Item No. 6/15: Proposal to introduce the Mentorship program for First Year UG students in the University.

First year students, being new to the campus and University system need to be guided from time to time. The study of science/Engineering etc is exciting, but also challenging. Every first student experiences stress at one time or the other. Stress may be brought on by academic factors, but often the causes may be personal. The situation may be overwhelming and might impact academic achievement.

Access to support provided by the University shall surely be helpful. It is thus proposed to introduce the Mentorship Program for First Year students in the University. The goal is to introduce an immediate support network for incoming students. Thus, new entrants will get familiar with life at the University, academically and culturally, so that they can better achieve their full academic potential.

Mentorship is a relationship between two people where the mentor provides advice and guidance to the mentee to help them grow, learn and develop professionally. Faculty mentors may help the new student in the following ways:

1. Becoming familiar with campus life and its support services
2. Communicating and socializing with staff and peers
3. Becoming informed about administrative/academic procedures
4. Transitioning to new methods of learning and working
5. Answering any questions, even those pertaining to personal matters
6. To be a source of information and assistance to help new students settle in.
7. Recognize and respond to feelings of anxiety or isolation among new students.

It is proposed that each faculty of a Department may be assigned to a group of 10-20 first year Undergraduate students of the same department at the time of

admission. The faculty of Sciences/Maths/HSS may assist larger Departments in this task. Few senior students can also be involved in the mentoring. The Mentor- Mentee meet should be held at least once a month. Detailed guidelines may be prepared separately.

4.7 FOUNDATION COURSE: ELECTRONICS & COMMUNICATION ENGINEERING.

COURSE 1: BASICS OF ELECTRONICS AND COMMUNICATION ENGINEERING

A. OVERVIEW OF THE COURSE:

Name of Course	**Basics Of Electronics And Communication Engineering**
Offering Department	**Electronics & Communication Engineering**
B.Tech Branches to which this course is offered	**1. Computer Science & Engg. and related courses** **2. Information Technology & Engg. and related courses**

OVERVIEW:

The course on **Basics of Electronics and Communication Engineering** is offered to the first year students of Computer Science and Information Technology Department. In this course basic knowledge of Signal and systems, Communication Engineering, Semiconductor devices, Operational Amplifier and VLSI is being provided to I Year students. The objective is to cover a broad spectrum in the field of Electronics and Communication Engineering.

This will help the students of these branches to have the basic knowledge of various types of signals used in any electronic systems. Further, the students will be able to understand the working of communication systems in analog mode. The students will familiarize with the working principles of semiconductor devices like diodes and transistors. The students will be able to understand the working of operational amplifier and its applications. At the end the students will understand different steps of VLSI design flow. The students will learn the skills of using the testing and measuring instruments like cathode ray oscilloscope, digital multimeter, ammeter, voltmeter etc.

B. SYLLABUS

COURSE NO	TITLE OF THE COURSE	COURSE STRUCTURE	PRE-REQUISITE

FC EC0 1 06	Basics of Electronics and Communication Engineering	3L-0T-2P	None

COURSE OUTCOMES (COs)

After completion of this course, the students are expected to be able to demonstrate the following knowledge, skills and attitudes:

CO 1 : To obtain conceptual knowledge of various types of signals used in any electronic systems.
CO 2 : To understand the working of communication systems in analog mode.
CO 3 : To understand working principles of semiconductor devices like diodes and transistors.
CO 4 : To get familiarized with OP-AMP and its applications.
CO 5 : To understand different steps of VLSI design flow.

COURSE CONTENTS

UNIT I

Signal and Systems : Standard signals- Step, Ramp, Pulse, Impulse, Real and complex exponentials and Sinusoids_ Classification of signals — Continuous time (CT) and Discrete Time (DT) signals, Periodic & Aperiodic signals, Fourier series for periodic signals — Fourier Transform — properties

UNIT II

Electronic Communication Systems : Introduction of communication system, Transmission media: wired and wireless, Radio Spectrum, Baseband and pass band signals, Distortion less Communication Channels, need of modulation, AM modulation, Generation of AM waves: square law Modulator, Detection of AM Waves: Square law detector, DSBSC, SSB, Concepts of FM and PM. Comparison of AM and FM.

UNIT III

Semiconductor Devices and Applications : Introduction to P-N Junction Diode and V-I characteristics, clipper and clamper. Zener diode and its characteristics, Zener diode as voltage regulator. Introduction to BJT and MOSFET, input-output and transfer characteristics, single stage CE and CS amplifier

UNIT IV

Operational amplifier and its applications : Introduction to operational

amplifiers, Op-amp input modes and parameters, Op-amp in open loop configuration, concept of feedback, study of practical op-amp IC 741, inverting and non inverting amplifier applications: summing and difference amplifier, unity gain buffer, comparator, integrator and differentiator.

UNIT V

Introduction to VLSI: Steps of IC fabrication, VLSI design flow steps such as synthesis, floor-planning, placement, routing. etc. Various steps of verification such as simulation, formal methods and timing/power analysis, the-state-of-the-art of CAD tools.

SUGGESTED READINGS

1. Haykin, Simon. *Communication systems*. John Wiley & Sons, 2008.
2. Kennedy, Davis and Prasanna. "Electronic Communication Systems" McGraw Hill Publications, 5th Edition.
3. Haykin, Simon, and Barry Van Veen. Signals and systems. John Wiley & Sons, 2007.
4. Malvino and Leach, "Digital Principles and Applications", TMH publishers, 8th Edition.
5. Boylestad and Nashelsky, "Electronic Devices and Circuit Theory" Pearson publishers, 10th Edition
6. Kang, Sung Mo, and Yusuf Leblebici. *CMOS digital integrated circuits*. New York: MacGraw-Hill, 2003.

C. LESSON PLAN THEORY LECTURE

S.No.	CONTENT	NUMBER OF LECTURES	UNIT
1	Standard signals- Step, Ramp, Pulse, Impulse,	1	**UNIT-I (8)**
2	Classification of signals — Continuous time (CT) and Discrete Time (DT) signals	1	
3	Periodic & Aperiodic signals,	1	
4	Real and complex exponentials and Sinusoids	1	
5	Fourier series for periodic signals	2	
6	Fourier Transform and it's properties	2	
7	Introduction of communication system	1	**UNIT-II (9)**
8	Transmission media: wired and wireless, Radio Spectrum	1	
9	Baseband and passband signals, Distortion less Communication Channels	1	

10	Need of modulation, Introduction to AM modulation	1	
11	Generation of AM waves: Square law Modulator, and Detection of AM Wave: Square Law Detector	1	
12	DSBSC: Its Generation and Demodulation	1	
13	SSB and its advantages	1	
14	Concepts of FM and PM.	1	
15	Comparison of AM and FM.	1	
MID SEMESTER EXAM			
16	PN junction diode and VI characteristics	1	**UNIT-III (10)**
17	Half-wave and Full-wave rectifier	1	
18	Efficiency, Ripple factor, Capacitor filter	1	
19	Zener diode and its applications	1	
20	Construction and operation of BJT	1	
21	Transfer characteristics, voltage divider biasing and region of operation	1	
22	BJT as a single stage CE amplifier	1	
23	Construction and operation of MOSFET	1	
24	Transfer characteristics, voltage divider biasing and region of operation	1	
25	MOSFET as a single stage CS amplifier	1	
26	Introduction to ideal Op-amp and its parameters	1	**UNIT-IV (6)**
27	Op-amp in open loop mode and use as comparator with positive feedback	1	
28	Op-amp with negative feedback, inverting and non-inverting amplifier	1	
29	Summing and difference amplifier	1	
30	Integrator, differentiator and unity gain amplifier	1	
31	Study of practical Op-amp 741 IC (non-ideal parameters) Introduction to ideal Op-amp and its parameters	1	
33	Overview of IC fabrication	1	**UNIT-V (7)**
34	VLSI design flow: Circuit synthesis and floor-planning	1	
35	Placement and routing	1	
36	Various steps of verification such as	1	

	simulation		
37	formal methods of timing/power analysis	2	
38	the-state-of-the-art of CAD tools	1	

C.LESSON PLAN PRACTICAL CLASSES

Experiment List (any two experiments from each unit to be done)

Unit no.	Experiment list
I	1. Generation of Signals & Signal Operations 2. To plot transient response of RL, RC and RLC circuits. 3. Perform Fourier transform for common signals.
II	4. Study of ETT Kit and other equipment of Communication Lab 5. Generation of Amplitude Modulated Wave 6. Generation of Double Sideband Suppressed Carrier Wave
III	7. To plot characteristics of a zener diode and its application as a voltage regulator. 8. To determine gain and bandwidth of a CE amplifier. 9. To determine gain and bandwidth of a CS amplifier.
IV	10. Inverting, Non-inverting and unity gain amplifiers using 741 Op-amp. 11. Integrator and differentiator using 741 Op-amp. 12. Voltage adder/ subtractor using 741 Op-amp.
V	13. Introduction of spice tools using RC circuits as an integrator and differentiator. 14. To plot V-I characteristics of PMOS and NMOS for different GATE bias. 15. To design a CMOS inverter and plot voltage transfer curve.

A. SELF STUDY

Sr. No	Topic	Unit
1.	Indian Knowledge System in the context of atomic theory as given in Vaisheshik Darshan (also called Kannada sutras). Students may explore other related topics also.	III
2.	The binary number system as described by the Vedic scholar Pingala, in his book *Chandahśāstra*. Students may explore other related topics also.	

3.	As suggested by Course instructor/CCC to bridge any gap in the curricullum	
4.	Any topic as suggested by Course instructor	

COURSE 2 : BASICS OF ANALOG AND DIGITAL ELECTRONICS

A. OVERVIEW OF THE COURSE:

Name of Course	**Basics Of Analog And Digital Electronics**
Offering Department	**Electronics & Communication Engineering**
B.Tech Branches to which this course is offered	**1. Bio Technology** **2. Geo-informatics** **3. Mechanical Engineering** **4. Mechanical Engineering (Electric Vehicles)**

OVERVIEW

The course on **Basics Of Analog And Digital Electronics** is offered to the first year students of Bio technology, Geo-Informatics, Mechanical Engineering and Mechanical Engineering (Electric Vehicles). In this course, basic knowledge of Semiconductor devices, Operational Amplifier, Timing Circuits, Oscillators, Digital Electronics, Microprocessor and Microcontroller is being provided to first Year students. The objective is to cover a broad spectrum in the field of Electronics Engineering and some information about Microprocessor and Microcontrollers.

This will help the students of these branches to have a basic understanding the working principle of semiconductor devices, operational amplifiers. The students will be able to construct oscillators and multi vibrators using 555 IC and 741 IC. Further, the students will be able to obtain conceptual knowledge of digital systems and memory design. It will help the students to understand working of microprocessors and microcontrollers. This will give the student a exposure to the abilities and limitations of microprocessors which will help them in understanding microprocessor control systems.

B. SYLLABUS

Course No	Title of the Course	Course Structure	Pre-Requisite
FC EC0 1 16	Basics of Analog and Digital Electronics	3L-0T-2P	None

COURSE OUTCOMES (COs)

After completion of this course, the students are expected to be able to demonstrate the following knowledge, skills and attitudes:

CO 1 : To understand working principles of semiconductor devices like diodes and transistor.
CO 2 : To get familiarized with OP-AMP and its applications.
CO 3 : To construct oscillators and multi-vibrators using 555 IC and 741 IC.
CO 4 : To obtain conceptual knowledge of digital systems and memory design.
CO 5 : To understand working of microprocessors and microcontrollers.

Contents:

UNIT I

Semiconductor Devices and Applications: Introduction to P-N Junction Diode and V-I characteristics, Half wave and Full-wave rectifiers, clipper and clamper. Zener diode and its characteristics, Zener diode as voltage regulator. Introduction to BJT and MOSFET, input-output and transfer characteristics, single stage CE and CS amplifier.

UNIT II

Operational amplifier and its applications: Introduction to operational amplifiers, Op-amp input modes and parameters, Op-amp in open loop configuration, concept of feedback, study of practical op-amp IC 741, inverting and noninverting amplifier applications: summing and difference amplifier, unity gain buffer, comparator, integrator and differentiator.

UNIT III

Timing Circuits and Oscillators: RC-timing circuits, IC 555 and its applications as astable and mono-stable multi-vibrators, Barkhausen's criteria for oscillation, R-C phase shift and Wein bridge oscillator using Op-amp.

UNIT IV

Digital Electronics Fundamentals: Difference between analog and digital signals, Boolean algebra, Basic and Universal Gates, Symbols, Truth tables, logic

expressions, Logic simplification using 3-variable K-map, half and full adder/subtractor, multiplexers, de-multiplexers, flip-flops, shift register, ripple counter, Memories-RAM, ROM.

UNIT V

Microprocessor and Microcontroller: Block diagram of 8085 microprocessor and its applications, basic instructions like addition, subtraction and basic logical operations, Simple programs. Concept of programmable processors and microcontrollers.

SUGGESTED READINGS

1. Boylestad and Nashelsky, "Electronic Devices and Circuit Theory" Pearson publishers, 10th Edition
2. Malvino and Leach, "Digital Principles and Applications", TMH publishers, 8th Edition.
3. Neamen, Donald A. S*emiconductor Physics and Devices Basic Principles*. Tata McGraw Hill Publishing, 1992.
4. Gaonkar, Ramesh. *Microprocessor architecture, programming, and application with the 8085*. Penram International, 2002.

C. LESSON PLAN THEORY LECTURE

S.No.	Topics	NUMBER OF LECTURES	UNIT
1.	Introduction to PN junction diode and VI characteristics	1	Unit-I (10)
2.	Half-wave and Full-wave rectifiers	1	
3.	Clipper and clamper	2	
4.	Zener diode and its characteristics	1	
5.	Zener diode as voltage regulator	1	
6.	Introduction to BJT and MOSFET	2	
7.	Input-output and transfer characteristics	1	
8.	single stage CE and CS amplifier.	1	
9.	Introduction to operational amplifiers, Op-amp input modes and parameters	1	Unit-II (6)
10.	Op-amp in open loop configuration, concept of feedback,	1	
11.	Study of practical op-amp IC 741,	1	
12.	Inverting and noninverting amplifier applications:	1	
13.	Summing and difference amplifier, Unity gain buffer, comparator,	1	
14.	Integrator and differentiator.	1	
15.	RC-timing circuits,	1	Unit-III

16.	IC 555 and its applications as astable and mono-stable multi-vibrators,	2	(6)
17.	Barkhausen's criteria for oscillation,	1	
18.	R-C phase shift and Wein bridge oscillator using Op-amp	2	
MID SEMESTER EXAMINATION			
19.	Difference between analog and digital signal	1	Unit-IV (10)
20.	Boolean algebra	1	
21.	Basic and Universal gates, truth tables	1	
22.	Logic simplification using 3 variable K-maps	1	
23.	Half and Full adder/subtractor	1	
24.	Multiplexer and De-multiplexer	1	
25.	Flip-flops	2	
26.	Ripple counter	1	
27.	Memories RAM and ROM	1	
28.	Block diagram of 8085 microprocessor and its application	2	Unit-V (10)
29.	Basic instructions like addition, subtraction and basic logical operations	2	
30.	Simple programs	3	
31.	Concept of programmable processors and microcontrollers.	3	

D. LESSON PLAN PRACTICAL CLASSES

Experiment List (any two experiments from each unit to be done)

Unit no.	Experiment list
I	1. To plot characteristics of a zener diode and its application as a voltage regulator. 2. To determine gain and bandwidth of a CE amplifier. 3. To determine gain and bandwidth of a CS amplifier.
II	4. Inverting, Non-inverting and unity gain amplifiers using 741 Op-amp. 5. Integrator and differentiator using 741 Op-amp. 6. Voltage adder/ subtractor using 741 Op-amp.
III	7. IC-555 as astable multivibrator. 8. IC-555 as a monostable multivibrator. 9. Wein bridge oscillator as Op-amp.
IV	10. Realize all logic functions using NAND/NOR gates. 11. Design of half adder and Full adder. 12. Verification of operation of flip-flops and implementation of a 2-bit counter.
V	13. Write a program using 8085 Microprocessor for Decimal and Hexadecimal addition. 14. To perform multiplication and division of two 8 bit numbers using 8085. 15. To find the largest and smallest number in an array of data using 8085 instruction set.

E.SELF STUDY

Sr. No	Topic	Unit
1	Indian Knowledge System in the context of atomic theory as given in Vaisheshik Darshan (also called Kannada sutras). Students may explore other related topics also.	I
2	The binary number system as described by the Vedic scholar Pingala, in his book *Chandahśāstra*. Students may explore other related topics also.	IV
3	As suggested by Course instructor/CCC to bridge any gap in the curriculum	
4	Any topic as suggested by Course instructor	

B.Tech -SEMESTER I														
Course Code	Type	Course	L	T	P	Credits	Evaluation Scheme					Offering Dept.	AICTE Course Type	NEP-2020 TYPE
							Theory			Practical				
							CA	MS	ES	CA	ES			
FC MT0 1 01	FC	Mathematics-I	3	1	0	4	30	**20**	50	-	-	MATHS	Basic Sciences	Multidisciplinary/ SMF
FC CS0 1 02	FC	Computer Programming	3	0	2	4	-	20	50	30	-	COE/IT		Skill Enhancement
FC PH0 1 24		Oscillations, Waves and Optics	3	0	2	4	-	20	50	30	-	Physics	Basic Sc	Multidisciplinary/ SMF
FC ME0 1 16	FC	Engineering Graphics & CAD	3	0	2	4	-	20	50	30	-	-	Engg Sc	Inter disciplinary
FC EE0 1 06	FC	Fundamentals of Electrical Engineering	-	-	-	-	-	-	-	-	-	-	Engg Sc	Inter disciplinary
VAXXxxx	VAC	Design Thinking	-	-	-	NIL	-	-	-	-	-	-	Mandatory Course	VAC
		21 contact hours **				20								
* As per Table 2 above														
** Actual teaching hours shall depend on L-T-P of all the courses														

B.Tech. SEMESTER II														
Course No.	Type	Course	L	T	P	Credits	Evaluation Scheme					Offering Dept.	AICTE Course Type	NEP-2020 TYPE
							Theory			Practical				
							CA	MS	ES	CA	ES			
FC MT0 2 01	FC	Mathematics-II	3	1	0	4	30	20	50	-	-	MATHS	Basic Sc.	Multidisciplinary/ SMF
FC HS0 1 05	FC	English	3	0	2	4	-	20	50	30	-	English	HUSS	AEC
FC CH 0 1 03	FC	Environment Sc. & Green Chem.	3	1	0	4	30	20	50	-	-	CHEMISTRY	Basic Sc.	Multidisciplinary/ SMF
	CC	*											Program Core/	Discipline Specific/
	CC	*											Engg Sc.	Interdisciplinary
	CC	*												
			24**			24								
* Core course to be run by the concerned Department for it's branch of B.Tech														
** Actual teaching hours shall depend on L-T-P of all the courses														