Government of Karnataka
Department of Technical Education

C-25 Diploma in Electronics & Communication Engineering

Scheme of Studies

(Effect from the AY 2025-26)

Government of Karnataka

DEPARTMENT OFTECHNICAL EDUCATION

Curriculum Structure

II Semester Scheme of Studies

Sl. No.	Teaching Department	Course Code	Course Name	Hours per week			Total Contact Hours/week	Credits	CIE Marks		Theory SEE Marks		Practice SEE Marks		Total Marks
				L	T	P			Max	Min	Max	Min	Max	Min	
Integrated Courses															
1	SC	25SC21I	Engineering Mathematics-II	4	0	4	8	6	50	20	50	20	-	-	100
2	ENG	25EG01I	Essential English Communication	4	0	4	8	6	50	20	-	-	50	20	100
3	ME	25ME02I	Computer Aided Engineering. Graphics	3	0	4	7	5	50	20	-	-	50	20	100
4	EC	25EC21I	Applied Electronics-1	4	0	4	8	6	50	20	50	20	-	-	100
Audit Course															
5	EC	25EC22T	Indian Constitution	2	0	0	2	2	50	20	-	-	-	-	50
6	Personality Development		NCC/NSS/YOGA/SPORTS…	Students are expected to engage in any one of these activities from 1st semester to 6th semester (No Credits)											
			Total	**17**	**0**	**16**	**33**	**25**	**250**	**-**	**100**	**-**	**100**	**-**	**450**

Government of Karnataka
DEPARTMENT OF TECHNICAL EDUCATION

Program	Electronics & Communication	**Semester**	**II**
Course Name	**Applied Electronics-I**	**Type of Course**	Integrated
Course Code	**25EC21I**	**Contact Hours**	8 hours/week 104 hours/semester
Teaching Scheme	L:T:P :: 4:0:4	**Credits**	6
CIE Marks	50	**SEE Marks**	**50 (Theory)**

1. Rationale:

Applied electronics focuses on providing students with practical knowledge and hands-on skills that are directly applicable in the real-world electronic industry. It aims to equip students with the essential technical expertise needed to work as professionals in a variety of sectors that rely on electronic systems. Practical, focused and accessible topics for students to gain relevant skills that meet the needs of rapidly evolving industries.

By focusing on hands-on training, industry-relevant skills and emerging technologies, applied electronics programs ensure that students are ready to contribute to the workforce and tackle real-world challenges effectively. This education plays a crucial role in preparing the next generation of electronics professionals who will drive innovation and technological progress across a range of sectors.

2. Course Outcomes: At the end of the course, the student will be able to:

CO-01	Apply the knowledge of semiconductors to illustrate the functioning of basic electronic devices.
CO-02	Identify and select the electronic components, devices & instruments for any specific application.
CO-03	Demonstrate the switching and amplification application of the semiconductor devices.
CO-04	Design simple applications under real environments.
CO-05	Test the designed circuit for an expected result/outcome, identify the problem and troubleshoot to obtain the desired result/outcome.

3. Course Content

WEEK	CO	PO	Theory	Practice
1	1,2	1,2,4,5	1. Introduction to basic Electronics: Definition: Electronics. 2. Atomic Structure, Structure of Elements, The Electron. 3. Energy of an Electron, Valence Electrons, Free Electrons. 4. Find the valence electrons of at least 6 given elements	1. Video demonstration on atomic structure. 2. Identification of Active and Passive components, Decade boxes (L, C and R).
2	1,2	1,2,4,5	1. Bohr's Atomic Model, Energy Levels, Energy Bands. 2. Energy Bands in Solids. 3. Classification of Solids and Energy Bands. 4. Atomic structure of Silicon & Germanium.	1. Tabulate the electron configuration of Tetravalent (Silicon, Germanium), Trivalent, Pentavalent. 2. Measurement of amplitude and frequency of sine, triangular, square waveform on CRO using signal generator.
3	1,2	1,2,4,5	1. Applied Electronics - Introduction, simple examples. 2. Bridge rectifier with Capacitive filter. 3. Ripple factor and efficiency for the above rectifier - Simple problems. 4. Soldering - introduction, soldering techniques, types, steps for soldering.	1. Practice Soldering Techniques. 2. Diode as Center tapped Full wave rectifier with Capacitive filter. Determine Vp, Vp-p, Time & Frequency of input signal using CRO. Measure Vrms and Vdc using multimeter and calculate Ripple factor and Efficiency of output signal.

4	1,2,4	1,2,4,5	1. Zener Diode - Construction, Symbol, working principle. 2. Applications - Zener diode as a voltage regulator. 3. LED - Construction, Symbol, working principle, applications. 4. Photo Diode - Construction, Symbol, working principle, applications.	1. Construct & verify Zener diode as voltage regulator, line regulation and load regulation. 2. Construct & verify forward & reverse bias characteristics of LED. Observe its light intensity for different voltages.
5	2,4	1,3,4,5	1. BJT - Current operating device. 2. BJT Types- PNP and NPN, Biasing of BJT. 3. Types of configurations - CE, CC, CB. 4. Need of DC load line, operating point.	1. Demonstrate Numbering System of Semiconductor Devices. Demonstrate different packages of Transistors. 2. Data sheet interpretation of any NPN & PNP transistors.

6	2,4	1,3,4,5	1. Stabilization, thermal runaway, heat sink 2. Voltage divider bias. 3. Definition of alpha, beta and gamma and relationship between them. 4. Input and output characteristics of CE.	1. Test the Transistor and determine the Input characteristics in CE configuration. 2. Test the Transistor and determine the output characteristics in CE configuration.
7	3,4	1,3,4,5	1. Applications of BJT - List the applications of transistors as switch in the real world. 2. Transistor as a Switch – working. 3. List the applications of Transistors as amplification in the real world. 4. Classification of Amplifiers based on usage, frequency capabilities, coupling methods and mode of operation.	1. Turn ON and OFF a BUZZER using a transistor. 2. Transistor as a Switch for electromagnetic Relay.

8	3,4	1,3,4,5	1. Single stage amplifier - Circuit diagram, working, various currents (I_b, I_c, I_e). 2. Voltage gain of CE amplifier (No derivation). 3. Frequency response of CE amplifier. 4. Simple problems on gain.	1. Do It Yourself (DIY) a Single Stage Amplifier. 2. Plot the frequency response of the CE amplifier.

9	3,4, 5	1,3,4,5, 7	1. Concept of Multistage amplifier. 2. Gain of the multistage amplifier. 3. Direct coupled amplifier - Circuit diagram, operation 4. Direct coupled amplifier - frequency response.	1. Build and test the performance of the Direct coupled two stage amplifier and Plot the frequency response. 2. DIY - Make an earphone for Mobile.
10	2,4, 5	1,3,4,5, 7	1. RC coupled amplifier – Circuit diagram, operation and frequency response. 2. Advantages, Disadvantages of RC coupled amplifier. 3. Applications of RC coupled amplifiers. 4. Comparison of Different Types of Coupling.	1. Build and test the performance of the RC coupled two stage amplifier and Plot the frequency response.
11	2,4, 5	1,3,4,5, 7	1. Voltage operating device - FET – Introduction of FET, Types of FET. 2. JFET - Symbol, Salient features of JFET. 3. Principle and working of JFET (N channel) 4. Importance of JFET, Difference between JFET and BJT.	1. Drain Characteristics of N-channel JFET. 2. Transfer Characteristics of N- channel JFET.

12	2,4, 5	1,3,4,5, 7	1. JFET parameters: Drain resistance (r_d), Transconductance (g_{fs}), Amplification Factor(μ) and relation among JFET parameters (No Derivation), JFET applications 2. MOSFET - Types, Symbol. 3. Construction, working principle and characteristics of Depletion MOSFET. 4. Construction, working principle and characteristics of Enhancement MOSFET.	1. Precautions to be followed for handling MOSFETs. 2. Demonstrate MOSFET as a switch to control an LED. 3. Demonstrate MOSFET as a switch to control a DC motor.

13	2,4, 5	1,3,4,5, 7	1. D-MOSFETs versus JFETs 2. D-MOSFETs versus E-MOSFETs 3. Introduction to CMOS, features, working and applications. 4. CMOS inverter: Schematic diagram, working and application.	1. Construct AND/OR gate using any transistors. 2. Construct NAND/NOR gate using any transistors.

Note:

1. In practice sessions all video demonstrations should be followed by MCQ/Quiz/ Subjective questions and evaluation has to be documented.

2. Online course completion certification to be done on relevant topics on Swayam/NPTEL/Infosys Springboard platforms or any other platform.

3. Problem statement to be collected from the relevant industries, resolve and submit it to the course coordinator.

4. References:

1. Principles of Electronics, Rohit Mehta & V K Mehta, S. Chand Publishing ISBN: 9788121924504
2. Fundamentals of Electrical and Electronics Engineering, B. L. Theraja, S. Chand and Company. REPRINT 2013, ISBN 8121926602
3. "A Textbook of Applied Electronics" by R. S. SEDHA.

4. Electronic Components, Dr. K. Padmanabhan and P. Swaminathan, Lakshmi Publications, 2006.
5. Electronic Devices and Circuits, David A. Bell, Oxford University Press, ISBN: 9780195693409.
6. https://youtube.com/shorts/YpXy5gGRncY?feature=shared
7. https://youtu.be/enwdrtef7r0?feature=shared
8. https://youtu.be/QmFo9KBlun0?feature=shared
9. https://youtu.be/sGxGQW9Ir0g?feature=shared
10. https://youtu.be/lFdtH9CHlfA?feature=shared
11. https://youtube.com/shorts/hUW_o0u5X6c?feature=shared
12. https://youtube.com/shorts/P94GHR8ohJk?feature=shared

5. CIE Assessment Methodologies

Sl.No	CIE Assessment	Test Week	Duration (minutes)	Max marks	
1.	CIE-1 Theory Test	4	90	50	Average of all CIE=50 Marks
2.	CIE-2 Practice Test	7	180	50	
3	CIE-3 Theory Test	10	90	50	
4.	CIE-4 Practice Test	13	180	50	
5	CIE-5 Portfolio evaluation of all the activities through Rubrics	1-13		50	
				Total	**50 Marks**

Note:- Portfolio evaluation includes average of (a) and (b)

(a) Any one of the Suggested activity model with report and presentation evaluated for 50 marks

(c) Each laboratory exercise will be evaluated for a total of 50 marks. The evaluation will include the following components:

1. Written description of the experiment in the observation book.
2. Conducting the experiment and the associated learning outcomes.
3. The results obtained from the experiment.
4. Corrections and evaluations of the experiment completed in the previous class, documented in the record book.

6. SEE - Theory Assessment Methodologies

Sl. No	SEE – Theory Assessment	Duration	Exam Paper Max marks	Exam Paper Max Marks scale down to (Conversion)	Min marks to pass
1.	Semester End Examination-Theory	3 Hours	100	50	20

7. CIE Theory Test model question paper

Program	**Electronics & Communication Engg**			**Semester - II**	
Course Name	**Applied Electronics - I**			**Test**	**I/III**
Course Code	**25EC21I**	**Duration**	**90 min**	**Marks**	**50**
Name of the Course Coordinator:					
Note: Answer any one full question from each section. Each full question carries equal marks.					

Q.No	**Questions**	**Cognitive Level**	**Course Outcome**	**Marks**
	Section - 1			
1	a) Realize a multistage amplifier using individual amplifiers. b) Identify and explain a two terminal electronic device which works as voltage regulator. c) Demonstrate transistors as an amplifier and list its applications.	L3 L3 L2	CO 1	5 M 10 M 10 M
2	a) Interpret JFET as a voltage controlled device. b) Explain the concept of field effect transistor and analyze how it controls current in JFET. c) Identify the types of JFET and explain the working of N Channel JFET.	L2 L3 L3	CO 1	5 M 10 M 10 M
	Section - 2			
3	a) Base width of the transistor is thin and the collector is thick. Infer your answer. b) Discuss the importance of heat sinks in transistors. c) Illustrate the working of NPN/PNP transistor	L2 L3 L2	CO 2	5 M 10 M 10 M
4	a) Develop an Inverter using CMOS. b) Explain working of enhancement type MOSFET and list its applications. c) Illustrate the transistor as a switch.	L3 L2 L2	CO 2	5 M 10 M 10 M

Note for the Course coordinator:

1. Each question may have one, two or three subdivisions. Optional questions in each section carry the same weightage of marks, cognitive level and course outcomes.
2. All questions must be framed under Understand (L2) & Apply (L3) cognitive level using Revised Bloom's Taxonomy.

Signature of the Course Coordinator | **Signature of the HOD** | **Signature of the IQAC Chairman**

8. CIE Practice Test model question paper

Program	**Electronics & Communication**			**Semester**	**II**
Course Name	**Applied Electronics - I**			**Test**	**II/IV**
Course Code	**25EC21I**	**Duration**	**180 min**	**Marks**	**50**
Name of the Course Coordinator:					

Questions	**CO**	**Marks**
Write up for two experiments and conduction of any one experiment.	CO 4,CO 5	**50**
Scheme of assessment **a) Writing the Circuit diagram, tabular column, calculations etc. for two experiments.** **b) Rig up and Conduction of any one** **c) Troubleshooting** **d) Result/Output** **e) Viva-voce**		**20 M** **10 M** **05 M** **05 M** **10 M**
Total Marks		**50**

Signature of the Course Coordinator | **Signature of the HOD** | **Signature of the IQAC Chairman**

9. **Suggestive Activities**:

The List is an example and not inclusive of all possible activities of the course. Students and Faculty are encouraged to choose activities that are relevant to the topic.

Note: Activity can be undertaken by either an individual or a team comprising up to 5 students.

Sl.No.	**Suggestive Activities**
01	Smoke detector application
02	Fire Alarm/detector application.
03	Clapp/sound detector application
04	Intruder detector
05	LED serial-sets
06	Simple 10 Watt Audio Amplifier
07	And all such simple circuits/projects that have scope to integrate multiple concepts learnt and for which circuits/boards/components are easily available.

10. Rubrics for Assessment of Activity (Qualitative Assessment)

Sl. No.	Dimension	Beginner	Intermediate	Good	Advanced	Expert	Students Score
		10	20	30	40	50	
1		Descriptor	Descriptor	Descriptor	Descriptor	Descriptor	40
2		Descriptor	Descriptor	Descriptor	Descriptor	Descriptor	30
3		Descriptor	Descriptor	Descriptor	Descriptor	Descriptor	50
4		Descriptor	Descriptor	Descriptor	Descriptor	Descriptor	20
	Average Marks=(40+30+50+20)/4=35						**35**

Note: Dimension and Descriptor shall be defined by the respective course coordinator as per the activities

11. Equipment/software list with Specification for a batch of 30 students

Sl. No.	Particulars	Specification	Quantity
1	Regulated Power Supply (Single) with short-circuit protection	1A/2A 0-30V	15
2	Regulated Power Supply (Dual) with short-circuit protection	1A/2A 0-30V	15
3	Function Generator	0-10MHz	15
4	Dual Trace Oscilloscope	20MHz	15
5	Digital multimeters.		20
6	Decade resistance boxes		15
7	Decade capacitance boxes		15
8	Decade inductance boxes		15
9	LCR meter		05
10	Electronic components/Consumables resistors, inductors, capacitors, transformers, hook up wires, SCR, MOSFET, DIAC, TRIAC, BJT, JFET, diode, Zener diode, soldering lead Etc.		20 each
11	Bread boards, Soldering Gun, Tag Board, General purpose PCB, 9V battery cells, Bulbs.		20 each