Linux

Hardware Support: Processor architectures, Buses and interfaces, I/O, Storage, General-purpose networking, Industrial-grade networking, System monitoring

UNIT-II (9)

Embedded Linux systems: Real life & embedded Linux Systems, Design and implementation methodology, Types of host/target development setups, Types of host/target debug setups, Generic architecture of an embedded Linux system , System startup, Types of boot configurations, System memory layout

Tool chain setup: A practical project workspace, Types of tool chains, Anatomy of tool chain, GNU cross-platform development toolchain, Linking with libraries

Boot loaders setup: Embedded boot loaders, boot sequence, device trees, Server setup for network boot, Using the U-Boot boot loader

UNIT-III (9)

Configuring and Building the Kernel: Choosing the kernel, Building the kernel, compiling the kernel, booting the kernel, porting Linux to a new board

Building a root file system: Root file system structure, File system types for embedded devices, Writing a file system image to flash using an NFS-mounted root file system, Placing a disk file system on a RAM disk, Rootfs and Initramfs, Choosing a file system type and layout, The init program

UNIT-IV (9)

Storage Strategy: Storage options, Accessing flash memory from boat loader, Accessing flash memory from Linux

Interfacing with device drivers: Role of device drivers, Character devices, Block devices, Network devices, drivers at run time, device drivers in user space, writing a kernel device driver, Discovering hardware configuration

Processes and Threads: Creating processes, threads and daemons, Messaging between and within processes

Text Books:

[1] Frank Vasquez Chris Simmonds, *Mastering Embedded Linux Programming* 3rd ed., Birmingham: Packt Publishing, 2021 (*Chapters 1-5, 9, 11, 17*)

[2] Karim Yaghmour, Jon Masters, Gilad Ben-Yossef, and Philippe Gerum, *Building Embedded Linux Systems*, 2 nd ed., CA: O'Reilly Media, Inc, 2008 (*Chapters 1-9)*

Reference Books:

[1] K.C. Wang, *Embedded and Real-Time Operating Systems*, Switzerland: Springer International Publishing, 2017

[2] P. Raghavan, Amol Lad, Sriram Neelakandan, *Embedded Linux system design and development*, Boca Raton: Auerbach Publications, 2006.

[3] Derek Molloy, *Exploring Raspberry Pi: Interfacing to the Real World with Embedded Linux*, Indianapolis: John Wiley & Sons, Inc, 2016.

[4] Rudolf J. Streif, *Embedded Linux Systems with the Yocto Project*, Indianapolis: Prentice Hall, 2016

Course Research Paper: Research paper (Journal/Conference papers) relevant to the course content will be posted by the course faculty in Course Webpage

Course Patent: Patent relevant to the course content will be posted by the course faculty in Course Webpage

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: describe the architecture of embedded Linux system

CO2: setup tool chains and boot loaders for the development of an embedded Linux system

CO3: build kernel configuration and root file systems for developing an embedded Linux system

CO4: develop device drivers for an embedded Linux system

Course Articulation Matrix (CAM): U18CI703A EMBEDDED AND REAL TIME OPERATING SYSTEMS															
CO		**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	U18CI802A.1	2	2	2	2	2	-	-	-	-	-	-	1	2	2
CO2	U18CI802A.2	2	2	2	2	2	-	-	-	-	-	-	1	2	2
CO3	U18CI802A.3	2	2	2	2	2	-	-	-	-	-	-	1	2	2
CO4	U18CI802A.4	2	2	2	2	2	-	-	-	-	-	-	1	2	2
U18CI802A		**2**	**2**	**2**	**2**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**1**	**2**	**2**

U18CI703B VLSI SYSTEM DESIGN

(Professional Elective-V)

Class: B.Tech.VII – Semester

Branch: Electronic Communications & 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: 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 SystemsPerspective*, 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**

U18CI703C Cyber Security

Class: B.Tech. VII-Semester **Branch:** Electronics Communication & Instrumentation

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: security, cryptography, encryption, firewalls, virtualization, and security principles

LO2: source of vulnerabilities, fraud techniques and threat infrastructure

LO3: various types of attacks, race conditions and web exploit tools

LO4: malicious code and defense & analysis techniques

UNIT – I (9)

Cyber Security Fundamentals: Network and security concepts- Information assurance fundamentals, Basic Cryptography, Symmetric encryption, Public key encryption, The domain name system, Firewalls, Virtualization

UNIT – II (9)

Attacker Techniques and Motivations: How hackers cover their track-How and why attackers use proxies, Types of proxies, Detecting the use of proxies, Tunneling techniques-HTTP, DNS, Detection and prevention, Fraud techniques-Phishing, Smishing and mobile malicious code, Rogue antivirus, Click fraud, Threat infrastructure-Botnets Case study on facebook security breach

UNIT – III (9)

Exploitation: Techniques to gain foothold-Shellcode, Integer overflow vulnerabilities, Stack-based buffer overflows, Format string vulnerabilities, SQL Injection, Malicious PDF files-PDF file format, Creating malicious PDF files, Reducing the risks of malicious PDF files, Race conditions , Web exploit tools-Features of hiding, Commercial web exploit to tolls and services

UNIT – IV (9)

Malicious Code: Self-replicating malicious code, Evading detection and elevating privileges-Obfuscation, Virtual machine obfuscation, Persistent software techniques

Defense and Analysis Techniques: Memory forensics -Why memory forensics is important, Capabilities of memory forensics, Finding hidden process, Honeypots, Automated malicious code analysis systems Case study on cyber security predictions and trends

Text Book:

[1] James Graham, Ricard Howard, Ryan Olson, *Cyber Security Essentials*, USA: CRC Press Taylor & Francis Group, 2011.

Reference Books:

[1] Nina Godboles, Sumit Belapure, Cyber Security Understanding Cyber Crimes, Computer Forensics and Legal perspectives, New Delhi: Wiley India (P). Ltd., 2011.

[2] Charles J.Brooks, Christopher Grow, Philip Craig, Donald Short, Cybersecurity Essentials, USA: John Wiley & Sons, USA,2018.

[3] Nilakshi Jain , Ramesh Menon, Cyber Security and Cyber Laws, New Delhi: WileyIndia (P).Ltd., 2019.

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

Course Patent: Patent 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: describe the fundamentals of security concepts and crypt analysis

CO2: illustrate types of proxies, attacking and fraud techniques used by the attackers

CO3: analyze SQL injections, malicious PDF files using web exploit tools

CO4: analyze the impact of malicious code to software application and categorize various defense & analysis techniques

Course Articulation Matrix: U18CI801C: CYBER SECURITY

CO		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO2
CO1	U18CI801C.1	1	1	-	-	-	-	-	1	-	1	-	-	-	1
CO2	U18CI801C.2	2	2	1	1	-	-	-	1	1	1	-	-	-	1
CO3	U18CI801C.3	2	2	2	1	-	-	-	1	1	1	-	1	-	1
CO4	U18CI801C.4	2	2	2	1	-	-	-	1	1	1	-	1	-	1
U18CI801C		**1.75**	**1.75**	**1.66**	**1**	**-**	**-**	**-**	**1**	1	**1**	**-**	**1**	**-**	**1**

U18CI704 INDUSTRIAL PROCESS CONTROL

Class: B.Tech. VII – 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: process control system, process modelling and process dynamics

LO2: discontinuous & continuous controller modes of operation, controller characteristics and its response

LO3: controller tuning techniques, types of physical controllers and actuators employed in process industry

LO4: various types of multiple loop & advanced control configurations, CCS, SCADA, PLC and DCS

UNIT–I (9)

Process Control System (PCS): Block diagram, Example (stirred tank heater system), I to P and P to I conversion, servo & regulator problems

Process Characteristics: Process variable, Load variable, Process degree of freedom, Process error, Process lag, Process regulation, Process parameters

Process Modeling *(Laplace domain approach)*: General process transfer function of process (for I order, II order, higher order and with dead time), Process model for single tank based liquid level process - With linear resistance element, with non-linear resistance element, with constant flow outlet; Process model for multi-tank system based liquid level process (interacting and non-interacting modes), Process model for liquid level process with pure dead time, Study of output level & output flow rate response curves of liquid level processes (for step input variation), Process model for thermal process, Process model for gaseous pressure process

UNIT – II (9)

Controller Response *(Schematic approach)*: Control system parameters - Controller output, controller range and control lag; Controller response of discontinuous controllers – Position controllers (ON-OFF & multi-position) and Floating controllers (single speed & multi-speed); Controller response of continuous controllers – Proportional (P), Integral (I), Derivative (D), PI, PD & PID; Controller transfer function and frequency response of continuous controllers (P, PI, PD & PID)

Closed Loop Response of PCS *(Laplace domain approach)*: Closed loop PCS transfer function, Servo & regulator transfer functions, Study of servo & regulator responses (for I & II order processes with step input variation), Effect of P, I & D controllers on the closed loop response of a controlled process

UNIT – III (9)

Controller Tuning Techniques *(Methodical approach)*: One quarter decay ratio technique, Cohen Coon (CC) technique, Zeigler Nichols (Z-N) technique

Physical Controllers *(Schematic approach)*: Pneumatic PID controller, Hydraulic PID controller, Electronic PID controller

Actuators *(Schematic approach)*: Control valve (CV) - Characteristics, sizing, positioner, types (butterfly, diaphragm, globe & ball types); Single acting type hydraulic actuator, Electromagnetic relay, Solenoid

UNIT – IV (9)

Multiple-loop Control Configurations *(Block diagram approach)***:** Cascade control, Selective control, Split range control, Feed forward control (FFC), Ratio control, Feed forward & feedback control (FFFBC)

Advanced Control Configurations *(Block diagram approach)***:** Programmed adaptive control, Self adaptive control, Inferential control, Multi-variable control

Automated Control Systems *(Block diagram approach)***:** Computer control system (CCS), Supervisory control and data acquisition system (SCADA), Programmable logic controller (PLC), Distributed control system (DCS)

Text Books:

[1] Surekha Bhanot, "Process Control: Principles and Applications", 6th ed., *Oxford University Press*, 2011. *(Chapters 1 to 6, 8, 10 to 12)*

[2] G. Stephanopoulos, "Chemical Process Control", 6th ed., *PHI*, 1998. *(Chapters 5, 10, 11, 13, 14, 16, 18, 20 to 23)*

Reference Books:

[1] C.D. Johnson, "Process Control Instrumentation Technology", 4th ed., *PHI*, 1996.

[2] K. Padma Raju and Y.J. Reddy, "Instrumentation and Control Systems", 1st ed., *McGraw Hill*, India, 2016.

[3] D.R. Coughanowr, "Process Systems Analysis And Control", 3rd ed., *McGraw Hill*, New York, 2009.

[4] B.G. Liptak, "Instrument Engineers Hand Book, Vol.III", 4th ed., *Chilton book co*., Philadelphia, 2003.

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

Course Patent: 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: develop process models for liquid level, thermal & pressure processes using transient mass/ energy balance equations

CO2: apply discontinuous & continuous controller modes of operation for process control applications and analyze the servo & regulator responses of I order process with application of P/PI/PD/PID controller

CO3: estimate the controller tuning parameters using one-quarter decay ratio, C-C & Z-N techniques and utilize pneumatic/ hydraulic/ electronic PID controller & pneumatic/ electric actuators for process control applications

CO4: utilize multiple loop/ advanced/ automated control configurations (PLC, SCADA & DCS) for different process control applications

Course Articulation Matrix (CAM): U18CI704 INDUSTRIAL PROCESS CONTROL

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	U18CI704.1	2	2	1	1	-	-	-	1	-	1	-	1	2	1
CO2	U18CI704.2	2	2	1	1	-	-	-	1	-	1	-	1	2	1
CO3	U18CI704.3	1	1	1	1	1	-	-	1	-	1	-	1	2	1
CO4	U18CI704.4	1	1	1	1	1	-	-	1	-	1	-	1	2	1
U18CI704		**1.5**	**1.5**	**1**	**1**	**1**	-	**-**	**1**	**-**	**1**	**-**	**1**	**2**	**1**

U18CI705 INDUSTRIAL PROCESS CONTROL LABORATORY

Class: B.Tech.VII – Semester **Branch:** Electronics Communication & Instrumentation Engineering (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 laboratory course will develop students' knowledge on /in…

LO1: process control loop & its dynamics, controller modes of operation (ON-OFF, P, PI & PID)and actuators
LO2: controller tuning of single loop & multiple loop control systems
LO3: SIMULINK software for designing of process controllers
LO4: ladder diagrams, PLC &DCS simulator

Sl. No. **LIST OF EXPERIMENTS**

1. Study the performance of ON-OFF/P/PI/PD/PID controller modes for Pressure process
2. Study the performance of ON-OFF, P, PI & PID controller modes for level process
3. Study the performance of ON-OFF, P, PI & PID controller modes for flow process
4. Study the performance of ON-OFF, P, PI & PID controller modes for temperature process
5. Study the performance of ON-OFF, P, PI & PID controller modes for level process using splitrange control configuration
6. Study the performance of level-flow integrated process using cascade control configuration
7. Tuning of controllers using SIMULINK
8. Study of process with and without transportation lag.
9. Study of complex control system using SIMULINK
10. Implementation of ladder logic for logical actions using PLC
11. Implementation ladder logic for traffic control application using PLC
12. Study hardware and software platforms for DCS

Laboratory Manual:

[1] *Process Control Laboratory Manual*, Dept. of EIE, KITSW.

Text book:

[1] Surekha Bhanot, *Process Control: Principles and Applications*, 6th ed. New Delhi: Oxford University Press, 2011.

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

Course Patent: 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 performance of ON-OFF, P, PI & PID controllers for single loop process control systems like temperature, pressure, level & flow controllers
CO2: examine the performance of ON-OFF, P, PI & PID controllers for multiple loop control configurations like cascade & split control configurations
CO3: design single loop & multiple loop controllers using SIMULINK software
CO4: develop ladder diagram programs for PLC and analyse the performance of DCS

Course Articulation Matrix (CAM): U18CI705 Industrial Process Control Laboratory															
CO		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	U18CI705.1	1	1	1	1	2	-	-	1	1	1	-	1	2	2
CO2	U18CI705.2	1	1	1	1	2	-	-	1	1	1	-	1	2	2
CO3	U18CI705.3	1	1	1	1	2	-	-	1	1	1	-	2	2	2
CO4	U18CI705.4	1	1	1	1	2	-	-	1	1	1	-	2	2	2
U18CI705		1	1	1	1	2	-	-	1	1	1	-	1.5	2	2

U18CI607 DIGITAL DESIGN LABORATORY

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

Teaching Scheme: **Examination Scheme:**

L	T	P	C
-	–	2	1

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**

U18CI707 MAJOR PROJECT WORK PHASE-I

Class: B.Tech. VII - Semester

Branch: Electronics Communication & Instrumentation Engineering

Teaching Scheme:

L	T	P	C
-	-	6	3

Examination Scheme:

Continuous Internal Evaluation	100 marks
End Semester Examination	--

Course Learning Objectives (LOs):

The major project work will develop students' knowledge on /in…

LO1: real-world complex engineering problems, literature review, problem formulation; and experimental and data analysis techniques

LO2: design/development of solutions to real-world engineering problems; conduct of investigations of complex problems; modern tool usage to design, build and test a prototype; impact of solution in society, environment and sustainability contexts

LO3: ethics, team work and project management skills such as budgeting, scheduling

LO4: oral, written and multimedia communication skills; self-directed independent learning and life-long learning

1. Final Year Major Project work represents the culmination of study towards the B. Tech degree. ***Major project offers an opportunity to integrate the knowledge acquired from various courses and apply it to solve real-world complex engineering problems.*** The **student learning assessment process** (SLAP) shall include good number of presentations, demonstration of work undertaken, submission of a project report, writing project paper in scientific journal style & format, preparing project poster and creating video pitch on the complete project work.
2. Activities of major project SLAP shall be planned in such a way to ensure that the students acquire the essential knowledge, skills and qualities (KSQ) of a professional engineer.
3. **Team work:** Major project work is a team work.
   - **(i)** The students of a project team shall work together to achieve a common objective.
   - **(ii)** Every student of a project team is expected to function effectively as an individual, and also with others as a team member in an ecosystem of team having knowledge diversity, gender diversity, social and cultural diversity among its members.
4. **Two phases:** Major project work shall be carried out in two phases. Nearly 50 - 75% of the proposed work to be completed in 7th semester as *Phase-I* and the remaining work to be continued and completed in 8th semester as *Phase-II.*
5. Every student is expected to put approximately **72 hours of work** into the major project *phase-I* course over the 12 weeks of 7th semester.

6. **Major project work *Phase-I*: 7th semester**
   - *(i)* The HoD shall constitute the ***department project evaluation committee (DPEC)*** with following composition

Department project evaluation committee (DPEC)	
HoD	Chairman
Senior Faculty	Convener
Coordinator(s)	Section - wise coordinator(s) *One coordinator for each section*
Three Faculty members	Section-wise faculty members *Three faculty members for each section representing various socializations.* *(Five specializations will be covered including the coordinator's and Convener's)*

(ii) Major project allotment to students during last working week of 6th semester:

(a) **First / Second week of 6th Semester**: The process shall be initiated during the first / second week of 6th semester by collecting project titles from the department faculty research groups, on offering innovative ideas/solutions for engineering problems.

(b) **MSE-I period of 6th Semester – Notifying project titles**: The finalized project titles shall be notified to students during the MSE-I period of 6th semester and student teams shall be allowed to exercise their options on titles that interest them.

(c) **Last working week of 6th Semester – Allotment of titles and supervisors to project teams**: The project title allotment to major project teams shall be completed before the last day of instruction of 6th semester

(d) **6th semester summer break - Literature review**: This 6th semester schedule enables students to complete literature review, preliminary simulations / investigations / experimentation during 6th semester summer break and *start the work from day-one in 7th semester*

(e) **Registration Presentation - Notifying the tentative dates:** The major project teams are expected to give registration presentation during second / third week from the commencement of 7th semester. The tentative dates for conducting the registration presentation shall be notified at the time of releasing the circular on allotted project title and project supervisors, as indicated in (c) above. This enables student teams to plan the work accordingly during summer break, to complete the literature review, preliminary simulations / investigations and get ready for informative, confident and comfortable presentations on their project work.

(iii) The convener DPEC shall notify, during MSE-I period of 6th semester, the list of implementable project titles offered by the faculty of different research groups of the department

(a) Project titles shall come with the following details to be made available to students on dept webpage and notice boards, facilitating students to select problems that interest them.

i. abstract
ii. deliverables / outcomes
iii. knowledge and skills required to complete the project
iv. resources required
v. one of the deliverables shall be writing a technical paper out of the major project work done for submission to a reputed non-predatory conference/non-paid peer reviewed journal

(iv) The major project teams, finalized by the convener DPEC, shall be allowed to exercise their options on the titles that interest them from the notified list

(v) Project supervisor allotment: The convener DPEC shall allot, during the last week of 6th semester, the faculty supervisors to all project teams

(a) The project supervisors shall

i. define project objectives and expected deliverables
ii. help the students plan their project work and timeline

iii. provide enough resources for successful project completion

(vi) The faculty supervisors are expected to provide guidance to project teams on

(a) *Knowledge, skills and qualities (KSQ) to be acquired* to propose solutions to the identified real-world problems

(b) *Problem analysis* - to identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences

(c) *Applying engineering knowledge* - to apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems

(d) *Design/development of solutions* - to 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

(e) *Conduct investigations of complex problems* - to 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

(f) *Modern tool usage* – to 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

(g) *Engineering and society* – to 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

(h) *Environment and sustainability* – to understand the impact of the professional engineering solutions in societal and environmental contexts, demonstrate the knowledge of, and need for sustainable development

(i) *Ethics* – to apply ethical principles and commit to professional ethics, responsibilities, and norms of the engineering practice

(j) *Individual and team work* – to function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings

(k) *Communication* – to 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

(l) *Project management and finance* – to 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

(m) *Life-long learning* – to 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

(vii) The project supervisors are also expected to continuously emphasize and guide students on

(a) Meeting Cadence:

i. **Regular meetings with supervisor:** Short and frequent meetings increase a team's work momentum. Regular meetings with supervisor to review the status of project are very essential. All students of the team shall participate in discussions and take notes.

ii. **Meeting Frequency: Semi-weekly cadence,** i.e., the meeting frequency shall be **twice a week.** Due weightage will be given to meeting cadence and considered for evaluation during presentations, i.e., number of planned meetings and number attended by students

b. **Project Log Book:** The activity journaling in project log book is very important for a successful project.

i. Project log book is a written record showing the daily project activity on project goals from the very first thing like starting the project (an introduction statement what the project is all about), to the completion of the work (including the final results, and whether project met the core objectives / outcomes, etc.).

ii. In project log book, the activities like regular meetings with project supervisor, and work carried out on daily/weekly basis are to be recorded. This ensures that the student progress is being monitored well.

iii. The project supervisor shall regularly check the log book of every student of project team and endorse each and every activity by affixing his signature with date. With this, the number of planned meetings and number attended by the students will be also monitored.

iv. Log books are to be shown during all presentations and will be graded along with the project.

v. At the conclusion of the project work phase-I, the supervisor shall specifically comment, in the project log book, on whether the project team met each of the project work phase-I goals and to give evidence which describes the quality of work. For project teams, this also serves as self-assessment.

(b) **Following project timeline**: completing the tasks as planned in project timeline

(c) The relevant knowledge, skills and qualities (**KSQ**) an engineering graduate should possess, which can be specially acquired by participating in major project work

(d) **Writing down whatever is done and making notes of whatever is read**. Writing down the procedures/models followed, designs made, experiments conducted, simulations carried out, intermediate results obtained, ***difficulties faced and how they were fixed*** are very important. This kind of documenting the whole process as we go with project implementation is a very effective way and will help preparing a well- documented report having original content. Note down and include information about all the resources that you used, magazines, Journals, patents, books, and so on.

This information will be needed for the bibliography in your project report. On the other hand, documenting a report ***on the spur of the moment*** would end up copying things from other sources resulting in a plagiarized document.

(e) **Good and sufficient literature review**: Literature review is a description and analysis of information related to the topic of project work. Reading good number of review articles, research articles published in recent issues of peer reviewed journals, technical magazines, patents, reference books on the topics of potential interest, will help one understand what has already been discovered and what questions remain to identify gaps in the literature.

(f) Completing nearly 50 - 75% of the proposed work during phase-I

(g) Right conduct of research to promote academic integrity, honesty and time management

(h) Preparing a well-documented report in proper format, covering the progress made during Phase-I

(i) Consequences of plagiarism and use of anti-plagiarism software to detect plagiarism in documents

(j) Submission of major project phase-I report within acceptable plagiarism levels, as per the ***Anti-plagiarism policy-2020 of our institute***.

(k) **Video pitch:** Capturing short videos, photos, screenshots on experiments conducted, simulations carried out, prototype / working model / process / software package /

system developed during course of project execution, photos showing interaction with supervisor for creating a short video pitch on the work done during *phase-I.*

(l) **Project Paper**: Writing a technical paper at the end of *phase-II* based on the solution(s) proposed, results obtained and prototype / working model / process/ software package / system developed, for submission to a reputed non-predatory conference/non-paid peer reviewed journal.

(m) **Project poster**: At the end of phase-II, the project teams shall have to present their project in the form of posters, at the time of demonstration of complete porotype / working model / software package / system developed.

(viii) Phase – I evaluation: There shall be only Continuous Internal Evaluation (CIE) for major project work *phase-I* with following components

(a) **Registration Presentation** *(during second / third week of 7th semester):* The Registration Presentation shall include a brief report and presentation focusing the identified problem, objective(s), literature review, identifying research gap in the literature, implementation of existing methods, proposed solution, and expected outcome(s).

i. The registration presentation shall invariably include the **project plan timeline** with actual start and finish dates– monthly/weekly project milestones/ timeline prepared in MS Excel or any other project management tool.

ii. **Project timeline** – *Weekly project milestones*: It's a compact and creative way to present a project plan. Identify the project intermediate goals and related tasks for completing each of those goals. Categorize tasks for each week. In the project timeline use different colors to the tasks for each week. Horizontal timeline layouts shall be preferred or any other layout of team's choice.

iii. Project teams shall create and present the following during registration presentation
   1. *Complete project timeline*
   2. *Phase-I project timeline*
   3. *Phase-II project timeline*

iv. During every presentation, project teams shall compulsorily show the following as part of their presentation
   1. *The slides on project timeline and*
   2. *A table showing targeted tasks as per timeline and status – whether tasks accomplished?*

v. **Project log book**: Every student of the Project team shall compulsorily show the activity journaling in the log book (*with due signatures of project supervisor*) during presentations

(b) **Progress Presentation-I** *(during penultimate week of 7th semester):* At the end of first stage (7th semester), student teams shall be required present, before the DPEC, the progress made during phase-I and submit a well-documented report of work done for evaluation to the project coordinator

i. **Following project timeline**: The project timeline shall be meticulously followed and the tasks shall be completed as planned in project timeline.

ii. Project teams shall compulsorily show the following as part of their progress presentation-I
   1. *The slides on project timeline and*
   2. *A table showing targeted tasks as per timeline and whether tasks accomplished?*

iii. **Project log book**: Every student of the Project team shall compulsorily show the activity journaling in the log book (*with due signatures of project supervisor*)

(c) **CIE schedule**: The convener DPEC shall release complete schedule of CIE before start of 7th semester well in advance, so that student teams will complete the scheduled works and get ready with informative, confident and comfortable presentation for registration and progress presentations.

(ix) CIE for the Major project work phase-I shall be as given below:

Major project work Phase-I Assessment *(7th semester)*	**Weightage**
A. Supervisor Assessment	**20%**
B. DPEC Assessment *(i) Registration Presentation (10%)* *(ii) Progress Presentation-I (20%)* *(iii) Project progress*: Part of working model/ process/software package/system developed (30%)* *(iii) Well-documented Progress Report on Phase-I work (10%)* *(iv) Video pitch on Phase-I (10%)*	**80%**
Total Weightage	**100 %**

* *Students are advised to complete major part of the project in phase-I only*

(a) **Working Model:** Every project team shall be required to develop a working model/ process/software package/system, on the chosen work. The progress made in this shall be demonstrated during progress presentation-I at the end of *phase-I* and the completed working model/ process/software package/system before the DPEC as per the dates specified by DPEC at the end of *phase-II*.

(b) **Progress Report on *phase-I*:** Every project team shall be required to submit a well-documented progress report on dissertation phase-I as per format specified by DPEC.

i. **Tangible outcomes of *phase-I* in Conclusions - Chapter:** These are the lessons learnt from doing a project work. The students have to describe in their own words what they learnt from the *phase-I* project work experience. They have to describe what specific KSQs are acquired by them, with reference to the expected COs, after successful completion of *phase-I* work. Finally, a table depicting systematic mapping of what they have learnt and the expected major project work COs, is to be presented in the conclusions chapter of *phase-I* report

(c) **Video pitch on *phase-I*:** Every project team shall be required to create a pitch video, which is a video presentation on their major project work *phase-I*. The project team shall present the produced video pitch during progress presentation-I. The produced video pitch should

i. be 3 to 5-minute-long video (no longer than 5 minutes)
ii. be concise and to the point, on the problem and proposed solution
iii. show project timeline and sample page of log book
iv. highlight the progress made at various stages during *phase-I* project implementation with the help of short videos / photos / screenshots on experiments conducted, simulations carried out, part of prototype / working model / process / software package / system being under development as part of proposed solution and also photos showing team interactions with supervisor and the team working in the lab on project
v. discuss the impact of proposed solution in *ethical, environmental, societal and sustainable development contexts.*
vi. emphasize key points about *business idea, potential market for the proposed solution*

(x) It is mandatory for

(a) every student of the team to *appear for oral presentation and viva-voce*, as part of progress presentation -I to qualify for course evaluation
(b) every project team *to submit a well-documented progress report on major project work phase-I*, as part of progress presentation -I to qualify for course evaluation

(c) every project team to create and present a good video pitch on major project work *phase-I*, as part of progress presentation -I to qualify for course evaluation

(xi) A student shall register for supplementary examination for the Major project work *phase-I* in the following cases:

(a) He/she is absent for oral presentation and viva-voce as part of progress presentation-I

(b) The project team fails to submit the progress report on *phase-I* in prescribed format

(c) The project team fails to submit the video pitch on the progress made during the *phase-I* period.

(e) he/she fails to fulfill the requirements of Major project work *phase-I* evaluation as per specified guidelines

(xi) Supplementary examination for Major project work phase-I

(a) The CoE shall send the list of students, registered for supplementary examination, to the HoDs concerned

(b) The DPEC, duly constituted by the HoD, shall conduct Major project phase-I supplementary exam and send the award list to the CoE within the stipulated time

Course Learning Outcomes (COs):

Upon completion of major project work, students will be able to…

CO1: review research literature, identify gaps in the literature, formulate problem, apply knowledge of mathematics, sciences, engineering fundamentals, experimental and data analysis techniques; synthesize technical knowledge and innovative approaches to generate suitable solutions for real-world complex engineering problems (**Technical skills**)

CO2: *design a system or product based on product/customer specifications; develop, analyze, and critically evaluate the design alternatives in order to justify the solutions to a real-world problem guided by ethical, environmental, societal and sustainable development considerations; use modern engineering and IT tools to design, build and test a prototype within specified project timeline and budget* (**Problem solving and critical thinking skills**)

CO3: apply project management and organizational skills; demonstrate integrity, leadership, creativity, professional and ethical responsibilities as an individual and as a member or leader to produce time-sensitive deliverables in a multi-disciplinary team (**Ethics and teamwork**)

CO4: *collate the results, compare performance of prototype to design specifications and present clearly and effectively the proposed solution, conclusions and/or recommendations in written (report, poster, technical paper), oral (presentations) and multimedia formats (video pitch) and engage in self-directed independent learning and life-long learning demonstrating the KSQ of a professional engineer* (**Communication skills and life-long learning**)

Course Articulation Matrix (CAM) : U18CI707 MAJOR PROJECT WORK PHASE-I

CO	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
CO1	**U18CI707.1**	2	2	2	2	-	-	-	3	-	2	-	3	2	2
CO2	**U18CI707.2**	2	2	2	-	2	2	2	3	-	2	-	3	2	2
CO3	**U18CI707.3**	-	-	-	-	-	-	-	3	2	-	2	3	2	2
CO4	**U18CI707.4**	-	-	2	2	-	-	-	3	-	2	-	3	2	2
U18CI707		**2**	**2**	**2**	**2**	**2**	**2**	**2**	**3**	**2**	**2**	**2**	**3**	**2**	**2**

U18CI708 INTERNSHIP EVALUATION

Class: B.Tech. VII–Semester

Branch: All the Branches

Teaching Scheme:

L	T	P	C
6 - 8 weeks internship			

Examination Scheme:

Continuous Internal Evaluation	100 marks
End Semester Examination	--

Course Learning Objectives (LOs):

The internships will develop student interns' knowledge in real-world or industry environment in/on

LO1: pre-employment training opportunities, career information and employability-enhancement skills
LO2: communication and personal development skills
LO3: critical thinking and problem-solving skills
LO4: professionalism / work ethics and teamwork / collaboration in real organizational setting

Mandatory Internships:

1. The internships provide exposure to the real-world, get a feel for the work environment and how a professional workplace operates.
2. During the internship, students will experience a real-life engineering workplace and understand how their engineering and professional knowledge, skills and qualities (KSQs) can be utilized in industry.
3. Students can learn, more importantly, how to apply the KSQs they have acquired during an internship to their future workplaces.
4. Students will also be able to demonstrate functioning engineering knowledge, both new & existing, and identify areas of further development for their future careers.
5. Internships give the student an opportunity to bridge theory and practice
6. Internships also provide students with the soft skills needed at workplace and leadership positions.
7. The internship guidelines are governed by the rules stipulated in the Institute's Internship policy-2020 document.
8. The students shall have to undergo 6-8 weeks of mandatory internship during summer/winter vacation at industry/R&D organization / Academic Institutes like IITs, IIITs& NITs.
9. HoD, along with Prof i/c internships, shall address students (*of 2nd, 4th and 6th semesters*) during last week of even semester of every academic year on the following

a. creating awareness on mandatory 6-8 weeks internship by every student
b. creating awareness on COs of internships
c. KSQs the students would acquire doing internships
d. expected internship outcomes
e. available internship options, and organizations offering internships
f. progressively completing 6-8 weeks internship by the end of 6th semester summer, starting from 2nd semester summer break.
g. internship evaluation in 7th semester
h. internship report submission and oral presentation (through PPT) by student

10. Students undergoing the internship shall be required to submit their details to the department internship coordinators of the respective branches. He will coordinate all the internship activities of the students of that department.
11. Students have to submit a signed undertaking to the department internship coordinator for demonstrating honesty, integrity, professionalism and regular attendance at work place to add value to the organization where the internship is allotted. Students also have to uphold the professional image of our institute.
12. In case, a student is found to violate the internship rules and regulations, the student will have to produce a valid reason for the violation of internship rules. Without a valid reason, the student will be debarred from taking part in subsequent placement activities of the institute.
13. The students preferably shall undergo internship at one organization only. In case of any difficulty, the stipulated period of internship shall be completed at different organizations with minimum of one week internship at every stage.
14. The internship evaluation shall be done in the VII semester of study and hence the students shall complete the prescribed period of internship before start of VII semester (from end of II semester to commencement of VII semester).
15. The student learning assessment process (SLAP): The SLAP in internships shall include feedback from internship supervisor, submission of internship report on the complete internship and PPT presentation.
16. Internship Log Book: The activity journaling in a log book is very important for a successful internship.
    a. The internship supervisor identifies the work goals at the beginning of the internship
    b. Student has to maintain internship log book, where in the activities undertaken during internship and timely submission at periodic intervals are to be documented.

c. At the conclusion of the internship, the supervisor shall specifically comment, in the internship log book, on whether the student met each of the work goals and to give evidence which describes the quality of work. For student, this also serves as a self-assessment.

d. Internship log book *(with due signatures of the internship supervisor)* shall be considered for evaluation during presentation, i.e., number of planned meetings with internship supervisor and number attended by student

17. Meeting Cadence:

i. **Regular meetings with internship supervisor:** Regular meetings with the internship supervisor to discuss work goals and review the status of activities undertaken are very essential. Student shall participate in discussions and take notes.

ii. **Meeting Frequency:** The meeting cadence, *i.e., meeting frequency* shall be fixed in consultation with the internship supervisor and accordingly student has to participate in discussions and take notes. Take signatures of internship supervisor as per the planned cadence in the internship log book.

18. The internship evaluation shall be done by ***department internship evaluation committee (*DIEC*)*** based on the submitted report by student and presentation.

19. There shall be only Continuous Internal Evaluation (CIE) for internship evaluation.

20. CIE for the Internship evaluation in VII semester shall be as below:

Internship evaluation	Weightage
A. **Internship Supervisor's Assessment** *(i) Feedback from the internship supervisor* *- on completion of internship assignment / work (20%)* *(ii) Feedback from the internship supervisor* *- on quality of work in internship assignment / work (10%)* *(iii) Feedback from the internship supervisor* *- internship log book (10%)* *(iv) Feedback from the internship supervisor* *- on attendance, punctuality and work hours (10%)* (For the case of 6-8 weeks internship done in more than one spell, it will be average of all the internship supervisors' assessment)	**50%**
B. DIEC Assessment *(i) Internship duration (8 /6 weeks) (15% / 10%)* *(ii) Internship Report (20%)* *(iii) Oral Presentation (with PPT) and viva voce (15%)*	**50%**
Total Weightage:	**100%**

Note: *It is mandatory for the student to appear for oral presentation (with PPT) and viva voce to qualify for course evaluation*

(a) Internship Report: Each student is required to submit a well-documented internship report (both *soft copy and softbound hard copy*) as per format specified by DIEC. In case of completing the 6-8 weeks internship in more than one organization,

the student shall be required to prepare separate softbound internship reports signed by the internship supervisor(s)along with the seal(s) of the organization(s). The student shall submit two final softbound internship reports along with a soft copy, keeping all the certificate(s) issued by the internship supervisor(s) and all the individual internship reports cleared by respective internship supervisor. The Chapter-1 of the final internship report shall clearly describe the following indicating overall summary.

(i) **Internship(s) attended**: A table with name & address of organization, organization's vision and mission, internship weeks attended, internship period (exact dates attended), internship supervisor, head of the section and head of the organization

(ii) **Duties/tasks during internship(s)**: Table describing name & address of organization, and the duties / tasks undertaken during internships. This indicates what opportunities and learning experiences the interns got to get hands-on experience on a wide range of KSQs of a professional engineer.

(iii) **Tangible outcomes of internship:** These are the lessons learnt from internship experience. The students have to describe in their own words what they learnt from the internship experience. The student has to describe what specific KSQs are acquired by him, with reference to the expected internship COs, after successful completion of internship(s). Finally, a table depicting systematic mapping of what they have learnt and the expected internship COs, is to be shown

(iv) **Student feedback on internship:** To gather information on whether internship was useful and gave practical experience on chosen field of interest, and other learning, a well-defined feedback questionnaire (*made available by the dept*)with closed and open questions shall be kept in the report.

(v) **Pictures at the worksite**: Student has to keep, in the report, his working pictures at the worksite, discussing with the internship supervisor, the creative project he is working on, or an event he is attending for work, group photo of the team/section/department he worked with.

(b) **Anti-Plagiarism Check:** The internship report should clear plagiarism check as per the Anti-Plagiarism policy-2020 of the institute.

(c) **Presentation:** Each student should prepare PPT with informative slides and make an effective oral presentation before the DIEC as per the schedule notified by the department. The presentation shall compulsorily have slides on the points mentioned in (a)(i)-(v)

(d) It is mandatory for every student to *appear for oral presentation(with PPT) and viva-voce*, to qualify for internship evaluation

(e) A student shall register for supplementary examination for the internship evaluation in the following cases:

(i) absent for oral presentation and viva-voce

(ii) fails to submit the internship report in prescribed format

(iii) fails to fulfill the requirements of internship evaluation as per specified guidelines

(f) Supplementary examination for internship evaluation

(i) The CoE shall send the list of students, registered for supplementary examination, to the HoD concerned

(ii) The DIEC, duly constituted by the HoD, shall conduct internship evaluation supplementary exam and send the award list to the CoE within the stipulated time

Course Learning Outcomes (COs):

Upon completion of the internship, student interns will be able to…

CO1: gain career awareness, company/industry/workspace related knowledge, skills and work experience to add to resume, employer expectations for workplace behaviours; explore career alternatives prior to graduation; initiate and build a professional network and acquire employment contacts leading directly to a full-time job following graduation from institute; apply practice-oriented 'hands-on' interdisciplinary working experience in the real world or industry to solve real life challenges in the workplace by integrating academic theory and practice and analysing work environment and conditions; commitment to quality and continuous improvement; integrate internship experience with academic plan and articulate career options **(Career information and employability-enhancement skills)**

CO2: receive and interpret messages in the communication; present thoughts and ideas clearly and effectively in oral, written, computer-based, graphical forms as required for particular workplace settings; collaborate effectively and appropriately with different professionals in the work environment; demonstrate time management, planning, independence, professional judgement and positive attitudes (self-reliance & self-confidence, openness, respect, proactive attitude, conscientiousness) **(Communication and personal development skills)**

CO3: review research literature, apply the knowledge of science, mathematics, and engineering with higher order cognitive skills to solve real-world problems and impact of solutions in society, environment and sustainability contexts; integrate existing and new technologies for industrial application; conduct investigations of problems; demonstrate analytical skills, including the ability to understand information and interpret data; exhibit foresight, independent thinking, resourcefulness, and the ability to make decisions; design systems, devices and components as needed and use the right tool (e.g., strategy, system, technology, etc.) for the right task **(Critical thinking and problem solving skills)**

CO4: *demonstrate effective leadership with work ethics including time management, punctuality, honesty, integrity, personal accountability, adaptability; work effectively in teams and real multidisciplinary organizational settings; interact respectfully with all people and understand individuals' differences; build professional relationships with interpersonal skills; maintain a sense of commitment to professional, ethical and social responsibilities; engage on life-long learning of technologies through critical reflection of internship experiences and the KSQ of a professional engineer* **(Professionalism / Work ethic and Teamwork / Collaboration)**

Course Articulation Matrix (CAM) :U18CI708 INTERNSHIP

CO	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
CO1	U18CI708.1	3	-	-	-	-	3	-	3	-	3	3	3	2	2
CO2	U18CI 708.2	-	-	-	-	-	-	-	3	-	3	3	3	2	2
CO3	U18CI 708.3	3	3	3	3	3	3	3	3	-	3	3	3	2	2
CO4	U18CI 708.4	-	-	-	-	-	-	-	3	3	3	3	3	2	2
U18CI708		**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**2**	**2**

ISO 9001:2015 AICTE-CII: GOLD Category Institute NAAC-'A' Grade Institute (CGPA: 3.21) NIRF-2020 Rank Band: 201-250
KAKATIYA INSTITUTE OF TECHNOLOGY & SCIENCE
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काकतीय प्रौद्योगिकी एवं विज्ञान संस्थान, वरंगल - ५०६ ०१५ तेलंगाना, भारत
కాకతీయ సాంకేతిక విజ్ఞాన కాళ్ళ విద్యాలయం, వరంగల్ - ౫౦౬ ౦౧౫ తెలంగాణ, భారతదేశము
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(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)
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DEPARTMENT OF ELELCTRONICS & COMMUNICATION ENGINEERING

SCHEME OF INSTRUCTION & EVALUATION

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

[3Th+0P+0MC]

S. No	Category	Course Code	Course Title	Hour per week			Credits	Evaluation Scheme				
				L	T	P		CIE			ESE	Total Marks
								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: (*offered by department*)		**SWAYAM - NPTEL Equivalent course**	**Professional Elective-VI:** (*offered by department*)		**SWAYAM - NPTEL Equivalent course**	**Open Elective-IV:**		**SWAYAM - NPTEL Equivalent course**
U18CI801A:	IoT Industria Applications	Introduction to Industry 4.0 and Industrial Internet of Things	U18CI802A:	Cloud Computing	Cloud Computing	U18OE803A: (*offered by M&HD*)	Operations Research	Operations Research
18CI801B:	Low Power VLSI Design	VLSI Interconnects	U18CI802B:	Mobile and Wireless Networks	-	U18OE803B: (offered by MBAD)	Management Information Systems	Management Information System
18CI801C:	FPGA Design	-	U18CI802C:	Robotics	Robotics	U18OE803C: (*offered by ECED*)	Entrepreneurship Development	Innovation, Business Models and Entrepreneurship/ Entrepreneurship/ Entrepreneurship and IP practice
-	-	-	-	-	-	U18OE803D: (*offered by MBAD*)	Forex and Foreign Trade	International Trade – Theory and Empirics
MOOCs-V: U18CI801M SWAYAM -MOOC course		(i) VLSI Signal Processing (ii) Computer Vision and Image – Fundamentals and Applications	**MOOCs-VI: U18CI802M SWAYAM -MOOC course**		(i) Optical fiber sensors (ii) Deep learning	**MOOCs-VII: U18CI803M SWAYAM -MOOC course**		(i) Patent Search and Analysis (ii) Numerical Methods for Engineers

MOOCs: *Students are encouraged to do Massive Open Online Courses (MOOCs) on SWAYAM platform (https: //www.swayam.gov.in) offered by NPTEL, CEC, IIM-B, IGNOU. Students shall contact the HoD to get their interested MOOCs approved by the HoD/ Dean Academic Affairs for proper transfer the credits for the MOOCs.*

Contact hours per week : 23; Total Credits : 16

U18CI801A IoT INDUSTRIAL APPLICATIONS

Class: B.Tech. VIII – Semester

Branch: Electronics Communication & Instrumentation Engineering (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 in/on…

LO1: challenges, future trends, automation protocols and wireless technologies in industrial internet of things

LO2: automation trends and security issues in industrial internet of things

LO3: hardware specifications, operational principle and basic programming of programmable logic controllers

LO4: components of process control systems, industrial bus standards & SCADA

UNIT-I (9)

Industrial Internet of Things(IIoT): Introduction to IIoT, Challenges in industrial networks, Future trends in industrial networks, Recent developments in industrial networks for industry 4.0, Industrial automation protocols, Interaction with IoT ecosystem, Summary of current wireless IIoT technologies, Ultra-Reliable Low-Latency Communication (URLLC) for IIoT applications

UNIT-II (9)

Automation Trends in IIoT: Industrial revolutions, Enabling technologies for new productive model, Automation networks in smart industries – Automation pyramid, Information and operational technologies convergence and distribution, Reference Architecture for IIoT and factories digitalization

Security in IIoT: Cloud models, Cloud computing security, IoT security, IIoT security issues and challenges

UNIT-III (9)

Programmable Logic Controllers (PLC): Introduction, Parts of PLC, Principle of operation, PLCs Vs PC, PLC sizes, PLC hardware components – I/O section, Discrete and analog modules, I/O specifications, CPU, Memory design, Terminal devices, Human machine interfaces (HMIs)

Basics of PLC programming: Data files, Program files, PLC scan process, PLC programming languages, Bit level instructions, Instruction addressing, Branch instructions, Internal relay instructions, If open and if close examination, Entering ladder diagrams, Modes of operation

UNIT-IV (9)

Process Control, Network Systems and SCADA(Qualitative): Types of processes, Structure of control systems, On/Off control, PID control, Motion control, Data communications – Serial communication, Bus standards: DeviceNet, ControlNet, EtherNet/IP, Field bus, Profibus, HART, Major elements of a SCADA system, Alarm handling in SCADA systems

Text Book(s):

1. Ismail Butun, Industrial IoT : Challenges, Design Principles, Applications, and Security, Switzerland: Springer Nature, 2020 (Chapters 1 to 5).
2. Frank D. Petruzella, Programmable logic controllers, 5th ed. New York: McGraw Hill education (Chapters 1,2,4,5 and 14).

Reference Book(s):

1. Alasdair Gilchrist, Industry 4.0: The Industrial Internet of Things, California: Apress Media, 2016.
2. Surekha Bhanot, *Process Control: Principles and Applications*, 6th ed., New Delhi: Oxford University Press, 2011. (Chapters 13 & 14)
3. K Padma Raju, Y. J. Reddy, *Instrumentation and control systems*, McGraw Hill Education, India, 2017.
4. Boyer SA, Supervisory Control and Data Acquisition (SCADA), Pittsburgh: International Society of Automation Press, 2004.

Course Learning Outcomes (COs):

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

CO1: analyze the challenges & recent developments in industrial internet of things technologies

CO2: examine the automation networks trends and security issues related to industrial internet of things

CO3: identify the hardware components & functions of PLC systems and develop ladder diagram programs for PLC using logical functions

CO4: choose required communication bus standards for industrial applications

Course Articulation Matrix: U18CI801A IoT INDUSTRIAL 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	U18CI801A.1	2	1	-	-	-	1	-	1	1	1	-	1	2	1
CO2	U18CI801A.2	2	2	2	1	1	1	-	1	1	1	-	1	2	2
CO3	U18CI801A.3	2	2	2	1	1	1	-	1	1	1	-	1	2	2
CO4	U18CI801A.4	2	2	2	1	1	1	-	1	1	1	-	1	2	2
U18CI801A		**2**	**1.75**	**2**	**0.75**	**0.75**	**1**	**-**	**1**	**1**	**1**	**-**	**1**	**2**	**1.75**

U18CI801B LOW POWER VLSI DESIGN

(Professional Elective-V)

Class: B.Tech.VIII-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: sources of power dissipation, circuit level power estimation and statistical techniques
LO2: low voltage CMOS circuit design styles and short channel effects in deep sub-micrometer MOSdevices
LO3: static RAM architecture & organization and energy computing & recovery techniques
LO4: sources of power dissipation in software, estimation and optimization of power for software design.

UNIT – I (9)

Introduction and need of low power design: sources of power dissipation and design strategies for low power; Physics of power dissipation in CMOS - low power VLSI design limits; Power estimation at circuit level – modeling of signals, signal probability calculations, statistical techniques, input vector compaction, circuit reliability

UNIT –II (9)

Design styles and testing: low voltage CMOS circuit design styles, leakage current in deep submission transitions and design issues, minimization of short channel effects (SCE) and hot carrier effects; Testing of deep sub-micron ICs with elevated intrinsic leakage

UNIT– III (9)

Low power architectures: MOS static RAM cells, banked organization SRAMS, reducing voltage swing on bit lines, write lines, driver circuits and sense amplifier circuits. Energy computing and recovery techniques energy dissipation using an RC model, energy recovery circuit design, design with partially reversible logic and supply clock generation

UNIT - IV (9)

Software design for low power: sources of software power dissipation, software power estimation, software power optimizations, automated low-power code generation and codesign for low power

Text Book(s):

[1] Kaushik Roy, Sharad Prasad, *Low Power CMOS VLSI Circuit Design,* New Delhi: Wiley India (P) Ltd., 2000.

Reference Book(s):

[2] A. P. Chandrakasan, R. W. Broderson, *Low Power design*, New York: Springer Science,1999
[3] Gary Yeap, *Practical low power digital VLSI design*, Kluwer, 1998.
[4] J. B. Kuo, J. H. Juo, *Low Voltage VLSI Circuits*, New York: John Wiley & Sons, 1999.

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

Course Patent: 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: differentiate static & dynamic power dissipations in CMOS circuits and estimate the power dissipation using statistical techniques

CO2: compare & contrast the low voltage CMOS circuit design styles and estimate the leakage currents due to short channel effects

CO3: develop low power SRAM architectures and integrate energy recovery techniques used for reversible logic circuits

CO4: classify the sources of software power dissipation and analyze the co-design for low power using optimization techniques

Course Articulation Matrix: U18CI703B LOW POWER VLSI 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	U18CI703B.1	2	2	2	2	1	-	-	-	-	-	-	1	2	1
CO2	U18CI703B.2	2	2	2	2	1	-	-	-	-	-	-	1	2	1
CO3	U18CI703B.3	2	2	2	2	1	-	-	-	-	-	-	1	2	1
CO4	U18CI703B.4	2	2	2	2	1	-	-	-	-	-	-	1	2	1
U18CI703B		**2**	**2**	**2**	**2**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**1**	**2**	**1**

U18CI801C FPGA Design

Class: B.Tech. VIII–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: programmable logic devices and FPGAs
LO2: programming technologies and building blocks of FPGAs
LO3: routing strategies in row based and symmetric FPGAs
LO4: design of typical digital circuits using FPGA boards

UNIT-I (9)

Programmable logic devices (PLDs): Evolution of programmable logic devices, programmable ROMs, programmable logic array devices (PLAs), programmable array logic devices (PALs), design examples using PLDs, Complex programmable logic devices (CPLDs), Field programmable gate arrays(FPGAs)

Introduction to FPGAs: FPGA- logic blocks, design flow, applications of FPGA

UNIT-II (9)

FPGAs: Programming technologies - Static RAM programming technology, anti-fuse programming technology, EPROM and EEPROM programming technology; commercially available FPGAs, Xilinx FPGAs, Actel FPGAs, Altera FPGAs

Building blocks of FPGAs: Logic block functionality, logic block selection, logic block area and routing model, impact of logic block functionality on FPGA performance, model for measuring delay

UNIT-III (9)

Routing Architectures: Routing terminology, general strategy for routing in FPGAs, routing for row based FPGAs, introduction to segmented channel routing, routing for symmetrical FPGAs, example of routing in a symmetrical FPGA, general approach to routing in symmetrical FPGAs

Flexibility of FPGA Routing Architectures: FPGA architectural assumptions - the logic block, the connection block, connection block topology, the switch block, switch block topology

UNIT-IV (9)

Case Study: FPGA Applications using Kintex-7, Viretex-7, Artix-7- Signed adder, floating point multiplier, single address ROM, dual address ROM, traffic light controller, real time clock

Text Books:

[1]. Stephen D. Brown, Robert J. Francis, Jonathan Rose, and Zvonko G. Vranesic, *Field-Programmable Gate Arrays,* Springer publications,1992. *(Chapter 1, 2, 4, 5, & 6)*

[2]. Seetharaman Ramachandran, *Digital VLSI Systems design,* 1st ed., Springer publications,2007. *(Chapter 9,10 & 14)*

Reference Books:

[1] Kilts, S., *Advanced FPGA design: architecture, implementation, and optimization.* John Wiley & Sons, 2007.

[2] Wolf, Wayne. *FPGA-based system design*. Pearson Education India, 2004.

[3] Samir Palnitkar, *Verilog HDL: A Guide to Digital Design and Synthesis,* 2nd ed., Pearson publisher, 2003.

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

Course Patent: 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):

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

CO1: build digital logic blocks using programmable logic devices
CO2: identify the building blocks of commercially available FPGAs
CO3: explain routing architectures for row based and symmetrical FPGAs
CO4: design typical digital circuit modules on FPGAs

Course Articulation Matrix: U18CI703C FPGA 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	U18CI703C.1	2	1	-	-	-	1	-	1	1	1	1	1	2	2
CO2	U18CI703C.2	2	2	2	1	2	1	-	1	1	1	1	1	2	2
CO3	U18CI703C.3	2	2	2	1	2	1	-	1	1	1	1	1	2	2
CO4	U18CI703C.4	2	2	2	1	2	1	-	1	1	1	1	1	2	2
U18CI703C		**2**	**1.75**	**2**	**1**	**2**	**1**	**-**	**1**	**1**	**1**	**1**	**1**	**2**	**2**

U18CI802A CLOUD COMPUTING

(Professional Elective-VI)

Class: B.Tech.VIII-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: cloud delivery and deployment models

LO2: parallel processing architectures and distributed file systems

LO3: virtualization techniques and cloud security solutions

LO4: Python programming for cloud based applications

UNIT-I (9)

Cloud Computing: Characteristics, Delivery models, Deployment models, Ethical issues, Challenges and Ecological Impact

Overview of cloud computing applications in healthcare, energy systems, transportation systems, government, education and mobile communications

Cloud Service Providers: Services offered by Amazon Web Services, Google, Microsoft and IBM

UNIT-II (9)

Parallel and Distributed Systems: Data, thread-level and task-level parallelism, Parallel architectures, SIMD architectures, Graphics processing units, Amdhal's Law, Multicore processor speedup, System Modularity, Layering & Hierarchy

Cloud data storage: Storage models, file systems and databases, Distributed file systems, General parallel file systems, Google file system, Big Table, NoSQL databases

UNIT-III (9)

Cloud Resource Virtualization: Performance and security isolation in computer clouds, Virtual machines, Full virtualization and paravirtualization, Hardware support for virtualization, Xen- a hypervisor based on paravirtualization, Kernel based virtual machine, Performance comparison of virtual machines, Open source software platforms for private clouds, Darker side of virtualization, Virtualization software

Cloud Security: Cloud security architecture, Authentication, Authorization, Identity and access management, Data security, Key management

UNIT-IV (9)

Cloud Applications Development: The map-reduce programming model, Design considerations for cloud applications, Reference architectures for cloud applications, Cloud application design methodologies, Data storage approaches, Python programming for Amazon Web Services, Google cloud, Windows Azure and map-reduce

Text Books:

[1] Dan C. Marinescu, *Cloud computing – Theory and Practice,* 2nd ed., MA: Morgan Kaufmann publishers, 2018 (*Chapters 1,2,4,6,7,10*)

[2] Arshdeep Bagha and Vijay Madisetti, *Cloud Computing- A Hands-on Approach*, Hyderabad: Universities Press (India) , 2014 (Chapters 1,3,5,7)

Reference Books:

[1] Anthony T. Velte, Toby .J Velte, Robert Elsenpeter, *Cloud Computing: A practical approach*, New York: McGraw Hill, 2010.

[2] Kai Hwang, Geoffrey C. Fox, Jack J. Dongarra, *Distributed and Cloud Computing: From Parallel Processing to the Internet of Things*, MA: Morgan Kaufmann publishers, 2013.

[3]Thomas Erl, Zaigham Mahmood, and Ricardo Puttini, *Cloud Computing Concepts, Technology & Architecture,* NJ: Prentice Hall, 2013

[4] Rajkumar Buyya, Christian Vecchiola, S Thamarai Selvi, *Mastering Cloud Computing*, NewDelhi: Tata McGraw-Hill Education, 2013

Course Learning Outcomes (COs):

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

CO1: discuss the delivery and deployment models of cloud computing
CO2: analyze parallel computing architectures and cloud storage models
CO3: apply virtualization techniques for cloud computing services
CO4: develop Python programs for cloud based applications

Course Articulation Matrix (CAM): U18CI802A CLOUD COMPUTING

CO		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	U18CI802A.1	2	2	2	2	2	1	-	1	-	1	-	1	2	2
CO2	U18CI802A.2	2	2	2	2	2	1	-	1	-	1	-	1	2	2
CO3	U18CI802A.3	2	2	2	2	2	1	-	1	-	1	-	1	2	2
CO4	U18CI802A.4	2	2	2	2	2	1	-	1	-	1	-	1	2	2
U18CI802A		**2**	**2**	**2**	**2**	**2**	**1**	**-**	**1**	**-**	**1**	**-**	**1**	**2**	**2**

U18CI802B MOBILE AND WIRELESS NETWORKS

Class: B.Tech., VIII-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: evolution of communication networks and wireless LAN technologies

LO2: bluetooth applications, architecture, specifications, wireless personal area network-IEEE 802.15 and ZigBee

LO3: *cellular wireless networks, first-generation analog, second-generation TDMA, Second-generation CDMA and **third-generation systems***

LO4: fourth generation systems, LTE architecture, Evolved Packet Core, LTE Resource Management, LTE Channel Structure & Protocols and LTE Radio Access Network

UNIT–I (9)

Communication Networks: Local Area Networks (LANs), Metropolitan Area Networks (MANs), and Wide Area Networks (WANs) , Circuit switching, Packet switching, Quality of service

Wireless Local and Personal Area Networks: Wireless LAN configurations, Ad-hoc networks, Wireless LAN Requirements, IEEE 802 architecture and standards, IEEE 802.11 architecture and Services, IEEE 802.11 Medium Access Control, IEEE 802.11 Physical Layer, Gigabit Wi-Fi, other IEEE 802.11 Standards, IEEE 802.11 Wireless LAN Security

UNIT – II (9)

Bluetooth and IEEE 802.15: Bluetooth applications, Bluetooth protocol Architecture, Piconets and scatternets, Bluetooth Radio and Base band specifications, Packet formats, Logical channels, Logical Link Control and Adaptation Protocol (L2CAP), Bluetooth High Speed and Bluetooth Smart, IEEE 802.15 protocol architecture and standards

ZigBee: features, architecture, device types, and protocols

UNIT – III (9)

Mobile Networks: Cellular network organization, Operation of Cellular Systems, Mobile Radio Propagation Effects, Handoff, First-Generation Analog, Second-Generation TDMA, Global System for Mobile Communications (GSM), Enhanced Data Rates for GSM Evolution (EDGE), Second-Generation CDMA, IS-95, Third-Generation Systems, Universal Mobile Telecommunications System (UMTS)

UNIT – IV (9)

Fourth Generation Systems: Requirements of 4G, LTE Architecture, Evolved packet system, Evolved Packet Core, LTE Resource Management, LTE Channel Structure and Protocols, LTE Radio Access Network

LTE-Advanced: Carrier Aggregation, Enhanced MIMO, Relaying, Heterogeneous Networks - Femtocells and macrocells, Coordinated Multipoint Transmission and Reception

Mobile IP: Operation of Mobile IP, Discovery, Registration, Tunneling

Textbook:

[1] William Stallings, *Wireless Communication Networks and Systems*, University of Missouri-Kansas City, Global Edition Contributions by Mohit Tahiliani, National Institute of Technology Karnataka.

Reference Books:

[1] Aftab Ahmad, *Wireless and Mobile Data Networks*, New Delhi: John Wiley & Sons, Inc., Publication, 2005.

[2] Khaldoun Al Agha, Guy Pujolle and Tara Ali-Yahiya, *Mobile and Wireless Networks*, vol. 2, Great Britain and the United States by ISTE Ltd and John Wiley & Sons, Inc. 2016.

[3] H. Schiller, *Mobile Communication*, 2nd ed., Berlin: Pearson Education, 2012.

[4] I.S. Misra, *Wireless Communication and Networks: 3G and beyond*, 2nd ed., New Delhi: McGraw Hill Education (India) Private Ltd, 2013.

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

Course Patent: Patent 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 different generations of wireless LAN Technologies and communication networks

CO2: analyze the bluetooth specifications, bluetooth high speed and bluetooth smart, IEEE 802.15 and ZigBee architecture

CO3: distinguish cellular networks, first-generation analog, second-generation TDMA, Second-generation CDMA and third-generation Systems

CO4: analyze the fourth generation systems, LTE architecture, Evolved Packet Core, LTE Resource Management, LTE Channel Structure & Protocols and LTE Radio Access Network

Course Articulation Matrix: U18CI802B MOBILE AND WIRELESS NETWORKS

CO		PO 1	PO 2	PO 3	PO 4	PO 5	PO6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	U18CI802B.1	2	1	-	-	-	1	-	1	1	-	1	1	2	1
CO2	U18CI802B.2	2	2	1	1	1	1	1	1	1	1	1	1	2	1
CO3	U18CI802B.3	2	2	1	1	1	1	1	1	1	1	1	1	2	1
CO4	U18CI802B.4	2	2	1	1	1	1	1	1	1	1	1	1	2	1
U18CI802B		**2**	**1.75**	**0.75**	**0.75**	**0.75**	**1**	**0.75**	**1**	**1**	**0.75**	**1**	**1**	**2**	**1**

U18CI802C ROBOTICS

Class: B.Tech. VIII-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

CourseLearningObjectives (LOs):

This course will develop students' knowledge in/on…

LO1: definitions and geometrical configurations of robotics and some related subjects

LO2: operation, programming and control of industrial robots and actuators used for robots

LO3: sensing units used for robots and automated guided vehicles

LO4: robotics and artificial intelligence and related economic & social aspects

UNIT-I (9)

Introduction: Definitions of 'robot' and 'robotics', connections between robotics and some related subjects, artificial intelligence

Economic and social aspects of robotics: Reasons for installing robots, economic costs and benefits of installing industrial robots

Geometric configurations for Robots: The distinction between arms and vehicles, structural elements of manipulators, degrees of freedom and number of joints, types of joint, construction of joints

UNIT-II (9)

Operation, programming and control of industrial robots: Types of industrial robot and their methods of operation, methods of teaching and programming, types of controller and program memory, analysis and control, programming languages for industrial robots

Actuators for robots: Pneumatic actuation, hydraulic actuation, hydrostatic circuits, electric actuation, mechanical transmission methods

UNIT-III (9)

Sensing for robots: Joint angle, joint angular velocity, proximity sensing and range measurement, touch sensing, vision, types of computer vision, non-visual sensing in welding and other processes

Automated guided vehicles: Automated guided vehicle technology, power, steering and guidance, route programming, route planning, loading and unloading, safety; vehicle separation, miscellaneous features, automated guided vehicles with mechanical and optical guidance, free ranging automated guided vehicles

UNIT-IV (9)

Robotics and artificial intelligence: Voice communication, planning, modeling, adaptive control, error monitoring and recovery, autonomy and intelligence in robots, expert systems in robotics

Text Books:

[1]. D. J. Todd, *Fundamentals to robot technology: An introduction to industrial robots,Teleoprators, and Robot Vehicles,* 1st edn., Kogan Page Ltd,1986.

Reference Books:

[1] Mikell P Groover, Nicholas G Odrey, Mitchel Weiss, Roger N Nagel, Ashish Dutta, *Industrial Robotics, Technology programming and Applications*, McGraw Hill, 2012.

[2] Craig. J. J. *Introduction to Robotics- mechanics and control,* Addison- Wesley, 1999.

[3] S.R. Deb, *Robotics Technology and flexible automation,* Tata McGraw-Hill Education., 2009.

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

Course Patent: Patent 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):

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

CO1: choose suitable joints, linkages and grippers to build robots for industrial automation
CO2: construct various types of industrial robots and analyze the methods of operation & programming
CO3: design the sensing unit of robots for automated guided vehicle technology
CO4: apply the various aspects of robotics to artificial intelligence

Course Articulation Matrix: U18CI802C ROBOTICS

CO		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	U18CI802C.1	2	1	-	-	-	1	-	1	1	1	1	1	2	1
CO2	U U18CI802C.2	2	2	2	1	1	1	-	1	1	1	1	1	2	2
CO3	U18CI802C.3	2	2	2	1	1	1	-	1	1	1	1	1	2	2
CO4	U18CI802C.4	2	2	2	1	1	1	-	1	1	1	1	1	2	2
U18CI802C		**2**	**1.75**	**2**	**1**	**1**	**1**	**-**	**1**	**1**	**1**	**1**	**1**	**2**	**1.75**

U18OE803A - OPEARTIONS RESEARCH

Class: B. Tech.VIII – Semester

Branch(s): ME, CSE, IT, CE, EEE, ECE, EIE, 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: concepts to solve linear programming problems which arise in real life using various methods and their advantages

LO2: applications of linear programming namely transportation and assignment problems which arise in different engineering fields.

LO3: non-linearity in optimization problems, direct search techniques and iterative methods.

LO4: various queuing systems and their practical relevance.

UNIT – I(9)

Linear Programming Problem (LPP): Mathematical models and basic concepts of linear programming problem; Solution of linear programming problem - Graphical method, Simplex method, Artificial variable techniques (Big-M and Two-phase method), Duality in linear programming, dual simplex method.

UNIT – II (9)

Special types of LPP: Mathematical model of transportation problem, Methods of finding initial basic feasible solution, optimal solution of transportation problem, Degeneracy in transportation problem; Exceptional cases in transportation problem- Unbalanced transportation problem, Maximization transportation problem; Assignment problem- Mathematical formulation of the problem, Hungarian method to solve an assignment problem, Special cases in assignment problem- Maximization assignment problem.

UNIT – III (9)

Non-linear Programming Problem (NLPP): Classical method of optimization using Hessian matrix; Iterative methods - Random search methods-Random jump method, Random walk method, Steepest decent method and Conjugate gradient method; Direct methods - Lagrange's method, Kuhn-Tucker conditions.

UNIT – IV (9)

Queueing Theory: Queueing system- Elements and operating characteristics of a queuing system; Probability distributions in queueing systems- Distribution of arrivals (Pure Birth Process); Classification of queueing models; Poisson queueing systems- Study of various characteristics of single server queuing model having infinite population $\{(M/M/1):(\infty/FIFO)\}$ and single server queuing model having finite population $\{(M/M/1):(N/FIFO)\}$, Generalized model (Birth-Death process).

Textbook:

[1]. Kanti swarup et.al, *Operations Research*, 16th ed., New Delhi: S. Chand & Sons, 2013. (Unit-I, Unit-II, Unit-IV)

[2]. Singiresu S. Rao, *Engineering Optimization Theory and Practice*, 4th ed., Hoboken, New Jersey: John Wiley & Sons, Inc, 2009 (Unit-III)

Reference Books:

[2] Hamdy. A. Taha, *Operations Research*, 7th ed., New Delhi: Prentice Hall of India Ltd, 2002.

[3] J.C. Pant, *Introduction to Optimization*, 7th ed., New Delhi*: Jain* Brothers, 2012.

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

Course Patent: Patent 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: model engineering real time problems and solve them using various LPP techniques

CO2: obtain the optimal solution of transportation, assignment problems and their real time applications

CO3: optimize the engineering problems using NLPP techniques

CO4: differentiate various queueing models and their practical relevance

Course Articulation Matrix: U18OE803A - OPEARTIONS RESEARCH

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	U18OE803A	2	2	-	-	-	-	-	1	-	1	-	1	-	-
CO2	U18OE803A	2	2	-	-	-	-	-	1	-	1	-	1	-	-
CO3	U18OE803A	2	2	-	-	-	-	-	1	-	1	-	1	-	-
CO4	U18OE803A	2	2	-	-	-	-	-	1	-	1	--	1	-	-
	U18OE803A	**2**	**2**	**-**	**-**	**-**	**-**	**-**	**1**	**-**	**1**		**1**	**-**	**-**

U18OE803B MANAGEMENT INFORMATION SYSTEMS

Class: B.Tech. - Semester **Branch: M E , C S E , I T , C E , E E E , E C E , E I E , E C I**

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 in/on…

LO1: basic concepts and challenges of management information systems

LO2: e-business and decision support systems techniques

LO3: development process and design of management information systems

LO4: different applications of management information systems

UNIT – I (9)

Management Information Systems: Systems: An Overview : Introduction, Need for management information systems, Management information systems: A concept, MIS: A definition, Management information system and Information technology, Nature and scope of MIS, MIS characteristics, Structure of MIS, Types of MIS, Role of MIS in global business, Challenges of managing information systems, IT Infrastructure and Emerging Technology

UNIT - II (9)

Business Applications of Information Systems:

E-Commerce, E-Business and E-Governance: Introduction, E-commerce, E-commerce sales life cycle, E-commerce infrastructure, E-commerce applications, E-commerce payment systems, Management challenges and opportunities, E-business, E-governance

Decision Support Systems: Introduction, Decision-Making: A concept, Simon's model of decision-making, Types of decisions, Methods for decision-making, Decision support techniques, Decision-making and role of MIS, Decision support systems, Business intelligence, Knowledge management systems

UNIT - III (9)

Development process of MIS : Development of long range plans of the MIS, Ascertaining the class of information, Determining the information requirement, Development and implementation of the MIS, Management of information quality in the MIS, Organisation for development of MIS, MIS: Development process mode

Strategic Design of MIS : Strategic management of the business, Why strategic design of MIS, Balance score card, Score card and Dash board, Strategic design of MIS, Development process steps for strategic design (SD) of MIS, Illustrating SD of MIS for big bazaar, Strategic management of business and SD of MIS, Business strategy determination, Business strategy implementation

UNIT - IV (9)

Management of Global Enterprise : Enterprise management system, Enterprise resource planning (ERP) System, ERP model and modules, Benefits of the ERP, ERP product evaluation, ERP implementation, Supply chain management (SCM), Information management in SCM, Customer relationship management (CRM), Management of global enterprise, EMS and MIS.

Applications in Manufacturing Sector: Introduction, Personnel management (PM), Financial management (FM), Production management (PM), Raw materials management (RMM), Marketing management, Corporate overview.

Text Books:

[1] D.P. Goyal, Vikas, *Management Information Systems–Managerial Perspective*, 4th ed. USA: Addison-Wesley, 2014. *(Unit 1)*

[2] Waman S. Jawadekar, *Management Information Systems Text and Cases: A Global Digital Enterprise Perspective*, 5th ed. New Delhi: McGraw Hill, 2014 (*Unit 2,3,4*)

Reference Books:

[1] *Kenneth C. Laudon & Jane P. Laudon, Management* Information Systems, 12th ed. USA: Prentice Hall, 2012.

[2] S. Sadagopan, *Management Information Systems*, 2nd ed., New Delhi: PHI Learning, 2014.

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

Course Patent: Patent 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: explain the structure and importance of management information systems
CO2: analyze management information systems for decision making
CO3: explain the methodology to design and develop a management information system
CO4: describe different applications of management information systems in various manufacturing sectors

Course Articulation Matrix (CAM): U18OE803B MANAGEMENT INFORMATION SYSTEMS

Course Outcomes		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	**U18OE803B**.1	2	2	1	1	1	-	-	1	-	1	-	1	2	1	2
CO2	**U18OE803B**.2	2	2	2	1	1	-	-	1	-	1	-	1	2	1	2
CO3	**U18OE803B**.3	2	2	2	3	1	-	-	1	-	1	-	2	2	1	2
CO4	**U18OE803B**.4	2	2	3	3	1	-	-	1	-	1	-	2	3	1	3
U18OE803B		**2**	**2**	**2**	**2**	**1**	**-**	**-**	**1**	**-**	**1**	**-**	**1.5**	**2.25**	**1**	**2.25**

U18OE 803C ENTREPRENEURSHIP DEVELOPMENT

(Open Elective-IV)

Class: B. Tech. VIII Semester

Branch: M E , C S E , I T , C E , E E E , E C E , E I E , E C I

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 characteristics of entrepreneur and his role in development of the nation

LO2: creativity and business plan

LO3: functions of various managements/managers in industry

LO4: legal issues in entrepreneurship and intellectual property rights

UNIT –I (9)

Entrepreneurship: Definition, role of entrepreneurship in economic development, characteristics and types of an entrepreneur, Forms of business organizations; agencies dealing with entrepreneurship and small scale Industries; Case studies of successful entrepreneurs- identification of business opportunities in various branches of engineering

UNIT-II (9)

Creativity and Business Idea: Sources of new ideas, methods of generating ideas and creative problem solving, concepts of innovation and incubation.

Business Plan: definition, scope and value of business plan, market survey and demand survey.

Feasibility studies: Technical feasibility, financial viability and social acceptability; Preparation of preliminary and bankable project reports;

UNIT-III (9)

Project Planning: Product planning and development process, Sequentialsteps in executing the project.

Plant layout: Principles, types and factors influencing layouts,

Material Management: Purchase procedures, Issues of Materials -LIFO,FIFO,HIFO and Base stock.

Fundamentals of Production Management: Production Planning and Control (PPC)- Concepts and functions, Long & short run problems.

Marketing Management: Definition, functions and market segmentation.

UNIT-IV (9)

Financial Management: Introduction, Sources of finance-internal and external.

Human Resource Management: Introduction, importance, selection, recruitment, training, placement, development;

Legal Issues in Entrepreneurship: Mechanisms for resolving conflicts; Industrial laws- Indian Factories Act, Workmen Compensation Act; Intellectual Property Rights (IPR) – patents, trademarks, and copyrights

Text Books:

[1] Robert D.Hisrich, Michael P. Peters, *Entrepreneurship*, 9 t h e d . New Delhi*:* Tata McGraw-Hill, 2014. (*Chapters 1,2,4,5,6,7,8,11 and 13*)

Reference Books

[1] David H. Holt, *Entrepreneurship New venture creation*, New Delhi: Prentice Hall of India, 2004.

[2] *Handbook for New Entrepreneurs*, Ahmedabad: Entrepreneurship Development Institute of India.

[3] T.R. Banga, *Project Planning and Entrepreneurship Development*, New Delhi: CBS Publishers, 1984.

[4] *Personnel efficiency in Entrepreneurship Development-A Practical Guide to Industrial Entrepreneurs*, New Delhi: *S. Chand & Co*.

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

Course Patent: Patent 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):

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

CO1: describe characteristics of entrepreneur and his role in economic development

CO2: apply creative problem solving methods to real time situations

CO3: explain the functions of production and marketing managements

CO4: identify the legal issues in entrepreneurship and explain intellectual property rights

Course Articulation Matrix (CAM): U18OE 803C ENTREPRENEURSHIP DEVELOPMENT														
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
U18OE803C.1	-	-	1	-	-	2	2	1	2	2	2	1	1	-
U18OE803C.2	-	2	1	-	-	2	2	1	2	2	2	1	1	-
U18OE803C.3	-	-	1	-	-	2	2	1	2	2	2	1	1	-
U18OE803C.4	-	2	1	-	-	2	2	1	2	2	2	1	1	-
U18OE803C	**-**	**2**	**1**	**-**	**-**	**2**	**2**	**1**	**2**	**2**	**2**	**1**	**1**	**-**

U18OE803D FOREX & FOREIGN TRADE

Class: B.Tech VIII Semester **Branch:** M E , C S E , I T , C E , E E E , E C E , E I E , E C I

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: business, business system, objectives and types of companies

LO2: fundamentals of foreign trade and EXIM procedure

LO3: foreign exchange rate and methods of payments

UNIT–I (9)

Business: Nature and scope, Classification of business activities, Functions of commerce and trade.

Business System: Characteristics and components of business system, objectives of business, classification of business objectives; Types of Business.

UNIT-II(9)

Foreign Trade: Introduction of International Trade, Reasons for External Trade, Special problems of Foreign Trade; EXIM-objectives, roles of EXIM in Foreign Trade, Stages in Import procedure, Stages in export procedure-bill of lading, mate's receipt, certificate of origin.

Corporations Assisting Foreign Trade: State Trading Corporation of India, Export Credit and Guarantee Corporation, Minerals and Metals Trading Corporation of India.

UNIT–III (9)

Foreign Exchange Rate: Meaning and importance of Foreign exchange rate, Methods of foreign payments; Exchange rates- Spot, Forward and Cross Rates; Demand and supply of foreign exchange rate, Equilibrium rate of foreign exchange, Theories of determining foreign exchange rate, International Parity condition - Balance of payments.

Foreign Exchange Markets: Functions of exchange markets, Components and Players in Exchange Markets; FEMA-objectives and its role in Foreign Trade.

UNIT–IV (9)

Foreign Exchange Control: objectives, characteristics, advantages and disadvantages, Methods: intervention, exchange restriction, multiple exchange rates, exchange clearing agreements, method of operation, exchange clearing agreements in practice, payments agreements, transfer moratoria; indirect methods.

Text Books:

[1] C.B. Guptha, *Business Organization & Management,* 15th ed. New: SultanChand & Sons, 2015(*Units 1,5*)

[2] M.L. Seth*, Macro Economics,* 22nd ed. New Delhi; Lakshmi Narayan Agarwal Publishers*,* 2014.

[3] M.C. Vaish, Ratan Prakashan Mandir, *Monetary Theory,* 16th ed. New Delhi: Vikas Publications,2016

Reference Books:

[1] Y.K. Bhushan, *Business Organization and Modern Management*, 15th ed. New Delhi: Sultan & Sons Publishers, 2014.

[2] S.A. Sherlekhar, *Business Organization and Management*, New Delhi: Himalaya Publishing House, 2000.

[3] K.P.M. Sundaram, *Money Banking, Trade & Finance*, New Delhi: Sultan & Sons Publishers, 2000.

[4] P.N. Chopra, *Macro Economics*, Ludhiana: Kalyani Publishers, 2000.

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

Course Patent: Patent 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 (CO):

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

CO1: evaluate the objectives and types of industries and companies.

CO2: assess the procedure in imports and exports

CO3: analyse the foreign exchange rate and methods of foreign payments

CO4: Adapt the methods of exchange control

Course Articulation Matrix (CAM): U18OE803D FOREX AND FOREIGN TRADE

CO	PO 1	PO2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO1	PSO2
U18OE803D 1	-	-	-	-	-	-	-	1	-	2	2	1	1	-
U18OE803D2	-	-	-	-	-	-	-	1	-	2	2	1	1	-
U18OE803D3	-	-	-	-	-	-	-	1	-	2	2	1	1	-
U18OE803D4	-	-	-	-	-	-	-	1	-	2	2	1	1	-
U18OE803D	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**1`**	**-**	**2**	**2**	**1**	**1**	**-**

U18CI804 MAJOR PROJECT WORK PHASE-II

Class: B.Tech. VIII - Semester

Branch: Electronics Communication &Instrumentation Engineering (ECI)

Teaching Scheme:

L	T	P	C
-	-	14	7

Examination Scheme:

Continuous Internal Evaluation	60 marks
End Semester Examination	40 marks

Course Learning Objectives (LOs):

The major project work will develop students' knowledge on /in…

LO5: real-world complex engineering problems, literature review, problem formulation; and experimental and data analysis techniques

LO6: design/development of solutions to real-world engineering problems; conduct of investigations of complex problems; modern tool usage to design, build and test a prototype; impact of solution in society, environment and sustainability contexts

LO7: ethics, team work and project management skills such as budgeting, scheduling

LO8: oral, written and multimedia communication skills; self-directed independent learning and life-long learning

1. **Major project work shall be continued in 8th semester as major project *phase-II*:** All the major project teams shall take the *phase -I* work forward and complete the remaining work as *Phase-II* in the 8th semester.

2. Final Year Major Project work represents the culmination of study towards the B. Tech degree. **Major project offers an opportunity to integrate the knowledge acquired from various courses and apply it to solve real-world complex engineering problems**. The **student learning assessment process** (SLAP) shall include good number of presentations, demonstration of work undertaken, submission of a project report, writing project paper in scientific journal style & format, preparing project poster and creating video pitch on the complete project

3. Activities of major project SLAP shall be planned in such a way to ensure that the students acquire the essential knowledge, skills and qualities (KSQ) of a professional engineer.

4. **Team work:** Major project work is a team work
   (i) The students of a project team shall work together to achieve a common objective.
   (ii) Every student of a project team is expected to function effectively as an individual, and also with others as a team member in an ecosystem of team having knowledge diversity, gender diversity, social and cultural diversity among its members.

5. Every student is expected to put approximately **168 hours of work** into the major project *phase-II* course over the 12 weeks of 8th semester.

6. Major project work *Phase-II*: 8th semester

(xi) The convener DPEC shall release complete schedule of *phase-II* CIE during last week of 7th semester (*well in advance before start of 8th semester*), immediately after completion of progress presentation-I, so that student teams would complete the scheduled works during inter-semester break and get ready with informative, confident and comfortable presentation for progress presentation-II.

(xii) **The project supervisors**: The project supervisors are expected to guide the students to systematically continue the *phase-I* work, useful work during inter-semester break, meeting the deadlines as proposed in project timeline.

(xiii) **The project supervisors shall ensure students focus on the project objectives and expected deliverables**

(xiv) **The project supervisors shall ensure students have sufficient resources for successful project completion.**

(xv) **The project supervisors shall continue guiding students on**

(a) *Knowledge, skills and qualities (KSQ) of a professional engineer to be acquired* to propose solutions and design the systems to the identified real-world problems.

(b) *Problem analysis* - to identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences

(c) *Applying engineering knowledge* - to apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems

(d) *Design/development of solutions* - to 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

(e) *Conduct investigations of complex problems* - to 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

(f) *Modern tool usage* – to 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

(g) *Engineering and society* – to 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

(h) *Environment and sustainability* – to understand the impact of the professional engineering solutions in societal and environmental contexts, demonstrate the knowledge of, and need for sustainable development

(i) *Ethics* – to apply ethical principles and commit to professional ethics, responsibilities, and norms of the engineering practice

(j) *Individual and team work* – to function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings

(k) *Communication* – to 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

(l) *Project management and finance* – to 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

(m) *Life-long learning* – to 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

(xvi) The project supervisors are also expected to continuously emphasize and guide the students on

(a) **Following project timeline**: completing the tasks as planned in project timeline

(b) Meeting Cadence:

i. **Regular meetings with supervisor:** Short and frequent meetings increase a team's work momentum. Regular meetings with supervisor to review the status of project are very essential. All students of the team shall participate in discussions and take notes.

ii. **Meeting Frequency: Semi-weekly cadence,** i.e., the meeting frequency shall be **twice a week.** Due weightage will be given to meeting cadence and considered for evaluation during presentations, i.e., number of planned meetings and number attended by students

(c) **Project Log Book:** The activity journaling in project log book is very important for a successful project.

vi. Project log book is a written record showing the daily project activity on project goals from the very first thing like starting the project (an introduction statement what the project is all about), to the completion of the work (including the final results, and whether project met the core objectives / outcomes, etc.).

vii. In project log book, the activities like regular meetings with project supervisor, and work carried out on daily/weekly basis are to be recorded. This ensures that the student progress is being monitored well.

viii. The project supervisor shall regularly check the log book of every student of project team and endorse each and every activity by affixing his signature with date. With this, the number of planned meetings and number attended by the students will be also monitored.

ix. Log books are to be shown during all presentations and will be graded along with the project.

x. At the conclusion of the project work *phase-II*, the supervisor shall specifically comment, in the project log book, on whether the project team met each of the project work outcomes and to give evidence which describes the quality of work. For project teams, this also serves as self-assessment.

(d) **Writing down whatever is done and making notes of whatever is read**. Writing down the procedures / models followed, designs made, experiments conducted, simulations carried out, intermediate results obtained, ***difficulties faced and how they were fixed*** are very important. This kind of documenting the whole process as we go with project implementation is a very effective way and will help preparing a well- documented report having original content. Note down and include information about all the resources that you used, magazines, Journals, patents, books, and so on. This information will be needed for the bibliography in your project report. On the other hand, documenting a report ***on the spur of the moment*** would end up copying things from other sources resulting in a plagiarized document.

(e) The relevant knowledge, skills and qualities (**KSQ**) an engineering graduate should possess, which can be specially acquired by participating in major project work

(f) **Good and sufficient literature review**: Literature review is a description and analysis of information related to the topic of project work. Reading good number of review articles, research articles published in recent issues of peer reviewed journals, technical magazines, patents, reference books on the topics of potential interest, will help one understand what has already been discovered and what questions remain to identify gaps in the literature.

(g) Completing the proposed work by the end of *phase-II*

(h) Right conduct of research to promote academic integrity, honesty and time management

(i) Preparing a well-documented overall project report in proper format, covering the complete work carried out during both the phases (*phase-I and phase-II*).

(j) Consequences of plagiarism, and use of anti-plagiarism software to detect plagiarism in the report

(k) Submission of major project work report within acceptable plagiarism levels, as per the ***Anti-plagiarism policy-2020 of our institute***

(l) **Video pitch on complete project work**: Capturing short videos, photos, screenshots on experiments conducted, simulations carried out, prototype / working model / process / software package / system developed during course of project execution, photos showing interaction with supervisor for creating a short video pitch on the complete work done during both phases (*phase-I and phase-II*).

(m) **Project Paper**: Writing a technical paper at the end of *phase-II* based on the solution(s) proposed, results obtained and prototype / working model / process / software package / system developed, for submission to a reputed non-predatory conference/non-paid peer reviewed journal.

(n) **Project poster**: At the end of phase-II, the project teams shall have to present their project in the form of posters, at the time of demonstration of complete porotype / working model / software package / system developed.

(xvii) Phase – II evaluation: There shall be only Continuous Internal Evaluation (CIE) for major project work *phase-I* with following components

(a) **Progress Presentation -II** *(during third / fourth week of 8th semester):* The progress presentation-II shall include the identified problem, objective(s), literature review, expected outcome(s), results of work done as per project plan timeline.

i. **Following project timeline**: The project timeline shall be meticulously followed and the tasks shall be completed as planned in project timeline.
ii. 80-85% of work is expected to be completed
iii. Project teams shall compulsorily show the following as part of their progress presentation-II
    1. *The slides on project timeline and*
    2. *A table showing targeted tasks as per timeline and status – whether tasks accomplished?*
iv. **Project log book**: Every student of the Project team shall compulsorily show the activity journaling in the log book (with due signatures of project supervisor) during presentations

(b) **Final Presentation** *(during penultimate week of 8th semester):* **Project supervisor shall ensure that the project team has accomplished 100% of work proposed**. The project team shall

i. **Follow project timeline**: The project timeline shall be meticulously followed and the tasks shall be completed as planned in project timeline.
ii. compulsorily show the following as part of their final presentation
    1. *The slides on project timeline and*

2. *A table showing targeted tasks as per timeline and whether all the identified tasks accomplished?*

iii. **show project log book**: Every student of the Project team shall compulsorily show the complete activity journaling in the log book (*with due signatures of project supervisor*)

iv. present complete results & analysis

v. **demonstrate the completed project**: working model / process / software package / system developed

vi. demonstrate the completed project with the **project poster presentation**

(xviii) Evaluation for Major project phase-II:

There shall be continuous internal evaluation (CIE) and end semester examination (ESE). The evaluation for *phase-II* shall be as given below:

Assessment	Weightage
A. CIE **(i) Supervisor Assessment (10%)** **(ii) DPEC Assessment (50%)** *(a) Progress presentation-II (10%)* *(b) Final presentation (10%)* *(c) Working model / process / software package / system developed (20%)* *(d) Project video pitch (5%)* *(e) Project paper (5%)*	**60%**
B. ESE *(i) Well-documented project report (15%)* *(DPEC shall evaluate the project reports, as per the rubrics, well before the ESE. At the time of ESE, evaluated project report marks shall be posted in the award list, along with the ESE oral presentation marks. Students shall appear for Viva-Voce with project report)* *(ii) Oral presentation with PPTs and viva-voce (15%)* *(iii) Project poster (5%)* *(DPEC shall evaluate the project poster, as per the rubrics, well before the ESE. At the time of ESE, evaluated project poster marks shall be posted in the award list. Students shall appear for Viva-Voce with project poster)*	**40%**
Total Weightage	**100%**

(d) **Working Model:** Every project team shall be required to develop a working model/ process/software package/system, on the chosen work. The completed working model/ process/software package/system shall be demonstrated during final presentation at the end of *phase-II*.

(e) **Video pitch**: Every project team shall be required to create a pitch video, which is a video presentation on their major project work *phase-I & phase-II*. The project team shall present the produced video pitch during Final presentation. The produced video pitch should

i. be 3 to 5-minute-long video (no longer than 5 minutes)

ii. be concise and to the point, on the problem, proposed solution and its salient features.

iii. show project timeline and sample page of log book

iv. highlight the various stages during project implementation with the help of short videos / photos / screenshots on experiments conducted, simulations carried out, prototype / working model / process / software package / system developed as part of proposed solution and also photos showing team interactions with supervisor and the team working in the lab on project.

v. discuss the impact of proposed solution in *ethical, environmental, societal and sustainable development contexts.*

vi. emphasize key points about *business idea, potential market for the proposed solution*

(f) **Project poster**: At the end, the project teams shall present their project in the form of posters (A2 size). The teams shall have to present their work during the poster presentation session scheduled at the end of the 8th semester, at the time of demonstration of complete porotype / working model / software package / system developed.

(g) **Well-documented plagiarism-cleared project report**: Every project team shall be required to submit a well-documented project report on the work carried out, as per the format specified by the DPEC. The report should clear plagiarism check as per the anti-plagiarism policy-2020 of the institute. The following shall compulsorily be included in the Results-Chapter of the project report

i. Photos / screen shots taken at various stages during the development of working model/ process/software package/system as part of Results-Chapter

ii. Snapshot of final working model/ process/software package/system developed

iii. Pictures of the team working in the lab, the team discussing with the project supervisor, working on creative project, or an event they are attending for work.

iv. All these photos / screen shots shall be properly referred in the project report by assigning figure numbers

(h) **Tangible outcomes of project work in Conclusions - Chapter:** These are the lessons learnt from doing a project work. The students have to describe in their own words what they learnt from the project work experience. They have to describe what specific KSQs are acquired by them, with reference to the expected COs, after successful completion of major project work. Finally, a table depicting systematic mapping of what they have learnt and the expected major project work COs, is to be shown in the conclusions chapter.

(i) **Student feedback on major project in Conclusions - Chapter:** To gather information on whether project work was useful and gave practical experience on chosen field of interest, and other learning, a well-defined feedback questionnaire (*made available by the dept*) with closed and open questions shall be kept in the conclusions chapter of the project report.

(xix) It is mandatory for

(a) every student of the team to appear for ESE oral presentation and viva-voce, to qualify for course evaluation

(b) every project team to write a technical paper based on the solution(s) proposed, results obtained and prototype / working model / process / software package / system developed, for submission to a reputed non-predatory conference/non-paid peer reviewed journal

(c) every project team shall be required to create a pitch video, which is a video presentation on their major project work *phase-I & phase-II*

(d) every project team shall present their project in the form of a poster, during the demonstration of complete porotype / working model / software package / system developed

(xi) The student has to register for the Major project work *phase-II* as supplementary examination in the following cases:

(a) He/ She is absent for oral presentation and viva-voce as part of ESE presentation

(b) He/ She fails to fulfill the requirements of Major project work *phase-II* evaluation as per specified guidelines

(xii) Supplementary examination for Major project work *phase-II*

(a) The CoE shall send the list of students, registered for supplementary examination, to the HoDs concerned

(b) The DPEC, duly constituted by the HoD, shall conduct Major project *phase-II* supplementary exam and send the award list to the CoE within the stipulated time

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Course Learning Outcomes (COs):

Upon completion of the major project work, students will be able to…

CO1: review research literature, formulate problem, apply knowledge of mathematics, sciences, engineering fundamentals, experimental and data analysis techniques; synthesize technical knowledge and innovative approaches to generate suitable solutions for real-world complex engineering problems **(Technical skills)**

CO2: design a system or product based on product/customer specifications; develop, analyze, and critically evaluate the design alternatives in order to justify the solutions to a real-world problem guided by ethical, environmental, societal and sustainable development considerations; use modern engineering and IT tools to design, build and test a prototype within specified project timeline and budget **(Problem solving and critical thinking skills)**

CO3: apply project management and organizational skills; demonstrate integrity, leadership, creativity, professional and ethical responsibilities as an individual and as a member or leader to produce time-sensitive deliverables in a multi-disciplinary team (**Ethics and teamwork**)

CO4: collate the results, compare performance of prototype to design specifications and present clearly and effectively the proposed solution, conclusions and/or recommendations in written (report, poster, technical paper), oral (presentations) and multimedia formats (video pitch) and engage in self-directed independent learning and life-long learning demonstrating the KSQ of a professional engineer (**Communication skills and life-long learning**)

Course Articulation Matrix (CAM) : U18CI804 MAJOR PROJECT WORK PHASE-II

CO	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
CO1	**U18CI804.1**	2	2	2	2	-	-	-	3	-	2	-	3	2	2
CO2	**U18CI804.2**	1	2	2	-	2	2	2	3	-	2	-	3	2	2
CO3	**U18CI804.3**	-	-	-	-	-	-	-	3	2	2	2	3	2	2
CO4	**U18CI804.4**	-	-	2	2	-	-	-	3	-	2	-	3	2	2
U18CI804		**1.5**	**2**	**2**	**2**	**2**	**2**	**2**	**3**	**2**	**2**	**2**	**3**	**2**	**2**