Shri Vile Parle Kelavani Mandal's

Dwarkadas J. Sanghvi College of Engineering

(Autonomous College Affiliated to the University of Mumbai)

Scheme and detailed syllabus (DJ19)

Second Year B.Tech.

in

Electronics & Telecommunication Engineering

(Semester IV)

Revision: 1 (2019)
With effect from the Academic Year: 2020-2021

1st July, 2020

Shri Vile Parle Kelavani Mandal's
DWARKADAS J. SANGHVI COLLEGE OF ENGINEERING
(Autonomous College Affiliated to the University of Mumbai)
NAAC Accredited with "A" Grade (CGPA : 3.18)

Scheme for Second Year Undergraduate Program in Electronics & Telecommunication Engineering : Semester IV (Autonomous)
(Academic Year 2020-2021)

Semester IV

Sr	Course Code	Course	Teaching Scheme				Semester End Examination (A)						Continuous Assessment (B)					Aggregate (A+B)	Credits earned	
			Theory (hrs.)	Practical (hrs.)	Tutorial (hrs.)	Credits	Duration (hrs.)	Theory	Oral	Pract	Oral & Pract	SEE Total (A)	Term Test 1 (TT1)	Term Test 2 (TT2)	Avg (TT1 & TT2)	Term Work Total	CA Total (B)			
1	DJ19ECC401	Engineering Mathematics IV	3	--	--	3	3	75	--	--	--	75	25	25	25	--	25	100	3	4
	DJ19ECT401	Engineering Mathematics IV - Tutorial	--	--	2	1	--	--	--	--	--	--	--	--	--	25	25	25	1	
2	DJ19ECC402	Analog Communication	3	--	--	3	3	75	--	--	--	75	25	25	25	--	25	100	3	4
	DJ19ECL402	Analog Communication - Laboratory	--	2	--	1	2	--	--	--	25	25	--	--	--	25	25	50	1	
3	DJ19ECC403	Integrated Circuits	3	--	--	3	3	75	--	--	--	75	25	25	25	--	25	100	3	4
	DJ19ECL403	Integrated Circuits - Laboratory	--	2	--	1	2	--	--	--	25	25	--	--	--	25	25	50	1	
4	DJ19ECC404	Electromagnetics and Wave Propagation	3	--	--	3	3	75	--	--	--	75	25	25	25	--	25	100	3	4
	DJ19ECT404	Electromagnetics and Wave Propagation - Tutorial	--	--	2	1	--	--	--	--	--	--	--	--	--	25	25	25	1	
5	DJ19ECL405	Python Programing - Laboratory	--	2	--	1	2	--	--	25	--	25	--	--	--	25	25	50	1	1
6	DJ19IHC1	Universal Human Values	2	--		2	3	75	--	--	--	75	25	25	25	--	25	100	2	3
	DJ19IHT1	Universal Human Values -Tutorial	--	--	1	1	--	--	--	--	--	--	--	--	--	25	25	25	1	
7	DJ19A4	Innovative Product Development -II	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
		Total	**14**	**6**	**5**	**20**	21	375	--	25	50	450	**125**	**125**	**125**	**150**	**275**	**725**	**20**	

Prepared by | Checked by | **Head of the Department** | **Vice Principal** | **Principal**

Syllabus for Second Year Electronics and Telecommunication Engineering-Semester IV (Autonomous)
(Academic Year 2020-2021)

<table>
<tr><td colspan="8">Program: Second Year Electronics & Telecommunication Engineering</td><td colspan="3">Semester: IV</td></tr>
<tr><td colspan="8">Course: Engineering Mathematics IV</td><td colspan="3">Course Code: DJ19ECC401</td></tr>
<tr><td colspan="8">Course: Engineering Mathematics IV -Tutorial</td><td colspan="3">Course Code: DJ19ECT401</td></tr>
<tr><td colspan="4" rowspan="2">Teaching Scheme
(Hours / week)</td><td colspan="7">Evaluation Scheme</td></tr>
<tr><td colspan="3">Semester End Examination Marks (A)</td><td colspan="3">Continuous Assessment Marks (B)</td><td>Total marks (A+ B)</td></tr>
<tr><td rowspan="3">Lectures</td><td rowspan="3">Practical</td><td rowspan="3">Tutorial</td><td rowspan="3">Total Credits</td><td colspan="3">Theory</td><td>Term Test 1</td><td>Term Test 2</td><td>Avg.</td><td rowspan="2"></td></tr>
<tr><td colspan="3">75</td><td>25</td><td>25</td><td>25</td></tr>
<tr><td colspan="3">Laboratory Examination</td><td colspan="2">Term work</td><td rowspan="2">Total Term work</td><td rowspan="3">25</td></tr>
<tr><td rowspan="3">3</td><td rowspan="3">--</td><td rowspan="3">2</td><td rowspan="3">3+1=4</td><td>Oral</td><td>Practical</td><td>Oral & Practical</td><td>Laboratory</td><td>Tutorial / Mini project / presentation/ Journal</td></tr>
<tr><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>--</td><td>--</td><td>--</td><td>--</td><td>25</td><td>25</td></tr>
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Pre-requisite:

1. Engineering Mathematics III

Objectives: To teach students

1. Random Variables and Random Process.
2. The design of the systems which involves randomness using mathematical analysis and computer simulations.
3. Concepts of Linear Algebra.

Outcomes: On completion of the course, learner will be able to:

1. Apply theory of probability in identifying and solving relevant problems.
2. Differentiate random variables through the use of cumulative distribution function (CDF), probability density function (PDF), probability mass function (PMF) as well as joint, marginal and conditional CDF, PDF and PMF.
3. Determine the response of a linear time invariant system to random processes.
4. Understand the theory of linear algebra and its applications to telecommunication engineering.

Detailed Syllabus: (unit wise)		
Unit	**Description**	**Duration**
1	**Introduction to Probability and Random Variable:** Sample space, events, set operations, the notion and axioms of probability Conditional probability, Joint probability, Bayes' rule, Independence of events. Definition of Random Variable. Continuous random variables, probability density function, probability distribution function Uniform, Exponential and Gaussian continuous random variables and distributions.	**10**
2	**Operations on One and Multiple Random Variable:** Functions of a random variable and their distribution and density functions, Expectation, Variance and Moments of random Variable. Pairs of random variables, Joint CDF, Joint PDF, Independence, Conditional CDF and PDF, Conditional Expectation One function of two random variables, two functions of two random variables; joint moments,joint characteristic function, covariance and correlation-independent, uncorrelated and orthogonal random variables. Central limit theorem and its significance.	**10**
3	**Random Process:** Random process: Definition, realizations, sample paths, discrete and continuous timeprocesses. Probabilistic structure of a Random process: mean, correlation and covariance, functions, stationarity of random process. Ergodicity and WSS.	**05**
4	**Matrix theory:** Eigenvalues and Eigenvectors, properties of Eigenvalues and Eigenvectors. Cayley- Hamilton theorem, Examples based on verification of Cayley-Hamilton theorem. Similarity of matrices, Diagonalisation of matrices. Function of square matrix. Quadratric forms over real field, Reduction of quadratic form to a diagonal canonical form, Rank, index and signature of quadratic form, Sylvester's law of inertia, Value-class of quadratic form of definite, Semi-definite and indefinite.	**10**
5	**Linear Algebra:** Vector Spaces, Subspaces, Span, Basis, Dimension, Rank. Linear transformations Givens and Householder transformations. Application of SVD to principal component analysis	**07**

List of Tutorials: (minimum eight)

1. Probability: Sample Space, events, Venn Diagram, De Morgan's law, Properties of Probability, Conditional Probability.
2. Bayes' Rule, Application of probability in communication
3. Random Variables: Functions of a random variable, distribution and density functions
4. Binomial, Poisson, Geometric discrete Random variable and their distributions.
5. Transformation of random variable, characteristic function, moment generating function of Bernoulli, Poisson, exponential random variable
6. Pairs of random variable, Joint CDF, Joint PDF, conditional CDF and PDF.
7. One function of Two random variables, Two functions of Two random variables
8. Mean and variance of a Random Process.
9. Eigenvalues and eigenvectors
10. Quadratic forms.
11. Implementation of Gram Schmidt Orthogonalization process.
12. Implementation of the singular vector decomposition algorithm.

Books Recommended:

Text Books:

1. T. Veerarajan, *Probability, Statistics and Random Processes*, 1st Edn, 2018, McGraw Hill.
2. Papoulis and S. Unnikrishnan Pillai, *Probability, Random Variables and Stochastic Processes*, 4th Edn. McGraw Hill.
3. Alberto Leon Garcia, *Probability and Random Processes For Electrical Engineering*, 2nd Edn. ,Pearson Education.
4. B.S. Grewal, *Higher Engineering Mathematics*, 44th Edn, Khanna Publishers.

Reference Books

1. Miller, *Probability and Random Processes-With Applications to Signal Processing and Communication*,1st Edn, 2007, Elsevier.
2. Dimitris. G. Manolakis, Vinay Ingale, and Stephen M. Kogon, *Statistical and Adaptive Signal Processing*,, 2005, Artech House, Inc.
3. Todd K. Moon and Wynn C. Stirling, *Mathematical Methods and Algorithms for Signal Processing"*, 2000, Pearson Education, Inc.
4. Seymour Lipschutz and Marc Lipson ― *Linear Algebra‖ Schaum's Outline Series*, 1st Edn, 2020, Mc-Graw Hill Publication.

Evaluation Scheme:

Semester End Examination (A):

Theory:

1. Question paper will be based on the entire syllabus summing up to 75 marks.
2. Total duration allotted for writing the paper is 3 hrs

Continuous Assessment (B):

Theory:

1. Two term tests of 25 marks each will be conducted during the semester out of which; one will be a compulsory term test (on minimum 02 Modules) and the other can either be a term test or an assignment on live problems or a course project.
2. Total duration allotted for writing each of the paper is 1 hr.
3. Average of the marks scored in both the two tests will be considered for final grading.

Tutorials: (Details of Term work)

1. Term work shall consist of minimum eight tutorials.
2. The distribution of marks for term work shall be as follows:

   Tutorials : 25 marks

The final certification and acceptance of term work will be subject to satisfactory performance of Term work and upon fulfilling minimum passing criteria in the term work.

Prepared by Checked by Head of the Department Principal

Syllabus for Second Year Electronics and Telecommunication Engineering-Semester IV (Autonomous)
(Academic Year 2020-2021)

Program: Second Year Electronics and Telecommunication Engineering	**Semester: IV**
Course: Analog Communication	**Course Code: DJ19ECC402**
Course: Analog Communication - Laboratory	**Course Code: DJ19ECL402**

Teaching Scheme (Hours / week)				**Evaluation Scheme**						
				Semester End Examination Marks (A)			**Continuous Assessment Marks (B)**			**Total marks (A+ B)**
Lectures	**Practical**	**Tutorial**	**Total Credits**	**Theory**			**Term Test 1**	**Term Test 2**	**Avg.**	
				75			**25**	**25**	**25**	**100**
				Laboratory Examination			**Term work**		**Total Term work**	**50**
3	**2**	**--**	**3+1=4**	**Oral**	**Practical**	**Oral & Practical**	**Laboratory Work**	**Tutorial / Mini project / presentation/ Journal**		
				--	**--**	**25**	**15**	**10**	**25**	

Pre-requisite:

1. Analog Circuits Design
2. Engineering Mathematics- III

Objectives:

1. To understand basics of communication systems and effect of noise on communication.
2. To understand various Continuous and pulse modulation, demodulation techniques.
3. Get acquainted with various types of multiplexing techniques and their use in communication.

Outcomes: On completion of the course, learner will be able to:

1. Describe different types of noise and its effect on communication system.
2. Analyze AM, FM, PM modulation and Demodulation systems.
3. Explain the block diagram of various types of receiver for analog communication.
4. Apply Sampling Technique in various pulse modulation systems.
5. Explain and differentiate TDM and FDM techniques used in communication.

Detailed Syllabus: (unit wise)		
Unit	**Description**	**Duration**
1	**Basics of Communication System:** Block diagram, electromagnetic spectrum, signal bandwidth and power, types of communication channels, Introduction to time and frequency domain. Types of noise, signal to noise ratio, noise figure and noise temperature.	**04**
2	**Amplitude Modulation and Demodulation:** Basic concepts, signal representation, need for modulation. DSBFC: Mathematical analysis, time domain waveforms, frequency spectrum, modulationindex, concept of under modulation, over modulation and critical modulation, bandwidth, voltage distribution and power calculations. Low level and high level modulation, simple diode detector, practical diode detector, square law detector. DSBSC: Mathematical analysis, time domain waveforms, frequency spectrum, modulation index, bandwidth, voltage distribution and power calculations. Multiplier modulator, balancedModulator. SSBSC: Mathematical analysis, time domain waveforms, frequency spectrum, modulation index, bandwidth, voltage distribution and power calculations. SSB generation, Filter method, Phase shift method, Third method. ISB: Basic concepts, transmitter and receiver block diagram, applications SB: Basic concepts, application in television. Comparison of different AM techniques	**10**
3	**Angle Modulation and Demodulation:** Frequency modulation (FM): Basic concept, mathematical analysis, time domain waveform, spectrum of FM wave, maximum deviation, modulation index, bandwidth requirement, narrowband FM and wideband FM, Effect of noise, noise triangle, pre-emphasis and de-emphasis, FET reactance modulator, varactor diode modulator, frequency stabilized reactance modulator, indirect method of FM generation. Phase modulation (PM): Basic concept, mathematical analysis, time domain waveform, maximum deviation, modulation index, Principle and working of transistor direct PM modulator FM demodulation: Balance slope detector, Foster-Seely discriminator, ratio detector, amplitude limiting and thresholding. Comparison between FM and PM, Applications of FM and PM.	**10**

4	**Radio Receivers:** Receiver parameters, TRF receiver, problems in TRF receiver, Super - heterodyne receiver, choice of IF. Importance of RF amplifier, tracking circuit, mixer, IF amplifier, simple AGC, AFC in super-heterodyne receiver. Comparison of FM receiver with AM receiver, communication receiver	**06**
5	**Pulse Modulation & Demodulation:** Sampling theorem, Nyquist criteria Sampling techniques, aliasing error and aperture effect PAM,PWM, PPM generation anddetection Pulse Code Modulation, delta modulation, adaptive delta modulation, principle, generation and detection Applications of pulse communication	**08**
6	**Multiplexing & De-multiplexing:** Frequency Division Multiplexing transmitter & receiver block diagram Time Division Multiplexing transmitter & receiver blockExamples and applications of FDM and TDM	**04**

List of Laboratory Experiments: (minimum eight)

1. Study of Amplitude Modulation.
2. **S**tudy of Double Side Band Suppressed Carrier and Single Side Band Amplitude Modulation.
3. Simulate of AM system and generate time and frequency domain output.
4. To study different types of frequency modulators and Demodulators.
5. Simulate Frequency Modulation system generate time and frequency domain output.
6. Implement Pre-emphasis and De-emphasis circuit required for FM and analyze the output.
7. Study of Natural Sampling and its reconstruction.
8. Study of Flat top sampling and its reconstruction.
9. Study of Pulse Amplitude Modulation.
10. Study of Pulse width Modulation.
11. Study of Pulse Position Modulation.
12. Study of PAM-TDM system.
13. Study of FDM.

Books Recommended:

Text books:

1. Kennedy & Devis, *Electronic Communication System*, 4th Edn McGraw Hill Education Pvt. Ltd.
2. Wayne Tomasi, *Electronic Communication System*, 4th Edn Pearson Publication
3. B. P. Lathi, Zhi Ding, *Modern digital and analog communication system, 4th* Edn Oxford University Press

Reference Books:

1. Toub Schilling and Shaha, *Principles of Communication System*, 3rd Edn ,Tata McGraw Hill Publication
2. Symon Haykin, Michal Moher, *Introduction to Analog and Digital Communication*, 4th Edn Wiley Publication.

Evaluation Scheme:

Semester End Examination (A):

Theory:

1. Question paper will be based on the entire syllabus summing up to 75 marks.
2. Total duration allotted for writing the paper is 3 hrs.

Laboratory:

1. Practical/Oral examination will be based on the entire syllabus including, the practicals performed during laboratory sessions.

Continuous Assessment (B):

Theory:

1. Two term tests of 25 marks each will be conducted during the semester out of which; one will be a compulsory term test (on minimum 02 Modules) and the other can either be a term test or an assignment on live problems or a course project.
2. Total duration allotted for writing each of the paper is 1 hr.
3. Average of the marks scored in both the two tests will be considered for final grading.

Laboratory: (Term work)

Term work shall consist of minimum 8 experiments, minimum 1 assignments and a mini project.

The distribution of marks for term work shall be as follows:

i. Laboratory work (Performance of Experiments): 15 Marks
ii. Journal Documentation (Write-up, Assignments, Mini project): 10 marks

The final certification and acceptance of term work will be subject to satisfactory performance of laboratory work and upon fulfilling minimum passing criteria in the term work.

Prepared by Checked by Head of the Department Principal

Syllabus for Second Year Electronics and Telecommunication Engineering-Semester IV (Autonomous)
(Academic Year 2020-2021)

Program: Second Year Electronic and Telecommunication Engineering	**Semester: IV**
Course: Integrated Circuits	**Course Code: DJ19ECC403**
Course: Integrated Circuits - Laboratory	**Course Code: DJ19ECL403**

Teaching Scheme (Hours / week)				**Evaluation Scheme**						
				Semester End Examination Marks (A)			**Continuous Assessment Marks (B)**			**Total marks (A+ B)**
Lectures	**Practical**	**Tutorial**	**Total Credits**	**Theory**			**Term Test 1**	**Term Test 2**	**Avg.**	
				75			**25**	**25**	**25**	**100**
				Laboratory Examination			**Term work**		**Total Term work**	**50**
3	**2**	**--**	**3+1=4**	**Oral**	**Practical**	**Oral & Practical**	**Laboratory**	**Tutorial / Mini project / presentation/ Journal**		
				--	**--**	**25**	**15**	**10**	**25**	

Pre-requisite:

1. Basic Electrical & Electronics Engineering
2. Analog Circuit Design
3. Digital System Design

Objectives:

1. To understand fabrication of integrated circuit.
2. To analyze active load differential amplifier
3. To understand the concepts, working principles and key applications of linear integrated circuits.
4. To perform analysis of circuits based on linear integrated circuits
5. To design circuits and systems for particular applications using linear integrated circuits

Outcomes: On successful completion of course, learner will be able to:

1. Analyze various constant current source circuit using MOS
2. Design and implement active load differential amplifier
3. Understand the fundamentals and areas of applications for the integrated circuits
4. Demonstrate the ability to design practical circuits that perform the desired operations.
5. Select the appropriate integrated circuit modules to build a given application.

	Detailed Syllabus: (unit wise)	
Unit	**Description**	**Duration**
1	**Physics of MOSFET**: NMOS, PMOS enhancement and depletion mode MOSFET transistor, threshold voltage, linearand saturated operation, FET capacitance.	**05**
2	**Silicon Semiconductor Technology:** Fabrication of passive elements, NMOS and PMOS processes, CMOS using n-well, CMOS using p-well, CMOS using twin tub process, CMOSLatch up, Comparison between MOS and Bipolar technology, Bipolar processes.	**07**
3	**Current sources & Operational Amplifier Overview:** Current Mirror, Current sources using FETs, Widlar current source, Wilson current source. Block diagram of Op-Amp, Basic MOS differential Amplifier, MOS differential amplifier with active load, Op-Amp symbol and Terminals, Ideal Op-Amp and Practical Op-Amp characteristics, Op-Amp Parameters, open loop and Closed loop configurations, Inverting, Non-inverting and Differential amplifier.	**12**
4	**Applications of OP-Amp & Special Purpose Integrated Circuits:** Summing and difference amplifier, Integrator and Differentiator, Schmitt trigger: Inverting andNon-inverting Schmitt trigger, 3 op-amp Instrumentation amplifier. Overview of Special purpose ICs, Functional block diagram, working, design of IC 555. Design of astable and monostable multivibrator using Timer 555, Functional block diagram, working andapplications of VCO 566, Functional block diagram, working and applications of PLL 565, Voltage regulators- functional block diagram, working of three terminal voltage regulators.	**12**
5	**Data Converters**: Performance parameters of ADC, single ramp ADC, ADC using DAC, dual slope ADC, successive approximation ADC, flash ADC, Performance parameters of DAC, binary weighted register DAC, R/2R ladder DAC, invertedR/2R ladder DAC.	**06**

List of Laboratory Experiments: (minimum eight)

1. To study VI characteristics of MOSFET using Spice tool.
2. To design single stage MOS amplifier.
3. To design Differential amplifier using MOSFET.
4. Design Inverting and non-inverting amplifier using Op-Amp (IC 741)
5. Design Integrator and Differentiator using Op-Amp (IC 741)
6. Design R-2R Ladder DAC using Op-Amp
7. Design Schmitt trigger using Opamp
8. Design of astable Multivibrator using IC 555.
9. Design voltage regulator

Books Recommended:

Textbooks:

1. D. A. Neamen, *Electronic Circuit Analysis and Design,* 2nd Edn, Tata McGraw Hill.
2. Ramakant A. Gayakwad, *Op-Amps and Linear Integrated Circuits*, 4th Edn, Pearson Prentice Hall
3. Sung-Mo Kang & Yusuf Leblebici, *CMOS Digital Integrated Circuits - Analysis & Design*, 2nd Edn, McGraw Hill.

Reference Books:

1. S. Sedra, K. C. Smith and A. N. Chandorkar, *Microelectronic Circuits Theory and Applications*, International Version, 6th Edn, OXFORD.
2. Sergio Franco, *Design with operational amplifiers and analog integrated circuits*, 3rd Edn, Tata McGraw Hill.
3. K. R. Botkar, *Integrated Circuits*, Khanna Publishers, 2004.
4. D. Roy Choudhury and S. B. Jain, *Linear Integrated Circuits*, 4th Edn, New Age International Publishers.

Evaluation Scheme:

Semester End Examination (A):

Theory:

1. Question paper will be based on the entire syllabus summing up to 75 marks.
2. Total duration allotted for writing the paper is 3 hrs.

Laboratory:

Oral examination will be based on the entire syllabus including, the practical performed during laboratorysessions.

Continuous Assessment (B):

Theory:

1. Two term tests of 25 marks each will be conducted during the semester. Total duration allotted for writing each of the paper is 1 hr.
2. Average of the marks scored in both the two tests will be considered for final grading.

Laboratory: (Term work)

Term work shall consist of minimum eight experiments, 1 power point presentation and assignment.

The distribution of marks for term work shall be as follows:

i. Laboratory work (Performance of Experiments): 15 Marks
ii. Journal Documentation (Write-up, Power Point Presentation and Assignments: 10 marks

The final certification and acceptance of term work will be subject to satisfactory performance of laboratory work and upon fulfilling minimum passing criteria in the term work.

Prepared by Checked by Head of the Department Principal

Syllabus for Second Year Electronics and Telecommunication Engineering-Semester IV (Autonomous)
(Academic Year 2020-2021)

Program: Second Year Electronics and Telecommunication Engineering	**Semester: IV**
Course: Electromagnetics and Wave Propagation	**Course Code: DJ19ECC404**
Course: Electromagnetics and Wave Propagation -Tutorial	**Course Code: DJ19ECT404**

Teaching Scheme (Hours / week)				**Evaluation Scheme**						
				Semester End Examination Marks (A)			**Continuous Assessment Marks (B)**			**Total marks (A+ B)**
Lectures	**Practical**	**Tutorial**	**Total Credits**	**Theory**			**Term Test 1**	**Term Test 2**	**Avg.**	
				75			**25**	**25**	**25**	**100**
				Laboratory Examination			**Term work**		**Total Term work**	**25**
3	**-**	**2***	**3+1=4**	**Oral**	**Practical**	**Oral & Practical**	**Laboratory**	**Tutorial / Mini project / presentation/ Journal**		
				-	-	-	-	**25**	**25**	

***Batch wise Tutorial of two hours**

Pre-requisite:

1. Engineering Mathematics-III

Objectives:

1. To learn concept of static and time varying electromagnetic fields.
2. To solve problems related to EM fields using Vectors and Partial differential equations.
3. To learn Electromagnetic radiation and propagation in space and within transmission lines.

Outcomes: On completion of the course, learner will be able to:

1. Compute electric and magnetic fields for symmetrical charge and current configurations using basic principles of electromagnetics.
2. Explain coupling between electric and magnetic fields through Faraday's law, displacement current and Maxwell's equations.
3. Explain Wave Polarization and propagation in different media.
4. Determine the parameters of transmission lines for various frequencies.

Detailed Syllabus: (unit wise)		
Unit	**Description**	**Duration**
1	**Electrostatics:** Coulomb's Law, Gauss's Law and its applications, Electric Potential, Electric Dipole Properties of Materials, Convection and Conduction Currents, Conductors, DielectricPolarization, Electric Boundary Conditions, Poisson's and Laplace's Equations, Resistance andCapacitance.	**10**
2	**Magnetostatics:** Biot - Savart's Law, Ampere's Circuital Law and its applications, Magnetic Flux density, Magnetic Scalar and Vector potentials Forces due to magnetic fields, Torque and Moment, Magnetic dipole, Classification of Magnetic materials, Magnetic boundary conditions.	**08**
3	**Time varying Fields:** Faraday's Law, Transformer and Motional Electromotive Forces, Displacement Current, Maxwell's equations in point form and integral form, Boundary conditions for time varying field, magnetic vector potential, Time-harmonic field.	**08**
4	**Electromagnetic Wave Propagation:** Derivation of Wave equation and its solution, Wave Propagation in lossy dielectrics, Plane waves in loss less dielectrics, free space and good conductors, Wave Polarization, Power and Poynting Vector and skin depth, Reflection of a Plane wave at normal incidence and oblique incidence. Ground Wave Propagation: Ground waves, effect of Earth's Curvature on Ground wave propagation, impact of imperfect earth. Sky Wave Propagation Ionosphere and Earth magnetic field effect, Critical frequency, Angle of incidence, Maximum usable frequency, Skip distance, Virtual height, Variations in ionosphere and Attenuation and fading of waves in ionosphereSpace Wave Propagation.	**12**
5	**Transmission Lines:** Parameters, Transmission line equations, Input impedance, reflection coefficient, Standing wave ratio.	**04**

List of Tutorials: (minimum eight)

1. Numerical problems based on Electrostatics
2. Numerical problems based on Electric Boundary conditions
3. Numerical problems based on Poisson's and Laplace's Equations
4. Numerical problems based on Magnetostatics
5. Numerical problems based on Vector Potentials
6. Numerical problems based on Maxwell Equations
7. Numerical problems based on calculation of Transmission line impedance
8. Numerical problems based on Transmission line reflection coefficient calculations
9. Numerical problems based on Wave Propagation in different material
10. Numerical problems based on Normal and Oblique incidence
11. Numerical problems based on Sky and Space wave propagation

Books Recommended:

Text books:

1. Matthew N. O.Sadiku, S.V.Kulkarni, *Principles of Electromagnetics*, 6th Edn, Oxford University Press.
2. William H. Hayt and John A Buck, *Engineering Electromagnetics*, 7th Edn, Tata McGraw Hill.
3. Edward C. Jordan, Keth G. Balmin, *Electromagnetic Waves & Radiating Systems*, 2nd Edn, Pearson Publications.
4. R. K. Shevgaonkar, *Electromagnetic Waves*, 3rd Edn, Tata McGraw Hill.

Reference books:

1. J.D. Krauss and Daniel Fleisch, *Electromagnetics with applications*, 5th Edn, McGraw Hill Education.
2. Bhag Singh Guru, Hüseyin R. Hiziroglu , *Electromagnetic Field Theory Fundamentals*, 2nd Edn, Cambridge University Press.
3. Joseph Edminister, Mahmood Nahvi, *Electromagnetics*, 4th Edn, Schaum Outline Series.
4. David K. Cheng, *Fundamentals of Electromagnetics*, 1st Edn, Addison Wesley, MA.
5. David M. Pozar, *Microwave Engineering*, 4th Edn, Wiley.

Evaluation Scheme:

Semester End Examination (A):

Theory:

1. Question paper will be based on the entire syllabus summing up to 75 marks
2. Total duration allotted for writing the paper is 3 hrs.

Continuous Assessment (B):

Theory:

1. Two term tests of 25 marks each will be conducted during the semester out of which, one will be a compulsory term test (on minimum 02 Modules) and the other can either be a term test or an assignment on live problems or a course project.
2. Total duration allotted for writing each of the paper is 1 hr.
3. Average of the marks scored in both the tests will be considered for final grading.

Tutorial (Term work):

Term work shall consist of minimum 8 tutorials two hours per batch lab wise and minimum 2 assignments.

The distribution of marks for term work shall be as follows:

i. Tutorial solving in lab (accuracy, Timely submission): 15 Marks
ii. Assignments: 10 marks

The final certification and acceptance of term work will be subject to satisfactory submission of tutorials and assignments.

Prepared by Checked by Head of the Department Principal

Syllabus for Second Year Electronics and Telecommunication Engineering-Semester IV (Autonomous)
(Academic Year 2020-2021)

<table>
<tr><td colspan="8">Program: Second Year Electronics & Telecommunication Engineering</td><td colspan="2">Semester: IV</td></tr>
<tr><td colspan="8">Course: Python Programming - Laboratory</td><td colspan="2">Course Code: DJ19ECL405</td></tr>
<tr><td colspan="4" rowspan="2">Teaching Scheme
(Hours / week)</td><td colspan="6">Evaluation Scheme</td></tr>
<tr><td colspan="3">Semester End Examination Marks (A)</td><td colspan="3">Continuous Assessment Marks (B)</td><td rowspan="2">Total marks (A+ B)</td></tr>
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<tr><td colspan="3">Laboratory Examination</td><td colspan="2">Term work</td><td rowspan="2">Total Term work</td><td rowspan="3">50</td></tr>
<tr><td rowspan="2">--</td><td rowspan="2">2</td><td rowspan="2">--</td><td rowspan="2">1</td><td>Oral</td><td>Practical</td><td>Oral & Practical</td><td>Laboratory</td><td>Mini project / presentation/ Journal</td></tr>
<tr><td></td><td>25</td><td>--</td><td>15</td><td>10</td><td>25</td></tr>
</table>

Pre-requisite:

1. Object Oriented Programming Laboratory

Objectives: The objective of this course is to get the students acquainted with

1. Python programming basics, Functions in Python and files handling.
2. GUI Programming and Databases operations in Python.
3. Network Programming in Python.

Outcomes: On completion of the course, learner will be able to:

1. Describe the various data types, dictionaries and regular expressions in Python.
2. Describe different control statements, conditional statements and functions in Python.
3. Realize and encapsulate different File handling and exception handling operations using Python.
4. Design GUI, estimate different database operations and array handling in Python.
5. Design and develop network applications using Python.

Detailed Syllabus: (unit wise)		
Unit	**Description**	**Duration**
1	**Introduction to Python:** History of Python, Data types & Regular expression Basic Data types identifiers, Basic Data types, Integer Data Type, Float and Complex Data Type, Mathematical Functions, String Data Types, String Manipulation Functions, String Slices Basic Data Types Collections Lists: Working with Lists, Basic Operations, Sorting, Count & Append, List Comprehension Dictionary: Definition, Update dictionary, Dictionary Comprehension Sets, Tuples and Frozen Sets Conversion of List to Dictionary Regular Expressions: Match function, Search Function, Modifiers, Patterns. **List of Suggested Practical (Any three)** 1. To read a number 'n' and print patterns 2. Program to map a list into a dictionary and vice versa 3. Program to study list and dictionary comprehension 4. To implement different string manipulation functions. 5. To count the number of letters/ vowels/ consonants in a string or a list or a dictionary. (Multiple variations of the above suggested programs can be performed)	**06**
2	**Control statements and Functions in Python:** While, for, Nested loops. Use of Continue, Pass and Break statement. Range function Conditional Statements: if, else, elif, nested if and Switch Case statements Function arguments pass by value and reference, Recursive Functions. **List of Suggested Practical (Any three)** Use of the control statements to implement :- 1. Factorial of a number 2. Palindrome of number or a string 3. Fibonacci series 4. Sine and Cosine series 5. Pythagoras triplets 6. Any one program to demonstrate the method of recursive functions	**06**

3	**Files Directories & Flow control:** Making and List directories, Changing directory, List files in directories. File & Directory manipulation, File functions, File object attributes, close () method, Opening a binary file, File Attributes, read (read_fixed_size) readline ( ) tell (). Read data from keyboard. File handling: Opening and closing file, Reading and writing files. Exception Handling, Except Clause, User defined Exceptions **List of Suggested Practical (Any three)** 1. Open a file and read the contents of a file and print 2. Open a file and write to a file (overwrite and append). 3. Open a file and count the characters present in the file. 4. Program to demonstrate Exception Handling 5. Splitting of lines by file handling.	**06**
4	**Python Database (Any Two):** Introduction, Connections and Executing queries, Transactions and Handling Errors Introduction to GUI Programming. **List of Suggested Practical:-** 1. Install MySQLdb 2. Establish database connection 3. Creating Database Table. 4. Use of Insert/Read/Update Operations in database	**04**
5	Working with numpy, constructing numpy arrays, Printing arrays, Arithmetic operations on matrix, Slicing Arrays, Random number generation. Working with Matplotlib, and pandas: Installation and implementation **List of Suggested Practical (Any Two**) 1. Data visualization with matplotlib. 2. Array manipulation/strings/indexing/slicing and other numpy library functions 3. Histogram using matplotlib. 4. Statistical functions in numpy. 5. Any one toolkits to extend python matplotlib functionality	**04**
6	Python for Networking Socket, Socket Module Clients and Server, Internet Modules. **List of Suggested Practical (Any Two)** 1. The socket Module 2. Client Socket Methods 3. A Simple Client 4. A simple server 5. Sending Email using SMTP	**04**

Suggested List of Laboratory Experiments:

1. Installing python and setting up environment. Simple statements like printing the names, numbers, mathematical calculations, etc.
2. Programs related to string manipulation.
3. Programs Lists, Tuples, Sets, arrays and dictionaries.
4. Programs based on various loops, conditional constructs and functions.
5. PYTHON program to update in the file "friendsContact.txt" which has name and contact and change the number of an old contact.
6. Demonstrate Amplitude-Shift-Keying (ASK) or On-Off Keying (OOK).
7. Compute the spectrum of the above OOK signal using FFT and plot its magnitude.
8. Write a program to demonstrate the BPSK signal of sequence [1 0 0 0 1 0 1 0 0 1].
9. Compute the spectrum of the above BPSK signal.
10. Write python programs to understand TCP and UDP Sockets in Python
11. Examples Illustrating broadcasting in Python (one for each rule of broadcasting).

Books Recommended:

Text Books:

1. James Payne, *Beginning Python: Using Python 2.6 and Python 3.1*, 2010, Wrox Publication

2. Dr. R. Nageswara Rao, *Core Python Programming*, 2021, Dreamtech Press, Wiley Publication.

3. Magnus Lie Hetland, *Beginning Python from Novice to Professional*, 2nd Edn, Apress Publication.

4. Charles Dierbach, *Introduction to Computer Science using Python*, 2013Wiley.

Reference Books:

1. Wesley J Chun, *Core Python Applications Programming*, 3rd Edn Pearson Publication.

2.E. Balaguruswamy, *Introduction to Computing and Problem Solving using Python*, 2017, McGraw Hill Education India Pvt. Ltd.

Evaluation Scheme:

Semester End Examination (A):

Laboratory:

Practical examination will be based on the entire syllabus including the practical performed during laboratory sessions.

Continuous Assessment (B):

Laboratory: (Term work)

Term work shall consist of minimum eight experiments and one Mini Project.

The distribution of marks for term work shall be as follows:

i. Laboratory work (Performance of Experiments and Mini-Project): 15 Marks
ii. Journal Documentation (Write-up, Timely submission) :10 marks

The final certification and acceptance of term work will be subject to satisfactory performance of laboratory work and upon fulfilling minimum passing criteria in the term work.

Prepared by Checked by Head of the Department Principal

Syllabus for Second Year Electronics and Telecommunication Engineering-Semester IV (Autonomous)
(Academic Year 2020-2021)

Program: Common for all program	**Semester: IV**
Course: Universal Human Values	**Course Code: DJ19IHC1**
Course: Universal Human Values -Tutorial	**Course Code: DJ19IHT1**

Teaching Scheme (Hours / week)				**Evaluation Scheme**						
				Semester End Examination Marks (A)			**Continuous Assessment Marks (B)**			**Total marks (A+ B)**
Lectures	**Practical**	**Tutorial**	**Total Credits**	**Theory**			**Term Test 1**	**Term Test 2**	**Avg.**	
				75			**25**	**25**	**25**	**100**
				Laboratory Examination						
2	**--**	**1**	**2+1=3**	**Oral**	**Practical**	**Oral & Practical**	**Total Term work (C)**			**125**
				--	--	--	**25**			

Objectives:

1. Development of a holistic perspective based on self-exploration about themselves (human being), family, society, and nature/existence.
2. Understanding (or developing clarity) of the harmony in the human being, family, society, and nature/existence
3. Strengthening of self-reflection.
4. Development of commitment and courage to act.

Outcomes: On completion of the course, learner will be able to:

1. Become more aware of themselves, and their surroundings (family, society, nature); they would become more responsible in life, and in handling problems with sustainable solutions, while keeping human relationships and human nature in mind. They would have better critical ability.
2. Become sensitive to their commitment towards what they have understood (human values, human relationship, and human society).
3. Apply what they have learnt to their own self in different day-to-day settings in real life, at least a beginning would be made in this direction.

Unit	Description	Duration in Hrs
1	**Introduction**: **Need, Basic Guidelines, Content and Process for Value Education:** Purpose and motivation for the course. Self-Exploration–what is it? - Its content and process; 'Natural Acceptance' and Experiential Validation- as the process for self-exploration. Continuous Happiness and Prosperity- A look at basic Human Aspirations. Right understanding, Relationship and Physical Facility- the basic requirements for fulfilment of aspirations of every human being with their correct priority. Understanding Happiness and Prosperity correctly- A critical appraisal of the current scenario. Method to fulfil the above human aspirations: understanding and living in harmony at various levels.	**05**
2	**Understanding Harmony in the Human Being - Harmony in Myself!:** Understanding human being as a co-existence of the sentient 'I' and the material 'Body'. Understanding the needs of Self ('I') and 'Body' - happiness and physical facility. Understanding the Body as an instrument of 'I' (I am being the doer, seer and enjoyer). Understanding the characteristics and activities of 'I' and harmony in 'I'. Understanding the harmony of I with the Body: Sanyam and Health; correct appraisal of Physical needs, meaning of Prosperity in detail. Programs to ensure Sanyam and Health.	**06**
3	**Understanding Harmony in the Family and Society: Harmony in Human-Human Relationship**.: Understanding values in human-human relationship; meaning of Justice (nine universal values in relationships) and program for its fulfilment to ensure mutual happiness; Trust and Respect as the foundational values of relationship. Understanding the meaning of Trust; Difference between intention and competence. Understanding the meaning of Respect, Difference between respect and differentiation; the other salient values in relationship. Understanding the harmony in the society (society being an extension of family): Resolution, Prosperity, fearlessness (trust) and co-existence as comprehensive Human Goals. Visualizing a universal harmonious order in society- Undivided Society, Universal Order- from family to world family.	**06**
4	**Understanding Harmony in the Nature and Existence: Whole existence as Coexistence:** Understanding the harmony in the Nature 19. Interconnectedness and mutual fulfilment among the four orders of nature recyclability and self-regulation in nature. Understanding Existence as Co-existence of mutually interacting units in all pervasive space. Holistic perception of harmony at all levels of existence.	**05**

5	**Implications of the above Holistic Understanding of Harmony on Professional Ethics**: Natural acceptance of human values 23. Definitiveness of Ethical Human Conduct. Basis for Humanistic Education, Humanistic Constitution and Humanistic Universal Order. Competence in professional ethics: a. Ability to utilize the professional competence for augmenting universal human order, b. Ability to identify the scope and characteristics of people friendly and eco-friendly production systems, c. Ability to identify and develop appropriate technologies and management patterns for above production systems. Case studies of typical holistic technologies, management models and production systems. Strategy for transition from the present state to Universal Human Order: a. At the level of individual: as socially and ecologically responsible engineers, technologists, and managers, b. At the level of society: as mutually enriching institutions and organizations.	**06**

Books Recommended:

Textbooks:

1. Human Values and Professional Ethics by R R Gaur, R Sangal, G P Bagaria, Excel Books, New Delhi, 2010

Reference books:

1. Jeevan Vidya: Ek Parichaya, A Nagaraj, Jeevan Vidya Prakashan, Amarkantak, 1999.
2. Human Values, A.N. Tripathi, New Age Intl. Publishers, New Delhi, 2004.
3. The Story of Stuff (Book).
4. The Story of My Experiments with Truth - by Mohandas Karamchand Gandhi
5. Small is Beautiful - E. F Schumacher.
6. Slow is Beautiful - Cecile Andrews
7. Economy of Permanence - J C Kumarappa
8. Bharat Mein Angreji Raj - PanditSunderlal
9. Rediscovering India - by Dharampal
10. Hind Swaraj or Indian Home Rule - by Mohandas K. Gandhi
11. India Wins Freedom - Maulana Abdul Kalam Azad
12. Vivekananda - Romain Rolland (English)
13. Gandhi - Romain Rolland (English)

Evaluation:

Semester End Examination (A):

Theory:

1) Question paper will be based on the entire syllabus summing up to 75 marks.
2) Total duration allotted for writing the paper is 3 hrs.

Continuous Assessment (B):

Theory:

1) Two term tests of 25 marks each will be conducted during the semester out of which; one will be a compulsory term test (on minimum 02 Modules) and the other can either be a term test or an assignment on live problems or a course project.
2) Total duration allotted for writing each of the paper is 1 hr.
3) Average of the marks scored in both the two tests will be considered for final grading.

Continuous Assessment (C):

Tutorials: (Term work)

1. Term work shall consist of minimum 4 activities based on activities suggested.
2. Term work shall carry total 25 marks based on the performance in the tutorials.

The tutorials could be conducted as per the following topics: -

Activity No 1	Practice sessions to discuss natural acceptance in human being as the innate acceptance for living with responsibility (living in relationship, harmony, and co-existence) rather than as arbitrariness in choice based on liking-disliking.
Activity No 2	Practice sessions to discuss the role others have played in making material goods available to me. Identifying from one's own life. Differentiate between prosperity and accumulation. Discuss program for ensuring health vs dealing with disease.
Activity No 3	Practice sessions to reflect on relationships in family, hostel and institute as extended family, real life examples, teacher-student relationship, goal of education etc. Gratitude as a universal value in relationships. Discuss with scenarios. Elicit examples from students' lives.
Activity No 4	Practice sessions to discuss human being as cause of imbalance in nature (film "Home" can be used), pollution, depletion of resources and role of technology etc.
Activity No 5	Practice Exercises and Case Studies will be taken up in Practice (tutorial) Sessions e.g. To discuss the conduct as an engineer or scientist etc.

The final certification and acceptance of term work will be subject to satisfactory performance of activities and upon fulfilling minimum passing criteria in the term work.

Prepared by Checked by Head of the Department Principal

Syllabus for Second Year Electronics and Telecommunication Engineering-Semester IV (Autonomous)
(Academic Year 2020-2021)

<table>
<tr><td colspan="8">Program: Second Year Electronics and Telecommunication Engineering</td><td colspan="2">Semester : IV</td></tr>
<tr><td colspan="8">Course : Innovative Product Development II</td><td colspan="2">Course Code: DJ19A4</td></tr>
<tr><td colspan="4" rowspan="2">Teaching Scheme
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<tr><td colspan="3">Laboratory Examination</td><td colspan="2">Semester review</td><td rowspan="2">Total</td><td rowspan="3">--</td></tr>
<tr><td rowspan="2">--</td><td rowspan="2">--</td><td rowspan="2">--</td><td rowspan="2">--</td><td>Oral</td><td>Practical</td><td>Oral & Practical</td><td>Review 1</td><td>Review 2</td></tr>
<tr><td>--</td><td>--</td><td>--</td><td>--</td><td>--</td><td>---</td></tr>
</table>

Pre-requisite:

1. Analog and Digital Circuit Design
2. Basic Programming Skills

Objectives:

1. To design and implement the problem statement as per the project requirement.
2. To improve the team building, communication and management skills.
3. To excel in arriving at a problem solution by making connections between the ideas and concepts across different disciplinary boundaries.
4. Consolidate learning by synthesizing ideas from many perspectives and consider an alternative way of acquiring knowledge.

Outcomes: On completion of the course, learner will be able to:

1. Apply engineering design to produce solutions that meet specified needs with consideration of cultural, social, environmental and economic factors.
2. Use project based learning that allows students to identify and transfer existing ideas into new contexts and applications thereby improving individual grooming.
3. Present their research in the form of a technical paper and thereby improve the technical communication skill.
4. Demonstrate the ability to work in teams and manage the conduct of the research study.
5. Integrate and synthesize different perspectives from relevant disciplines, which help them to get internships, jobs and admission for higher studies.

Syllabus:

Domain knowledge (and beyond as applicable) needed from the following areas for the effective implementation of the project.

Microcontroller and Embedded Systems, Signal Processing, Microwave and Antennas, Networking and Internet of Things, Data science and Big data, Communication, Web and Application development, Robotics, AI and Machine learning etc.

Above areas can be updated based on the technological innovations and development needed for specific project.

Guidelines:

The main purpose of this course is to improve the student's technical skills and paper writing skills by integrating key aspect of writing, presentation and teamwork opportunities. Each project group is already undergone project topic allotment, followed by two reviews in their third semester and during this semester, students are expected to continue the project work.

1. Each group will be reviewed twice in a semester (January and March) and grades will be allotted based on the various points mentioned in the evaluation scheme.
2. In the first review of this semester, each group is expected to complete 50% of project and write first draft of the technical paper.
3. In the second review of this semester, each group is expected to complete 80% of project and submit final draft of the technical paper.
4. The technical paper will be published in DJ Strike magazine with ISBN number.
5. The students may use this opportunity to learn different computational techniques towards the development of the product.
6. Interaction with alumni mentor will also be appreciated for the improvement of project.

Evaluation Scheme:

Semester review (B):

Each group will be reviewed twice in a semester by the faculty guide and faculty coordinators, based on the following criteria:

1. Project progress
2. Documentation/Technical paper writing
3. Key findings
4. Validation of results
5. Product Development

The final certification and acceptance is subject to satisfactory performance of the project.

Prepared by Checked by Head of the Department Principal