KANNUR UNIVERSITY

(Abstract)

FYUG Electronics Programme in Affiliated colleges under Kannur University -Third and Fourth semester syllabi -Approved and implemented with effect from 2024 Admission-- Orders issued

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ACADEMIC C SECTION

ACAD C/ACAD C1/21843/2024 Dated: 13.08.2025

Read:-1. U O No. ACAD C/ACAD C1/21843/2024 dated 26.11.2024

2. E mail dated 21.05.2025 from Dr. Rohit K. Raj, Associate Professor & Head, Department of Electronics, Government College, Mananthavady.

3. Minutes of the meeting of all Deans of Faculty held on 04.06.2025

4. Orders of the Vice Chancellor in file of even No dated 04.06.2025

ORDER

1. As per the paper read as (1) above, the scheme & First and Second semester syllabus of the FYUG Electronics Programme in Affiliated colleges under Kannur University were implemented w.e.f. 2024 admission.

2. Dr. Rohit K. Raj, Associate Professor & Head, Department of Electronics, Government College, Mananthavady, who has resigned from the position of Chairperson of the existing Board of Studies in Electronics, submitted (Vide paper read as 2 above) the third and fourth semester syllabus of FYUG Electronics Programme for approval.

3. Subsequently, third and fourth semester syllabus of FYUG Electronics Programme was forwarded to the Dean, Faculty of Science for verification.

4. The Dean, Faculty of Science, vide the paper read 3, recommended to approve the third and fourth semester syllabus of FYUG Electronics Programme.

5.The Vice Chancellor, after considering the recommendation of the Dean, Faculty of Science and in exercise of the powers of the Academic Council conferred under Section 11(1) Chapter III of Kannur University Act, 1996 and all other enabling provisions read together with, approved the third and fourth semester Syllabus of the FYUG Electronics programme in Affiliated Colleges under Kannur University and accorded sanction to implement the same w.e.f. 2024 admission, subject to the reporting to the Academic Council.

8. The third and fourth semester Syllabus of the FYUG Electronics Programme in Affiliated colleges under Kannur University w.e.f. 2024 admission are appended herewith.

Orders are issued accordingly.

Sd/-

Bindu K P G

DEPUTY REGISTRAR (ACADEMIC)

For REGISTRAR

To: 1. The Controller of Examination (Through PA to CE)

2. Dr. Rohit K. Raj, Associate Professor & Head, Department of Electronics, Government College, Mananthavady.

3. The Principals of all affiliated colleges.

Copy To: 1. The Examination Branch (through PA to CE)
2. JR (Exam)
3. DR/AR (Academic)
4. Computer Programmer
5. The Web Manager I (For uploading in the website)
6. SF/DF/FC

Forwarded / By Order

SECTION OFFICER

KANNUR UNIVERSITY
CIVIL STATION P.O.
KANNUR
Pin-670 002
THAVAKKARA

KANNUR UNIVERSITY

Four Year Undergraduate Programme

ELECTRONICS

(OBE – Outcome Based Education)

2024 Admission onwards

(Semester III & IV Only)

List of Courses (Category wise)

Discipline Specific Core Courses (DSC) - Major pathway

Sl. No.	Semester	Course Code	Course Title	MARKS			Credit				Hours/Week			
				CE	ESE	Total	L	T	P	Total	L*	T*	P*	Total
1	1	KU1DSCELE101	Fundamentals of Electrical and Electronics	35	65	100	3	0	1	4	3	0	2	5
2	2	KU2DSCELE105	Fundamentals of Digital Circuits	35	65	100	3	0	1	4	3	0	2	5
3	3	KU3DSCELE201	Analog Electronics	35	65	100	3	0	1	4	3	0	2	5
4	3	KU3DSCELE205	Microprocessor and microcontroller	35	65	100	3	0	1	4	3	0	2	5
5	4	KU4DSCELE206	Analog Integrated Circuits	35	65	100	3	0	1	4	3	0	2	5
6	4	KU4DSCELE207	Electronic Communication	35	65	100	3	0	1	4	3	0	2	5
7	4	KU4DSCELE208	Electronic Intstrumentation	35	65	100	3	0	1	4	3	0	2	5
8	5	KU5DSCELE301	Fibre optic communication	30	70	100	4	0	0	4	4	0	0	4
9	5	KU5DSCELE302	Digital System Design	35	65	100	3	0	1	4	3	0	2	5
10	5	KU5DSCELE303	Embedded Systems	35	65	100	3	0	1	4	3	0	2	5
11	5		Elective1											
12	5		Elective2											
13	6	KU6DSCELE304	Python Programming	35	65	100	3	0	1	4	3	0	2	5

14	6	KU6DSCELE305	VLSI	30	70	100	4	0	0	4	4	0	0	4
15	6	KU6DSCELE306	ARM Processor	35	65	100	3	0	1	4	3	0	2	5
16	6	KU6INTELE200	**Intership**							2				
17	6		Elective3											
18	6		Elective4											
19	7	KU7DSCELE401	Low power VLSI	35	65	100	3	0	1	4	3	0	2	5
20	7	KU7DSCELE402	Information Theory and coding	35	65	100	3	0	1	4	3	0	2	5
21	7	KU7DSCELE403	Machine Learning	35	65	100	3	0	1	4	3	0	2	5
22	7	KU7DSCELE404	Printed Antennas	35	65	100	3	0	1	4	3	0	2	5
23	7	KU7DSCELE405	Digital Image processing	35	65	100	3	0	1	4	3	0	2	5
Honours with Research														
24	8	KU8RPHELE400	PROJECT							12				
25	8		Elective5*											
26	8		Elective6*											
27	8		Elective7*											
Honours without research														
28	8	KU8DSCELE406	Embedded OS and RTOS	35	65	100	3	0	1	4	3	0	2	5
29	8	KU8DSCELE407	Advanced Python Programming	35	65	100	3	0	1	4	3	0	2	5
30	8	KU8DSCELE408	Deep learning	35	65	100	3	0	1	4	3	0	2	5
31	8		Elective5											
32	8		Elective6											
33	8		Elective7											

*** These electives can be done as online courses. BoS will decide the title of the online courses upon request from the insitution.**

Discipline Specific Core Courses (DSC) - Minor Pathway

Sl. No.	Semester	Course Code	Course Title	MARKS			Credit				Hours/Week			
				CE	ESE	Total	L	T	P	Total	L*	T*	P*	Total
1	1	KU1DSCELE102	Fundamentals of Digital Electronics	35	65	100	3	0	1	4	3	0	2	5
2	1	KU1DSCELE103	Basic Electronics	35	65	100	3	0	1	4	3	0	2	5
3	1	KU1DSCELE104	Foundations of Electrical and Electronics	35	65	100	3	0	1	4	3	0	2	5
4	2	KU2DSCELE106	Introduction to 8051 Microcontroller	35	65	100	3	0	1	4	3	0	2	5
5	2	KU2DSCELE107	Electronic Devices and Circuits	35	65	100	3	0	1	4	3	0	2	5
6	2	KU2DSCELE108	Digital Electronics	35	65	100	3	0	1	4	3	0	2	5
7	3	KU3DSCELE202	Embedded C and Arduino programming	35	65	100	3	0	1	4	3	0	2	5
8	3	KU3DSCELE203	Linear Integrated Circuits	35	65	100	3	0	1	4	3	0	2	5
9	3	KU3DSCELE204	Analog Circuits	35	65	100	3	0	1	4	3	0	2	5

Discipline Specific Elective Courses (DSE) – Major Pathway

Sl. No.	Semester	Course Code	Course Title	Marks			Credit				Hours/Week			
				CE	ESE	Total	L	T	P	Total	L*	T*	P*	Total
1	5	KU5DSEELE307	Programming with C	30	70	100	4	0	0	4	4	0	0	4
2	5	KU5DSEELE308	Signals and Systems	30	70	100	4	0	0	4	4	0	0	4
3	5	KU5DSEELE309	PIC microcontrollers	30	70	100	4	0	0	4	4	0	0	4
4	5	KU5DSEELE310	Electromagnetics	30	70	100	4	0	0	4	4	0	0	4
5	5	KU5DSEELE311	Power Electronics	30	70	100	4	0	0	4	4	0	0	4
6	5	KU5DSEELE312	Control System	30	70	100	4	0	0	4	4	0	0	4
7	5	KU5DSEELE313	Wireless sensor Networks	30	70	100	4	0	0	4	4	0	0	4
8	6	KU6DSEELE314	Fundamentals of IOT	30	70	100	4	0	0	4	4	0	0	4
9	6	KU6DSEELE315	Robotics and Automation	30	70	100	4	0	0	4	4	0	0	4
10	6	KU6DSEELE316	Wireless Communications	30	70	100	4	0	0	4	4	0	0	4
11	6	KU6DSEELE317	Digital Signal Processing	30	70	100	4	0	0	4	4	0	0	4
12	6	KU6DSEELE318	Advanced Power electronics	30	70	100	4	0	0	4	4	0	0	4
13	6	KU6DSEELE319	Antennas and Microwave Devices	30	70	100	4	0	0	4	4	0	0	4
14	6	KU6DSEELE320	MEMS	30	70	100	4	0	0	4	4	0	0	4
15	6	KU6DSEELE321	Cryptography	30	70	100	4	0	0	4	4	0	0	4
16	8	KU8DSEELE409	Research Methodology	30	70	100	4	0	0	4	4	0	0	4
17	8	KU8DSEELE410	Computer	30	70	100	4	0	0	4	4	0	0	4

			networks											
18	8	KU8DSEELE411	Microwave Integrated Circuits	30	70	100	4	0	0	4	4	0	0	4
19	8	KU8DSEELE412	Radar and navigation	30	70	100	4	0	0	4	4	0	0	4
20	8	KU8DSEELE413	Industrial Automation	30	70	100	4	0	0	4	4	0	0	4
21	8	KU8DSEELE414	Optical sensing	30	70	100	4	0	0	4	4	0	0	4
22	8	KU8DSEELE415	Mixed Signal Circuit Design	30	70	100	4	0	0	4	4	0	0	4
23	8	KU8DSEELE416	Secure Communication	30	70	100	4	0	0	4	4	0	0	4
24	8	KU8DSCELE417	Basic Tools of Microwave Engineering	30	70	100	4	0	0	4	4	0	0	4

Discipline Specific Elective Courses (DSE) – Minor Pathway

1	8	KU8DSEELE322	Embedded OS and RTOS	30	70	100	4	0	0	4	4	0	0	4
2	8	KU8DSEELE323	Advanced Python Programming	30	70	100	4	0	0	4	4	0	0	4
3	8	KU8DSEELE324	VLSI	30	70	100	4	0	0	4	4	0	0	4
4	8	KU8DSEELE325	Fundamentals of IOT	30	70	100	4	0	0	4	4	0	0	4

Skill Enhancement Courses (SEC)

Sl. No.	Semester	Course Code	Course Title	Marks			Credit				Hours/Week			
				CE	ESE	Total	L	T	P	Total	L*	T*	P*	Total
1	4	KU4SECELE109	Embedded product design	25	50	75	2	0	1	3	2	0	2	4
2	5	KU5SECELE110	Computer Aided Circuit design	25	50	75	3	0	0	3	3	0	0	3
3	6	KU6SECELE111	PCB Design and Fabrication	25	50	75	3	0	0	3	3	0	0	3

Value Added Courses (VAC)

Sl. No.	Semester	Course Code	Course Title	Marks			Credit				Hours/Week			
				CE	ESE	Total	L	T	P	Total	L*	T*	P*	Total
1	3	KU3VACELE112	Web Application Development	25	50	75	3	0	0	3	3	0	0	3
2	4	KU4VACELE113	Mobile Application development	25	50	75	3	0	0	3	3	0	0	3
3	4	KU4VACELE114	Artificial Intelligence for You	25	50	75	3	0	0	3	3	0	0	3

Multi Disciplinary Courses (MDC)

Sl.No.	Semester	Course Code	Course Title	Marks			Credit				Hours/Week			
				CE	ESE	Total	L	T	P	Total	L*	T*	P*	Total
1	1	KU1MDCELE115	Computer Hardware	25	50	75	2	0	1	3	2	0	2	4
2		KU1MDCELE116	Electronics for You	25	50	75	2	0	1	3	2	0	2	4
3	2	KU2MDCELE117	R and Python for Data Analysis	25	50	75	2	0	1	3	2	0	2	4
4	3	KU3MDCELE118	Fundamentals of Electric Vehicles	25	50	75	3	0	0	3	3	0	0	3

* L=Lecture, T=Tutorial, P=Practical

Internship & Project

Sl.No.	Semester	Course Code	Course Title	Credit
1	6	KU6INTELE200	INTERNSHIP	2
2	8	KU8RPHELE400	PROJECT	12

SYLLABUS

Semester -III

Sl.No.	Course Type	Course Title	Course Code	Credit
1	Major	Analog Electronics	KU3DSCELE201	4
		Microprocessor and microcontroller	KU3DSCELE205	4
2	Minor	Embedded C and Arduino programming	KU3DSCELE202	4
		Linear Integrated Circuits	KU3DSCELE203	4
		Analog Circuits	KU3DSCELE204	4
3	Value Added Course (VAC)	Web ApplicationDevelopment	KU3VACELE112	3

KU3DSCELE201: Analog Electronics

Semester	Course Type	Course Level	Course Code		Credits (L+T+P)	Total Hours (L+T+P)
3	Major	200	KU3DSCELE201		3+0+1	45+0+30
Learning Approach (Hours/ Week)			Marks Distribution			Duration of ESE (Hours)
Lecture	Practical	Tutorial	CE	ESE	Total	
3	2	0	35	65	100	2

Course Description:

This course aims to develop skills in designing circuits based on BJTs, FETs, MOSFETs, amplifiers, and oscillators. The working principle of BJTs is explained in Unit I. Unit II explains the design of CE amplifiers and power amplifiers. The working principle of oscillators and their types is also explained in detail. After the successful completion of this course, the student will be able to design circuits based on the above devices. Practical sessions are also included.

Course Prerequisite: Understanding of fundamental electronic components, knowledge of circuit analysis techniques, and familiarity with semiconductor devices.

Course Outcomes:

CO No.	Expected Outcome	Learning Domains
1	Explain the working of BJTs, FETs, Amplifiers and oscillators	U
2	Design biasing circuits for BJT	C
3	Design single stage BJT amplifier and Power amplifier	C
4	Comparison of positive feedback and negative feedback	U
5	Design and develop oscillator circuits	C

****Remember (R), Understand (U), Apply (A), Analyse (An), Evaluate (E), Create ©***

Mapping of Course Outcomes to PSOs							
	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6	PSO 7
CO 1	3						
CO 2		3		3			
CO 3		3		3			
CO 4	3						
CO 5		3		3			3

COURSE CONTENTS

Contents for Classroom Transaction:

MODULE	UNIT	DESCRIPTION	HOURS
1	**Module I**		**10**
	1.1	Bipolar Junction Transistor (BJT) symbol, types (NPN and PNP), construction, working principle,parameters	
	1.2	BJTamplification,BJT switching, Transistor configurations- CB, CE and CC , characteristics	
	1.3	DC load line (CE), Q point, factors affecting the stability	
	1.4	Biasing circuits-fixed bias, emitter feedback bias , voltage divider, thermal stability	
2	**Module II**		**10**
	2.1	AC analysis, Coupling and bypass capacitors, AC load line and equivalent circuits	
	2.2	Transistor models – RE model Hybrid equivalent circuits	
	2.3	CE circuit analysis, - Small signal amplifier, Design of single stage RC Coupled amplifier	
	2.4	Classification of power amplifiers on basis of coduction: class A, class B, class AB, Class C amplifiers	

3	**Module III**		**10**
	3.1	Construction, working principle,Symbol, types, V-I characteristics, Specifications and parameters of Junction Field Effect Transistor (JFET)	
	3.2	Construction, working principle,Symbol, types, V-I characteristics, Specifications and parameters of Metal Oxide Semiconductor FET (MOSFET)	
	3.3	MOSFET Based practical switching circuits	
	3.4	Comparison of JFET, MOSFET and BJT, Applications	
4	**Module IV**		**10**
	4.1	Concept of negative and positive feedback. Types of feedbacks circuits: current shunt, current series, voltage shunt and voltage series	
	4.2	Comparison and applications	
	4.3	Effect of negative feedback: on amplifier performance, stability of an amplifier.	
	4.4	Positive feedback: oscillator circuits -Wien bridge , Phase Shift , Hartley , Colpitts and Crystal	
5	**Teacher Specific Module**		**5**
	Directions: Teacher can design this module based on their expertise and demand from the students		

Essential Readings:

1. Electronic Devices and Circuits: David A Bell, Oxford University Press 5th edition

2. A text book of Applied Electronics : R. S. Sedha, S Chand Company Ltd

Suggested Readings:

· Basic Electronics Solid state : B. L. Theraja, S Chand Company Ltd, 5 th edition

- A text book of Electrical Technology: B.L.Theraja, S.Chand and Co.
- Basic Electronics and Linear Circuits: Bhargava N.N., Kulshreshtha D.C., TMH
- Electronic Devices and Circuits: Bolyestad, TataMcGraw Hill.
- Electronic Principles: Albert Malvino, David J Bates, McGraw Hill 7th Edition.

Laboratory Sessions : Practical sessions to reinforce theoretical concepts

1 : V-I Characteristics of the CE configuration of BJT

2 : Design Transistor Biasing circuits (Fixed and voltage divider bias) for a given specification

3: Design a single stage CE amplifier for a given gain

4: Design BJT as switch

5: Design current series feedback amplifier

6 : Design phase shift oscillator

7: Design Wein bridge oscillator

8: Design current shunt feedback amplifier

9: Design Hartley oscillator

10: Design Colpitts oscillator

Each laboratory experiment should be accompanied by a detailed lab note containing theoretical background, experimental procedures, circuit diagrams, program listings, and expected outcomes.

Assessment Rubrics:

	Marks
End Semester Evaluation	**65**
Continuous Evaluation	**35**

KU3DSCELE205: Microprocessor &Microcontroller

Semester	Course type	Course level	Course code	Credits (L+T+P)	Total hours(L+T+P)
3	Major	200	KU3DSCELE 205	3+0+1	45+0+30

Learning Approach (Hours\week)			Mark Distribution			Duration of ESE(Hours)
Lecture	Practical	Tutorial	CE	ESE	Total	
3	2	0	35	65	100	2

Course Description:

This is a complete introductory course designed to provide a solid understanding of the basic and programming concepts underlying microprocessor and microcontroller 8051.Topics covered include basic processor instructions sets ,programming concepts in processors and 8051 microcontroller basics,memory,i/o ports,serial communication and interfacing techniques.

Course Prerequisite;Baic understaning of Digital electronics

Course Outcomes

CO No.	Expected Outcomes	Learning Domains
1	Understand Introduction to microprocessors ,types,discriptions	U
2	Explain Microcontroller concepts and instructions formats	E
3	Understand Microcontroller 8051programming techniques	U
4	Develop interfacing concepts and sample programs	C
5	Develop practical experience through laboratory experiments and projects	C

Remember(R) Understand (U) Apply (A) Analyse (An) Evaluate (E) Create(C)

Mappng of Course Outcomes to PSOs

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7
CO1	2		2				

CO2			2		3		
CO3					3		
CO4			3		3	3	
CO5					3	3	3

COURSE CONTENTS

Contents for Classroom Transacton

		Descripton	Hours
1		**Module 1**	10
	1.1	Evoluton of microprocessor-introducton to 0185-Functonal block-pindiagram-8085 regsters-bus organsaton – microprocessor intiated operations&internal data operatiuons	
	1.2	Externally intiated operations-memory organisation-mappng and types Types of I/O addressing –instruston format. Instructions and timing (programming not)-	
	1.3	Instruction classiuPOfcation .concepts of RISC &CISC – MMX-Pentium processors (instructions only).Simple programs in examples	
2		**Module 2**	10
	2.1	Microcontroller 8051Architecture:Comparision between microprossor and microcontroller	
	2.2	microcontroller 8051 Hardware (oscillator&clock,program counter,Data pointer,Aand B registers,Flag and PSW,internal memory ,memory RAM/ROM,Stack and stack memory&SFRs)	
	2.3	I/O Ports,external memory,counters and timers	
	2.4	Serial I/O interrupts.types define only	
		Module3	10
	3.1	Addressing modes,Different groups of instructions-Data transfer instructions,Logical operations, simple programs	
	3.2	Arithmetic operations, jump and call instructions,some	

		simple programs	
	3.3	Code conversion,Block data transfer ,timer programming	
	3.4	All types of instruction based 8051 microcontroller simple programs for solevd examples	
4		Module4	10
	4.1	Peripherals timer,counter,interrups-serial data –i/p and serial data o/p	
	4.2	Serial data interrupts,timer flag interrupts,serial port interrupt,external interrupts,reset,interrupt priority-software geerated interrupt	
	4.3	Data transmission and reception –serial data transmission mode.Keyboard interfacing,display interfacing,seven segment and LCD Display	
	4.4	D/A and A/D interface,simple programms for solved examples	
5		Teacher Specific Module	5
	Directions: Teacher can design this module based on their expertise and demand from the students		

Essential Readings:

1.8085 –Architecture programming & technique-Ramesh Goanker

2.The 8051 microcontroller Architecture programming & Applications(II Edition)-Kenneth .J.Ayala

3. The 8051 microcontroller and Embedded systems-Muhammad Ali Mazidi

Suggested Readings:

1. Kenneth .J.Ayala- The 8051 microcontroller& embedded system using assembly and C
2. The 8051 microcontroller –Phinillos Gimenez

3. The 8051 microcontroller- Scott MacKenzie
4. The 8051 microcontroller MCS 51 Family and its variants-Satish Shah
5. The 8051 microcontroller.Fundamental cocepsts,Hardware,software and applications in Electronics-Salvador Pinillos Gimenez

Laboratory Sessions:Practical sessions to include programming and interfacing programms based on theoretical concepts using microcontroller 8051 trainer kit

1. Addition ,Subtraction,Multiplication and Division(8-bit numbers)
2. Addition and subtraction (16 bit numbers)
3. Logical operation –AND,OR and NOT
4. Programme to transfer a block of data
5. Array addition (8-bit number array)
6. Decimal to Hex and Hex to Decimal
7. Decimal to ASCII and ASCII to Decimal
8. Sort numbers in Ascending order/Descending order
9. UP/DOWN counter
10. Dancing LED
11. Square wave generator
12. Serial communicationbased programms
13. Seven segment LED interface
14. LCD interface

Lab rules to be followed

Each laboratory experiment should be accompanied by a detailed lab note containing theoretical background, experimental procedures, circuit diagrams, program listings, and expected outcomes.

Assessment Rubrics:

	Marks
End Semester Evaluation	**65**

Continuous Evaluation	**35**

KU3DSCELE202 Embedded C and Arduino programming

Semester	Course Type	Course Level	Course Code	Credits (L+T+P)	Total Hours (L+T+P)
3	Minor	200	KU3DSCELE202	3+0+1	45+0+30

Learning Approach (Hours/ Week)			Marks Distribution			Duration of ESE (Hours)
Lecture	Practical	Tutorial	CE	ESE	Total	
3	2	0	35	65	100	2

Course Description:

This is a comprehensive introductory course designed to provide a solid understanding of the basic principles and concepts underlying Embedded C and Arduino programming . *Topics covered include the fundamentals of C and Embedded C programming, microcontroller basics using Arduino hardware, interfacing sensors and actuators using Arduino and applications of embedded systems in real-world projects. Throughout the course, emphasis is placed on practical applications to reinforce theoretical concepts. By the end of the course, students should have a solid foundation in embedded systems in real-world projects, preparing them for more advanced coursework or practical applications in the field.*

Course Prerequisite: Basic understanding of Embedded C and Arduino Hardware. To develop programming skills for interfacing sensors and actuators using Arduino.

Course Outcomes:

CO No.	Expected Outcome	Learning Domains

1	To introduce the fundamentals of C and Embedded C programming.	U
2	To provide knowledge on microcontroller basics using Arduino hardware.	U
3	To develop programming skills for interfacing sensors and actuators using Arduino.	A
4	To enable practical applications of embedded systems in real-world projects.	E
5	Develop Mini Projects: (Line follower, Smart Light, Temperature Logger). Debugging and troubleshooting techniques.	C

****Remember (R), Understand (U), Apply (A), Analyse (An), Evaluate (E), Create (C)***

Mapping of Course Outcomes to PSOs

	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6	PSO 7
CO 1	3						
CO 2							
CO 3							
CO 4	3	3					
CO 5		3					3

COURSE CONTENTS

Contents for Classroom Transaction:

MODULE	UNIT	DESCRIPTION	HOURS
1	**Module I**		**10**
	1.1	Introduction to programming and structure of C programs	
	1.2	Data types, variables, constants, operators.	
	1.3	Control statements: if, else, switch, loops (for, while, do-while)	

	1.4	Functions, arrays, strings, pointers. Structure and file handling basics (overview).	
2	**Module II**		**10**
	2.1	Differences between C and Embedded C. Microcontroller architecture overview.	
	2.2	Registers, memory types (RAM, ROM, EEPROM	
	2.3	Bit manipulation, I/O port programming. Delay functions and embedded C libraries.	
	2.4	Introduction to Interrupts.	

3	**Module III**		**10**
	3.1	Overview of Arduino platform and IDE.	
	3.2	Arduino UNO: pin configuration, power supply, memory.	
	3.3	Sensors and Actuators: Types and working (temperature, motion, IR, relay, motors, etc.).	
	3.4	Communication protocols: UART, SPI, I2C (basics).	

4	**Module IV**		**10**
	4.1	Basic Arduino programs (Blink, Serial Print, DigitalRead/Write.	
	4.2	AnalogRead/Write and PWM. Interfacing LEDs, switches, buzzers, sensors (IR, ultrasonic).	
	4.3	Mini Projects: (Line follower, Smart Light, Temperature Logger)..	
	4.4	Debugging and troubleshooting techniques.	
5	**Teacher Specific Module**		**5**
	Directions: Teacher can design this module based on their expertise and demand from the students		
	Space to fill the selected		

	area/ activity	

Essential Readings:

1) Let Us C – Yashavant Kanetkar
2) Embedded C Programming and the Atmel AVR – Barnett, Cox, O'Cull
3) Arduino Cookbook – Michael Margolis
4) Getting Started with Arduino – Massimo Banz

Suggested Readings:

1) C Programming Absolute Beginner's Guide-Greg Perry, Dean Miller
2) C Programming in easy steps (5th Edition)- Mike McGrath
3) "Embedded C" by Michael J. Pont
4) "First Steps with Embedded Systems" by Phaedrus Systems:
5) Programming Arduino-Simon monk

Laboratory Sessions : Practical sessions to reinforce theoretical concepts

1) Familiarization with Arduino IDE and Basic C Programming (Blink LED)

Objective: To introduce students to Arduino development environment and write a basic program to blink an LED.

Tasks: - Install and configure Arduino IDE.

- Identify Arduino UNO board and its components.

- Write a simple program to blink an LED connected to a digital pin.

- Upload the program to the Arduino board and observe output.

2) Digital Input Reading: Interface a Push Button

Objective: To understand digital input reading using Arduino.

Tasks:

- Connect a push button to an Arduino digital pin.

- Write a program to read button state.

- Display button status on Serial Monitor.

3) Analog Input Reading: Read Values from a Potentiometer

Objective: To measure analog voltages using Arduino ADC.

Tasks:

- Connect a potentiometer to an analog pin.

- Write a program to read and display analog values.

- Observe changes in Serial Monitor.

4) PWM Output: Control LED Brightness

Objective: To generate PWM signals using Arduino.

Tasks:

- Connect an LED to a PWM capable pin.

- Write a program to vary LED brightness.

- Use analogWrite() function.

5) Temperature Monitoring: Interfacing LM35 Sensor

Objective: To measure ambient temperature using LM35 and Arduino.

Tasks:

- Interface LM35 sensor to analog input.

- Write a program to calculate and display temperature.

6) Motion Detection: Interfacing PIR Sensor

Objective: To detect motion using PIR sensor and trigger an output device.

Tasks:

- Connect a PIR sensor to Arduino.

- Write a program to detect motion.

- Activate LED/Buzzer upon detection.

7) Motor Control: Interface and Control DC Motor Using PWM

Objective: To control the speed of a DC motor using PWM.

Tasks:

- Connect motor driver circuit to Arduino.

- Write a program to vary motor speed.

- Test different speed levels.

8) Serial Communication: UART Communication with PC

Objective: To perform serial communication using Arduino UART.

Tasks:

- Write a program to send sensor data to PC.

- Display the data using Serial Monitor.

9) Mini Project 1: Smart Automatic Lighting System

Objective: To automate lighting using LDR and Motion Sensor.

Tasks:

- Interface LDR and PIR sensor.

- Write program logic to turn on light in dark when motion detected.

10) Mini Project 2: Obstacle Detection and Alert System

Objective: To detect obstacles using Ultrasonic Sensor and generate alert.

Tasks:

- Interface Ultrasonic sensor (HC-SR04) with Arduino.

- Write program to measure distance.

- Activate buzzer/LED if obstacle detected within threshold.

Each laboratory experiment should be accompanied by a detailed lab note containing theoretical background, experimental procedures, circuit diagrams,algorithm/flow chart, program listings, and expected outcomes.

Assessment Rubrics:

	Marks
End Semester Evaluation	**65**
Continuous Evaluation	**35**

KU3DSCELE203: Linear integrated circuits

Semester	Course Type	Course Level	Course Code		Credits (L+T+P)	Total Hours (L+T+P)
3	Minor	200	KU3DSCELE203		3+0+1	45+0+30
Learning Approach (Hours/ Week)			Marks Distribution			Duration of ESE (Hours)
Lecture	Practical	Tutorial	CE	ESE	Total	
3	2	0	35	65	100	2

Course Description:

This course aims to develop the skill to design circuits using operational amplifiers and other linear ICs for various applications. It includes the study of OP-AMP characteristics, basic amplifier circuits, filters, waveform generators, voltage regulators and various OP-AMP applications. Practical sessions include hands-on experience with OP-AMP circuits such as amplifiers, oscillators, and multivibrators using IC 741 and 555 Timer. Students will gain a comprehensive understanding of OP-AMP theory and practical applications, preparing them for real-world electronic circuit design and analysis.

Course Prerequisite: Understanding of fundamental electronic components and concepts, familiarity with circuit analysis techniques.

Course Outcomes:

CO No.	Expected Outcome	Learning Domains
1	Analyse the differential amplifier configuration	A n
2	Design operational amplifier circuits for various applications	A
3	Understand the working of oscillators	U
4	To develop the circuit using 555 timer	C
5	Evaluate the performance of voltage regulator IC's and data	E

	converters	

Remember (R), Understand (U), Apply (A), Analyse (An), Evaluate (E), Create (C)

Mapping of Course Outcomes to PSOs							
	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6	PSO 7
CO 1	3	3	1	2			
CO 2	3	3	2	2	2		
CO 3	3	3	2	2	2		
CO 4	3	3	1	2	2		
CO 5	3	3	2	2	2		

COURSE CONTENTS

Contents for Classroom Transaction

MODULE	UNIT	DESCRIPTION	HOURS
1	**Module I**		**10**
	1.1	Basic Differential amplifier configurations.	
	1.2	The 741 Op Amp, Block diagram, Equivalent circuit,	
	1.3	Ideal op-amp parameters, typical parameter values for 741	
	1.4	Open loop configurations, Voltage transfer curve, Frequency response curve	
2	**Module II**		**10**
	2.1	Analysis of practical inverting and non-inverting amplifiers for Closed loop gain, Input resistance and output resistance.	
	2.2	Summer, Voltage Follower, Differential and Instrumentation Amplifiers	
	2.3	Voltage to current and Current to voltage converters	
	2.4	Integrator, Differentiator, Comparators, Schmitt Triggers.	

3	**Module III**		**10**
	3.1	Phase Shift and Wien-bridge Oscillator.	
	3.2	Astable and monostable multivibrators	
	3.3	Timer IC 555- Functional diagram.	
	3.4	Astable and monostable operations.	
4	**Module IV**		**10**
	4.1	Fixed and Adjustable voltage regulators, IC 723 – Low voltage and high voltage configurations,	
	4.2	Digital to Analog converters, Specifications	
	4.3	Weighted resistor type and R-2R Ladder type	
	4.4	Analog to Digital Converters: Specifications, Flash type and Successive approximation type.	
5	**Teacher Specific Module**		**5**
	Directions: Teacher can design this module based on their expertise and demand from the students		
	Space to fill the selected area/ activity		

Essential Readings:

1. Gayakwad , Op-Amps and Linear Integrated Circuits , PHI,4/e.2013.
2. Roy Chowdhary, Linear Integrated Circuits, New Age International, 2/e, 2010.

3. Botkar, Integrated Circuits, Khanna Publishers,9/e,2003.

Suggested Readings:

- Salivahanan S. and V. S. K. Bhaaskaran, Linear Integrated Circuits, Tata McGraw Hill, 2008.
- David A. Bell, Operational Amplifiers & Linear ICs, Oxford University Press, 2nd edition,2010
- Franco, Design with Operational Amplifiers and Analog Integrated Circuits, TMH, 3/e, 2008 .

Laboratory Sessions : Practical sessions to reinforce theoretical concepts

1. OPAMP – Non inverting & inverting Amplifier using IC 741
2. Adder & subtractor using IC 741
3. RC phase shift oscillator using IC 741 - design, output waveform
4. Astable Multivibrator using IC 741 - design, output waveform.
5. Mono stable Multivibrator using IC 741 - design, output waveform.
6. Schmitt trigger using IC 741 - design, output waveform.
7. Timer IC 555 – Astable Multivibrator - design, output waveform.
8. Integrators & Differentiators using IC 741- design, waveforms.
9. voltage regulator using IC 723.

Each laboratory experiment should be accompanied by a detailed lab note containing theoretical background, experimental procedures, circuit diagrams, program listings, and expected outcomes.

Assessment Rubrics:

	Marks
End Semester Evaluation	**65**
Continuous Evaluation	**35**

KU3DSCELE204: Analog Circuits

Semester	Course Type	Course Level	Course Code		Credits (L+T+P)	Total Hours (L+T+P)
3	Minor	200	KU3DSCELE204		3+0+1	45+0+30
Learning Approach (Hours/ Week)			Marks Distribution			Duration of ESE (Hours)
Lecture	Practical	Tutorial	CE	ESE	Total	
3	2	0	35	65	100	2

Course Description:

This course aims to develop knowledge about analog circuits. The course covers BJTs, FETs, MOSFETs, amplifiers, and oscillators. Practical sessions are also included in this course.

Course Prerequisite: Understanding of fundamental electronic components and concepts, familiarity with circuit analysis techniques.

Course Outcomes:

CO No.	Expected Outcome	Learning Domains
1	Explain the working of BJTs, FETs, Amplifiers and oscillators	U
2	Design biasing circuits for BJT	C
3	Design single stage BJT amplifier	C
4	Comparison of positive feedback and negative feedback	U
5	Design and develop oscillator circuits	C

****Remember (R), Understand (U), Apply (A), Analyse (An), Evaluate (E), Create ©***

Mapping of Course Outcomes to PSOs							
	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6	PSO 7
CO 1	3						
CO 2		**3**		**3**			
CO 3		**3**		**3**			
CO 4	3						
CO 5		3		**3**			3

COURSE CONTENTS

Contents for Classroom Transaction:

MODULE	**UNIT**	**DESCRIPTION**	**HOURS**
1	**Module I**		**10**
	1.1	Bipolar Junction Transistor (BJT) symbol, types (NPN and PNP), construction, working principle,parameters	
	1.2	BJTamplification,BJT switching, Transistor configurations- CB, CE and CC , characteristics	
	1.3	DC load line (CE), Q point, factors affecting the stability	
	1.4	Biasing circuits-fixed bias, emitter feedback bias , voltage divider, thermal stability	
2	**Module II**		**10**
	2.1	AC analysis, Coupling and byepass capacitors, AC load line and equivalent circuits	
	2.2	Transistor models – RE model Hybrid equivalent circuits	
	2.3	CE circuit analysis, - Small signal amplifier, Design of single stage RC Coupled amplifier	
	2.4	Comparison of small signal and large signal amplifiers	

3	**Module III**		**10**
	3.1	Construction, working principle,Symbol, types, V-I characteristics, Specifications and parameters of Junction Field Effect Transistor (JFET)	
	3.2	Construction, working principle,Symbol, types, V-I characteristics, Specifications and parameters of Metal Oxide Semiconductor FET (MOSFET)	
	3.3	MOSFET Based practical switching circuits	
	3.4	Comparison of JFET, MOSFET and BJT, Applications	
4	**Module IV**		**10**
	4.1	Concept of negative and positive feedback	
	4.2	Comparison and applications	
	4.3	Effect of negative feedback: on amplifier performance	
	4.4	Positive feedback: oscillator circuits -Wien bridge , Phase Shift	
5	**Teacher Specific Module**		**5**
	Directions: Teacher can design this module based on their expertise and demand from the students		

Essential Readings:

1. Electronic Devices and Circuits: David A Bell, Oxford University Press 5th edition

2. A text book of Applied Electronics : R. S. Sedha, S Chand Company Ltd

Suggested Readings:

· Basic Electronics Solid state : B. L. Theraja, S Chand Company Ltd, 5 th edition

- A text book of Electrical Technology: B.L.Theraja, S.Chand and Co.
- Basic Electronics and Linear Circuits: Bhargava N.N., Kulshreshtha D.C., TMH
- Electronic Devices and Circuits: Bolyestad, TataMcGraw Hill.
- Electronic Principles: Albert Malvino, David J Bates, McGraw Hill 7th Edition.

Laboratory Sessions : Practical sessions to reinforce theoretical concepts

1 : V-I Characteristics of the CE configuration of BJT

2 : Design Transistor Biasing circuits (Fixed and voltage divider bias) for a given specification

3: Design a single stage CE amplifier for a given gain

4: Design BJT as switch

5: Design a FET based switching circuit

6 : Design phase shift oscillator

7: Design Wein bridge oscillator

Each laboratory experiment should be accompanied by a detailed lab note containing theoretical background, experimental procedures, circuit diagrams, program listings, and expected outcomes.

Assessment Rubrics:

	Marks
End Semester Evaluation	**65**
Continuous Evaluation	**35**

KU3VACELE112: Web Application Development

Semester	Course Type	Course Level	Course Code	Credits (L+T+P)	Total Hours (L+T+P)
3	VAC	100	**KU3VACELE112**	3+0+0	45

Learning Approach (Hours/ Week)			Marks Distribution			Duration of ESE (Hours)
Lecture	Practical	Tutorial	CE	ESE	Total	
3	0	0	25	50	75	1.5Hr

Course Description:

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The course aims to provide the basics of web applications development from theoretical point of view. Students explore various aspects of web, web technologies and possible approaches to development. Emphasis is given on understanding the basic concepts of web applications development tools such as HTML, JavaScript, CSS etc.

Course Prerequisite: No prior knowledge of web application development is required.

Course Outcomes:

CO No.	Expected Outcome	Learning Domains
1	Knowledge about Websites	U
2	Knowledge about Web Application	U

3	Distinguish between Static and Dynamic Webpages	U
4	Basics of HTML, CSS, JavaScript and DHTML	U
5	Knowledge about Web Application Development	U

****Remember (R), Understand (U), Apply (A), Analyse (An), Evaluate (E), Create (C)***

Mapping of Course Outcomes to PSOs

	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6	PSO 7
CO 1					2	3	3
CO 2					2	3	3
CO 3					2	3	3
CO 4					2	3	3
CO 5					2	3	3

COURSE CONTENTS

Contents for Classroom Transaction:

MODULE	**UNIT**	**DESCRIPTION**	**HOURS**
1	**Introduction to Websites.**		**10**
	1.1	Web Basics and Overview: Introduction to Internet, World Wide Web, Web Browsers, URL , HTTP.	
	1.2	Introduction to Webpages (Static and Dymamic)	
	1.3	Basics of HTML	
2	**Dynamics Webpages**		**10**
	2.1	What is DHTML?	
	2.2	Applications of DHTML	

	2.3	Components of DHTML	
	2.4	Introduction to Cascading Style Sheets (CSS)	
	2.5	Ways of specifying style – inline, internal, external	

3	**Advanced CSS**		**10**
	3.1	Font, color, background, text, border, margin and list related attributes	
	3.2	Use of classes, spans, divs	
	3.3	Working with layers	
	3.4	Simple Webpage creation	

4	**Basics of JavaScript**		**10**
	4.1	JavaScript basics – syntax, data types and literals, type casting, variables, operators, arrays	
	4.2	Applications and advantages of JavaScript	
	4.3	Using JavaScript on a webpage	
	4.4	Simple dynamic webpage creation	
5	**Teacher Specific Module**		**5**
	Directions: Teacher can design this module based on their expertise and demand from the students		
	Space to fill the selected area/ activity		

Essential Readings:

6. Ivan Bayross, "Web Enabled Commercial Applications Development using HTML, DHTML, Javascript, Perl CGI"

7. Wilton P. : Beginning JavaScript, 2nd Edition, Wiley DreamTech, 2004

Suggested Reading:

- Danny Goodman, Machael Morrison , "JavaScript Bible", 3rd edition

TEACHING LEARNING STRATEGIES

Lectures: Theory sessions covering fundamental concepts and principles.

ASSESSMENT RUBRICS

	Marks
End Semester Evaluation	**50**
Continuous Evaluation	**25**

SYLLABUS

Semester -IV

Sl.No.	Course Type	Course Title	Course Code	Credit
1	Major	Analog Integrated Circuits	KU4DSCELE206	4
2		Electronic Communication	KU4DSCELE207	4
3		Electronic Intstrumentation	KU4DSCELE208	4
4	Value Added Course (VAC)	Mobile Application development	KU4VACELE113	3
5		Artificial Intelligence for You	KU4VACELE114	3
6	Skill Enhance Course (SEC)	Embedded product design	KU4SECELE109	3

KU4DSCELE206: ANALOG INTEGRATED CIRCUITS

Semester	Course Type	Course Level	Course Code	Credits (L+T+P)	Total Hours (L+T+P)
4	Major	200	KU4DSCELE206	3+0+1	45+0+30

Learning Approach (Hours/ Week)			Marks Distribution			Duration of ESE (Hours)
Lecture	Practical	Tutorial	CE	ESE	Total	
3	2	0	35	65	100	2

Course Description:

This course aims to develop the skill to design circuits using operational amplifiers and other linear ICs for various applications. It includes the study of OP-AMP characteristics, basic amplifier circuits, filters, waveform generators, voltage regulators, and various OP-AMP applications. Practical sessions include hands-on experience with OP-AMP circuits such as amplifiers, oscillators, and multivibrators using IC 741 and 555 Timer. Students will gain a comprehensive understanding of OP-AMP theory and practical applications, preparing them for real-world electronic circuit design and analysis.

Course Outcomes:

CO No.	Expected Outcome	Learning Domains
1	Analyse the differential amplifier configuration	A n
2	Design operational amplifier circuits for various applications	A
3	Understand the working of oscillators and filters	U
4	To develop the circuit using 555 timer,VCO and PLL	C
5	Evaluate the performance of voltage regulator IC's and data	E

	converters	

Remember (R), Understand (U), Apply (A), Analyse (An), Evaluate (E), Create (C)

Mapping of Course Outcomes to PSOs

	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6	PSO 7
CO 1	3	3	1	2			
CO 2	3	3	2	2	2		
CO 3	3	3	2	2	2		
CO 4	3	3	1	2	2		
CO 5	3	3	2	2	2		

COURSE CONTENTS

Contents for Classroom Transaction:

MODULE	UNIT	DESCRIPTION	HOURS
1	**Module I**		**10**
	1.1	Basic Differential amplifier configurations.	
	1.2	DC and AC analysis	
	1.3	The 741 Op Amp, Block diagram, Ideal op-amp parameters, typical parameter values for 741	
	1.4	. Equivalent circuit, Open loop configurations, Voltage transfer curve, Frequency response curve	
2	**Module II**		**10**
	2.1	General concept of Voltage Series, Voltage Shunt, current series and current shunt negative feedback	
	2.2	Analysis of practical inverting and non-inverting amplifiers for Closed loop gain, Input resistance and output resistance.	

	2.3	Summer, Voltage Follower, Differential and Instrumentation Amplifiers	
	2.4	Voltage to current and Current to voltage converters, Integrator, Differentiator, Precision rectifiers-half wave and full wave, Comparators, Schmitt Triggers.	

3	**Module III**		**10**
	3.1	Phase Shift and Wien-bridge Oscillators, Triangular and Sawtooth waveform generators.	
	3.2	Astable and monostable multivibrators	
	3.3	Comparison, design of First and second order low pass and High pass active filters	
	3.4	Timer IC 555- Functional diagram, Astable and monostable operations.	

4	**Module IV**		**10**
	4.1	Basic concepts of Voltage Controlled Oscillator, Application of VCO IC LM566	
	4.2	PLL Operation, Closed loop analysis Lock and capture range. Basic building blocks, PLL IC 565, Applications of PLL	
	4.3	Fixed and Adjustable voltage regulators, IC 723 – Low voltage and high voltage configurations,	
	4.4	Digital to Analog converters, Specifications, Weighted resistor type and R-2R Ladder type. Analog to Digital Converters: Specifications, Flash type and Successive approximation type.	
5	**Teacher Specific Module**		**5**
	Directions: Teacher can design this module based on their expertise and demand from the students		
	Space to fill the selected area/ activity		

Essential Readings:

1. Gayakwad , Op-Amps and Linear Integrated Circuits , PHI,4/e.2013.
2. Roy Chowdhary, Linear Integrated Circuits, New Age International, 2/e, 2010.
3. Botkar, Integrated Circuits, Khanna Publishers,9/e,2003.

Suggested Readings:

8. Salivahanan S. and V. S. K. Bhaaskaran, Linear Integrated Circuits, Tata McGraw Hill, 2008.
9. David A. Bell, Operational Amplifiers & Linear ICs, Oxford University Press, 2nd edition,2010
10. Franco, Design with Operational Amplifiers and Analog Integrated Circuits, TMH, 3/e, 2008 .

Laboratory Sessions : Practical sessions to reinforce theoretical concepts

1 : Fundamentals of operational amplifier

Objective: To familiarize operational amplifier

Tasks:

Implement voltage follower.

Implement inerting and noninverting amplifier and plot the frequency response

2 :Basic circuits using op amp

Objective: To create basic circuits using op amp

Tasks:

Construct summing and difference amplifier.

Implement integrator and differentiator circuit.

3: Oscillators using op amp

Objective: To generate sine and square wave forms

Tasks:

Design and set up RC phase shift and wein bridge oscillator using IC 741.

Design and set up Astable and monostable multivibrator using IC 741.

4: Applications of 741 IC.

Objective: To understand the operation of 741 in different circuits

Tasks:

Schmitt trigger using IC 741 - design, output waveform
Timer IC 555 – Astable Multivibrator - design, output waveform
Construct VCO using 565
Construct dc power supply using IC 723.

5: Simulation experiments using Spice

Objective: simulate basic op amp circuit using spice

Task:

Simulation of basic op amp circuits

Each laboratory experiment should be accompanied by a detailed lab note containing theoretical background, experimental procedures, circuit diagrams, program listings, and expected outcomes.

Assessment Rubrics:

	Marks
End Semester Evaluation	**65**
Continuous Evaluation	**35**

KU4DSCELE207: Electronic Communication

Semester	Course Type	Course Level	Course Code	Credits (L+T+P)	Total Hours (L+T+P)
4	Major	200	**KU4DSCELE207**	3+0+1	45+0+30

Learning Approach (Hours/ Week)			Marks Distribution			Duration of ESE (Hours)
Lecture	Practical	Tutorial	CE	ESE	Total	
3	2	0	35	65	100	2

Course Description:

This course is designed to provide a solid understanding of the basic principles and concepts underlying in Electronic communication. This course cover AM,FM, SSB generation and detection. Pulse communication techniques and digital modulations are also covered. By the end of the course, students should have a solid foundation in Analog and digital modulation techniques.

Course Prerequisite: Basic understanding of mathematics and Electronic circuits

Course Outcomes:

CO No.	Expected Outcome	Learning Domains
1	Understand operation of a basic communication system	U
2	Explain the operation of AM FM & SSB transmitters and receivers	E
3	Solve problems related to Analog modulations	A

4	Understand concept of Pulse communication and digital modulations	U
5	Develop practical experience through laboratory experiments and projects	C

****Remember (R), Understand (U), Apply (A), Analyse (An), Evaluate (E), Create (C)***

Mapping of Course Outcomes to PSOs

	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6	PSO 7
CO 1							
CO 2							
CO 3	2		3				
CO 4							
CO 5	3		3				3

COURSE CONTENTS

Contents for Classroom Transaction:

MODULE	**UNIT**	**DESCRIPTION**	**HOURS**
1	**Module I**		**10**
	1.1	Block diagram of an electronic communication system, electromagnetic spectrum- band designations and applications.	
	1.2	Types of Electronic Communication systems: Simplex & Duplex	
	1.3	Noise in communication: External noise- Atmospheric, space noise, man-made noise, Internal noise- Thermal and Shot noise	
	1.4	Definitions and relationship between Bit rate, Baud rate, Bandwidth and signal to noise ratio	

2	**Module II**		**10**
	2.1	Modulation – Need for modulation- Amplitude modulation –Side band- AM signals & spectra, power relation	
	2.2	AM generation – High level & low level AM transmitters	
	2.3	AM receivers - Super heterodyne receivers	
	2.4	SSB generator balanced modulator -SSB transmitters –SSB receivers.	

3	**Module III**		**10**
	3.1	Frequency modulation -FM & PM signals – spectra – Band with	
	3.2	Narrow band & wide band FM – generation – direct FM – VCO – phase modulator – indirect FM	
	3.3	Demodulation of FM- balanced discriminator, de- emphasis & pre–emphasis	
	3.4	FM transmitter & receivers – FM stereo transmission & reception.	

4	**Module IV**		**10**
	4.1	Sampling – Aliasing - PAM, PWM, PPM	
	4.2	Concept of FDM & TDM,	
	4.3	Pulse code modulation – quantization – generation & reconstruction – companding	
	4.4	Concept of ASK, FSK,PSK & QPSK	

5	**Teacher Specific Module**	**5**
	Directions: Teacher can design this module based on their expertise and demand from the students	
	Space to fill the selected	

	area/ activity	

Essential Readings:

1. G. Kennedy, Electronic Communication, 2nd edition TMH

Suggested Readings:

11. Frenzel, Communication Electronics, 3rd edition TMH
12. Dennis Roddy,JohnCoolen Electronic Communication System PHI

Laboratory Sessions : Practical sessions to reinforce theoretical concepts

- AM generation
- Frequency response of IF amplifier
- Study of Pulse Amplitude Modulation and Demodulation
- Study of Pulse Width Modulation and Demodulation
- Study of Pulse Position Modulation Demodulation
- Assemble and test a low power AM Transmitter circuit (Antenna- Random length wire)
- Assemble and test a low power FM Transmitter circuit (Antenna- Random length wire)
- Design a Quarter wave monopole antenna and connect at the output of the FM transmitter and observe the range enhancemnt

Each laboratory experiment should be accompanied by a detailed lab note containing theoretical background, experimental procedures, circuit diagrams, program listings, and expected outcomes.

Assessment Rubrics:

	Marks
End Semester Evaluation	**65**
Continuous Evaluation	**35**

KU4DSCELE208: Electronic Instrumentation

Semester	Course Type	Course Level	Course Code	Credits (L+T+P)	Total Hours (L+T+P)
4	Major	200	**KU4DSCELE208**	3+0+1	45+0+30

Learning Approach (Hours/ Week)			Marks Distribution			Duration of ESE (Hours)
Lecture	Practical	Tutorial	CE	ESE	Total	
3	2	0	35	65	100	2

Course Description:

This course is designed to provide basic understanding of Electronic instrumentation. This course cover introduction to instrumentation, laboratory instruments such as signal generators and CRO. Various sensors used in Electronic instruments are also included. By the end of the course, students should have a solid understanding of Electronic instrumentation.

Course Prerequisite: Basic understanding of fundamentals of Electronic devices and circuits

Course Outcomes:

CO No.	Expected Outcome	Learning Domains
1	Understand the operation of digital voltage and current meters	U
2	Explain the operation of various signal generators	E
3	Explain the operation of CRO	E
4	Understand operation of various transducers	U
5	Develop practical experience through laboratory experiments and projects	C

****Remember (R), Understand (U), Apply (A), Analyse (An), Evaluate (E), Create (C)***

Mapping of Course Outcomes to PSOs

	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6	PSO 7
CO 1	2		2				
CO 2			2				
CO 3	2		2				
CO 4	2		2				
CO 5		3	2	3			3

COURSE CONTENTS

Contents for Classroom Transaction:

MODULE	**UNIT**	**DESCRIPTION**	**HOURS**
1	**Module I**		**10**
	1.1	Basic Measurement Instruments: DC measurement: dc voltmeter, ohm meter and ammeter	
	1.2	Digital type voltmeter and ammeter	

	1.3	Digital Multimeter	
	1.4	AC measurement , volt meter and ammeter	
2	**Module II**		**10**
	2.1	Pulse generators, RF generators and Random noise generator	
	2.2	Function generators	
	2.3	Probes and Connectors: Test leads, Shielded cables, connectors, low capacitance probes and high voltage probes	
	2.4	RF demodulator probes, special probes for ICs	

3	**Module III**		**10**
	3.1	Block diagram of a General Purpose Oscilloscope and its basic operation	
	3.2	Electrostatic focussing, deflection and screen for CRT	
	3.3	CRO Probes	
	3.4	Types of CRO's: dual trace oscilloscope and digital storage oscilloscope	

4	**Module IV**		**10**
	4.1	Classification and selection of transducers	
	4.2	Strain Gages: bonded and un-bonded strain gages, strain gage transducer sensitivity.	
	4.3	Position Transducer: capacitive, inductive, linear variable differential transformer (LVDT), Piezoelectric Transducer.	
	4.4	Temperature transducers: Resistance, thermocouples, thermistor and semiconductor p-n junction transducer.	
5	**Teacher Specific Module**		**5**
	Directions: Teacher can design this module based on their expertise and		

	demand from the students	
	Space to fill the selected area/ activity	

Essential Readings:

- H. S. Kalsi, Electronic Instrumentation, Tata McGraw Hill (2006)
- Joseph J Carr, Elements of electronic instrumentatioand measurement, Pearson Education (2005)
- C. S. Rangan, G. R. Sarma and V. S. Mani, Instrumentation Devices and Systems, Tata McGraw Hill (1998)

Suggested Readings:

- H. Cooper, Modern electronic instrumentation and measurement techniques, Pearson Education (2005)
- R. A. Witte, Electronic test instruments: analog and digital measurements, Tata McGraw Hill (2004)
- S. Wolf and R. F. M. Smith, Student Reference Manual for Electronic Instrumentation Laboratories, Pearson Education (2004)

Laboratory Sessions : Practical sessions to reinforce theoretical concepts

1. Study the characteristics of a PT 100 transducer
2. Plot Temperature Vs output voltage of a thermocouple transducer
3. Design a Wheatstone's bridge to detect temperature
4. Using PN junction diode convert Temperature into Voltage value
5. Using ADC covert Analog voltage to digital Value
6. Setup a humidity sensor and evaluate the performance
7. Measuring displacement using LVDT

8. Design a Digital thermo meter
9. Design a temperature controller to control the temperature of a soldering iron
10. Design a function generator (Square and triangular wave)

Each laboratory experiment should be accompanied by a detailed lab note containing theoretical background, experimental procedures, circuit diagrams, program listings, and expected outcomes.

Assessment Rubrics:

	Marks
End Semester Evaluation	**65**
Continuous Evaluation	**35**

KU4VACELE113: Mobile Application Development

Semester	Course Type	Course Level	Course Code	Credits (L+T+P)	Total Hours (L+T+P)
4	VAC	100	KU4VACELE113	3+0+0	45+0+0

Learning Approach (Hours/ Week)			Marks Distribution			Duration of ESE (Hours)
Lecture	Practical	Tutorial	CE	ESE	Total	
3	0	0	25	50	75	1.5Hr

Course Description:

This course provides a comprehensive introduction to the fundamental components and concepts of Mobile application development. Through a theoretical approach , students will gain a solid understanding of fundamental mobile generations, smartphone architecture and especially the Android platform.

Course Prerequisite: No prior knowledge of computer hardware or software is required

Course Outcomes:

CO No.	Expected Outcome	Learning Domains
1	Understand Smart phone architecture	U
2	Understand Mobile OS Architecture	U
3	Understand Android terminologies	U
4	Explain fundamentals of Android studio	E
5	Build a small android application	C

****Remember (R), Understand (U), Apply (A), Analyse (An), Evaluate (E), Create (C)***

Mapping of Course Outcomes to PSOs

	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6	PSO 7
CO 1	2						
CO 2	2						
CO 3	2						
CO 4	2					3	
CO 5	3			3	3	3	

COURSE CONTENTS

Contents for Classroom Transaction:

MODULE	**UNIT**	**DESCRIPTION**	**HOURS**
1	**Overview of MOBILE PLATFORMS**		**10**
	1.1	Introduction to mobile phone generations – 1G to 5G, , Application	

		deployment.	
	1.2	Smart phone architecture-ARM and Intel architectures	
	1.3	Power Management, Screen resolution, Touch interfaces, Memory-Sensors, I/O interfaces, GPS,	
	1.4	Mobile OS Architectures-Kernel structure-Comparing and Contrasting architectures of Android, iOS, and Windows, Darwin vs. Linux vs. Windows	
2	Introduction to Android		**10**
	2.1	Introduction to Android	
	2.2	Android Operating System	
	2.3	Android versions, Features of Android	
	2.4	Android Architecture , Android Devices, History of Android	

3	**Android Termonologies**		**10**
	3.1	Introduction to Android terminologies, Application Context	
	3.2	Activities, Services, Intents, Receiving and Broadcasting Intents,	
	3.3	Android Manifest File and its common settings, Using Intent Filter, Permissions.	
	3.4	USB ports and their prevalence in modern systems	

4	**Fundamentals of Android Studio**		**10**
	4.1	Android SDK	

	4.2	Eclipse Installation, Android Installation,	
	4.3	Building your First Android application	
	4.4	Understanding Anatomy of Android Application, Android Manifest file.	
5	**Teacher Specific Module**		**5**
	Directions: Teacher can design this module based on their expertise and demand from the students		
	Space to fill the selected area/ activity		

Essential Readings:

13. Lauren Darcey and Shane Conder, "Android Wireless Application Development", Pearson Education, 2nd ed. (2011)

14. Google Developer Training, "Android Developer Fundamentals Course – Concept Reference", Google Developer Training Team, 2017.

15. Prasanth Kumar Pattnaik,Rajib Mall,"Fundamentals of Mobile Computing",PHI Learning Pvt.Ltd,New Delhi-2012

16. Reto Meier, "Professional Android 2 Application Development", Wiley India Pvt Ltd, 2010

17. Mark L Murphy, "Beginning Android", Wiley India Pvt Ltd, 2009

Suggested Readings:

1. Dawn Griffiths and David Griffiths, "Head First Android Development", 1st Edition, O"Reilly SPD Publishers, 2015. ISBN-13: 978-9352131341

2. Erik Hellman, "Android Programming – Pushing the Limits", 1st Edition, Wiley India Pvt Ltd, 2014. ISBN-13: 978-8126547197

3. Bill Phillips, Chris Stewart and Kristin Marsicano, "Android Programming: The Big Nerd Ranch Guide", 4th Edition, Big Nerd Ranch Guides, 2019. ISBN-13: 978-0134706054

TEACHING LEARNING STRATEGIES

Lectures: Theory sessions covering fundamental concepts and principles.

ASSESSMENT RUBRICS

	Marks
End Semester Evaluation	**50**
Continuous Evaluation	**25**

KU4VACELE114: ARTIFICIAL INTELLIGENCE FOR YOU

Semester	Course Type	Course Level	Course Code	Credits (L+T+P)	Total Hours (L+T+P)
4	VAC	100	KU4VACE LE114	3+0+0	45+0+0

Learning Approach (Hours/ Week)			Marks Distribution			Duration of ESE (Hours)
Lecture	Practical	Tutorial	CE	ESE	Total	
3	0	0	25	50	75	1.5Hr

Course Description:

This course provides a strong foundation in modern AI principles, tools, and applications. The course covers core AI concepts, data preparation techniques, fundamental machine learning algorithms, and practical applications in vision and language processing. By the end of this course, students will be equipped with a working knowledge of AI technologies and their relevance in various fields like healthcare, education, agriculture etc.,

Course Prerequisite: No prior knowledge of computer hardware is required

Course Outcomes:

CO No.	Expected Outcome	Learning Domains
1	Understand the basics and scope of Artificial Intelligence.	U
2	Describe key AI technologies	U
3	Define basic concepts and terminology in machine learning, including supervised, unsupervised, and reinforcement learning.	R
4	Identify and analyse common machine learning models such as decision trees, k-nearest neighbours and linear regression	A,An
5	Undertake the identification of simple real-life problems from various domains which requires data driven solutions using AI and ML techniques	A

****Remember (R), Understand (U), Apply (A), Analyse (An), Evaluate (E), Create (C)***

Mapping of Course Outcomes to PSOs

	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6	PSO 7
CO 1	2						
CO 2							
CO 3	3						
CO 4							
CO 5	5		3				3

COURSE CONTENTS

Contents for Classroom Transaction:

MODULE	**UNIT**	**DESCRIPTION**	**HOURS**
1	**INTRODUCTION TO ARTIFICIAL INTELLIGENCE**		**10**

	1.1	What is Artificial Intelligence? : Definition and scope, Intelligence, AI vs Machie Learning vs Deep Learning.	
	1.2	History and Evolution	
	1.3	Types of AI: Reactive Machines, Limited Memory, Theory of Mind, and Self-aware AI; Narrow AI vs General AI vs Super AI; Examples of each type in today's world.	
	1.4	Key concepts in AI: Problem-solving, Reasoning, Learning, Perception, and Language Processing; Role of data in AI; Introduction to intelligent agents	
2	**TECHNIQUES USED IN AI**		**10**
	2.1	Intelligent agents and Environment: Concept of agents, Types of Agents, Environment	
	2.2	Problem solving and Search Techniques: Problem formulation; Uninformed search- BFS, DFS; Informed search – greedy search, A* algorithm	
	2.3	Knowledge representation and Reasoning(Conceptual introduction)	
	2.4	Introduction to Planning and Decision making: Goal-based planning, Basic concepts of utility and rational decision making	

3	**BASICS OF MACHINE LERNING**		**10**
	3.1	Introduction to Machine Learning: What is Machine Learning? Relationship between AI and ML	
	3.2	Types of ML: Supervised, Unsupervised, and Reinforcement Learning	
	3.3	Basic Algorithms: **(Conceptual Only)** Supervised – Linear regression, Decision Tree, KNN Unsupervised - K-Means Clustering	
	3.4	Role of Data in ML: Data collection, preparation, and labelling; Features, training data, testing data; Overfitting and underfitting (intuitive understanding)	

4	**INTERDISCIPLINARY AI**		**10**
	4.1	AI in Medicine : Disease prediction, Drug discovery	
	4.2	AI in Agriculture: Crop monitoring, Yield prediction	
	4.3	AI in Finance: Fraud detection, Algorithmic trading	
	4.4	AI in Humanities and Languages : Chatbots and virtual assistants, Machine translation (e.g., Google Translate)	
	4.5	AI in Creative Arts : AI-generated music, painting, and writing, Creative tools like DALL·E and MuseNet	
5	**Teacher Specific Module**		**5**
	Directions: Teacher can design this module based on their expertise and demand from the students		
	Space to fill the selected area/ activity		

Essential Readings:

- Melanie Mitchell, *Artificial Intelligence: A Guide for Thinking Humans*.
- Ajay Agrawal et al., *Prediction Machines.*
- Kate Crawford, *Atlas of AI*
- Stuart Russell and Peter Norvig, *Artificial Intelligence: A Modern Approach*, 3rd Edition, Pearson
- Elaine Rich, Kevin Knight, Shivashankar B Nair, *Artificial Intelligence*, 3rd Edition, McGraw-Hill
- Tom M. Mitchell, *Machine Learning*, McGraw-Hill

Suggested Readings:

1. John Haugeland – *Artificial Intelligence: The Very Idea*, MIT Press

2. Dieter Vanderelst – *Artificial Intelligence for Humans*, Beginner-friendly Open Book Series
3. Chris Baker & Mike Hobbs – *Artificial Intelligence: Foundations, Applications and Techniques*, Springer
4. Michael Wooldridge – *A Brief History of Artificial Intelligence: What It Is, Where We Are, and Where We Are Going*, Flatiron
5. Toby Walsh – *Machines Behaving Badly: The Morality of AI*, La Trobe University Press
6. Peter Szolovits (Ed.), *Artificial Intelligence in Medicine*, Westview Press – Selected chapters
7. Yoshua Bengio, *Deep Learning and AI in Healthcare*, MIT OpenCourseWare (online resources)
8. Ahmed Elgammal, *AI in the Arts: Aesthetic and Creative Dimensions*, Springer – Selected readings
9. Ethem Alpaydin, *Introduction to Machine Learning*, MIT Press

TEACHING LEARNING STRATEGIES

Lectures: Theory sessions covering fundamental concepts and principles.

ASSESSMENT RUBRICS

	Marks
End Semester Evaluation	**50**
Continuous Evaluation	**25**

KU4SECEL E109 Embedded Product Design

Semester	Course Type	Course Level	Course Code	Credits (L+T+P)	Total Hours (L+T+P)
4	SEC	100	**KU4SECELE109**	2+0+1	30+0+30

Learning Approach (Hours/ Week)			Marks Distribution			Duration of ESE (Hours)
Lecture	Practical	Tutorial	CE	ESE	Total	
2	2	0	25	50	75	1.5Hr

Course Description

This undergraduate-level course provides a comprehensive introduction to embedded systems, focusing on their architecture, programming, interfacing, and real-world applications. Students will gain hands-on experience in designing and developing embedded systems using microcontrollers and microprocessors, with a strong emphasis on practical implementation and real-time constraints.

Course Prerequisite: No prior knowledge of Embedded systems is required

Course Outcome

Sl No	Expected outcome	Learning Domains
1	Define and Analyze Embedded Systems	R, An
2	Understand System Architectures	U
3	Utilize Sensors and Actuators	A
4	Implement Communication Protocols	A
5	Design Real-World Applications	C

Remember (R), Understand (U), Apply (A), Analyse (An), Evaluate (E), Create (C)

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7
CO1			3	2	2		
CO2							
CO3	2	2		3	2	2	
CO4	2	2		3			
CO5	2	2		2			
CO6	2	2	3	3	2		

COURSE CONTENTS

	UNIT	Description	Hours
1		**Introduction to Embedded Systems**	6
	1.1	Definition and key characteristics of embedded systems	
	1.2	General purpose processor, Single purpose processor , Application specific processor	
	1.3	System Architecture: Microcontrollers & Microprocessors, System-on-Chip (SoC) -Concepts only	
	1.4	Real-world applications: smart homes, health monitoring, automation	
	1.5	Basic concepts of real-time systems: Hard vs. Soft Real-Time	
	1.6	Overview of the embedded product development life cycle	
2		**I/O , Sensors and Actuators**	8
	2.1	Digital and analog I/O fundamentals -Concepts only	
	2.2	Sensor Interfacing: IR sensor, temperature and humidity SENSOR:DHT11 , Ultrasonic distance sensor (HC-SR04)	

	2.3	Actuator Control: Buzzer, DC motor	
	2.4	Display Devices: Interfacing 16x2 LCD (with I2C module), Interfacing LED display	
3	**Peripherals and interfaces**		8
	3.1	Timers, Counters, and Watchdog timers, PWM	
	3.2	Communication protocols: UART, I2C, SPI	
	3.3	WiFi, Bluetooth, ZigBee	
	3.4	IoT device management	
	3.5	Switch	
4	**Introduction to IDE**		8
	4.1	MPLAB, Aurdino	
	4.2	Develop a temperature and humidity monitoring system using DHT11 sensor and display readings.	
	4.3	Create a simple home automation system that controls lights based on ambient light levels.	

Essential Readings:

- *Embedded Systems: Concepts, Design and Programming* by Himanshu B. Dave and Parag H. Dave
- *Embedded Systems: Foundations of Cyber-Physical Systems and the Internet of Things" by Raj Kamal*
- *Embedded System Design: A Unified Hardware/Software Introduction" by Frank Vahid and Tony Givargis*
- *Introduction to Embedded Systems" by K.V. Shibu*
- *Embedded Systems: Architecture , Programming and design by Raj Kamal*

Suggested Readings:

Real-Time Concepts for Embedded Systems" By Qing Li, Caroline Yao

The Art of Designing Embedded Systems" By **Jack Ganssle**

Free/Open Resources

- **Arduino Project Hub**: https://create.arduino.cc/projecthub
  Tons of practical projects with code and diagrams.
- **Espressif Docs (ESP32)**: https://docs.espressif.com
  Best for WiFi/Bluetooth-based IoT projects.
- **All About Circuits**: https://www.allaboutcircuits.com
  Theory + tutorials on sensors, interfacing, and electronics.

TEACHING LEARNING STRATEGIES

Lectures: Theory sessions covering fundamental concepts and principles.

Practical:

- Study of Microcontroller vs Microprocessor
- Interfacing IR Sensor

1. **Objective**: Detect object presence using IR sensor.
2. Blink LED
3. DHT11 Sensor Interfacing (Temperature & Humidity)
4. HC-SR04 Ultrasonic Sensor

3. Digital Input - Switch

10. **Objective**: Turn on LED when switch pressed

4 . Wireless Communication - Bluetooth

11. **Objective**: Control LED using smartphone.

Each laboratory experiment should be accompanied by a detailed lab note containing Aim, methodology and results obtained.

ASSESSMENT RUBRICS

	Marks
End Semester Evaluation	**50**
Continuous Evaluation	**25**