



**SRI RAMAKRISHNA**  
**COLLEGE OF ARTS AND SCIENCE**  
 (An Autonomous Institution)  
 Nava India, Avinashi Road, Coimbatore

## **Scheme of Examination**

(For the students admitted during the academic year 2020 - 2021 and onwards)

Under  
 Choice Based Credit System (CBCS)  
 & Learning Outcomes-Based Curriculum Framework (LOCF)

### **UNDERGRADUATE PROGRAMMES**

**Programme: BSc Branch: Electronics and Communication System**

Part	Course Code	Study Components and Course Title	CIA	Comprehensive Exam (Theory)			Total Marks	Credit
				Online	Descriptive	Total		
Semester - I								
I	20TA01/HA01/FA01/MA01 / AA01	Language-I/ <b>AECC-II</b> (MIL) Tamil-I/ Hindi-I/ French-I/Malayam-I/Arabic-I	40	10	50	60	100	3
II	20EA01	English-I/ <b>AECC-I</b>	40	10	50	60	100	3
III	20EC101	CORE/ <b>DSC-I Basic Electronics</b>	40	10	50	60	100	4
III	20EC102	CORE/ <b>DSC-II Electric Circuits &amp; Network Analysis</b>	40	10	50	60	100	4
III	20EC103	CORE / <b>DSC-III Practical I: Components and Network Analysis</b>	40	-	60	60	100	3
III	20MACC G01	Allied-I / <b>GE-I Mathematics-I</b>	40	10	50	60	100	3
IV	20EIA01	Foundation Course on Entrepreneurship & Innovation # / <b>AECC</b>	100	-	-	-	100**	1#
IV	20LSA01	Life Skills-I @ / <b>SEC</b>	-	-	-	100	100**	2 @
V	20NS01/NC01/SP01/YR01/SIS01/ RB01	Extension Activities NSS/NCC/SPORTS/YRC/SIS /RBC	Assessment will be in the Final Semester					



### Semester -II

I	20TA02/ HA02/FA 02/MA02 / AA02	Language-II / <b>AECC-II</b> (MIL) Tamil-II/ Hindi-II/ French-II/Malayam-II /Arabic-II	40	10	50	60	100	3
II	20EA02	English-II / <b>AECC-I</b>	40	10	50	60	100	3
	20EC201	CORE / <b>DSC-IV</b> <b>Electronic Devices</b>	40	10	50	60	100	3
III	20EC202	CORE / <b>DSC-V</b> <b>Practical II : Electronic</b> <b>Devices Lab</b>	40		60	60	100	3
III	20EC203	CORE / <b>DSC-VI</b> <b>Digital Electronics and</b> <b>Lab</b>	50	-	50	50	100	5
III	20ECE01 /02/03	Electives / <b>DSE-I</b>	40	10	50	60	100	4
III	20MACC G01	Allied-II / <b>GE-II</b> <b>Mathematics - II</b>	40	10	50	60	100	3
IV	20ESA02	Environmental Studies <b>AECC</b>	100	-	-	-	100**	1#
IV	20LSA02	Life Skills-II @/ <b>SEC</b>	-	-	-	100	100**	2 @
IV	20EC204	Internship / Institutional Training / Mini-Project (Summer Course-1 #)	100 #	-	-	-	100**	1\$

### Semester III

III	20EC301	CORE / <b>DSC-VII</b> <b>Electronic Principles</b> <b>and Circuits</b>	40	10	50	60	100	3
III	20EC302	CORE / <b>DSC-VIII</b> <b>Practical III: Electronic</b> <b>Principles and Circuits</b>	20		30	30	50	2
III	20EC303	CORE / <b>DSC-IX</b> <b>Principles of</b> <b>Electronic</b> <b>Communication</b>	40	10	50	60	100	3
III	20EC304	CORE / <b>DSC-X</b> <b>Practical IV: Electronic</b> <b>Communication</b>	20		30	30	50	2
III		Open Elective-1/ <b>AEE-I</b>					100	4
III	20CSGE3	Allied-III / <b>GE-III</b> <b>Computer</b> <b>Programming I: C &amp;</b> <b>C++ Programming</b>	20	05	25	30	50	2
III	20CSGE4	Allied-III / <b>GE-</b> <b>III</b> <b>Practical I: Computer</b> <b>lab: C &amp;C++</b> <b>Programming</b>	20		30	30	50	2
III	20ECE04 /05/06	Electives / <b>DSE-II</b>	40	10	50	60	100	4
IV	20BT/	Basic Tamil-I /	100	-	-	-	100**	1\$



	AT01	Advanced Tamil-I #						
IV	20PEA01	PACE-I @ / SEC-I	-	-	-	100	100**	1@
IV	20ECV01	JOC / VAC-I\$	-	-	-	-	-	1\$
<b>Semester IV</b>								
III	20EC401	CORE / DSC-XI Biomedical Instrumentation	40	10	50	60	100	3
III	20EC402	CORE / DSC-XII ICs and their Applications	40	10	50	60	100	3
III	20EC403	CORE / DSC-XIII Electronic Design Automation and lab	50		50	50	100	5
III	20EC404	CORE / DSC-XIV Practical V Biomedical Instrumentation Lab	20		30	30	50	2
III	20EC405	CORE / DSC-XV Practical VI: Integrated circuits	40		60	60	100	3
III	20ECE07 /08/09	Electives / DSE-III	40	10	50	60	100	4
III	20CSGE5	Allied-IV /GE-IV Computer Programming II: Python Programming	20	5	25	30	50	2
III	20CSGE6	Allied-Practical /GE-IV Computer Programming II: Python Programming	20		30		50	2
IV	20BT/ AT02	Basic Tamil-II / Advanced Tamil-II #	100	-	-	-	100**	1\$
IV	20PEA02	PACE-II @ / SEC-II	-	-	-	100	100**	2@
IV	20ECV02	JOC/VAC-II \$	-	-	-	-	-	1\$
IV	20EC406	Internship / Institutional Training / Mini-Project (Summer Course-2 #)	100 #	-	-	-	100**	1\$
<b>Semester V</b>								
III	20EC501	CORE / DSC-XVI 8051 Microcontroller & its Applications	40	10	50	60	100	3
III	20EC502	CORE / DSC-XVII Industrial and Power Electronics	40	10	50	60	100	3
III	20EC503	CORE / DSC-XVIII Modern Communication System	20	5	25	30	50	2
III	20EC504	CORE / DSC-XIX	40		60	60	100	3



		<b>Practical VII: 8051 Microcontroller</b>						
III	20EC505	<b>CORE / DSC-XX Practical VIII: Industrial and Power Electronics</b>	40		60	60	100	3
III	20EC506	<b>CORE / DSC-XXI Practical IX: Modern Communication System lab</b>	20		30	30	50	2
III		<b>Open Elective-II/AEE-II</b>					100	4
III	20ECE10 /11/12	<b>Electives/DSE-IV</b>	40	10	50	60	100	4
IV	20PEA03	<b>PACE-III @ / SEC-III</b>	-	-	-	100	100**	1@
IV	20ECV03	<b>JOC/VAC-III \$</b>	-	-	-	-	-	1\$
<b>Semester VI</b>								
III	20EC601	<b>CORE / DSC-XXII Arduino Programming and lab</b>	50			50	100	5
III	20EC602	<b>CORE / DSC-XXIII VLSI System Design using VHDL Programming</b>	40	10	50	60	100	3
III	20EC603	<b>CORE / DSC-XXIV VHDL Programming Lab</b>	20		30	50	50	2
III	20EC604	<b>CORE / DSC-Project / Student Research</b>	80			20	100	6
IV	20ECS01	<b>Self-Study Course Mobile Application Development</b>					100**	3\$
V	20NS01/ NC01/ SP01/ YR01/ SI01/ RB01	<b>Extension Activities NSS/NCC/SPORTS/YR C/SIS #</b>	100	-	-	-	100**	1

**\$ Extra credit courses in which Basic Tamil and Advanced Tamil are for the candidates who opted other than Tamil Language in Part-I.**

**# Continuous Internal Assessment (CIA) only.**

**@ Comprehensive Examinations only.**

**\*\* Not included in Total Marks and CGPA Calculation.**

**@@ MOOC Course-Minimum of 30 Hours from recognized MOOC portal like SWAYAM, Coursera, etc. Assessment with Score/Credit and Certificate is mandatory.**



## Abstract of Scheme of Examination

(For the students admitted during the academic year 2020 - 2021 and onwards)

Part	Course	Papers	Credit	Total Credits	Marks	Total Marks
Part I	Languages/AECC-II (MIL)	2	3	6	100	200
Part II	English/AECC-I	2	3	6	100	200
Part III	Core /DSC	25	2/3/4/5	80	100	2200 +400
	Allied /GE	6	2/3	14	100	
	Open Electives /AEE	2	4	8	100	200
	Electives/DSE	4	4	16	100	400
Part IV	Lang. (BCT/AT #)	2	1	2\$	100	200**
	EVS & EI / AECC-III #	2	1	2	100	200**
	Job Oriented Course / Value Added Course	3	1	3\$	-	-
	Skill Based/ PACE/ SEC @	3	1	3	100	300**
	Life Skills / SEC @	2	2	4	100	200**
	Self-Study Course /DSC	1	3	3\$	100	100**
	Internship/ Institutional Training/ Mini-Project (Summer Courses #)	2	2	2\$	100	200**
Part V	@ Extension	1	1	1	100	100**
	<b>Total</b>			<b>140 + (10Extra Credits)</b>		<b>3600 + (1300**)</b>

Note:

- Four core courses are mandatory in MOOC Portal
- Minimum 20 and Maximum 24 Credit/Semester (except for VI Sem)
- VI Semester will have 12 To 16 Credit (Core/DSE Papers Only)



List of Open Elective Papers	
Open Electives	Yoga for Human Excellence Human Health & Hygiene Indian Culture and Heritage Indian Constitution and Political System Consumer Awareness and Protection Professional Ethics and Human Values Human Rights, Women's Rights & Gender Equality Disaster Management Green Farming Campus to Corporate How to start a Business? Research Methodology and IPR General Studies for Competitive Examinations IIT JAM Examination (for Science only) CUCET Examination
20ECI01	Courses offered by the Departments to other Programmes <b>Mobile Phone Servicing</b>

List of Elective Papers/ DSE (Can choose any one of the paper as electives)		
Electives / <b>DSE-I</b>	Course Code	Title
	20ECE01	Instrumentation and Measurements
	20ECE02	Fundamentals of Embedded Systems
	20ECE03	Circuit Design and Simulation
Electives / <b>DSE-II</b>	20ECE04	Audio and Video Communication
	20ECE05	PLC and Automation
	20ECE06	Virtual instrumentation using Multisim
Electives / <b>DSE-III</b>	20ECE07	Wireless and Network Communication
	20ECE08	Introduction to IoT and Robotics
	20ECE09	Electrical Vehicles
Electives / <b>DSE-IV</b>	20ECE10	Nano Electronics
	20ECE11	Automotive Embedded system
	20ECE12	Introduction to MATLAB and Simulink

  
**Syllabus Coordinator**  
[ Ms. Indira S]

  
**BOS-Chairperson**  
[Dr. Poornima K]

  
**Academic Council – Member Secretary**  
[Dr. Jayasheela D]



## SEMESTER I

COURSE CODE	COURSE NAME	CATEGORY	L	T	P	CREDIT	ASSESSMENT CODE
20EC101	BASIC ELECTRONICS	DSC	60		-	4	Theory

## PREAMBLE / COURSE OBJECTIVE

This course helps students to become familiar with fundamentals of electronic components and to implement for an application. The course makes the students to design electronic circuits to perform realistic tasks.

## DEPARTMENT OFFERING

Electronics

## PREREQUISITE

Higher Secondary Level – Fundamental knowledge on Mathematics and Physics

## EXPECTED SKILL

**Domain Knowledge** / Entrepreneurship / Employability / **Skill Development**

## COURSE OUTCOMES

On successful completion of the course, students will be

S. NO.	COURSE OUTCOME	BLOOMS LEVEL
CO1	Identify electronic components	Remember
CO2	Differentiate and demonstrate the voltage and current source	Understand
CO3	Put into practice and use the electronic components	Apply
CO4	Design simple electronic circuits	Apply
CO5	Analyze the performance of ideal and practical electronic sources	Apply





**SYLLABUS****UNIT I****12 HOURS**

**Resistor** :- Classifications of Resistors, Linear Resistors: Fixed Resistors (Carbon Composition, Thin Film, Thick Film, Wire Wound) - Variable Resistors (Wire Wound, Potentiometer, Trimmers), Non Linear Resistors: Thermistors, Photo Resistors, Varistors, Resistance designation- Color Coding of Resistors- Detects in Resistors - Resistors in Series and Parallel Combinations.

**UNIT II****12 HOURS**

**Inductance:-** - Inductors- Types of Inductors: Fixed Inductors: - Air Core Inductors Variable Inductors:- Variable Ferrite Core Inductor - Self Inductance of a coil - Mutual Inductance of Coil - Inductors in Series and Parallel with Mutual Inductance - Inductive Reactance - Energy Stored by an Inductor - Coil and Core Losses - Q Factor of Inductor - Factors Affecting Inductance of a Coil - Troubles in Coil.

**UNIT III****12 HOURS**

**Capacitance:-** Capacitors - Capacitor Specifications - Capacitor Action - Types of Capacitor: Fixed Capacitors: Electrolytic, Ceramic, Mica, Paper Variable Capacitors:- Gang Capacitors, Trimmer & Padders, Capacitors in Series and Parallel - Factors affecting the Capacitor - Capacitive Reactance - Troubles in Capacitors

**UNIT IV****12 HOURS**

**Batteries:-** - Internal Resistance of a Sources - Concept of Voltage Source - Ideal Voltage source - Practical Voltage Source - VI Characteristics of Practical Voltage Source - Procedure for Determining Internal Resistance - Ideal Current Source - Practical Current Source - Equivalent Between Voltage Source and Current Source - Conversion of Voltage, Current Source

**UNIT V****12 HOURS**

**Switches:-** Switching Action - Types of Switches (SPST, SPDT, DPST, DPDT, Toggle Switch, DIP, Rotary Switch) - Analog and Digital Switches - Fuses Rating, Connectors, Insulators, Circuit Breaker, Relays (Electromagnetic Relay)

**TEXT BOOKS**

- A. R. S. Sedha, "A Text Book of Applied Electronics", S. Chand & Company Ltd, Revised III Edition, 2013
- B. S.P.SHARMA, "Basic Radio and B/W, Color Television", Tata McGraw Hill Publishing, 5<sup>th</sup> Edition 2007

**REFERENCE BOOKS**

- A. Bernard Grob, "Basic Electronics" Mc Graw Hill, 12<sup>th</sup> Edition, 2016.
- B. S.Salivahanan, N.Sureshkumar, A. Vallavaraj, "Electronic Devices and circuits", Tata Mc Graw Hill, 3<sup>rd</sup> Edition 2012.



**WEB RESOURCES**

- A. <https://www.electronicshub.org/tutorials/>  
 B. <https://www.electronics-tutorials.ws/>  
 C. <https://www.instructables.com/id/Basic-Electronics/>


**MAPPING WITH PROGRAM OUTCOMES**

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	S	-	S	-	-	-	-	-
CO2	S	-	S	-	-	-	-	-
CO3	S	S	S	-	-	-	-	-
CO4	S	M	S	-	-	-	-	S
CO5	S	-	S	M	-	-	S	-

S- Strong; M-Medium; L-Low

**ASSESSMENT PATTERN (if deviation from common pattern)**

Follows common pattern of Internal and External assessment, suggested in the Regulations.

  
 Prepared by  
**[Ms Indira S]**

  
 Verified by  
**[Ms Indira S]**

  
 Approved by  
**[Dr Poornima K]**





## SEMESTER I

COURSE CODE	COURSE NAME	CATEGORY	L	T	P	CREDIT	ASSESSMENT CODE
20EC102	ELECTRIC CIRCUITS AND NETWORK ANALYSIS	DSC	60	-	-	4	Theory

**PREAMBLE / COURSE OBJECTIVE**

This course aims at facilitating the students to understand fundamentals of Electronic components and to implement for an application. This course makes students to design electronic circuits to perform realistic tasks.

**DEPARTMENT OFFERING**

Electronics

**PREREQUISITE**

Higher Secondary Level – Fundamental knowledge on Mathematics and Physics

**EXPECTED SKILL**

**Domain Knowledge** / Entrepreneurship / Employability / **Skill Development**

**COURSE OUTCOMES**

On successful completion of the course, students will be

S. NO.	COURSE OUTCOME	BLOOMS LEVEL
CO1	Interpret the basics of electricity	Remember
CO2	Compare electric networks by using theorems.	Understand
CO3	Design simple electric circuits and to analyze the network theorems.	Apply
CO4	Develop the electric circuit's applications by using the principles.	Apply
CO5	Analyze the performance of AC Circuits	Apply



**SYLLABUS****UNIT I****12 HOURS**

**ELECTRICITY:-** Introduction – Electric field - Potential and Potential difference, Unit of potential difference – Electric current – Unit of Electric current – Difference between electric charge and current - Electron and conventional current flow - Electrical resistance - Temperature coefficient of electrical resistance-Electric circuit or Network – Load resistance and Load Current- Direct current and Alternating current – Comparison

**UNIT II****12 HOURS**

**ELECTRICAL ELEMENTS AND OHM'S LAW:-** Introduction -Ohms Law- Typical values of V & I- Ohm's law problems- Electrical energy – Electrical power- Power dissipation in the resistance – Power formulae – Kirchhoff's current law – Kirchhoff's Voltage law – Method of Branch current, Node voltage method, Method of Mesh current.

**UNIT III****12 HOURS**

**ELECTRICAL CIRCUITS:-** Series circuit – Resistance in series- Series I.R voltage drops – Series voltage divider –Total power in a series circuit – Opens in a series circuit – Shorts in series circuit - Parallel circuit- Resistance in parallel circuit – Equivalent resistance of a two branched circuit – Total power in a parallel circuit- – Opens in a parallel circuit – Shorts in parallel circuit – Series parallel circuit.

**UNIT IV****12 HOURS**

**NETWORK THEOREMS:-** Thevenin's theorem – Norton's theorem – Conversion of Thevenin and Norton – Super position theorem – Millman's theorem – Star to Delta and Delta to Star conversion – Maximum power transfer theorem.

**UNIT V:****12 HOURS**

**AC CIRCUITS:-** AC Circuit with resistance alone – Circuit with XL alone – Circuit with XC alone – Series reactance and resistance – Parallel reactance and resistance - Series parallel reactance and resistance – Real power – Series resonance circuit - Parallel resonance circuit – Q-factor.

**TEXT BOOKS**

- A. R.S.Sedha, "A Text Book of Applied Electronics", S. Chand & Company Ltd, Revised III Edition, 2013.
- B. A. Sudhakar, S. P. Shyammohan, "Circuits and Networks, Analysis and Synthesis", Tata McGraw-Hill Publishing Company Ltd., IV Edition, 2010.

**REFERENCE BOOKS**

- A. Bernard Grob, "Basic Electronics" Mc Graw Hill, 12<sup>th</sup> Edition, 2016.

**WEB RESOURCES**

- A. [https://www.tutorialspoint.com/network\\_theory/network\\_theory\\_quick\\_guide.htm](https://www.tutorialspoint.com/network_theory/network_theory_quick_guide.htm)
- B. <https://myelectrical.com/notes/entryid/179/network-theory-introduction-and-review>
- C. <https://www.electronicshub.org/basic-electrical-circuits-componentstypes/>



**MAPPING WITH PROGRAM OUTCOMES**

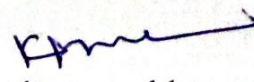
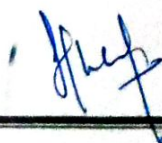
COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	S	-	S	-	-	-	-	-
CO2	S	-	S	-	-	-	-	-
CO3	S	S	S	-	-	-	-	-
CO4	S	M	S	-	-	-	-	S
CO5	S	-	S	M	-	-	S	-

S- Strong; M-Medium; L-Low

**ASSESSMENT PATTERN (if deviation from common pattern)**

Follows common pattern of Internal and External assessment, suggested in the Regulations.


Prepared by  
[Dr Sidharthan V]

Verified by  
[Dr Poornima K]

Approved by  
[Dr Poornima K]




## SEMESTER I

COURSE CODE	COURSE NAME	CATEGORY	L	T	P	CREDIT	ASSESSMENT CODE
20EC103	<b>PRACTICAL - I: COMPONENTS AND NETWORK ANALYSIS</b>	DSC	-	-	45	3	Practical

**PREAMBLE / COURSE OBJECTIVE**

This Course aims at facilitating the students to understand the fundamental principles of circuit theory. This course makes the students to use circuit laws and theorems for designing the applications.

**DEPARTMENT OFFERING**

Electronics

**PREREQUISITE**

Higher Secondary Level – Fundamental knowledge on Mathematics and Physics

**EXPECTED SKILL**

**Domain Knowledge** / Entrepreneurship / Employability / **Skill Development**

**COURSE OUTCOMES**

On successful completion of the course, students will be

S. NO.	COURSE OUTCOME	BLOOMS LEVEL
CO1	Knowledge on components and network theorems	Remember
CO2	Explain the operation of Electronic components	Understand
CO3	Simplify the circuits using series and parallel equivalents and using Thevenin's and Norton's equivalent circuits	Apply
CO4	Apply the concept of basic circuits and theorems in real time applications	Apply
CO5	Design Resonance Circuits and use the Oscilloscope for the display and measurements of signals	Apply

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**SYLLABUS****Any 10 Experiments:**

1. Measurement of Amplitude, Frequency and Phase difference using CRO
  2. Resistor in Series, Parallel and Series-Parallel
  3. Voltage sources in Series, Parallel and Series - Parallel
  4. Voltage and Current divider
  5. Verification of Ohm's law
  6. Verification of Kirchhoff's law
  7. Verification of Thevenin's Theorem
  8. Verification of Norton's Theorem
  9. Superposition Theorem
  10. Millman's Theorem
  11. Verification of Star-Delta Conversion
  12. Maximum Power Transfer Theorems
  13. Series resonance circuit
  14. Parallel resonance circuit
  15. Frequency response of R, L & C
- Ref:*




**MAPPING WITH PROGRAM OUTCOMES**

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	S	-	M	L	-	S	-	-
CO2	S	-	M	L	-	S	-	-
CO3	S	-	M	L	-	-	S	-
CO4	S	-	S	M	-	S	-	S
CO5	S	-	S	M	-	-	S	-

S- Strong; M-Medium; L-Low

**ASSESSMENT PATTERN (if deviation from common pattern)**

Follows common pattern of Internal and External assessment, suggested in the Regulations.

  
Prepared by  
[Ms Indira S]

  
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Approved by  
[Dr Poornima K]





## SEMESTER I

COURSE CODE	COURSE NAME	CATEGORY	L	T	P	CREDIT	ASSESSMENT CODE
20MACCG01	MATHEMATICS-I	GE	45	0	-	3	A(Theory)

## PREAMBLE / COURSE OBJECTIVE

This course aims at facilitating the students to get basic knowledge of binomial, exponential and logarithmic theorem and its summation of series. The course helps the students to get the basic knowledge of Trigonometry, Matrices, and Mathematical concepts in Calculus.

## DEPARTMENT OFFERING

Mathematics with Computer Applications

## PREREQUISITE

Higher Secondary Level – Basic Mathematics

## EXPECTED SKILL

Domain Knowledge

## COURSE OUTCOMES

On successful completion of the course, students will be able to:

S. NO.	COURSE OUTCOME	BLOOMS LEVEL
CO1	Find the summation of series.	Remember
CO2	Acquire the concept of Characteristic equations to find Eigen Values and Eigen Vector.	Understand
CO3	Apply direct and indirect methods for simultaneous linear equations.	Apply
CO4	Gain the knowledge about Trigonometry.	Analyze
CO5	Derive the formula for radius of curvature.	Apply

## SYLLABUS

## UNIT I

9 HOURS

**ALGEBRA:** Binomial Theorem(without proof)-Some standard expansions-Exponential Theorem-The Logarithmic Series. (Example problems only)



## UNIT II

9 HOURS

**MATRICES:** Rank of a matrix-Linear equations-Characteristic roots and characteristic vectors: Linear Transformation-The characteristic equation of a transformation-Properties of eigen vectors-Cayley Hamilton theorem. (Example problems only)

## UNIT III

9 HOURS

**SOLUTION OF SIMULTANEOUS LINEAR ALGEBRAIC EQUATIONS:** Gauss elimination method-Gauss Jordan method-Iterative methods: Gauss Jacobi method-Gauss seidal method of iteration. (Example problems only)

## UNIT IV

9 HOURS

**TRIGONOMETRY:** Expansion in series-Expansions of  $\cos n\theta$ ,  $\sin n\theta$  in powers of  $\sin\theta$  and  $\cos\theta$  when  $n$  is a positive integer. Exponential series and Hyperbolic functions: Exponential series- Hyperbolic functions. (Example problems only)

## UNIT V

9 HOURS

**DIFFERENTIAL CALCULUS:** Curvature- Some important results-Radius of curvature in Cartesians- Centre and circle of curvature-Radius of Curvature in polar coordinates. (Example problems only)

### TEXT BOOKS

1. P. Kandasamy, K. Thilagavathi, "Mathematics for B.Sc BRANCH-I", First semester, Volume-I, S. CHAND & Company Pvt Ltd, Reprint 2015.
2. P. Kandasamy, K. Thilagavathi, "Mathematics for B.Sc BRANCH-I", Second semester, Volume-II, S. CHAND & Company Pvt Ltd, Reprint 2015.
3. P. Kandasamy, K. Thilagavathi, K. Gunavathi, "Numerical Methods", S. CHAND & Company Pvt Ltd, Reprint 2016.

### REFERENCE BOOKS

1. S. Narayanan, R. Hanumantha Rao, Manickavachagam Pillai and P. Kandaswamy, Ancillary Mathematics (Volume I), S. Viswanathan (Printers & Publishers) Pvt Ltd., 2007.
2. G.C.Sharma and Madhu Jain, Algebra and Trigonometry, 1st Edition, Galgotia Publications Pvt.Ltd., 2003.

### WEB RESOURCES

- A. [https://www.amsi.org.au/ESA\\_Senior\\_Years/PDF/Thebinomialtheorem1c.pdf](https://www.amsi.org.au/ESA_Senior_Years/PDF/Thebinomialtheorem1c.pdf)
- B. <https://www.slideshare.net/UmurGmba/cayley-hamilton-theorem-64432271>
- C. <https://theengineeringmaths.com/wp-content/uploads/2017/09/Radius-of-curvature.pdf>
- D. <https://hal.archives-ouvertes.fr/hal-01484165/document>



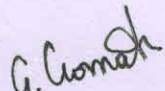
## MAPPING WITH PROGRAM OUTCOMES

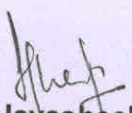
Cos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	M	-	-	-	-	L	-	-
CO2	M	-	-	-	-	L	-	-
CO3	M	-	-	-	-	L	-	-
CO4	M	-	-	-	-	L	-	-
CO5	M	-	-	-	-	L	-	-

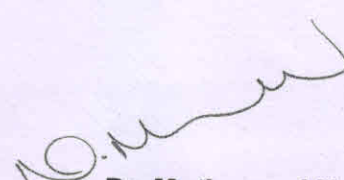
S- Strong; M-Medium; L-Low

## ASSESSMENT PATTERN (if deviation from common pattern)

Follows common pattern of Internal and External assessment, suggested in the Regulations.

  
**Prof. Gomathi G**  
 (Course Coordinator)

  
**Dr. Jayasheela D**  
 (Academic Council)

  
**Dr. Muthumani N**  
 (BOS Chairman)



**SEMESTER I**

COURSE CODE	COURSE NAME	CATEGORY	L	T	P	CREDIT	ASSESSMENT CODE
20EIA01	Entrepreneurship & Innovation	AECC-III	-	26	-	1#	Theory

**PREAMBLE / COURSE OBJECTIVE**

Students acquire the knowledge and skills needed to manage the development of innovations, to recognize and evaluate potential opportunities to monetize these innovations, to plan specific and detailed methods to exploit these opportunities, and to acquire the resources necessary to implement these plans. Topics include entrepreneurial thinking; innovation management; opportunity spotting and evaluation; industry and market research; business strategy; business models and business plans; financial forecasting and entrepreneurial finance; pitching to resource providers and negotiating deals; and launching new ventures.

**DEPARTMENT OFFERING**

International  
Business

**PREREQUISITE**

Higher Secondary ( +2 Pass)

**EXPECTED SKILL**

Interested to become an Entrepreneur / Innovator / Design thinker

**COURSE OUTCOMES**

On successful completion of the course, students will be

S. NO.	COURSE OUTCOME	BLOOMS LEVEL
CO1	Think critically and creatively about the nature of business opportunities, resources, and industries.	Remember
CO2	Delineate the processes by which innovation is fostered, managed, and commercialized.	Understand
CO3	Effectively and efficiently evaluate the potential of new business opportunities.	Apply
CO4	Assess the market potential for a new venture, including customer need, competitors, and industry attractiveness.	Apply
CO5	Develop a business model for a new venture, including revenue, margins, operations, working capital, and investment.	Apply



## SYLLABUS

Module No.	Topic	Total Hours
1.	Entrepreneurial Thinking	2
2.	Innovation Management	2
3.	Design Thinking	1
4.	Opportunity Spotting / Opportunity Evaluation	2
5.	Industry and Market Research	2
6.	Innovation Strategy and Business Models	2
7.	Financial Forecasting	2
8.	Business Plans/ Business Model Canvas	3
9.	Entrepreneurial Finance	1
10.	Pitching to Resource Providers / Pitch Deck	3
11.	Negotiating Deals	2
12.	New Venture Creation	2
Total Hours		25

## TEXT BOOKS

- Arya Kumar "Entrepreneurship – Creating and leading an Entrepreneurial Organization", Pearson, Second Edition (2012).
- Christopher Golis "Enterprise & Venture Capital", Allen & Unwin Publication, Fourth Edition (2007).
- Emrah Yayici "Design Thinking Methodology", Artbiztech, First Edition (2016).
- Thomas Lock Wood & Edgar Papke "Innovation by Design", Career Press.com, Second Edition (2017).

## REFERENCE BOOKS

- Andrew J. Dubrin "Leadership – Research Findings, Practice & Skills", Biztantra Publishers, Fourth Edition (2007).
- Jonathan Wilson "Essentials of Business Research", Sage Publication, First Edition (2010).

## WEB RESOURCES

- <https://blog.forgeforward.in/tagged/startup-lessons>
- <https://blog.forgeforward.in/tagged/entrepreneurship>
- <https://blog.forgeforward.in/tagged/minimum-viable-product>
- <https://blog.forgeforward.in/tagged/minimum-viable-product>
- <https://blog.forgeforward.in/tagged/innovation>
- <https://www.youtube.com/watch?v=8vdEyL7uKXs&list=PLmP9QrmTNPqBEvKbMSXvwlwn7fdnXe6>

Lw



**MAPPING WITH PROGRAM OUTCOMES**

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	-	-	-	S	S	M	-	-
CO2	-	-	-	S	S	M	L	-
CO3	-	L	-	S	S	S	-	-
CO4	-	-	-	S	S	S	-	-
CO5	-	L	-	S	S	S	-	S

S- Strong; M-Medium; L-Low

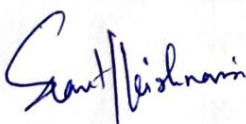
**ASSESSMENT PATTERN**

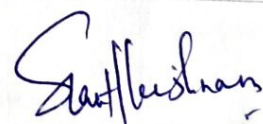
To Successfully Complete the course, Students must achieve a passing grade of 40% in the Comprehensive Internal Examination.

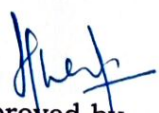
# Extra Credit Course

\*No Comprehensive Examination only Continuous Internal Assessment

Assessment Type	Topic	Marks
Assignment	Strategic Innovation	20
Group Discussion/ Presentation	Design Thinking	10
Objective Type	MCQ (CIA 1)	20
Assignment	Market Research	10
Group Discussion/ Presentation	Pitch Deck / Business Plan (Presentation)	20
Descriptive Type	Model Test (4 Questions * 5 Marks)	20
Total		100 Marks

  
Prepared by  
**Dr D Santhanakrishnan**

  
Verified by  
**Dr D Santhanakrishnan**

  
Approved by  
**Academic Council - Member Secretary**  
**[Dr. Jayasheela D]**



## SEMESTER II

COURSE CODE	COURSE NAME	CATEGORY	L	T	P	CREDIT	ASSESSMENT CODE
20EC201	ELECTRONIC DEVICES	DSC	45	-	-	3	A

This course helps students to understand and gain the knowledge on semiconductor devices. The course makes the students to acquaint with construction of devices and characteristics of the electronic devices.

## DEPARTMENT OFFERING

Electronics

## PREREQUISITE

Fundamental knowledge on Electronic components.

## EXPECTED SKILL

Domain Knowledge / Entrepreneurship / Employability / **Skill Development**

## COURSE OUTCOMES

On successful completion of the course, students will be

S. NO.	COURSE OUTCOME	BLOOMS LEVEL
CO1	Explain the structure of the basic electronic devices	Remember
CO2	Design application by using diode	Apply
CO3	Design application by using special diodes	Apply
CO4	Analyze the transistor configurations & choose transistor.	Advance thinking
CO5	Compare the performance of various field effect transistors	Understand



**SYLLABUS****UNIT I****9 HOURS**

**Semiconductor:** -Energy band structure: Valance and Conduction Band-Conduction in solids-Hole formation and its movement-Conductors-Insulators and Semiconductors - Types of Semiconductor: Intrinsic semiconductor-Extrinsic semiconductor-N type semiconductor-P type semiconductor-Majority and Minority charge carriers- Mobile charge carries and immobile Ions-Drift - Diffusion.

**UNIT II****8 HOURS**

**PN Junction Characteristics:** - - PN junction-Formation of depletion layer-Barrier voltage- Effect of temperature on barrier voltage -VI Characteristics of PN Junction Diode. Applications: Clippers, Clampers.

**UNIT III****9 HOURS**

**Special Diodes & Devices:** - Zener Diode- Zener diode as a voltage regulator- Backward diode- Varactor diode- Step recovery diode- Schottky diode- Tunnel diode- Gunn diode - IMPATT diode- PIN diode - TRAPATT - LED-LASER diode- Photodiode- opto-coupler.

**UNIT IV****9 HOURS**

**Bipolar Junction Transistor:** - - Construction- Transistor biasing-Operation of NPN Transistor-Operation of PNP transistor, Types of configuration: CB configuration, CE configuration, CC configuration -Current amplification factor and characteristics of CB, CE &CC -Relation among  $\alpha$ ,  $\beta$  &  $\gamma$  Applications: Transistor as a switch-Emitter Follower.

**UNIT V****10 HOURS**

**FET & UJT:** -Types of FET-Construction of JFET-Operation-Characteristics of JFET- Drain & Transfer Characteristics of JFET - JFET parameters- source follower - Comparison of JFET with BJT-MOSFET-Working and Characteristics of Depletion type & Enhancement type MOSFET- Construction of UJT-Characteristics of UJT-Relaxation Oscillator.

**TEXT BOOKS**

- A. R.S. Sedha, "A Text Book of Applied Electronics", S. Chand & Company Ltd, Revised III Edition, 2013
- B. V. K. Metha, "Principles of Electronics", S. Chand and Company Ltd, 11<sup>th</sup> Edition, 2014.

**REFERENCE BOOKS**

- A. Louis Nashelsky and Robert Boylestad, "Devices discrete and Integrated", PHI, I Edition, 2009.
- B. B. L. Theraja "Basic Electronics Solid State S. Chand and Company Ltd, 5<sup>th</sup> Edition, 2005.

**WEB RESOURCES**

- A. <https://www.electronicshub.org/tutorials/>
- B. <https://www.electronics-tutorials.ws/>
- C. <https://www.physics-and-radio-electronics.com/electronic-devices-and-circuits.html>



**MAPPING WITH PROGRAM OUTCOMES**

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1			S					
CO2			S	M				S
CO3	S			M				S
CO4								S
CO5			S					M

S- Strong; M-Medium; L-Low

**ASSESSMENT PATTERN (if deviation from common pattern)**

Follows common pattern of Internal and External assessment, suggested in the Regulations.



**Dr Poornima K**  
(Course Coordinator)



**Dr Poornima K**  
(BoS Chairperson)



**Dr Jayasheela D**  
(Academic Council- Member Secretary)



## SEMESTER II

COURSE CODE	COURSE NAME	CATEGORY	L	T	P	CREDIT	ASSESSMENT CODE
20EC202	ELECTRONIC DEVICES LAB	DSC			36	3	A

**PREAMBLE / COURSE OBJECTIVE**

This course helps students to understand and experiment the basic parameters of electronic devices. The course makes the students to design electronic circuits for a real time application using semiconductor devices.

**DEPARTMENT OFFERING**

Electronics

**PREREQUISITE**

Knowledge on active and passive components and Electric circuits.

**EXPECTED SKILL**

**Domain Knowledge** / Entrepreneurship / Employability / **Skill Development**

**COURSE OUTCOMES**

On successful completion of the course, students will be

S. NO.	COURSE OUTCOME	BLOOMS LEVEL
CO1	Experiment the fundamental operations of the semiconductor devices.	Apply
CO2	Design and construct electronic circuits using semiconductor devices	Apply



**SYLLABUS****Any 10 Experiments:**

1. Photo conductivity in Semiconductor for Bio Medical Applications
2. Band gap energy of Silicon
3. Temperature coefficient of junction diode
4. Junction diode characteristics
5. Clipping and Clamping circuits
6. Zener diode characteristics
7. Zener Diode as a voltage regulator
8. Opto-coupler for Isolation in Biomedical Instrumentation
9. CE characteristics
10. CB characteristics
11. Stability factor of a transistor
12. Emitter follower
13. Characteristics of UJT
14. Relaxation Oscillator
15. FET characteristics

**MAPPING WITH PROGRAM OUTCOMES**

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	M		S				L	S
CO2	M		S				L	S

S- Strong; M-Medium; L-Low

**ASSESSMENT PATTERN (if deviation from common pattern)**

Follows common pattern of Internal and External assessment, suggested in the Regulations.

  
**Dr Poornima K**  
 (Course Coordinator)

  
**Dr Jayasheela D**  
 ( Academic Council- Member Secretary)

  
**Dr Poornima K**  
 ( BoS Chairperson)



**SEMESTER II**

COURSE CODE	COURSE NAME	CATEGORY	L	T	P	CREDIT	ASSESSMENT CODE
20EC203	DIGITAL ELECTRONICS AND LAB	DSC	45		30	5	A

**PREAMBLE / COURSE OBJECTIVE**

This course helps students to know the number systems, codes, methods for simplifying Boolean expressions, logic gates and circuits. To outline the formal procedures for the analysis and design of combinational circuits and sequential circuits. It is also to encourage the students to learn the concepts of A/D, D/A conversions and memories.

**DEPARTMENT OFFERING**

Electronics

**PREREQUISITE**

Higher Secondary Level – Fundamental knowledge on Mathematics and Physics

**EXPECTED SKILL**

Domain Knowledge / Entrepreneurship / Employability / Skill Development

**COURSE OUTCOMES**

On successful completion of the course, students will be

S. NO.	COURSE OUTCOME	BLOOMS LEVEL
CO1	Realize different logic gates and analyzing the outputs	Understand
CO2	Simplify the digital circuits by applying the Boolean algebra laws	Apply
CO3	Reduce the digital logic circuits by Karnaugh map reduction method	Apply
CO4	Analyze and design the combinational and sequential logic circuits	Apply
CO5	Analyze the performance of different methods of A/D and D/A converters	Apply



**SYLLABUS****UNIT I****10 HOURS**

**Number Systems and Logic Gates:** -Digital Vs Analog Signals-Logic families- RTL-DTL-TTL -Decimal, Binary, Octal, Hexadecimal Number Systems-Conversions and Arithmetic operations -1's and 2's Complements- BCD and Arithmetic Operations  
**Logic Gates:** AND, OR, NOT, EX-OR - IC Implementations -Universal gate (NAND, NOR).

**Practical:**

1. Characteristics of TTL gate
2. Logic gates
3. Universal gates

**[6Hrs]****UNIT II****9 HOURS**

**Boolean Algebra And Codes:** -- Basic Operations with Boolean Variables-Boolean Function and Truth Table -Demorgan's Theorem- Graphical representation method: Karnaugh Map Method-Simplifications. Weighted and Non-Weighted Codes-ASCII Code-Parity -Excess 3-GrayCode

**Practical:**

4. Demorgan's Theorem
5. Code Converters

**[6Hrs]****UNIT III****9 HOURS**

**Combinational Logic Circuits:** -Arithmetic building block: Half adder-Full adder-Half Subtractor-Full Subtractor-Multiplexer- Demultiplexer -Encoder-Decoder.

**Practical:**

6. Half Adder & Full Adder
7. Half Subtractor & Full Subtractor
8. Encoder & Decoder
9. Multiplexer & De-multiplexer

**[12Hrs]****UNIT IV****9 HOURS**

**Sequential Logic Circuits:** - Flip Flops: RS, JK, D and T types. Shift Register: Serial-Parallel- Counters: Ring-Ripple-Synchronous -Up/Down -Decade counter

**Practical:**

10. Flipflop -RS
11. Decade Counter

**[6Hrs]****UNIT V****12 HOURS**

**D/A and A/D Converters:** -DA/Converters: Weighted Resister and Binary Ladder-D/A Converter specifications: definition of Resolution and Accuracy. A/D Converters: Comparator/Flash-Successive Approximation.

**Practical:**

12. Digital to Analog Converter

**TEXT BOOKS**

- A. Roger L. Talheim "Digital Electronics Principles and applications", Tata Mc Graw-Hill Pub. Co. Ltd, 8<sup>th</sup> Edition 2013 (Unit I, II,V)
- B. S. Salivahanan & S. Arivazhagan "Digital Circuits and Design", Vikas pub House, 4<sup>th</sup> Edition 2012 (Unit III, IV &V)



**REFERENCE BOOKS**

- A. Edition Albert P. Malvino, P. Leach, "Digital Principles and Applications", TMH, 7<sup>th</sup> Ed 2010.  
 B. R.P. Jain "Modern Digital Electronics" Tata Mc Graw-Hill Pub. Co. Ltd, III Edition, 2012.

**WEB RESOURCES**

- A. <https://www.javatpoint.com/digital-electronics>  
 B. [https://www.tutorialspoint.com/digital\\_circuits/index.htm](https://www.tutorialspoint.com/digital_circuits/index.htm)  
 C. [https://www.electronics-tutorials.ws/logic/logic\\_1.html](https://www.electronics-tutorials.ws/logic/logic_1.html)

**MAPPING WITH PROGRAM OUTCOMES**

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	S						M	
CO2	S		S					
CO3	L		S					
CO4			S					S
CO5			L				S	

S- Strong; M-Medium; L- Low

**ASSESSMENT PATTERN (if deviation from common pattern)**

Follows common pattern of Internal and External assessment, suggested in the Regulations.

**Question Paper Pattern for CIA I (50 marks converted to 20 Marks)**

SECTION – A (5x 4 =20Marks) - Descriptive: Either or type

SECTION – B (5 x 6 = 30 Marks) - Descriptive: Either or type

**Question Paper Pattern for Model Exam (50 Marks converted to 20 Marks)**

SECTION – A (5 x 4 = 20 Marks) - Descriptive: Either or type

SECTION – B (5x 6 = 30 Marks)- Descriptive: Either or type

**CIA Theory (50 Marks)**

CIA I - 20 Marks Model - 20 Marks


Activity - 10 Marks (Lab observation marks converted to 10 Marks)

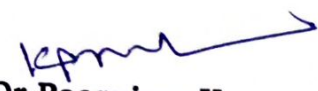
**CE Lab (50 Marks)**

Experiment - 45 Marks

Record - 5 Marks

  
**Mr Ashok Kumar K**  
 (Course Coordinator)

  
**Dr Jayasheela D**  
 ( Academic Council- Member Secretary)

  
**Dr Poornima K**  
 ( BoS Chairperson)



COURSE CODE	COURSE NAME	CATEGORY	L	T	P	CREDIT	ASSESSMENT CODE
20EC204	Internship/Institutional Training/Mini- Project	Summer Course -1	-	-	-	1	A

### PREAMBLE / COURSE OBJECTIVE

This course helps students to study the latest/ recent developments and happenings pertaining to the functions of an industry. It gives a real exposure for the students on the latest and trending technologies, to gain knowledge of Lab practices, that will lead to undertaking projects in future.

### DEPARTMENT OFFERING

Electronics

### PREREQUISITE

Basic Electronics

### EXPECTED SKILL

**Domain Knowledge / Entrepreneurship / Employability / Skill Development**

### COURSE OUTCOMES

On successful completion of the course, students will be

S.NO.	COURSE OUTCOME	BLOOMS LEVEL
CO1	Applying the concepts and strategies of academic study in a live work environment	Apply
CO2	Develop the skills required to meet the industrial needs.	Apply
CO3	Prepare them to know the innovations and changes happenings in the industrial sector.	Apply



**SYLLABUS****Internship**

- Duration of the industry training is 15 days during the Summer Vacation which falls at the end of the 2<sup>nd</sup> Semester.
- Obtain a certificate on successful completion of the internship from the chief executive of the organization.
- Report must be submitted at the end of the training to the college.
- Online training certificate can be submitted.

**Institutional training:**

- The students are expected to visit organizations and prepare an observational report based on their visit.
- Obtain a certificate on successful completion of the training from the Industry.

**Mini-Project**

- Students are expected to undergo project work individually/as a group and submit project report.
- Students can do project in Industry or in our Lab.

**MAPPING WITH PROGRAM OUTCOMES**

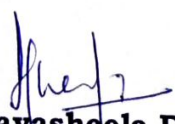
COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	S			M				
CO2					M	S		M
CO3						S	M	S

S- Strong; M-Medium; L-Low

**ASSESSMENT PATTERN (if deviation from common pattern)**

Follows common pattern of Internal assessment, suggested in the Regulations.

  
**Ms Indira S**  
 (Course Coordinator)

  
**Dr Jayasheela D**  
 (Academic Council- Member Secretary)

  
**Dr Poornima K**  
 ( BoS Chairperson)

## SEMESTER II

COURSE CODE	COURSE NAME	CATEGORY	L	T	P	CREDIT	ASSESSMENT CODE
20ECE01	INSTRUMENTS AND MEASUREMENTS	DSE	55		-	4	A

## PREAMBLE / COURSE OBJECTIVE

This course helps students to understand how different types of meters, Transformers work and their applications. The course makes the students to know the use of various electronic instruments, their construction, applications, principles of operation, standards and units of measurements.

## DEPARTMENT OFFERING

Electronics

## PREREQUISITE

Fundamental knowledge on electronic components

## EXPECTED SKILL

Domain Knowledge / Entrepreneurship / **Employability** / Skill Development

## COURSE OUTCOMES

On successful completion of the course, students will be

S. NO.	COURSE OUTCOME	BLOOMS LEVEL
CO1	Differentiate the various meters and put them into practices.	Understand
CO2	Impact the knowledge on differential transducers	Understand
CO3	Analyze the characteristics of transformer	Apply
CO4	Differentiate the various Oscilloscope and use them into practices	Apply
CO5	Impact the knowledge on different types of digital displays	Apply



**SYLLABUS****UNIT I****11 HOURS**

**DIGITAL INSTRUMENTS:** - Introduction - Digital Multimeter - Digital Frequency Meter - Digital Measurement of Time - Digital Measurement of Frequency - Digital Tachometer - Digital pH meter - Automation in Digital Instruments - Digital Phase meter - Digital Capacitance meter.

**UNIT II****11 HOURS**

**TRANSDUCERS AND BRIDGE MEASUREMENT:** -Introduction - Wein bridge measurement - Types of transducers - Resistance thermometer - Thermistor - LVDT - Advantages of LVDT - Uses of LVDT - RVDT - Advantages of RVDT - Uses of RVDT - Load Cell - Photo Transistor - Photo Voltaic Cell - Semiconductor Photo diode.

**UNIT III****11 HOURS**

**INSTRUMENT TRANSFORMERS:**-Introduction - Transformer working- Step up transformer - Step down transformer - Transformer Impedance - Transformer ratio - Current transformer - Potential transformer - Difference between them - Auto transformer.

**UNIT IV****11 HOURS**

**OSCILLOSCOPE:** -Block diagram - CRT - CRT circuits - Principle of Secondary emission - Analog storage oscilloscope - Digital storage oscilloscope - Comparison of Analog and digital storage oscilloscope - Mixed signal oscilloscope- Logic probe.

**UNIT V****11 HOURS**

**DIGITAL DISPLAYS:** -Digital Display System and Indicators - Classification of Displays - Display devices - Light Emitting Diode - Liquid Crystal Display - Gas discharge Plasma Display - Segmented gas Discharge display - Segmented display - Dot matrix display

**TEXT BOOKS**

- A. H.S. Kalsi, "Electronic Instrumentation", 3<sup>rd</sup> Edition, TMH, 2010 (Unit I, II & V).
- B. A.K. Sawhney, "Electrical & Electronic Measurement and Instrumentation", 2012 (Unit III & IV).

**REFERENCE BOOKS**

- A. David A. Bell, Electronic Instrumentation and measurements, Prentice Hall of India Pvt Ltd, 2003.
- B. B.C. Nakra and K.K. Choudhry, Instrumentation, Measurement and Analysis, 2nd Edition, TMH, 2004.

**WEB RESOURCES**

- A. <https://www.electronicshub.org/tutorials/>
- B. <https://www.electronics-tutorials.ws/>

**MAPPING WITH PROGRAM OUTCOMES**

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1			S					
CO2	S		S					
CO3	M		S					S
CO4	S		S					S
CO5	S		S				S	M

S- Strong; M-Medium; L-Low

**ASSESSMENT PATTERN (if deviation from common pattern)**

Follows common pattern of Internal and External assessment, suggested in the Regulations.



**Dr Sidharthan V**  
(Course Coordinator)



**Dr Poornima K**  
(BoS Chairperson)



**Dr Jayasheela D**  
(Academic Council Member Secretary)



## SEMESTER II

COURSE CODE	COURSE NAME	CATEGORY	L	T	P	CREDIT	ASSESSMENT CODE
20ECE02	FUNDAMENTALS OF EMBEDDED SYSTEMS	DSE	55		-	4	A

## PREAMBLE / COURSE OBJECTIVE

This course helps students to impart knowledge on different communication protocols used in embedded systems and learn the fundamental differences between OS and RTOS and understand the general architecture of microcontroller and its applications.

## DEPARTMENT OFFERING

Electronics

## PREREQUISITE

Knowledge on basic electronics and electric circuits

## EXPECTED SKILL

Domain Knowledge / Entrepreneurship / **Employability** / Skill Development

## COURSE OUTCOMES

On successful completion of the course, students will be

S. NO.	COURSE OUTCOME	BLOOMS LEVEL
CO1	Describe the features of embedded systems	Understand
CO2	Characterize real-time systems and describe their functions	Understand
CO3	Implement a real-time system	Apply
CO4	Describe the architecture and registers of Microcontrollers	Remember
CO5	Explain the operation of interrupts and timers	Understand

**SYLLABUS****UNIT I****11 HOURS**

**INTRODUCTION TO EMBEDDED SYSTEMS:** Overview of Embedded Systems, Features, Requirements and Applications, Recent Trends in the Embedded System Design, Common architectures for the Embedded System Design, Embedded Software design issues.

**UNIT II****11 HOURS**

**EMBEDDED SOFTWARE ARCHITECTURE:** - Round Robin – Round Robin with Interrupts – Function Queue Scheduling Architecture-Real Time Operating Systems (RTOS) – Tasks and Data-Semaphores and Shared data- Message Queues, Mail box and Pipes.

**UNIT III****11 HOURS**

**RTOS BASED EMBEDDED SYSTEM DESIGN:** -RTOS Basics – Types of RTOS – Tasks, Process and threads- multiprocessing & multi-tasking-Task Scheduling – Task communication.

**UNIT IV****11 HOURS**

**MICROCONTROLLERS:** -Introduction to microcontrollers, Overview of Harvard architecture and Von Neumann architecture, RISC and CISC microcontrollers. Introduction to AVR Microcontrollers, Architecture overview, status register, general purpose register file, memories, Instruction set, Data Transfer Instructions, Arithmetic and Logic Instructions, Branch Instructions, MCU Control Instructions.

**UNIT V****11 HOURS**

**INTERRUPTS AND TIMER:** Introduction to System Clock, Reset sources, Introduction to interrupts, External interrupts, IO Ports, 8-bit and 16-bit Timers, introduction to different modes, Input Capture and Compare Match.

**TEXT BOOKS**

- A. Embedded system Design - Frank Vahid and Tony Givargis, John Wiley, 2002.
- B. An Embedded Software Primer by David E Simon, Addison Wesley, Published by Pearson Education, 2005.
- C. AVR Microcontroller and Embedded Systems: Using Assembly and C by Muhammad Ali Mazidi, Sarmad Naimi, Sepehr Naimi, Pearson Prentice Hall, 2011.

**REFERENCE BOOKS**

- A. AVR Microcontroller Datasheet, Atmel Corporation,
- B. Programming and Customizing the AVR Microcontroller by D V Gadre, McGraw-Hill Education, 2000.

**WEB RESOURCES**

- A. [www.atmel.com](http://www.atmel.com)
- B. [www.microchip.com](http://www.microchip.com)



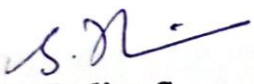
**MAPPING WITH PROGRAM OUTCOMES**


COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1						S		
CO2				S				
CO3						S	M	
CO4						S	L	
CO5						S	L	

S- Strong; M-Medium; L-Low

**ASSESSMENT PATTERN (if deviation from common pattern)**

Follows common pattern of Internal and External assessment, suggested in the Regulations.

  
**Ms Indira S**  
 (Course Coordinator)

  
**Dr Jayasheela D**  
 (Academic Council- Member Secretary)

  
**Dr Poornima K**  
 (BoS Chairperson)

## SEMESTER II

COURSE CODE	COURSE NAME	CATEGORY	L	T	P	CREDIT	ASSESSMENT CODE
20ECE03	CIRCUIT DESIGN AND SIMULATION	DSE	55		-	4	A

## PREAMBLE / COURSE OBJECTIVE

This course aims to teach students about how to simulate the electronic circuit and how to design PCB layout of given circuit using available circuit simulation and PCB layout design tools (free or licensed). This course helps the student to simulate the circuit and develop complete hardware circuit on PCB.

## DEPARTMENT OFFERING

Electronics

## PREREQUISITE

Fundamental knowledge on electronic components

## EXPECTED SKILL

Domain Knowledge / Entrepreneurship / **Employability** / Skill Development

## COURSE OUTCOMES

On successful completion of the course, students will be

S. NO.	COURSE OUTCOME	BLOOMS LEVEL
CO1	Compare different circuit simulation and PCB layout design software.	Understand
CO2	Make schematic electronic circuits in the software.	Apply
CO3	Simulate simple electronics circuits in the software.	Apply
CO4	Design and develop layout of PCB using PCB layout design tool	Apply



**SYLLABUS****UNIT I****11 HOURS**

**Circuit Simulation and PCB Design Software:** - Circuit simulation software and PCB layout design software.

**UNIT II****11 HOURS**

**Design of Schematic Electronic Circuits using Software:** - Wire, Bus, junction, probe, voltage source, current source and ground etc., used in circuit simulation software- Create new project and schematic file- Search, add and create new electronic part- Edit, connect or wire the circuit.

**UNIT III****11 HOURS**

**Introduction to Altium Design:** - Introduction to Altium Designer- The Altium Design environment- Schematic graphical objects- Schematic electrical objects - Introduction to Schematic Capture -Libraries and components - Placing and wiring.

**UNIT IV****11 HOURS**

**PCB Design Flow Using Altium:** - PCB design process - Transferring design information to the PCB - Using the PCB Panel - Project Navigation and Cross Probing - Design rules and design rule checking.

**UNIT V****11 HOURS**

**Routing and Polygon:** -Routing – Test point System - Adding and removing teardrops - Automatic routing - Polygons and the Polygon Manager - Output Generation and CAM File Editing - Bill of Materials - Output Generation - CAM Editor - Interfacing to 3D Mechanical CAD.

**TEXT BOOKS**

- A. Multisim user manual, National Instruments, [www.ni.com](http://www.ni.com)
- B. Orcade online manual, Cadence, [www.cadence.com](http://www.cadence.com)
- C. Altium Designer reference manual.

**REFERENCE BOOKS**

- A. Ultiboard user manual, National Instruments, [www.ni.com](http://www.ni.com)

**WEB RESOURCES**

- A. [www.ni.com](http://www.ni.com) (Multisim and Ultiboard - Academic version)
- B. [www.cadence.com](http://www.cadence.com) (Orcade - Student version)

**MAPPING WITH PROGRAM OUTCOMES**

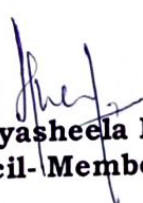
COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	L		M					S
CO2	L			M				S
CO3				L				S
CO4				M				S


S- Strong; M-Medium; L-Low

**ASSESSMENT PATTERN (if deviation from common pattern)**

Follows common pattern of Internal and External assessment, suggested in the Regulations.

  
**Mr Ashok Kumar K**  
 (Course Coordinator)

  
**Dr Jayasheela D**  
 (Academic Council- Member Secretary)

  
**Dr Poornima K**  
 (BoS Chairperson)