ANNEXURE-I

UNIVERSITY OF JAMMU
COURSE SCHEME
B.E 5th Semester Electronics and Communication Engineering
For Examination to be held in the Year December 2020,2021,2022,2023

Contact hours/week = 28

COURSE CODE	COURSE TYPE	COURSE TITLE	LOAD ALLOCATION			MARKS DISTRIBUTION		TOTAL MARKS	CONTACT HRS/WEEK	CREDITS	%CHANGE
			L	T	P	INTERNAL	EXTERNAL				
PEC-501	Professional Core Courses	Digital Communication	3	1	0	50	100	150	4	4	100%
PEC-502	Professional Core Courses	DSP	2	1	0	50	100	150	3	3	100%
PEC-503	Professional Core Courses	Microprocessor	3	1	0	50	100	150	4	4	100%
*MOC-504	Massive Open Online course	SWAYAM /NPTEL	3	0	0	100	-	100	3	3	100%
EEE-501	Engineering Science Course	Control System	3	1	0	50	100	150	3	3	100%
ECE-511	Professional Elective Courses*	Microwave and Radar Laboratory	0	0	2	50	-	50	2	1	100%
ECE-512		Power Electronics Laboratory									
PEC-513	Professional Core Courses	Microprocessor Laboratory	0	0	3	75	-	75	3	1.5	100%
ECS-514	Engineering Science Course	OOP Laboratory	0	0	3	75	-	75	3	1.5	100%
PIT-504	Professional Core Courses	Industrial Training-1	0	0	0	50	-	50	-	1	100%
NCC-501	Humanities & Social Science Course	Essence of Indian Traditional Knowledge	2	0	0	-	-	-	2	-	100%
TOTAL			**16**	**4**	**8**	**550**	**400**	**950**	**27**	**22**	

** **NOTE:-**The department shall offer the Swayam / NPTEL course out of the list of courses offered by Swayam around the time of commencement of the semester. However, the selected NPTEL course should not be similar to the regular courses offered as a part of the department curriculum.*

Examination to be held in the Year December 2020, 2021, 2022, 2023

CLASS: B.E. 5TH SEMESTER **CREDITS: 4**

BRANCH: ECE

COURSE NO: PEC-501	**L**	**T**	**P**	**Marks Theory**	**Marks Sessional**
COURSE TITLE: DIGITAL COMUNICATION	**3**	**1**	**0**	**100**	**50**

DURATION OF EXAM: 3 HOURS

COURSE OUTCOMES **At the end of the course student will be able to:**	
CO1	Understand basics of digital communication and design of various modulation techniques.
CO2	Analyze channel coding and information theory.
CO3	Explain multiplexing, multiple access techniques and spread spectrum techniques.

SECTION-A

Signal Space Analysis: Geometric Representation of Signals, Gram-Schmidt Orthogonalization Procedure. (04 hrs)

Digital Modulation Techniques: Introduction, Types of digital modulation techniques, FSK, ASK, BPSK, DPSK, QPSK generation and reception, Differentially encoded PSK (DEPSK), M-ray PSK, MSK, Comparison of digital modulation techniques. (10 hrs)

Multiplexing and Multiple Access: Allocation of communication Resources, FDM/FDMA, TDM/TDMA, CDMA (07 hrs)

SECTION-B

Spread Spectrum Techniques: Spread Spectrum Overview, Pseudo-noise Sequences, Direct Sequence and Frequency Hopped Systems, Synchronization of DS and FH systems. (10 hrs)

Information theory: Information rate, Entropy, source coding & coding efficiency, Shannon Fanno coding, Huffman coding, channel capacity theorem. (05 hrs)

Channel coding: Block codes coding and decoding, Soft and hard decision, Convolution coding and decoding, State & Trellis diagrams, Viterbi Algorithm. (06 hrs)

TEXT BOOKS

S. No. NAME AUTHOR(S) PUBLISHER

1. Principles of Communication Systems ,Taub and Schilling Tata McGraw Hill

RECOMMENDED BOOK

S. No. NAME AUTHOR(S) PUBLISHER

1. Communication Signals and Systems ,S. Haykins Wiley
2. Principles of Digital Communication J. Das, S.K. Mullick, P.K. Chatterjee, New Age International Ltd
3. Digital Communications, J.G. Proakis Tata McGraw Hill

NOTE: There shall be total eight questions, four from each section. Each question carries 20 marks. Five questions have to be attempted, selecting at least two from each section. Use of calculator is allowed.

Examination to be held in the Year December 2020, 2021, 2022, 2023

CLASS: B.E. 5TH SEMESTER **CREDITS: 3**

BRANCH: ECE

COURSE NO: PEC-502	**L**	**T**	**P**	**Marks**	
				Theory	**Sessional**
COURSE TITLE: Digital Signal Processing	**2**	**1**	**0**	**100**	**50**

DURATION OF EXAM: 3 HOURS

COURSE OUTCOMES: **At the end of the course student will be able to:**	
CO1	Understand the discrete time signal & system and its importance
CO2	Realization of digital linear systems ,introduction and properties of DFT, FFT and its computational complexity
CO3	Designing of FIR and IIR filters, Applications

SECTION-A

Discrete Time Signal & System:

Introduction, Classification of discrete time signal, Discrete time system, Analysis of linear time Invariant system, Properties of LTI system, System described by difference equations, Correlation of discrete time system, Recursive & Non-recursive structures, Properties of Z-Transform, Evaluation of the Inverse Z-Transform. (12 hrs)

Realisation of Digital linear systems:

Introduction, Basic realisation Block diagram and signal flow graph, Basic structures for IIR systems; direct form-I, direct form- II, cascade form and parallel form realisation. Basic structure for FIR systems; direct form and cascade form realisation. (06 hrs)

Section-B

Discrete & Fast Fourier Transform:

Introduction, Properties of DFT, Linear convolution using DFT, Circular convolution, Discrete time Fourier transform (DTFT), Fast fourier transform (FFT), FFT Algorithms–Decimation in time FFT algorithms & decimation in frequency algorithms, Computational consideration. (12 hrs)

Digital Filter Design:

Generation consideration, Design of FIR filter, Design of IIR filter-Impulse Invariant method, Bilinear transformation Application of DSP, Radar, Image processing. (05 hrs)

RECOMMENDED BOOKS:

01. Digital Signal Processing by S. Salivaharan
02. Digital Signal Processing by John G. Proakes
03. Digital Signal Processing A.V Oppenheim and R.W.Schafer

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Examination to be held in the Year December 2020, 2021, 2022, 2023

CLASS: B.E. 5TH SEMESTER **CREDITS: 4**
BRANCH: ECE

			Marks	
L	**T**	**P**	**Theory**	**Sessional**
3	**1**	**0**	**100**	**50**

COURSE NO: PEC-503
COURSE TITLE: MICROPROCESSORS
DURATION OF EXAM: 3 HOURS

COURSE OUTCOMES **At the end of the course student will be able to:**	
CO1	To understand the basic Architecture of 8085 and 8086 Microprocessors and their working with instruction set.
CO2	To understand both hardware and software techniques of interfacing digital devices (I/P, O/P) with microprocessor-based systems and provide solutions to real-world problems
CO3	To understand the operation & interfacing of different Peripheral I/C's, memory chips with advanced Processors.

Section-A

Microprocessor 8085 pin diagram, Architecture, Addressing modes, Instruction set,, Timing diagram, Programming techniques with additional instructions, looping, Counting design of counters & time delays, debugging & memory mapping, memory mapped I/O design. (12 hrs)

Stack & Subroutines, Advanced subroutines concept, Call & Ret instructions, Advanced programming (Code conversions, BCD addition/subtraction, Multiplication etc), 8085 interrupts & process. (10 hrs)

Section-B

8086 Microprocessor: Pin diagram, Architecture, Instruction set, assembler directives, macros and procedures, min max mode, Introduction to multiprocessor configuration (8087, 8089). Programming techniques with macro and procedures. (08 hrs)

Operation & Interfacing of 8155, 8255, 8253, 8251, 8259, 8279 with 8086, Memory interfacing Of RAM & ROM with 8086. (08 hrs)

Advanced Processors: Introduction to Pentium processor architecture, Use of RISC & CISC instructions. (04 hrs)

RECOMMENDED BOOKS:

01. Microprocessor Architecture Programming & App. By Ramesh Gaonkar
02. Microprocessor & Interfacing Programming by Douglas V Hall
03. Microprocessor Systems by Liu Gibson
04. The Intel Microprocessor by Brey

NOTE: There shall be total eight questions, four from each section. Each question carries 20 marks. Five questions have to be attempted, selecting at least two from each section. Use of calculator is allowed.

Examination to be held in the Year December 2020, 2021, 2022, 2023

CLASS: B.E. 5TH SEMESTER **CREDITS: 3**

BRANCH: ECE

COURSE NO: MOC-504	**L**	**T**	**P**	**Marks Sessional**
COURSE TITLE: SWAYAM/ NPTEL	**3**	**0**	**0**	**100**

DURATION OF EXAM: 3 HOURS

The department shall offer the SWAYAM / NPTEL course (12 weeks) out of the list of courses offered by SWAYAM around the time of commencement of the semester. However, the selected NPTEL course should not be similar to the regular courses offered as a part of the department curriculum.

The overall monitoring of the NPTEL course will be under the supervision of the teacher incharge of the department.

The NPTEL/SWAYAM certification course comprises of Assignments (25%) and Proctor Examination (Online examination MCQ's based = 75%) conducted at the end of the semester by IIT Madras as per the schedule.

The marks obtained by the student in the NPTEL/SWAYAM certification course will be tabulated by the concerned department.

NOTE: In case the student does not pass the certification exam or remains absent in the proctor examination, no certificate will be given to the candidate by the NPTEL and the student will be deemed to have failed in the course. The examination of the said NPTEL course will be taken by the department concerned in the next semester under the supervision of Examination Cell of GCET Jammu. The paper will be of 75 marks and assignment marks will be carried forward from the previous semester.

Examination to be held in the Year December 2020, 2021, 2022, 2023

CLASS: B.E. 5TH SEMESTER **CREDITS: 3**

BRANCH: ECE

				Marks	
COURSE NO: EEE-501	**L**	**T**	**P**	**Theory**	**Sessional**
COURSE TITLE: CONTROL SYSTEM	**3**	**1**	**0**	**100**	**50**

DURATION OF EXAM: 3 HOURS

COURSE OUTCOMES **At the end of the course student will be able to:**	
CO1	Understand the concept of open loop and closed loop system, transfer functions and modelling of physical systems
CO2	Understand block diagram technique, signal flow graph, time domain analysis and control components.
CO3	Understand different stability criterions and plots, design and PID controller

SECTION A

Introduction to Linear Control System: Control, types of control systems, feedback and its effects, mathematical modelling of physical systems. (04 hrs)

System Representation: Block diagrams, representation of control systems, transfer functions, signal flow graphs, Time domain analysis of Control Systems,: Time domain analysis of first & second order Control systems. Typical test signals for time response of control systems, time domain performance of first and second order control systems, (steady state response and transient response). (09 hrs)

Control Components: AC and DC servomotors, ac tachometer, synchro transmitter and receiver, synchro pair as control transformer, ac and dc position control system, stepper motor, magnetic amplifier and adaptive control. (05 hrs)

SECTION B

Frequency Domain Analysis of Control Systems: Stability characteristic equation, stability of linear time invariant systems, Routh-Hurwitz stability criterion, Root locus plot, Bode plot, Polar plot, Nyquist Criterion. (09 hrs)

Design of Feedback Control Systems: Approaches to system design, phase lead and phase lag design using Bode plot and root locus techniques, introduction to P, PI and PID controllers. (08 hrs)

RECOMMENDED BOOKS:

1. Modern Control Engineering — K.Ogatta
2. Automatic Control Systems — B.C. Kuo
3. Control System Engineering — Nagrath and Gopal
4. Digital Control and State variable methods — M. Gopal

NOTE: There shall be total eight questions, four from each section. Each question carries 20 marks. Five questions have to be attempted, selecting at least two from each section. Use of calculator is allowed.

Examination to be held in the Year December 2020, 2021, 2022, 2023

CLASS: B.E. 5TH SEMESTER **CREDITS: 1**

BRANCH: ECE

COURSE NO: ECE-511	**L**	**T**	**P**	**Marks Practical**
COURSE TITLE: MICROWAVE AND RADAR LABORATORY	**0**	**0**	**2**	**50**

COURSE OUTCOMES **At the end of the course student will be able to:**	
CO1	Plot and study the characteristics of reflex klystron tube/Gunn Diode/Tees /Isolator and circulators.
CO2	Evaluate the parameters (frequency, wavelength) of rectangular waveguide for a particular mode and verify the impedance measured using klystron tube with Smith Chart.
CO3	Calculate reflection coefficient and VSWR of electromagnetic field

LIST OF EXPERIMENTS

01. To study the characteristics of Reflex Klystron tube and to determine its electronic tuning range.
02. To determine the frequency and wave length in Rectangular wave guide.
03. To determine the standing-wave ratio & reflection coefficient.
04. To measure an unknown impedance with smith chart.
05. To study the following characteristics of Gunn diode.
    i. V-I Characteristics.
    ii. Output power & frequency as a function of voltage.
06 To calculate the Coupling Factor & directivity using a directional coupler.
07 To study the following Tees :-
    i) E-Plane Tee.
    ii) H-Plane Tee.
    iii) Magic Tee.
08 To study the Isolator & Circulators.
09 To draw the radiation pattern of Horn antenna.

NOTE: Each student has to perform at least six experiments. Additional Practical / Experiments will be performed based on the course content requirements.

Examination to be held in the Year December 2020, 2021, 2022, 2023

CLASS: B.E. 5TH SEMESTER **CREDITS: 1**

BRANCH: ECE

COURSE NO: ECE-512	**L**	**T**	**P**	**Marks Practical**
COURSE TITLE: POWER ELECTRONICS LABORATORY	**0**	**0**	**2**	**50**

COURSE OUTCOMES **At the end of the course student will be able to:**	
CO1	Understand the different working modes of SCR.
CO2	Analyze voltage waveforms in single phase-controlled rectifier circuit using load.
CO3	Understand the concept of choppers /converter by observing waveforms.

LIST OF EXPERIMENTS:

1. SCR Triggering circuits.
2. Forced Commutation Circuits in Converters.
3. SCR Phase Control Circuits.
4. Triac Phase Control Circuits.
5. Fully Controlled Single - Phase thyristor bridge.
6. SCR DC Circuit breaker.
7. Zero Voltage switching.
8. Voltage Commutated DC chopper.
9. Current commutated DC chopper.
10. Microprocessor based three – phase thyristor bridge.
11. Converter fed drive.
12. Chopper fed drive.

NOTE: Each student has to perform at least eight aforementioned Practical / Experiments. Additional Practical / Experiments if required, will be performed based on the course content requirements.

Examination to be held in the Year December 2020, 2021, 2022, 2023

CREDIT: 1.5

CLASS: B.E. 5TH SEMESTER
BRANCH: ECE
COURSE NO: PEC-513
COURSE TITLE: MICROPROCESSOR LABORATORY

L	T	P	Marks Practical
0	0	3	75

COURSE OUTCOMES **At the end of the course student will be able to:**	
CO1	Write assembly language programs using microprocessor 8085/ 8086 kit.
CO2	Perform Arithmetic, logic operations using microprocessor 8085/8086 kits and store the result in a register or memory.
CO3	Perform Advanced Programming Techniques and by interfacing IC's with 8085/8086 microprocessor

LIST OF PRACTICALS

01. Programs of data transfer group and block transfer of data from source memory to destination memory.
02. Write a program to calculate the factorial of a number.
03. Write a program for the addition of two numbers.
04. Write program to find average of two numbers.
05. Write a program to find the sum of numbers in the array & store it in Register or Memory.
06. Write a program to find the greatest number from a given array.
07. Write a program find the smallest number from a given array.
08. Write a program for arranging numbers in ascending order.
09. Write a program for arranging numbers in descending order.
10. Write a program to search an element from a given array.
11. Write a program to convert BCD number into its binary equivalent number.
12. Write a program to move a string from one location to another.

NOTE: Each student has to perform at least eight experiments from the aforementioned list using 8085/8086 kits. Additional Practical / Experiments if required, will be performed based on the course content requirements.

Examination to be held in the Year December 2020, 2021, 2022, 2023

CLASS: B.E. 5th SEMESTER **CREDIT: 1.5**
BRANCH: ECE
COURSE NO: ECS-514
COURSE TITLE: OOP LABORATORY

L	T	P	Marks Practical
0	0	3	75

COURSE OUTCOMES **At the end of the course the student will be able to: -**	
CO1	Develop solutions for a range of problems using Objects and Classes and implement the concepts of Constructors, Destructors and Operator Overloading.
CO2	Apply fundamental algorithmic problems including Type Casting, Inheritance.
CO3	Implement the concepts of Run Time Polymorphism using Virtual Functions, Generic Programming, Templates, File Handling using C++.

List of Practicals:

Experiment 1	Design and implement programs using Pointers.
Experiment 2	Design and implement programs using Classes and Objects.
Experiment 3	Design and implement programs using Constructors and Destructors.
Experiment 4	Design and implement programs using the concepts of Inheritance.
Experiment 5	Design and implement programs using Friend Function.
Experiment 6	Design and implement programs using New and Delete operator.
Experiment 7	Design and implement programs using the concepts of Overloading.
Experiment 8	Design and implement programs using the concepts of files.

NOTE: Additional Lab experiments/practicals if required will be performed based on the course content requirements.

Examination to be held in the Year December 2020, 2021, 2022, 2023

CLASS: B.E. 5th SEMESTER **CREDIT: 1**
BRANCH: ECE
COURSE TITLE: INDUSTRIAL TRAINING-1
COURSE NO: PIT-504

L	T	P	Marks Practical
0	0	0	50

COURSE OUTCOMES **At the end of the course the student will be able to: -**	
CO1	Interact and study with a range of students and to practice multiple management skills, including communication, independent action and teamwork.
CO2	Understand the engineering code of ethics and demonstrate knowledge of practical application of training
CO3	Submit a training report along with the certificate issued by the concerned department.

Students are required to undertake 4 to 6 weeks Practical Training during the summer vacations in the field of Electronics and Communication Engineering in Govt./Semi-Govt./Private organizations through offline/Online mode. Thereafter, each student shall be required to submit a report on the practical training to the concern HOD for evaluation.

Guidelines for evaluation of Practical Training: The evaluation shall be done by the Departmental committee by the end of 5thsemester. The committee shall have a convener and at least two members.

Distribution of Marks as per the University statues:

Total Marks for Evaluation		= 50 marks	
i)	Report	= 20	40%
ii)	Viva-Voce	= 15	30%
iii)	Miscellaneous Marks	= 15	30%

Due weight age will be given to those who have opted for Industrial Training outside the UT as well as keeping in view the profile of that Industry.

Award of the Marks:
Marks under (i), (ii) & (iii) will be awarded by the departmental committee constituted for the purpose.

Examination to be held in the Year December 2020, 2021, 2022, 2023

CLASS: B.E 5TH SEMESTER **CREDITS: 0**

BRANCH: ECE **MARKS**

CORSE TITLE: ESSENCE OF INDIAN TRADITIONAL KNOWLEDGE **L T P THEORY/SESSIONAL**

COURSE NO: NCC-501 **2 0 0 SATISFACTORY/UNSATISFACTORY**

Course outcomes:	
CO1	The students shall be able to know about the Vedic philosophy in detail and its relevance in present scenario.
CO2	The students will be able to strengthen their mind and body through the knowledge of yoga.

Unit 1

Vedic Philosophy: Concept of Vedas, Ethics & Values, Educational system, Knowledge of science, trade/commerce & medicines as per Vedas, Environmental ethics: Preservation & Purification, Harnessing of natural resources in alienation with nature as per Vedas.

Unit 2

Yoga Philosophy: Parts of Yoga, Importance of Yam and Niyam, Stress management through yoga, Purification of mind and body through yoga.

Note for Teacher:

The course should aim at enlightening students with the importance of ancient traditional knowledge.

Evaluation of the course:

There will be internal evaluation based on two internal sessional and viva -voce.

ANNEXURE-II

UNIVERSITY OF JAMMU
COURSE SCHEME
B.E 6th Semester Electronics and Communication Engineering
For Examination to be held in the Year May 2021,2022,2023,2024

Contact hours/week = 25

Course Code	Course Type	Course Title	Load Allocations			Marks Distribution		Total Marks	Contact Hrs/Week	CREDITS	%Change
			L	T	P	Internal	External				
PEC-601	Professional Core Courses	Embedded System	3	1	0	50	100	150	4	4	100%
*MOC-604	Massive Open Online Course	SWAYAM/ NPTEL	3	-	0	100	-	100	3	3	100%
PEC-603	Professional Core Courses	Antenna & Wave Propagation	2	1	0	50	100	150	3	3	100%
PEC-604	Professional Core Courses	Integrated circuits and Instrumentation	3	1	0	50	100	150	4	4	100%
HMC-602	Humanities & Social Science Course	Engineering Economics	2	1	0	50	100	150	3	3	100%
HMC-603		Organisational Behaviour									
PEC-611	Professional Core Courses	Embedded System Laboratory	0	0	2	50		50	2	1	100%
PEC-614	Professional Core Courses	Integrated circuits and Instrumentation Laboratory	0	0	2	50		50	2	1	100%
PEC-615	Professional Core Courses	IoT Laboratory	0	0	2	50		50	2	1	100%
PEC-616	Professional Core Courses	PCB Designing Laboratory	0	0	2	50		50	2	1	100%
MOC-617	Massive Open Online Course	MOOC									
TOTAL			**13**	**4**	**8**	**500**	**400**	**900**	**25**	**21**	

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Examination to be held in the Year May 2021,2022,2023,2024

CLASS: B.E. 6TH SEMESTER **CREDITS: 4**

BRANCH: ECE

				Marks	
COURSE NO: PEC-601	**L**	**T**	**P**	**Theory**	**Sessional**
COURSE TITLE: EMBEDDED SYSTEM	**3**	**1**	**0**	**100**	**50**

DURATION OF EXAM: 3 HOURS

COURSE OUTCOMES **At the end of the course student will be able to:**	
CO1	Understand the hardware concept of Microcontroller- 8051, write simple programs.
CO2	Understand the concept and applications of DC motor and indicators (Display Devices like LEDs, Seven Segment Displays, LCD) and use in project work.
CO3	Illustrate the concept of hardware details of ARM-7LPC2148 along with its programs and interfacing of with devices.

SECTION–A

INTRODUCTION: Definition of Embedded system, macro and micro embedded systems, different types of microcontrollers: Embedded microcontrollers, external memory microcontrollers etc., processor architecture: CISC V/S RISC. (06 hrs)

TOOLS AND SOFTWARE FOR EMBEDDED SYSTEM DESIGN: Development tools/ environments, Assembly language programming style, Interpreters, High level languages, Intel hex format object files, Debugging. (04 hrs)

8051 MICRO CONTROLLERS: Architecture, Pin description of 8051, 8051 assembly language programming JUMP, LOOP and CALL instructions, arithmetic and logic instructions, I/O PORT functions. Single bit instruction programming, Reading Input Pins Vs Port latch, Programming using 8051 timers, counter programming, simplex, half duplex, full duplex transmission, synchronous and asynchronous communication, Interfacing A/D, D/A Converter to 8051. (10 hrs)

SECTION–B

TIMERS, SERIAL INTERFACE & INTERRUPTS OF 8051 MICROCONTROLLER: Timer: Control Word, mode of timers, Interfacing of Display devices like LEDs, seven segment displays with8051, Serial interface: Introduction, Control Word, mode of serial interface, interrupts: Interrupt based programming. Working of IR& temperature Sensor, Relays, Analog to Digital converter, Digital to Analog converters. (12hrs)

ARM7 MICRO-CONTROLLERS: Architecture: PIN and Block Diagram, Instruction Set, Addressing Modes of ARM-7 LPC2148Microcontroller, simple programming concepts System Design based on 8051, ARM7 LPC2148 Processor. Peripheral Interfaces: LCD, Seven Segment Display. (09 hrs)

BOOKS RECOMMENDED:

01. The 8051 Microcontroller (architecture, Programming and Applications)
    By : Kenneth J. Ayala -----Penram International.
02. The 8051 Microcontroller and Embedded Systems-
    By : Muhammed Ali Mazidi& Janice GillispieMazdi.
03. Design with Microcontroller
    By : John B. Peatman (Tata McGraw Hill Publications)
04. ARM system development guide
    By : Andrew-n-sloss& Dominic Symes Publisher –Morgan Aausamann.

NOTE: There will be eight questions of 20 marks each, four from each section. Students are required to attempt five questions selecting atleast two questions from each section. Use of Calculator is allowed.

Examination to be held in the Year May 2021,2022,2023,2024

CLASS: B.E. 6TH SEMESTER				**CREDITS: 3**
BRANCH: ECE				**Marks**
COURSE NO: MOC-604	**L**	**T**	**P**	**Sessional**
COURSE TITLE: SWAYAM/ NPTEL	**3**	**0**	**0**	**100**
DURATION OF EXAM: 3 HOURS				

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The overall monitoring of the NPTEL course will be under the supervision of the teacher incharge of the department.

The NPTEL/SWAYAM certification course comprises of Assignments (25%) and Proctor Examination (Online examination MCQ's based = 75%) conducted at the end of the semester by IIT Madras as per the schedule.

The marks obtained by the student in the NPTEL/SWAYAM certification course will be tabulated by the concerned department.

NOTE: In case the student does not pass the certification exam or remains absent in the proctor examination, no certificate will be given to the candidate by the NPTEL and the student will be deemed to have failed in the course. The examination of the said NPTEL course will be taken by the department concerned in the next semester under the supervision of Examination Cell of GCET Jammu. The paper will be of 75 marks and assignment marks will be carried forward from the previous semester.

Examination to be held in the Year May 2021,2022,2023,2024

CLASS: B.E. 6TH SEMESTER **CREDITS: 3**

BRANCH: ECE

				Marks	
COURSE NO: PEC- 603	**L**	**T**	**P**	**Theory**	**Sessional**
COURSE TITLE: ANTENNA AND WAVE PROPOGATION	**2**	**1**	**0**	**100**	**50**

DURATION OF EXAM: 3 HOURS

COURSE OUTCOME **At the end of the course student will be able to:**	
CO1	Explain basic Antenna parameters and design antenna arrays.
CO2	Describe and analyze design parameters related to practical antennas
CO3	Illustrate and understand wave propagation

SECTION - A

Antenna Radiation: Antenna Parameters: Antenna impedance, Directional patterns, Effective length, Radiation Intensity, Directivity, Power gain, Efficiency, Effective area, Equivalent circuit, Front to back ratio, polarization and antenna temperature. Application of reciprocity theorem in antennas Radiation from short dipole and thin linear antenna (13hrs)

Antenna Arrays: Array factor, Multiplication of patterns, Linear array of n point sources broadside and end fire arrays and their directivities. (05 hrs)

SECTION - B

Practical Antennas: VLF and LF antennas. High frequency antenna (Rhombic antenna), VHF and UHF antennas (Yagi Uda, antenna with parabolic reflector, microstrip antenna, log periodic antenna). (05 hrs)

Wave Propagation: Modes of Propagation: Surface Wave Propagation, Sky Wave (Ionospheric) Propagation- Virtual height, Maximum usable Frequency, Skip Distance, Optimum working frequency, Space Wave (Tropospheric) Propagation- line of sight distance. (12 hrs)

TEXT BOOKS

NAME AUTHOR PUBLISHER

1 Antennas and Radio Wave Propagation K D Prasad Satya Prakashan

BOOKS RECOMMENDED:

1 Antennas and Wave Propagation G S N Raju Pearson
2 Antenna and Radio Wave Propagation Krauss TMH
3 Antenna and Radio Wave Propagation Ballanis John Wiley & Sons

NOTE: There shall be total eight questions, four from each section. Each question carries 20 marks. Five questions have to be attempted, selecting at least two from each section. Use of calculator is allowed.

Examination to be held in the Year May 2021,2022,2023,2024

CLASS: B.E. 6TH SEMESTER **CREDITS: 4**

BRANCH: ECE

COURSE NO: PEC-604	**L**	**T**	**P**	**Marks**	
				Theory	**Sessional**
COURSE TITLE: INTEGRATED CIRCUITS AND INSTRUMENTATION	**3**	**1**	**0**	**100**	**50**

DURATION OF EXAM: 3 HOURS

COURSE OUTCOMES **At the end of the course student will be able to:**	
CO1	Understand the theoretical and the circuit aspects of operational amplifier and its characteristics
CO2	Understand and Illustrate the applications of OPAMP, measurement of parameters and and its wavwforms.
CO3	Analysis /Explanation of different analog instruments, digital instruments, transducers & bridges.

SECTION-A

Ideal & Practical Op-Amp & Characteristics: Block diagram, characteristics of ideal & practical operational amp, Ideal voltage transfer curve, Open loop Op-amp configurations, Op-Amp as inverting, Non-inverting amplifier, Differential amplifiers using one and two Op-Amp, Op-amp Characteristics, Measurement of Op-amp parameters, Slew rate and its cause. (10 hrs)

Op-Amp & Applications: DC & AC Amplifier, AC amplifier with single power supply, peaking amplifier, Summing, Scaling & Averaging amplifiers using inverting/Non-inverting Configurations, Differential input / Differential output amplifier, Active filters, Integrator, Differentiator, Instrumentation amplifier (06 hrs)

Op-Amp circuits and Waveform generators: Square, Triangular, saw tooth, Sine wave generator, Sample and hold circuit, Voltage limiter, Peak detector, comparators, zero crossing detector, Schmitt trigger. (03 hrs)

Brief introduction to Phase-Locked Loops & 555 Timers (02 hrs)

SECTION-B

Measurement & Error: Introduction to Measurement & Instrumentation, Types of instrumentation & measurement, Sensitivity, resolution, Accuracy, Precision, significant figures, Absolute & relative errors, Types of errors, Probability of errors, Limiting errors, Linearity. (04 hrs)

Instruments: Digital Voltmeter & its types and Ammeter, Digital Multimeter, Resolution of digital meters. Digital frequency meters. (05 hrs)

Transducers: Introduction, Selection of transducers, Resistive transducers, Strain gauges, Thermistor & thermometer, LVDT, Load cells, Piezo Electric transducers, Photo voltaic, Frequency generation transducer. (05 hrs)

Bridge: Introduction, Wheat stone bridge, Kelvin bridge, Guarded wheat stone bridge, AC bridge & their application, Maxwell bridge, Hay bridge, Schering bridge, Wagner ground connection, Unbalance conditions. (06 hrs)

BOOKS RECOMMENDED:

1. Op-Amp & Linear Integrated Circuit — Ramakant A. Gayakwad
2. Linear Integrated Circuit — Wixer
3. Linear Integrated Circuit — Tobey Graeme &Huelsomen
4. Op-Amp Design Application — Dailey
5. Design with Op-Amp — Franco

NOTE: There shall be total eight questions, four from each section. Five questions have to be attempted selecting at least two questions from each section. Use of calculator is allowed.

Examination to be held in the Year May 2021,2022,2023,2024

CLASS B.E.:6th Semester **CREDITS: 3**

BRANCH: ECE **MARKS**

COURSE NO.- HMC-602	**L**	**T**	**P**	**THEORY**	**SESSIONAL**
COURSE TITLE: ENGINEERING ECONOMICS	**2**	**1**	**0**	**100**	**50**

DURATION OF EXAM: 3 HOURS

COURSE OUTCOMES **At the end of the course students will be able to:**	
CO1	Understand the micro economic concepts such as demand, utility, consumer behaviour, laws of production, cost analysis and their applicability in day to day life.
CO2	Understand and apply macroeconomics concepts such as national income, index numbers, inflation and business cycle in real life situations.
CO3	Understand and learn about functioning of central and commercial banks.

SECTION – A

Unit1: DEMAND THEORY Meaning of demand and law of demand; Factors affecting demand; Elasticity of demand (price; income & cross elasticity). (06 hrs)

Unit2: CONSUMER BEHAVIOUR: Cardinal utility analysis: law of diminishing marginal utility; law of Equi-marginal utility; Ordinal utility analysis: meaning and properties of indifference curves and utility maximization (consumer equilibrium). (06 hrs)

Unit3: THEORY OF PRODUCTION AND COST ANALYSIS Factors of Production and Production Function; Law of Variable Proportions; law of Returns to Scale; The concept of Fixed, Variable, Total, Marginal, and Average Costs; their shapes and relationships (Short Run). (06 hrs)

SECTION – B

Unit4: BASIC MACRO ECONOMICS CONCEPTS: Meaning& Concept of National Income (Different methods of calculating national income and difficulties in measuring national income); Concept of stock market. (06 hrs)

Unit5: INDEX NUMBERS: Meaning, Construction and difficulties in measurement of Index Number and its uses; Meaning and phases of Trade/ Business Cycle. (06 hrs)

Unit6: BANKING AND INFLATION: Functions of Central Bank and methods of credit control; Functions of Commercial Bank and methods of credit creation. Inflation (Types, effects and methods to control inflation). (06 hrs)

NOTE FOR PAPER SETTER: There shall be total eight questions, four from each section. Each question carries 20 marks. Five questions will have to be attempted, selecting at least two from each section. Use of calculator is allowed.

BOOKS RECOMMENDED :

1. K.K.Dewett : Modern Economic Theory
2. H.L Ahuja : Advanced Economic Theory
3. M.L. Jhingan : Macro Economics
4. P.N Chopra : Business Economics/Advanced Eco. Theory
5. A. Koutsoyiannis : Modern Micro Economics

NOTE: There shall be total eight questions, four from each section. Five questions have to be attempted selecting at least two questions from each section. Use of calculator is allowed.

Examination to be held in the Year May 2021,2022,2023,2024

B.E.:6th Semester **CREDITS 3**

BRANCH: ECE **MARKS**

COURSE NO.- HMC-603	**L**	**T**	**P**	**THEORY**	**SESSIONAL**
COURSE TITLE: ORGANISATIONAL BEHAVIOUR	**2**	**1**	**0**	**100**	**50**

DURATION OF EXAM: 3 HOURS

COURSE OUTCOMES At the end of the course students will be able to:	
CO1	Understand how to work in organizations by acquiring proper knowledge about organizational behavior and individual differences.
CO2	Have good knowledge about the concepts of personality, perception, attitude and learning.
CO3	Develop their organization properly after acquiring good knowledge about managing conflicts, leadership concepts and organizational culture.

SECTION -A

Unit1: Organisational Behaviour -Concept, Meaning, Nature and Scope of Organisational Behaviour , Models of organizational behavior, Individual Difference: Meaning, Factors & implications of individual differences (06 hrs)

Unit 2: Individual behavior and its determinants: Personality-Concept & Determinants; Perception-Meaning, Definition, Perceptual Process, internal & external factors in perceptual selectivity; Attitude–Features, Components, Formation of Attitudes. (07 hrs)

Unit3: Learning: Definition,Theories of learning- Classical Conditioning, Operant Conditioning, Observational learning, Reinforcement- Concept, Types, Importance. (05 hrs)

SECTION-B

Unit4: Organizational development: Concept, Characteristics & Objectives of Organization Development, Organization Development Process. Organizational Change: Nature of Organizational Change, Forces to Change, Causes of Resistance to Change, Techniques of overcoming Resistance to Change, Response & Reactions to Change..Dynamics of Conflict – Nature of Conflict, Types of Conflict, Stages in conflict, Resolution of conflict. (06 hrs)

Unit5: Leadership–Characteristics and Functions of Leader, Qualities of a good Leader, Importance of leadership, Styles of Leadership; Motivation: Concept & importance Theories of motivation: Maslow's need hierarchy Herzberg's motivation hygiene theory, Mcclelland's need theory. (07hrs)

Unit6: Organisational culture: Meaning, definition, Elements & Characteristics of organizational culture, Functions of Culture in Management. (05 hrs)

Books Recommended:

1. Organizational Behavior — JohnR.Schermerhorn, jrJames G.Hunt,RichardN.Osborn
2. Organizational Behaviour — Stephen P. Robbins
3. Principles of Management — Dr. NeeruVaisisth
4. Organizational Behaviour (Humane Behaviour at work) — Keith Davis
5. Organisational theory & behavior — B.P. Singh;T.N.Chabbra
6. Organisational Behaviour — L.M.Prasad

NOTE: There shall be total eight questions, four from each section. Five questions have to be attempted selecting at least two questions from each section. Use of calculator is allowed.

Examination to be held in the Year May 2021,2022,2023,2024

Class: B.E. 6th Semester **CREDITS: 1**

BRANCH: ECE

				Marks	
COURSE NO: PEC-611	**L**	**T**	**P**	**Theory**	**Sessional**
COURSE TITLE: EMBEDDED SYSTEMS LABORATORY	**0**	**0**	**2**	**0**	**50**

COURSE OUTCOME **At the end of the course student will be able to:**	
CO1	Write assembly language programs including interrupt-based programming using 8051 microcontrollers.
CO2	Displaying message using LCD display, LED indicator, seven segment display with a delay.
CO3	Perform interfacing of ARM processor with Robot system, DC motors and A/D Converters and interfacing of biometric and RFID module with ARM 7 microcontroller.

LIST OF EXPERIMENTS

01. Program to display a message "Excel" on the first line & a message "_____" on 2nd line using LCD display.
02. Program to output incrementing date on Do to D7 on output part in a Continuous loop with some delay.
03. Program to switch on & switch off the relays on output port simultaneously with delay in between.
04. Program to display a message "_____" by pressing reset key. Now press any key, the code will be echoed on Computer Screen.
05. Program to display a message "_____" on the seven segment display with a delay.
06. Program to output the date FA, F6, F5, & F9 on four winding in a continuous loop with delay of a stepper motor.
07. Program to scan Eight keys & display its binary code on LED's.
08. Program to output logic '1'- logic 'O' alternatively on Eight LED's with delay between by making the eight LED's flash.
09. Write a program to convert digital voltage 5v and display using D/A converter.
10. Write a program to convert analog voltage of 5v and display using A/D converter.

Programs based on ARM processor:

11. Study of ARM7-32 Bit Processor Architecture and pin dig.
12. Write a program of Flashing LED connected to port 1 of the Micro Controller
13. Interfacing of ARM Processor with Robot System such as DTMF, IR, RF.
14. Interfacing of the SD-MMC card with ARM7 microcontroller.
15. Interfacing of Biometric & RFID module with ARM7 microcontroller

NOTE: Each student has to perform at least six experiments out of which 40% shall be simulation based. Additional Practical / Experiments will be performed based on the course content requirements.

Examination to be held in the Year May 2021,2022,2023,2024

CLASS: B.E. 6TH SEMESTER **CREDIT: 1**

BRANCH: ECE

COURSE NO: PEC-614	**L**	**T**	**P**	**Marks Practical**
COURSE TITLE: INTEGRATED CIRCUITS AND INSTRUMENTATION LABORATORY	**0**	**0**	**2**	**50**

COURSE OUTCOMES **At the end of the course student will be able to:**	
CO1	Study and use of OP-Amp in open loop and closed loop configuration and observe waveforms.
CO2	Study and use of op-amp in different applications and observe their waveforms.
CO3	Study and use of various instruments and measurement of various component values. Observation of Lissajous patterns using CRO and study of different bridges to calculate Resistance, Capacitance and Inductance.

LIST OF PRACTICALS:

SECTION -A

01. Design of OP-amp as closed loop Inverting, Non-Inverting, amp voltage follower & Inverter.
02. Design of Op-Amp as summer, Scaling, Averaging using Inverting amplifier & Non-Inverting amplifier.
03. Design of Op-Amp as Square wave generator.
04. Design of Op-Amp as Integrator & Differentiator.
05. Design of Op-Amp as low pass filter & high pass filter.
06. Study of analog multimeter (Voltmeter, Ammeter, & Current meter)

SECTION -B

07 Study of Rectifier type instruments
08 Study of Analyzers (Wave, Spectrum & Distortion)
09 Study of Digital multimeter
10 Study of LCR Q meter
11 Study of frequency meter
12 Study of Oscilloscope, Measurement of frequency, Phase, Amplitude using Lissajous pattern, Digital storage & Sampling Oscilloscope
13 Study of Transducers: LVDT, Strain, RTD, Thermocouple, Load cell, Photo voltage & Frequency generation transducers
14 Study of Bridge: wheat stone, Kelvin, AC bridge

NOTE: Each student has to perform at least four experiments from each section, out of which 40% shall be simulation based. Additional Practical / Experiments will be performed based on the course content requirements.

Examination to be held in the Year May 2021,2022,2023,2024

CLASS: B.E. 6TH SEMESTER **CREDIT: 1**

BRANCH: ECE

	L	T	P	Marks Practical
COURSE NO: PEC-615				
COURSE TITLE: INTERNET OF THINGS LABORATORY	**0**	**0**	**2**	**50**

COURSE OUTCOMES **At the end of the course student will be able to:**	
CO1	To develop the knowledge and interfacing of components using embedded C
CO2	To know about XBEE, Bluetooth and its communication devices
CO3	To have the knowledge about Arduino module and its interfacing with GSM and WIFI

LIST OF PRACTICALS:

SECTION -A

Embedded Experiments

1. Learning the Embedded C programming concepts
2. Interfacing of peripherals like LEDs, seven segment and LCD.
3. Interfacing of Relay and Buzzer Module.
4. Interfacing of various Sensors with Arduino Board.
5. Interfacing of Temperature humidity Sensors and turning on Relay at threshold level.

SECTION -B

Wireless Experiments

6. How to communicate two XBEE modules in AT mode
7. How to configure a XBEE module in Broadcast and API Mode
8. How to read destination address of XBEE module using API mode
9. Data sharing using Bluetooth module to the Android APP
10. Making a call and receiving a call using GSM module

SECTION -B

IOT Experiments

11. Interfacing Wi- Fi with Arduino Module
12. Study of various AT Commands for Wi-fi
13. Setting a Link With things Speak Server.
14. Updating Data of Sensors on Thing speak cloud using Wi –Fi Module
15. Study of AT commands for GSM Module.
16. Updating data on Cloud using GSM module.

NOTE: Each student has to perform at least ten experiments at least two from each section, out of which 40% shall be simulation based. Additional Practical / Experiments will be performed based on the course content requirements.

Examination to be held in the Year May 2021,2022,2023,2024

CLASS: B.E. 6TH SEMESTER **CREDIT: 1**

BRANCH: ECE **Marks**

COURSE NO: PEC-616	**L**	**T**	**P**	**Practical**
COURSE TITLE: PCB DESIGNING LABORATORY	**0**	**0**	**2**	**50**

COURSE OUTCOMES **At the end of the course student will be able to:**	
CO1	Develop knowledge of Schematic Design Techniques and demonstrate all fundamental operation of the design CAD tool
CO2	Implement design route checking
CO3	Prepare and setup manufacturing POST- Process

LIST OF PRACTICALS:

1-Introduction to PCB design tool
2-Design minimum two circuits on any available tool/software
3-Prepare PCB by etching
4-Test the PCB by assembling the designed circuit

NOTE: Additional experiments/practicals will be performed based on the course contents requirements.

Examination to be held in the Year May 2021,2022,2023,2024

CLASS: B.E. 6th SEMESTER **CREDIT: 1**
BRANCH: ECE
COURSE NO: MOC-617
COURSE TITLE: MOOC

L	T	P	Marks Practical
0	0	2	50

MOOC: A massive open online course (MOOC) is a model for delivering learning content to any person who wants to take a course by means of the web. It has been incorporated in the 6thsemester and is compulsory for all the students. To evaluate a MOOCs course following is the scheme proposed:

Breakup of Marks:

- **Attendance: 10 marks**
  Students will have to visit the lab twice a week as per the time table and pursue their respective online course.

- **Report file: 15 marks**
  A detailed report of about 20-25 pages has to be submitted to the department at the end of the semester. It should contain details about the course that was undertaken by the student. A copy of the assignments with solutions that have been uploaded on the MooC platform should also be included in the final report. A copy of the certificate if awarded should also be appended to the report.

- **Presentation: 15 marks.**
  The presentation should be given to the peers/students focusing on the key points of the course with an aim to share the knowledge.

- **Certification: 10 marks**
  The students awarded with the certificate will be given 10 marks. (Copy to be attached in the report.)

  THE OPTED COURSE NEED TO BE APPROVED BY THE DEPARTMENT.