SYLLABUS

(Witheffectfrom2022-23)

BachelorDegree
In

Electronics & Communication Engineering

III& IV Semester

Out Come Based Education
With
Choice Based Credit System

[National Education Policy Scheme]

P.E.S. College of Engineering, Mandya -571401, Karnataka
[An Autonomous Institution affiliated to VTU, Belagavi,
Grant – in – Aid Institution (Government of Karnataka),
Accreditedby NBA (All UG Programs), NAAC and Approved by AICTE, NewDelhi]

Ph:08232-220043,Fax:08232–222075,Web:www.pescemandya.org

VISION

"PESCEshallbealeadinginstitutionimpartingqualityEngineeringandManagement education developing creative and socially responsible professionals."

MISSION

- *Provide state of the art infrastructure, motivate the faculty to be proficient in their field ofspecialization and adopt best teaching-learning practices.*
- *Impart engineering and managerial skills through competent and committed faculty usingoutcome based educational curriculum.*
- *Inculcateprofessionalethics,leadershipqualitiesandentrepreneurialskillstomeetthe societal needs.*
- *Promoteresearch,productdevelopmentandindustry-institution interaction.*

QUALITYPOLICY

Highlycommittedinprovidingquality,concurrenttechnicaleducationandcontinuouslystrivingto meet expectations of stake holders.

COREVALUES

***P**rofessionalism*
***E**mpathy*
***S**ynergy*
***C**ommitment*
***E**thics*

Department of Electronics and Communication Engineering

The department of Electronics and Communication Engineering was incepted in 1967 with an undergraduate program in Electronics and Communication Engineering. Initially, the program had an intake of 60 students, which increased to 120 in 2012, and further increased to 180 in 2019. Almost 200 students graduate every year, and the long journey of 50 years has seen satisfactory contributions to society, the nation, and the world. The alumni of this department have a strong global presence, making their alma mater proud in every sector they represent.

The department started its PG program in 2012 in the specializations of VLSI design and embedded systems. Equipped with well qualified and dedicated faculty, the department has a focus on VLSI design, embedded systems and image processing. The quality of teach in gandtraining has yieldeda high growth rate of placement at various organizations. The large number of candidates pursuing research programs (M.Sc. and Ph.D.) is a true testimonial to the research potential of the department. The department is recognized as a research centre by VTU, and Mysore University offers a part-time and full-time Ph.D. Program.

Vision

The department of E & C would endeavour to create a pool of Engineers who would be extremely competent technically, ethically strong also fulfil their obligation in terms of social responsibility.

Mission

- M1:Adoptthebestpedagogicalmethodsandprovidethebestfacility,infrastructureandan ambience Conducive to imbibe technical knowledge and practicing ethics.
- M2:Groupandindividualexercisestoinculcatehabitofanalyticalandstrategicthinkingto help the Students to develop creative thinking and instil team skills
- M3:MoUsandSponsoredprojectswithindustryandR&Dorganizationsforcollaborative learning
- M4:Enablingandencouragingstudentsforcontinuingeducationandmouldingthemforlife- long Learning process

ProgramEducationalObjectives (PEOs)

- **PEO1:** Graduates to exhibit knowledge in mathematics, engineering fundamentals applied to Electronics and Communication Engineering for professional achievement in industry, research and academia
- **PEO2:** Graduates to identify, analyse and apply engineering concepts for design ofElectronics and Communication Engineering systems and demonstrate multidisciplinary expertise to handle societal needs and meet contemporary requirements
- **PEO3:** Graduates to perform with leadership qualities, team spirit, management skills,attitude and ethics need for successful career, sustained learning and entrepreneurship.

ProgramOutcomes(POs)

- **Engineering knowledge:**Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
- **Problem analysis:** Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
- **Design/development of solutions:**Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
- **Conductinvestigationsof complexproblems:**Useresearch-basedknowledgeandresearch methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
- **Modern tool usage:**Create, select, and apply appropriate techniques, resources, andmodern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
- **The engineer and society:**Apply reasoning informed by the contextual knowledge toassess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
- **Environment and sustainability:**Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
- **Ethics:**Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
- **Individual and team work:**Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
- **Communication:**Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and writeeffectivereportsanddesigndocumentation,makeeffectivepresentations,andgiveand receive clear instructions.
- **Project management and finance:**Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a memberand leader in a team, to manage projects and in multidisciplinary environments.
- **Life-long learning:**Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

ProgramSpecificOutcomes(PSOs)

Electronics and Communication Engineering Graduates will be able to

- **PSO1:** An ability to understand the basic concepts in Electronics and Communication Engineering and to apply them in the design and implementation of Electronics and Communication Systems.
- **PSO2:** An ability to solve complex problems in Electronics and Communication Engineering, using latest hardware and software tools, along with analytical skills to arrive at appropriate solutions.

Bachelor of Engineering(III–Semester)										
Sl. No.	Course Code	Course Title	Teaching Department	Hrs/Week			Credits	Examination Marks		
				L	T	P		CIE	SEE	Total
1	P21MA301	Transform and Numerical Analysis	MA	2	2	-	3	50	50	100
2	P21EC302	Linear Integrated Circuits	EC	3	-	-	3	50	50	100
3	P21EC303	Circuit Theory	EC	3	-	-	3	50	50	100
4	P21EC304	Digital Logic design	EC	3	-	2	4	50	50	100
5	P21EC305	Signals and Systems	EC	3	-	2	4	50	50	100
6	P21ECL306	Linear Integrated Circuits Laboratory	EC	-	-	2	1	50	50	100
7	P21KSK307	Samskrutika Kannada/	HSMC	-	2	-	1	50	50	100
	P21KBK307	Balake Kannada								
	OR									
	P21CIP307	Constitution of India and Professional Ethics	HSMC	-	2	-	1	50	50	100
8	P21HSMC308	Employability Enhancement Skills-III	HSMC	-	2	-	1	50	50	100
9.	P21AEC309	Innovation and Design Thinking	EC	-	2	-	1	50	50	100
Total							**21**			

10	P21MDIP301	Basic Engineering Mathematics-I	MA	2	2	-	0	100	-	100
11	P21HDIP308	Employability Enhancement Skills-I	HSMC	-	2	-	0	100	-	100

Bachelor of Engineering(IV–Semester)										
Sl. No.	Course Code	Course Title	Teaching Department	Hrs/Week			Credits	Examination Marks		
				L	T	P		CIE	SEE	Total
1	P21MA401	Applied Mathematical Methods	MA	2	2	-	3	50	50	100
2	P21EC402	Analog and Digital Communication	EC	3	-	-	3	50	50	100
3	P21EC403	Electromagnetic field theory	EC	3	-	-	3	50	50	100
4	P21EC404	Digital Design Using Verilog HDL	EC	3	-	2	4	50	50	100
5	P21EC405	Microcontroller	EC	3	-	2	4	50	50	100
6	P21ECL406	Analog and Digital Communication Laboratory	EC	-	-	2	1	50	50	100
7	P21KSK407	Samskrutika Kannada/	HSMC	-	2	-	1	50	50	100
	P21KBK407	Balake Kannada								
	OR									
	P21CIP407	Constitution of India and Professional Ethics	HSMC	-	2	-	1	50	50	100
8	P21HSMC408	Employability Enhancement Skills-IV	HSMC	-	2	-	1	50	50	100
9.	P21INT409	Internship–I	EC	-	-	-	1	-	100	100
Total							**21**			

10	P21MDIP401	Basic Engineering Mathematics-II	MA	2	2	-	0	100	-	100
11	P21HDIP408	Employability Enhancement Skills–II	HSMC	-	2	-	0	100	-	100

L–Lecture,T–Tutorial,P-Practical/Drawing,CIE:ContinuousInternalEvaluation,SEE:Semester End Examination

TransformandNumericalAnalysis
[AsperChoiceBasedCreditSystem(CBCS) &OBE Scheme]
SEMESTER–III

Course Code:	**P21MA301**	**Credits:**	**03**
TeachingHours/Week(L:T:P):	**2-2-0**	**CIE Marks:**	**50**
TotalNumberof TeachingHours:	**40**	**SEE Marks:**	**50**

CourseLearning Objectives:

- Adequateexposuretobasicsofengineeringmathematicssoastoenablethemto visualizetheapplications to engineering problems
- Analyze periodic phenomena using concept of Fourier series, series solution of Engineering problems
- Understand Fourier transforms of functions and use it to solve initial value, boundary value problems.
- ApplyZ-TransformtechniquetoSolvedifferenceequationsandNumericalTechnique to estimate interpolation, Extrapolation and area - (All formulae without proof)-problemsonly
- UsemathematicalITtoolstoanalyzeandvisualizetheaboveconcepts.

UNIT– I	**8 Hours**

Fourier Series: Introduction, periodic function, evenand oddfunctions, properties.Special waveforms - square wave, half wave rectifier, saw-tooth wave and triangular wave. Dirichlet's conditions, Euler's formula for Fourier series (no proof). F urier series for functions of period 2L (all particular cases) – problems, Half Range Fourier series-ConstructionofHalfrangecosineandsineseriesandproblemsPracticalharmonicanalysis-Illustrative examples from engineering field.

Self-study component:	DeriveEuler's formula,Fourierseries incomplexform.

UNIT– II	**8 Hours**

Partialdifferentialequations(PDE's):
Formation of PDE's. Solution of non-homogeneous PDE by direct integration. Solutions of homogeneous PDE involving derivative with respect to one independent variable only, Method of separation of variables(first and second order equations).

ApplicationsofPDE's:VariousPossiblesolutionofPDE's
Classification of second order PDE, various possible solutions for One- dimensional wave and heat equations, by the method of separation ofvariables. Solution of all these equations withspecifiedboundaryconditions(Boundaryvalueproblems).Illustrativeexamplesfrom engineeringfield.

Self-study component:	Charpit'sMethod-simpleproblem.VariouspossiblesolutionsofTwo dimensional Laplace equation.

UNIT– III	**8 Hours**

FiniteDifferencesandInterpolation:Forwardandbackwarddifferences,Interpolation, Newton-Gregoryforwardandbackwardinterpolationformulae,Lagrange'sinterpolation formulaandNewton'sdivideddifferenceinterpolationformula(Allformulaewithout

proof)-problemsonly. **NumericalDifferentiation**:DerivativesusingNewton-Gregoryforwardandbackward interpolation formulae, Applications to Maxima and Minima of atabulated function. **NumericalIntegration:**Newton-Cotesquadratureformula,Simpson's1/3rdruleand Simpson's 3/8th rule. Weddle's rule (All rules without proof)-	
Self-study component:	InverseLagrange'sInterpolationformula,Central differences.
UNIT– IV	**8 Hours**
Fourier Transforms: InfiniteFouriertransforms.Properties-linearity,scaling,shiftingand modulation (no proof), Fourier sine and cosine transforms. Inverse Fourier Transforms, Inverse Fourier cosine and sine transforms. Problems. Convolution theorem and Parseval's Identity (noproof)-problems.	
Self-study component:	Finite Fourier transform, Fourier transform of derivatives of functions
UNIT– V	**8 Hours**
Z-Transforms: Definition.Z-transformsofbasicsequencesandstandardfunctions.Properties-linearity,scaling,Dampingrule,first andsecondshifting,multiplicationby*n*, initial and final value theorem (statement only)-problems.Inverse Z-transforms- problems. **Difference Equations:** Definition. Formation of Difference equations, Linear &simultaneous linear difference equations with constant coefficients-problems, Solutions of difference equations using Z- transforms.	
Self-study component:	Convolutiontheorem and problems, Applicationto deflectionofa loaded string.
CourseOutcomes: On completionofthecourse,studentshould beableto:	
CO1	**Analyze**engineeringproblemsusingthefundamentalconceptsinFourierseries, FourierTransformsandBasicsideasofPDE's.
CO2	**Explain** various methods tofindtheFourierconstants, solution of PDE's, Estimationofinterpolationandfindthe area,solutionofdifference equations.
CO3	**Apply**theacquiredknowledgetoconstructtheHalf-rangeFourierseries,FindingFourier transformsandInverseLaplacetransformsforsomestandardfunctions.
CO4	**Evaluate**Z-transformofvariousfunctions,solutionsofdifferentialequationswithinitial andboundaryconditions.

TEXTBOOKS

1. B.S.Grewal,HigherEngineeringMathematics (44thEdition2018),KhannaPublishers, New Delhi.
2. E.Kreysizig,Advanced EngineeringMathematics,JohnWileyandsons,10thEd.(Reprint) 2016.

REFERENCE BOOKS

1. V.Ramana:HigherEngineeringMathematics,McGraw–HillEducation,11thEd..
2. H.C.Taneja,AdvancedEngineeringMathematics,Volume I&II,I.K.

InternationalPublishingHousePvt.Ltd.,NewDelhi.
3.N.P.BaliandManishGoyal,AtextbookofEngineering Mathematics,
Laxmi Publications,Reprint, 2010.

ONLINERESOURCES

1. http://www.nptel.ac.in
2. https://en.wikipedia.org
3. https://ocw.mit.edu/courses/18-085-computational-science-and-engineering-i-fall-2008/resources/lecture-28- fourier-series-part-1/
4. https://www.thefouriertransform.com/
5. http://mcatutorials.com/mca-tutorials-numerical-methods-tutorial.php

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	**2**	**2**										
CO2	**2**	**3**										
CO3	**3**	**2**										
CO4	**2**	**3**										
Strengthofcorrelation: Low-1,Medium-2,High-3												

LinearIntegratedCircuits
[AsperChoiceBasedCreditSystem(CBCS) &OBE Scheme]
SEMESTER–III

Course Code:	**P21EC302**	**Credits:**	**03**
TeachingHours/Week(L:T:P):	**3 : 0: 0**	**CIE Marks:**	**50**
TotalNumberof TeachingHours:	**40**	**SEE Marks:**	**50**

CourseLearningObjectives: Thiscoursewillenable thestudents to:

- Understandthe basicoperation ofOp–Ampand itsoperation as DCand AC amplifiers.
- UnderstandthevariousapplicationsofOp-Amplikeinvertingamplifier,non–inverting amplifier, voltage follower, summing amplifier and difference amplifier.
- Understandthevoltagesources,currentsources,currentamplifiers,Circuitstabilityand Frequency compensation methods.
- UnderstandtheoperationofOpAmpbaseddifferentiating,integratingandSchmitt trigger circuits.
- Knowtheapplicationsof555timersuchasmonostable,astablemultivibratorsanduseof Op–Amps in signal generators, filters and DC voltage regulators.
- ExplainingtheoperationofADC,DACandPLL.

UNIT– I	**8 Hours**

Operational Amplifier Fundamentals: IC Operational amplifiers, Op–Amp parameters – Input, outputandsupplyvoltages,Offsetvoltages and currents,Slew rate and frequencylimitation. **Op–Amps as DC Amplifiers**– Biasing Op–Amps, Direct coupled –Voltage Follower, Direct–Coupled Non–inverting Amplifiers, Direct–Coupled Inverting amplifiers, Summing amplifiers, Difference amplifier.

Op–Amps as AC Amplifiers: Capacitor coupled Voltage Follower, Capacitor Coupled Non–inverting Amplifier, Capacitor Coupled Inverting Amplifier, Capacitor Coupled Difference amplifier.

Text1:1.1, 2.3, 2.4, 2.6,3.1, 3.2, 3.3, 3.4, 3.6, 3.7, 4.1, 4.3, 4.5, 4.7.

Self-study component:	1. Studyofinstrumentationamplifier. 2. StudyofHighInputImpedanceCapacitorCoupledVoltage Follower.

UNIT– II	**8 Hours**

Op–Amps Frequency Response and Compensation: Op-Amp Circuit Stability, Frequency Compensation Methods, Circuit Stability Precautions.

OP–AMP Applications: Voltage Sources, Current Sources and Current Sinks, Current Amplifiers, Voltage Level Detectors, Inverting Schmitt Trigger Circuit, Differentiating Circuit, Integrating Circuit.

Text1:5.1, 5.2, 5.6,7.1,7.2, 7.3,8.2, 8.3, 8.6, 8.7.

Self-study component:	**1.** StudyofLogandAnti-log amplifiers. **2.** Studyof Circuit Bandwidth and Slewrate.

UNIT– III	**8 Hours**
Signal Processing Circuits: Precision Half–Wave Rectifiers: Saturating Precision Rectifier and Non saturating Precision Rectifier, Precision Full–Wave Rectifiers: Half wave and summing circuit, Limiting circuits: Peak Clipper and precision clipper, Clamping circuits, Peak detectors: Precisionrectifierpeakdetector,SampleandHoldCircuits,AstableMultivibratorusingOp-Amp, Triangular wave generator **Text1:**9.1,9.2.9.3(Mentionedtopicsonly), 9.4,9.5(Mentionedtopicsonly),9.6,10.1, 10.3.	
Self-study component:	**1.** StudyMonostable Multivibrator usingOp-Amp. **2.** Studyof DeadZoneCircuit
UNIT– IV	**8 Hours**
Signal Generators: 555 Timer Monostable, 555 Timer Astable, Phase Shift and Quadrature Oscillators, Colpitts and HartleyOscillators, **Active Filters –**Filter types and characteristics, First order active filter, Second Order active filters. **DC Voltage Regulators:** Voltage Regulator Basics, Op–Amp Series Voltage Regulator, Adjustable Output Regulators, IC linear Voltage Regulators: 723 IC regulator and LM 317 IC regulator. **Text1:**10.6, 10.7,11.1,11.2,12.1, 12.2,12.3, 13.1,13.2, 13.3,13.5(Mentioned topics only)	
Self-study component:	1. Studyof Band pass andBand reject filter usingOp-amp. 2. StudyofLM337 ICregulatorand IC FunctionGenerator(IC8038).
UNIT– V	**8 Hours**
DAC and ADC: Analog/Digital Conversion Basics, Digital-To-Analog Conversion, Parallel ADC,ADC Counting Methods: Dual-Slope Integrator ADC, Digital Ramp ADC(Mentioned topics only). **PLL:**BasicPLLSystem,PLLComponents,PLLPerformanceFactors,IntegratedCircuitPLL **Text1**:15.1,15.2,15.3,15.4(Mentioned topicsonly),16.1,16.2,16.3, 16.5	
Self-study component:	1. StudyofLinear Ramp ADC. 2. Studyof applications ofPLL

CourseOutcomes: Oncompletionofthiscourse,studentsareable to:

COs	**CourseOutcomes**with***Actionverbs***** forthe Course topics	**Bloom's TaxonomyLevel**	**Program Outcome Addressed(PO#) with BTL**
CO1	**Apply** the knowledge of basic circuit concepts to describetheoperationandcharacteristicsofOp-Amps.	Remember	L3(PO1)
CO2	**Discuss**theworkingofop-ampapplications, signalgenerators,voltageregulators,ADC,DAC andPLL.	Understanding	L3(PO2)
CO3	**Analyze**theCircuitstabilityandFrequency	Understanding	L3(PO2)

	compensationmethods,andapplicationsofop-amps.		
CO4	**Design** the different op-amp applications circuits, signalgenerators,voltageregulators,ADC,DAC andPLLsystemsfor agiven specifications.	Applying	L4(PO3)
CO5	**Designanddevelop**thegivenop-ampcircuits andalsosimulatethesameusinganysimulation toolsas an individualorin a group.	Applying	L3(PO5,PO9, PO12)

TextBook(s):

1. **"OperationalAmplifiersandLinearIC's"**,DavidA.Bell,3rdedition,Oxforduniversity Press, 2011.ISBN-13: 978-0-19-569613-4 ISBN-10: 0-19-569613-1

ReferenceBook(s):

1. **"Linear Integrated Circuits",** D. Roy Choudhury and Shail B. Jain, 2nd edition, Reprint 2006, New Age International. ISBN-10: 8122430988: ISBN-13: 978-8122430981
2. **"Op–AmpsandLinearIntegratedCircuits",**RamakantA.Gayakwad,4thedition, PHI.

WebandVideo link(s):

1. AnalogElectronicCircuit-https://youtu.be/pkIxCmaxWFg
2. DifferentialandOperationalAmplifiers-https://youtu.be/LS8ne40mSTE

E-Books/Resources:

1. https://www2.mvcc.edu/users/faculty/jfiore/OpAmps/OperationalAmplifiersAndLinearICs_3E.pdf
2. https://books.google.co.in/books?id=aByz9D63wC&printsec=frontcover#v=onepage&q&f=false
3. https://drive.google.com/u/0/uc?id=1cK8mBJXxeFyNENRFYzSuqLCHWsqyRzzp&export=download

D.CourseArticulationMatrix(CAM)

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
#1	2												2	
#2		3												3
#3		2												2
#4			3											
#5					2				2			1		

CircuitTheory
[AsperChoiceBasedCreditSystem(CBCS) &OBE Scheme]
SEMESTER–III

Course Code:	**P21EC303**	**Credits:**	**03**
TeachingHours/Week(L:T:P):	**3 : 0: 0**	**CIE Marks:**	**50**
TotalNumberof TeachingHours:	**40**	**SEE Marks:**	**50**

CourseLearningObjectives: Thiscoursewillenable thestudents to:

- Understand electrical circuits, their sources and transformations and also their analysis and solutions through node analysis and mesh analysis methods, various network theorems (ac and dc) to analyze complex circuits.
- Analyze the transient conditions that may occur in electrical networks by solving necessary differential equations.
- Provideexplanationof Laplacetransformanditsapplicationinsolvingcircuitproblems.
- DeterminetransientresponseofelectricalcircuitsbyLaplacetransformmethod.
- Examinethebehaviourof two-portnetworksandlearn aboutfewspecialtwo-port networks.
- Demonstrate that the graph theory concept eases the solution method for solving networkswith a large number of nodes and branches.
- Discussthevarious properties and synthesismethods fordifferent one-portnetworks

UNIT– I	**8 Hours**

IntroductiontoNetworkTheorems: MeshAnalysis,NodeAnalysis,SuperpositionTheorem, Thevenin's Theorem, Norton's Theorem, Maximum Power Transfer Theorem, Reciprocity Theorem.

Text:6.1, 6.2,6.3, 6.4, 6.5,6.6, 6.7, 6.8

Self-studycomponent:	SourceTransformation, StarDeltaTransformation,Millman's Theorem, Substitution Theorem.

UNIT– II	**8 Hours**

IntroductiontoResonance: SeriesResonance,Parallel Resonance
IntroductiontoTransientAnalysis: InitialConditions,Resistor-InductorCircuit,Resistor- Capacitor Circuit, Resistor-Inductor- Capacitor Circuit.

Text: 5.1, 5.2, 5.3, 10.1,10.2, 10.3, 10.4, 10.5

Self-studycomponent:	ComparisonofSeriesandParallelResonanceCircuits,Behaviourof Pure Resistor in an ac Circuit, Behaviour of Pure Inductor in an ac Circuit,BehaviourofPureCapacitorinanac Circuit.

UNIT– III	**8 Hours**

Introduction to Laplace Transforms and its Applications: Laplace transforms of Periodic Functions, Waveform Synthesis, The Transformed Circuit, Resistor-Inductor Circuit, Resistor-Capacitor Circuit, Resistor-Inductor- Capacitor Circuit, Response of RL Circuit to Various Functions, Response of RC Circuit to Various Functions.

Text:11.1, 11.5, 11.6,11.10, 11.11, 11.12,11.13, 11.14, 11.15

Self-studycomponent:	WriteprogramsinMATLAB/PYTHONtosynthesisthewaveforms.

UNIT– IV	**8 Hours**

IntroductiontoNetworkTopology: GraphofaNetwork,DefinitionsAssociatedwithaGraph, Incidence Matrix, Loop Matrix or Circuit Matrix, Cutset Matrix,
Introduction to Two-Port Networks: Open-Circuit Impedance Parameters (Z Parameters), Short-Circuit Admittance Parameters (Y Parameters), Transmission Parameters (ABCD Parameters), Hybrid Parameters (h parameters).

Text:9.1, 9.2, 9.3,9.4, 9.5, 9.6, 13.1,13.2, 13.3, 13.4, 13.6

Self-studycomponent:	Duality,Inter-relationshipsbetweenthe Parameters.

UNIT– V	**8 Hours**

IntroductiontoNetworkSynthesis: Hurwitz Polynomials, Positive Real Functions, Elementary Synthesis Concepts, Realization of LC Functions, Realization of RC Functions.

Text:16.1, 16.2,16.3, 16.4,16.5, 16.6, 16.7

Self-studycomponent:	PassiveFilters,Realization ofRLFunctions

CourseOutcomes: Oncompletionofthiscourse,studentsareable to:

COs	**CourseOutcomes**with***Actionverbs***fortheCoursetopics**	**Bloom's Taxonomy Level**	**Program Outcome Addressed(PO#) withBTL**
CO1	Abilityto**apply**thefundamentalconceptsinsolvingand analyzingdifferentElectricalnetworks	Remember	L3(PO1)
CO2	Abilityto**solve**circuits usingappropriate technique	Understanding	L3(PO2)
CO3	Ability to **apply** mathematics in analyzing and synthesizingthe networks in timeand frequencydomain	Understanding	L3(PO2)
CO4	Abilityto**analyze**theperformanceofaparticular network	Applying	L4(PO3)
CO5	Abilityto**formulate**varioussynthesismethodsfor differentone-port networks	Applying	L3(PO5,PO9,PO12)

TextBook(s):

1. NetworkAnalysisandSynthesis,RavishR Singh, McGrawHillEducation(India)PrivateLimited. ISBN:978-1259062957

ReferenceBook(s):

1. Networkanalysis,3E,M.E.VanValkenburgandT.S.Rathore, Pearson Education. ISBN: 978-9353433123
2. EngineeringCircuitAnalysis,9E,William H.HaytJr.,JackE. Kemmerly, JamieD.Phillips,StevenM.Durbin,McGrawHillEducation(India)PrivateLimited. ISBN: 978-9390185139

3.ProblemsandSolutionsinEngineeringCircuitAnalysis,WilliamHayt,JackKemmerly, McGraw Hill Education (India) Private Limited. ISBN: 978-0071333030
WebandVideo link(s): https://archive.nptel.ac.in/courses/108/105/108105159/ NetworkAnalysisbyProf.TapasKumarBhattacharya, IIT Kharagpur
E-Books/Resources:

D.CourseArticulationMatrix (CAM)

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
#1	2												2	
#2		3												3
#3		2							1			1		2
#4			3											
#5					2				2			1		

DigitalLogicDesign
[AsperChoiceBasedCreditSystem(CBCS) & OBE Scheme]
SEMESTER–III

Course Code:	**P21EC304**	**Credits:**	**04**
TeachingHours/Week(L:T:P):	**3 : 0: 2**	**CIE Marks:**	**50**
TotalTheoryTeachingHours: **TotalLaboratoryHours:**	**40** **24**	**SEE Marks:**	**50**

CourseLearningObjectives: Thiscoursewillenable thestudents to:

- DiscussthesimplificationtechniquessuchasK–map,QMmethodandVEM Technique.
- Designandimplementthecombinationallogiccircuits.
- Analyzethesequentialelementsandsequentialcircuits.
- Designandimplementthesequentiallogiccircuits.
- Developdigitalcircuits/systemsapplyingfinitestatemachine approach.
- DiscussthestructureofComputerarchitecture,ROM,PLAandFPGAwithlogic Implementation.

UNIT– I	**8 Hours**

Simplification Methods and NAND/NOR Implementation: The Map Method, Two-Variable,Three-VariableandFourVariableK-Maps,NANDandNORImplementation, Don't – Care Conditions, Determination of Prime-Implicants.

CombinationalLogic: DesignProcedure,BinaryParallelAdder,MagnitudeComparator, Encoders, Decoders, Multiplexers, Demultiplexers.

Text1:3.1-3.3, 3.6,3.8-3.10, 4.2, 5.2, 5.4-5.6

Self-study component:	TabulationMethod,LogicSynthesisandoptimization,Decoders in RAM.
PracticalTopics: **(6 Hours)**	1. DiscreteGate Implementation (i) Logiccircuitrealizationusingbasicgates. (ii) Logiccircuitrealizationusinguniversal gates. 2.(i)Realizationofparallel adder/subtractorusing7483 chip (ii)Demonstrationof BCDtoExcess–3codeconversionandvice versa.

UNIT– II	**8 Hours**

SequentialLogic: Introduction,Flip-Flops,TriggeringofFlip-Flops.
RegistersandCounters: Introduction,Registers,ShiftRegisters,RippleCounters, Synchronous-counters.

Text1:6.1-6.3,7.1-7.5

Self-study component:	Setupandholdtimeissues,flip-flopversuslatches,Delay elements, Watchdog timer.
PracticalTopics: **(6 Hours)**	1. (i)RealizationofBooleanexpression/CombinationalLogic. (ii)ApplicationoftheIC's–MUX–74153andDEMUX–74139forhalf and full adders for 3 – bit binary to gray and BCD to Excess–3 code converters. 2. Realizationof2–bitcomparatorusinggatesandbasicoperationalstudy of Priority encoder using 74147.

UNIT– III	**8 Hours**
State Machines: State Tables and Graph, General Models of Sequential Circuits, Design of a Sequence detector, More Complex Design Problems, Guidelines for Construction of State Graphs, Elimination of Redundant States, Equivalent States, Equivalent Sequential Circuits, Reducing incompletely Specified State Tables, Derivation of Flip-Flop Input Equations. **Text2:13.3-13.4,14.1-14.3, 15.1,15.2, 15.4-15.6**	
Self-study component:	DigitalCameraControllerStateMachine.Bluetooth Controller.
PracticalTopics: **(4 Hours)**	1. Design2/3bitsynchronouscountersusing Flip–Flops. **2.** Design2/3bitasynchronouscountersusingFlip–Flops.
UNIT– IV	**8 Hours**
Programmable Logic and Storage Devices: Read-Only Memory (ROM), ROM Based Implementation of Combinational Logic, Programmable Logic Array (PLA), Programmability of PLD's,CPLD's,XILINXXC9500CPLD's,XILINXFPGAFliedProgrammable GateArray(FPGA), XILINXSpartanXLFPGA's. **Text3:5.7-5.8**	
Self-study component:	ArchitectureandprogrammingexamplesofFPGA's.
PracticalTopics: **(4 Hours)**	1. DesigntheRingcountersand Johnson counter. 2. DemonstrationofFPGA.
UNIT– V	**8 Hours**
ComputerArchitecture and Memory: TheMemoryunit,ExamplesofRandom-accessMemories. Introduction, Processor Organization, Arithmetic Logic Unit, Design of Arithmetic Circuit, Design of Logic Circuit, Design of Arithmetic Logic Unit, Status Register, Design of Shifter, Processor Unit, Design of Accumulator. **Text1:7.7-7.8,9.1-9.10**	
Self-study component:	Intel4004,8085processors,ARMMachineandAMD's Processors.
PracticalTopics: **(4 Hours)**	1. Demonstrationof7489,16by4 randomaccess memory. 2. RealizationofShiftoperationsusing7495.

CourseOutcomes: Oncompletionofthiscourse,studentsareable to:

COs	**CourseOutcomes**with***Actionverbs***** fortheCourse topics	**Bloom's Taxonomy Level**	**Program Outcome Addressed(PO #) with BTL**
CO1	Applythesimplificationtechniques/methodsto Optimize and Implement the digital functions/circuits.	Understand& Apply	L2,L3(PO1,PO2)

CO2	Analyze,Debuganddesigncombinationaland sequential logic circuit for the given requirements/specification.	Apply,Analyze & Create	L3,L4,L6(PO2,PO3)
CO3	Develop,SimulateandImplementlogiccircuits forthe givenrequirements/specification.	Analyze& Create	L4,L6(PO4, PO5,PO9, PO12)
CO4	AnalyzeandDesignprocessordatapathblocks.	Analyze& Create	L4,L6(PO2,PO3)
CO5	DesignROM/PLA/FPGAbasedcircuits forthe givenrequirements/specifications.	Applyand Create	L3,L6 (PO3)

TextBook(s):

1. M.MorrisMano,"DigitalLogicandComputerDesign",Pearson,2020.ISBN:978- 93-325-4252-5.
2. CharlesHRothJr,LarryL.Kinney,"FundamentalsofLogicDesign",7thEdition, Thomson Learning, 2019.ISBN-13: 978-81-315-2615-6.
3. MichaelD.Ciletti,"AdvancedDigitalDesignwiththeVerilogHDL",2ndEdition, Pearson, 2011. ISBN-13: 9780133002546.

ReferenceBook(s):

1. John.MYarbrough,"DigitallogicapplicationsandDesign",Pearson,Thomson Learning,2006.ISBN: 981-240-62-1.

WebandVideo link(s):

1. https://nptel.ac.in/courses/108106177-CoursebyNeerajGoel, IIT Ropar.
2. https://nptel.ac.in/courses/106105185-CoursebyIndranilSengupta,IIT Kharagpur.
3. https://ocw.mit.edu/courses/6-004-computation-structures-spring-2017/pages/syllabus/-ChrisTerman,MassachusettsInstituteofTechnology.

E-Books/Resources:

CourseArticulationMatrix(CAM)

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
#1	3	3											3	3
#2		2	3											2
#3				2	3				1			1		
#4		2	2											2
#5			2											

SignalsandSystems [AsperChoiceBasedCreditSystem(CBCS) &OBE Scheme] **SEMESTER–III**			
Course Code:	**P21EC305**	**Credits:**	**04**
TeachingHours/Week(L:T:P):	**3:0:2**	**CIE Marks:**	**50**
TotalTheoryTeachingHours: **TotalLaboratoryHours:**	**40** **24**	**SEE Marks:**	**50**

CourseLearningObjectives: Thiscoursewillenable thestudents to:

- Classifythe signalsand understand differentoperations on signals.
- Recognizethebasicsignals(bothcontinuous-timeanddiscrete-time)likeimpulse,unit step, ramp, sinusoids and exponentials, represented both in frequency and time domains.
- Characterize LTI system using impulse response and linear constant coefficient differential equations.
- Representall typesof signals(CT/DT, periodic/non-periodic)in termsofcomplex
- DefinerelationshipbetweenZtransformand Fourier transform.
- Implementthe systems (anyorder)in Direct-form-Iand Direct-form-II

UNIT– I	**8 Hours**

Continuous time and discrete time signals, transformations of the independent variable, exponential and sinusoidal signals, the unit impulse and unit step functions, Continuous-time and discrete-time systems, basic system properties.
Text1:1.1,1.2,1.3,1.4, 1.6

Self-study component:	Moreproblems on the periodicity,energyand power a signal.
PracticalTopics: **(6 Hours)**	1. Developa MATLAB codeto generate theCTS and DTS a. Periodic Signals b. ExponentialSignals c. Sinusoidal Signals 2. Developa MATLAB codeto generate theCTS and DTS a. ExponentiallyDamped Sinusoidal Signals b. Step,ImpulseandRampfunctions c. Userdefinedfunctions

UNIT– II	**8 Hours**

Linear Time Invariant Systems: Discrete-time LTI systems- The Convolution sum, Continuous-time LTI systems- The Convolution integrals, properties of linear time-invariant systems, Causal LTI systems described by differential and difference equations,

Text1:2.1 to 2.4.3

Self-study component:	1. Examplesonthecausality,timeinvariantandlinearityofthe system 2. Blockdiagramrepresentationofsystems(Directform-IandDirect form-II)
PracticalTopics: **(6 Hours)**	1. WriteaMATLAB codetosimulatedifferenceequation. 2. WriteaMATLABcodetofindthefrequencyresponseofLTI systems described by differential or difference equations. 3. WriteaMATLABcodeto performconvolution of signals.

UNIT– III	8 Hours

Fourier Representation of Continuous-time (CT) Signals: Fourier series representation of continuous-time periodic signals, Properties of continuous –Time Fourier Series. CT Non-Periodic Signals: Representation of Aperiodic signals: The continuous time Fourier transform, Properties of continuous- time Fourier Transform, Convolution property.

Text1:3.3, 3.5, 4.1,4.3,4.3.1,4.3.5,4.3.7,4.4

Self-studycomponent:	1. Examplesontheconvolutionoftwodiscretetimesignalsand Fourier transform of the signal. 2. Propertiesofcontinuous-timeFourierTransform. 3. Thefouriertransformfor periodicsignals.
PracticalTopics: **(4Hours)**	1. WriteaMATLABcodetogenerateAmplitudeModulated signal. 2. WriteaMATLABcodetofind theDTFSofthe given signal.

UNIT– IV	8 Hours

Discretization of CT signals and Fourier Representation of Discrete-Time (DT) Signals SamplingofCTSignals-RepresentationOfcontinuous-Timesignalsbyitssamples:Thesampling theorem, **Fourier Representation for DT Non Periodic Signals**: Representation of Aperiodic signals: The discrete- Time fourier Transform, Properties of the Discrete- Time Fourier transforms, Multiplication Property.

Text1:7.1,5.1,5.3,5.5

Self-studycomponent:	TheConvolution property
PracticalTopics: **(4 Hours)**	1. WriteaMATLABcodetofind PolesandZerosofLTIsystems. 2. WriteaMATLABcodetogeneratesampledsignalofadiscrete and Continuous-time signal.

UNIT– V	8 Hours

Z–Transforms: The Z – transform, the region of convergence for the Z-transform. The inverse Z-transform,propertiesofZ–transforms,Systemfunctionalgebraandblockdiagramrepresentations, The Unilateral Z transform.

Text1:10.1,10.2,10.3,10.5,10.8,10.9

Self-studycomponent:	1. Find Ztransform ofthe unit impulse, unit step, cosine signals and find the z transform using differentiation property 2. Analysisand characterizationof LTIsystemsusingZ-transforms.
PracticalTopics: **(4Hours)**	1. WriteaMATLABcodetofindZ-transformandinverseoftheZ-transform.

	2.Solveagivendifferenceequation/systemoflinearequations[Z-transform].

CourseOutcomes: Oncompletionofthiscourse,studentsareable to:

COs	Course Outcomes with *Action verbs* for the Course topics	Bloom's Taxonomy Level	Program Outcome Addressed(PO #) with BTL
CO1	**Apply**knowledgeofbasicmathematicsto classify different signals and systems	Remember	L1[PO1]
CO2	**Analyze**signalsandsystemstodetermine their properties.	Understanding	L2[PO2]
CO3	**Develop** LTI/LSI systems in time domainand frequency domain to determine system output and properties.	Applying	L3[PO2],[PO3]
CO4	**Design**CTandDTsystemandimplement using different structures.	Applying	L3[PO2],[PO3]
CO5	**Develop** and **Simulate** the different types of signals and perform many operations on discrete time signals and Continuous time signals using tools.	Analyzing	L4[PO5],[PO9]

TextBook(s):

1. **"SignalsandSystems",**V.Oppenheim,AlanWillskyandA.HamidNawab,Pearsoneducation asia/PHI, 2nd edition, 2006. ISBN: 9789332550230, 9332550239
2. **"SignalsandSystems",**SimonHaykinandBarry VanVeen,2ndEditionJohnWiley& Sons, 2nd edition 2008. ISBN:9788126512652, 8126512652

ReferenceBook(s):

1. **"Signals and systems",**H.P.Hsu, R.Ranjan, Schaum's outlines, TMH, 2006. ISBN:9780070669185, 007066918X
2. **"SignalsandSystems",**ANagoorKani,McGrawHill2010.ISBN:9780070151390, 0070151393.
3. **"Fundamentals of Signals and Systems",**Michael J Roberts, Govind Sharma, McGrawHill 2010. ISBN: 0070702217, 9780070702219.

WebandVideo link(s):

- **https://www.youtube.com/watch?v=up55tuwestg&list=PLWPirh4EWFpHr_1ZCkuF9ToYUrmujv9Aa**
- **https://www.youtube.com/watch?v=I_ZcZF-EWj8&list=PLWPirh4EWFpHr_1ZCkuF9ToYUrmujv9Aa&index=3**
- **https://www.youtube.com/watch?v=0nZYen9w_eo&list=PLyqSpQzTE6M8KJ-XQ1m2vl3nd2ZUqKEN8**
- **https://www.youtube.com/watch?v=uEIVDGbaE5c**

E-Books/Resources:

- **https://link.springer.com/book/10.1007/978-3-031-02545-7?page=2#book-header**

“Fundamentalsof Signals&Systems”,BenoitBoulet,Charles RiverMedia2006, ISBN:1-58450-381-5, eISBN: 1-58450-660-1.

- **https://mlichouri.files.wordpress.com/2013/10/fundamentals-of-signals-and-systems.pdf.**

D.CourseArticulation Matrix(CAM)

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
#1	3												3	
#2		2												2
#3		3	2											3
#4		2	1											2
#5					1				1					

LinearIntegratedCircuitLaboratory
[AsperChoiceBased CreditSystem(CBCS) &OBE Scheme]
SEMESTER–III

Course Code:	**P21ECL306**	**Credits:**	**01**
TeachingHours/Week(L:T:P):	**0-0-2**	**CIE Marks:**	**50**
ContactPeriod:	**Lecture:2Hr,Exam:2Hr.**	**SEE Marks:**	**50**

Prerequisite: BasicElectronicsandBasicElectricals**.**

CourseLearningObjectives(CLOs)

Thiscourseaimsto

1. ProvidethebasicknowledgeofhowtouseCRO,signalgenerator,breadboard,power supply, ammeter, voltmeter and how to rig-up the circuits.
2. Analyzethe characteristicsofMOSFET,Op-amp.
3. Design Inverting and Non-inverting amplifiers, Summing, Subtracting and Schmitt triggercircuit using Op-Amp.
4. Demonstrate the working of Integrator, Differentiating circuit, precision half wave and full wave rectifier using 741 IC
5. DesigntheRC phaseshift oscillators usingOp-amp.
   Understanding theworkingDACusingOp-AmpandVoltageregulatorusingLM317IC regulator.

Course Content

1. MOSFETdrainandtransfercharacteristics
2. Op-ampRCphaseshiftoscillator.
3. DeterminingtheCharacteristicparameters of Op-Amp 741IC,
4. DesignofInvertingandNon-invertingamplifier using741IC
5. Op-ampasadder,subtractorandvoltage follower
6. Op-ampasIntegratorandDifferentiator circuit
7. Precisionhalf waveandfull waverectifierusing741IC.
8. DesignofSchmitttrigger andzerocrossingdetectionusing741IC
9. 4bitR-2R DACusingOp-amp741IC
10. VoltageregulatorusingLM317ICregulator.

Openendedexperiments

1. ConductanexperimentforthevoltagelevelmonitortoenergizetheLEDwhenVcc exceeds 16V. Use zener diode and 471 op-amp with single power supply
2. Conductanexperimenttosumtwo sinusoidal signalsofpeakamplitude4vandclip the output level to 5v.
3. Conductanexperimenttoclipnegativehalfcycleat2Vandinvertthesignal.Assume5V p-psinusoidalinput signal.

CourseOutcome (CO)

CO #	Course Outcome	Bloom Taxonomy Levels	Program Outcome Addressed(PO#)with BTL
CO1	**Analyze** the MOSFET characteristics, workingofamplifierandoscillatorwithOp-amp,and tofind characteristicsofOp-Amp.	Understanding	L3(PO2)
CO2	**Design** the inverting and non-inverting amplifier for a given gain, Schmitt trigger circuitforagivenLTPandUTP,andvoltage regulatorusingLM217regulator.	Apply	L4(PO3)
CO3	**Ability**toconductexperimentsusingop-ampsandotherelectroniccomponentson adder,subtractor,voltagefollower,integrator, differentiator, rectifiers and DAC circuits.	Apply	L4(PO2)
CO4	**Ability**toworkeffectivelyinateamto analyze the given design and conduct experiment.	Evaluate	L4(PO2,PO9,PO12)

CourseArticulation Matrix(CAM)

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
#1		**2**												**2**
#2			**3**											
#3		**3**												**3**
#4		**2**							**2**			**1**		**2**

EmployabilityEnhancementSkills(EES)-III
[Asper ChoiceBasedCreditSystem (CBCS)&OBE Scheme]
SEMESTER–III

Course Code:	**P21HSMC308**	**Credits:**	**01**
TeachingHours/Week (L:T:P):	**0:2:0**	**CIEMarks:**	**50**
TotalNumberof TeachingHours:	**28**	**SEEMarks:**	**50**

CourseLearningObjectives: Thiscoursewillenablestudents to:

- BuildPersonalBranding,team binding.
- Presentthedata usingpresentationskills inabetter manner.
- Understandtheimportanceofstressmanagement,Entrepreneurship& Businessskills.
- Usageofvarious voicesinasentenceandcritical reasoning.
- Explainthebasic conceptsinboat andstream,geometryandtrigonometryproblems.
- CalculationsinvolvingPermutationsand combinations,probabilityand logarithms.
- Explainconceptsbehindlogicalreasoningmodulesofanalytic,syllogisms,venn diagrams and puzzles.

UNIT– I	**8 Hours**

SoftSkills: PersonalBranding,SynergybetweenTeams(OnlineandOffline),Interviewskills, Stress Management, Entrepreneurship & Business skills.

VerbalAbility: Activevoiceandpassivevoice,critical reasoning.

Self-Study: CorporateethicsandMannerism

UNIT– II	**10 Hours**

QuantitativeAptitude: Boatsandstreams,Geometry&Trigonometry,Permutationsand combinations, Probability & Logarithms.

Self-Study: Pipes and cisterns

UNIT– III	**10 Hours**

LogicalReasoning: Analyticalreasoning,Syllogisms,clocksandcalendars,Venndiagram, puzzles.

Self-Study: Binarylogic

CourseOutcomes: Oncompletionofthiscourse,studentsareable to:	
CO– 1:	Exhibitamplifiedlevelofconfidencetoexpressthemselvesin English
CO– 2:	Develop the presentation skills, entrepreneurial skills by managing stress at variouslevels.
CO– 3:	SolvetheproblemsbasedonBoatsandstreams,Geometry&Trigonometry, Permutations and combinations, Probability & Logarithms.
CO– 4:	Solve logical reasoning problems based on Analytical reasoning, Syllogisms, clocks and calendars, cases and Venn diagram, puzzles.

Text Book(s):

1. WordPowerMadeEasyNewRevisedandExpandedEdition,FirstEdition,Norman Lewis, Goyal Publisher.
2. EssentialEnglishGrammarbyRaymondMurphy,CambridgeUniversityPress,new edition
3. The7 habits ofHighlyEffectivePeople byStephen R. Covey
4. QuantitativeaptitudebyDr.R. SAgarwal,publishedbyS.Chand privatelimited.
5. VerbalreasoningbyDr.R. S Agarwal , published byS.Chand privatelimited.

ReferenceBook(s):

1. QuantitativeAptitudebyArunSharma,McGrawHill Education PvtLtd
1. 2.CATMathematicsbyAbhijithGuha, PHIlearningprivate limited.

Weband Video link(s):

1. NPTELCourse:Soft skillsbyByProf. Binod Mishra,IIT Roorkee

https://onlinecourses.nptel.ac.in/noc21_hs76/preview

COURSEARTICULATIONMATRIX[EmployabilityEnhancementSkills(EES)-III]

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO-1	-	-	-	-	-	-	-	-	2	3	-	2
CO-2	-	-	-	-	-	-	-	-	2	3	2	2
CO-3	2	-	-	-	-	-	-	-	-	-	-	-
CO-4	2	-	-	-	-	-	-	-	-	-	-	-

InnovationandDesignThinking
[AsperChoiceBasedCreditSystem(CBCS) &OBE Scheme]
SEMESTER–III

CourseCode	**P21AEC309**	**Credits**	**01**
TeachingHours/Week(L:T:P: S)	**0:2:0**	**CIEWeightage**	**50**
TotalHoursof Pedagogy	**25**	**SEE Weightage**	**50**
ExamHour	**01**	**Total Marks**	**100**

CourseCategory: Foundation

Preamble: This course provides an introduction to the basic concepts and techniques of engineeringandreversesengineering,theprocessofdesign,analyticalthinkingandideas, basicsanddevelopmentofengineeringdrawing,applicationofengineering drawingwithcomputer aide.

Courseobjectives:

- Toexplaintheconceptofdesignthinkingforproduct andservicedevelopment
- Toexplainthefundamentalconcept ofdesignthinking
- Todiscussthemethodsofimplementingdesignthinkinginthereal world.

Module-1

UnderstandingDesignThinking

Definitionofdesign-DesignVsEngineeringDesign– DifferencebetweenDesignandEngineering Design–The General Design process Model – Design to Design thinking - Time line of Design thinking.

Module-2

FeaturesofDesignThinking

Venndiagramofdesignthinking– Designthinkingresources–DesignthinkingprocessModels– Design thinking methodologies

Module-3

ModelstoDoDesign Thinking

Differentkindsofthinking–5Staged.SchoolProcess -5stagesofStanford–Empathize–Define- Ideate – Prototype – Test – Iterate - Applications of Design Thinking.

Module-4

Design thinking for Engineering- Concept models for comparing design thinking and engineeringsystemsthinking-TheDistinctiveConceptModel-TheComparativeConceptModel- The Inclusive Concept Model - The Integrative Concept Model.

Module-5

DesignThinkingToolsandMethods-PurposefulUseofToolsandAlignmentwithProcess-What Is: Visualization - What Is: JourneyMapping - What Is: Value Chain Analysis - What Is: Mind Mapping - What If: Brainstorming - What If: Concept Development - What Wows: Assumption Testing - What Wows: Rapid Prototyping - What Works: Customer Co-Creation - What Works: Learning Launch.

Course Outcomes:

Upon thesuccessfulcompletionofthecourse,studentswillbe ableto:

CO Nos.	Course Outcomes	Knowledge Level (Based on revised Bloom'sTaxonomy)
CO1	UnderstandingDesignThinkingprocess	L2
CO2	Appreciatevariousdesignprocessprocedure	L2
CO3	Generateanddevelopdesignideasthroughdifferent Technique.	L2
CO4	Identifythesignificance ofreverseEngineeringtoUnderstand products	L3
CO5	Practicethemethods,processes,andtoolsofDesignThinking	L2

SuggestedLearningResources:

TextBooks:

1. John.R.Karsnitz, Stephen O'Brien and John P. Hutchinson, "Engineering Design",Cengagelearning (International edition) Second Edition, 2013.
2. RogerMartin,"TheDesignofBusiness:WhyDesignThinkingistheNextCompetitive Advantage",Harvard Business Press , 2009.

References:

1. Jakeknapp,Johnkeratsky andBradenkowitz"Sprinthowtosolvebigproblems and test new ideas in just five days"
2. TimBrown "Changebydesign"
3. SteveKrug"Don't makeme think; Revisited"
4. Rogermartin"Thedesignof Business"
5. YousefHaikandTamerM.Shahin,"EngineeringDesignProcess",CengageLearning, SecondEdition, 2011.
6. IdrisMootee, "Design Thinking for Strategic Innovation: What They Can't Teach You at Businessor Design School", John Wiley & Sons 2013.
7. HassoPlattner,ChristophMeinelandLarryLeifer(eds),"DesignThinking:Understand– Improve – Apply", Springer, 2011

BasicEngineeringMathematics-I [AsperChoiceBasedCreditSystem(CBCS) &OBE Scheme] **SEMESTER–III(LateralEntry:Commontoallbranches)**			
Course Code:	**P21MDIP301**	**Credits:**	**00**
TeachingHours/Week(L:T:P):	**2-2-0**	**CIE Marks:**	**100**
TotalNumberof TeachingHours:	**40**	**SEE Marks:**	**-**

Course Learning Objectives: The mandatory learning course **P21MADIP301**viz., **Basic Engineering Mathematics-I** aims to provide basic concepts of complex trigonometry,vector algebra, differential & integral calculus,vector differentiation and various methods of solving first order differential equations**.**

UNIT– I	**8 Hours**

ComplexTrigonometry: ComplexNumbers:Definitions&properties.Modulusand amplitude of a complex number, Argand's diagram, De- Moivre's theorem (without proof).

VectorAlgebra:Scalarandvectors.Vectorsadditionandsubtraction.Multiplicationof vectors (Dot and Cross products). Scalar and vector triple products-simple problems.

Self-study component:	De-Moivre'stheorem(withoutproof).Rootsofcomplexnumber-Simple problems.

UNIT– II	**8 Hours**

Differential Calculus: Polar curves –angle between the radius vector and thetangent pedal equation-Problems.Taylor's seriesandMaclaurin'sseriesexpansions-Illustrative examples.

Partial Differentiation: Elementary problems. Euler's theorem for homogeneous functions of two variables. Total derivatives-differentiation of composite and implicit function.

Self-study component:	Reviewofsuccessivedifferentiation.Formulaefornthderivativesof standardfunctions-Liebnitz'stheorem(withoutproof).Applicationto Jacobians, errors & approximations.

UNIT– III	**8 Hours**

Integral Calculus: reduction formulae for $sin^n x$, $cos^n x$, *and* $sin^m x cos^m x$and evaluation of these with standard limits-Examples. Applications of integration to area, length of a given curve, volume and surface area of solids of revolution.

Self-study component:	Differentiationunderintegralsign(Integralswithconstantslimits)- Simple problems.

UNIT– IV	**8 Hours**

Vector Differentiation: Differentiation of vector functions. Velocity and acceleration of a particle moving on a space curve. Scalar and vector point functions. Gradient, Divergence, Curl and Laplacian (Definitions only).

Self-study component:	Solenoidalandirrotationalvectorfields-Problems.

UNIT– V	**8 Hours**

Ordinary differential equations (ODE's): Introduction-solutions of first order and first degree differential equations: homogeneous, exact, lineardifferential equations of order one and equations reducible to above types.

Self-study component:	ApplicationsoffirstorderandfirstdegreeODE's- Orthogonal trajectoriesofCartesianandpolarcurves.Newton'slawofcooling, R-L circuits- Simple illustrative examples from engineering field.

CourseOutcomes: Afterthesuccessfulcompletionofthecourse,thestudentsare able to

CO1	**Explain**thefundamentalconcepts–incomplexnumbersandvectoralgebrato analyzetheproblemsarisinginrelatedareaof engineeringfield.
CO2	**Identify**–partialderivativestocalculaterateofchangeofmultivariatefunctions.
CO3	**Apply**-theacquiredknowledgeofintegrationanddifferentiationtoevaluatedoubleand tripleintegralstocomputelengthsurfaceareaandvolumeofsolidsofrevolutionand indentify velocity, acceleration of a particle moving in a space.
CO4	**Find**analyticalsolutionsbysolvingfirstorderODE'swhicharisingindifferent branches of engineering.

TEXTBOOKS

1. B.S.Grewal,HigherEngineeringMathematics(44th Edition),KhannaPublishers,New Delhi.
2. B.V.Ramana,HigherEngineeringMathematics,TataMcGrawHillpublications, New Delhi, 11thReprint, 2010.

REFERENCE BOOKS

1. ErwinKreyszig,AdvancedEngineeringMathematics(LatestEdition),Wiley Publishers, New Delhi.
2. H.C.Taneja,AdvancedEngineeringMathematics,VolumeI&II,I.K. International PublishingHouse Pvt. Ltd., New Delhi.
3. N.P.BaliandManishGoyal,AtextbookofEngineeringMathematics,Laxmi Publications, Reprint,2010.
4. V.Krishnamurthy,V.P.MainraandJ.L.Arora,AnintroductiontoLinearAlgebra, Affiliated East–West press, Reprint 2005.
5. D.Poole,LinearAlgebra:AModernIntroduction,2ndEdition,Brooks/Cole,2005.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	**3**	**2**										
CO2	**3**	**2**										
CO3	**2**	**3**										
CO4	**2**											
CO5	**3**											

Strengthofcorrelation: Low-1,Medium-2,High-3

EmployabilityEnhancementSkills(EES)-I
[Asper ChoiceBasedCreditSystem (CBCS)&OBE Scheme]
SEMESTER-III

Course Code:	**P21HDIP308**	**Credits:**	**01**
TeachingHours/Week (L:T:P):	**0:2:0**	**CIEMarks:**	**100**
TotalNumberof TeachingHours:	**28**	**SEEMarks:**	**-**

CourseLearningObjectives: Thiscoursewillenablestudents to:

- Getintroducedtosomeof theconceptsofsoft skillsandenhancecommunication skills
- Recognizecommonmistakesdonebyanindividualinthecourseofhis/her communication
- Writeeffectiveemails
- Identifytheirstrengths,weakness,opportunitiesandthreats
- Understandthebasicrulesofsentence structures
- Understandthe correctusageofpartsofspeech,tensesand articles
- Explaindivisibilityroles,propertiesofvarioustypesofnumbers
- Explainapplication ofpercentagein our dailylife
- Describetheconcepts ofprofit,loss, discounts
- Explainconceptsbehind logicalreasoningmodulesofarrangements andblood relations

UNIT– I	**10 Hours**

SoftSkills:LSRW,Listening,communicationskills(verbalandnon-verbalskills),public speaking, Email writing, SWOT Analysis

Self-Study: Motivation andTimeManagement

UNIT– II	**10 Hours**

VerbalAbility: PartsofSpeech-Prepositions,AdjectivesandAdverbs;Tenses,Articles, Idioms and Phrasal verbs, Subject verb agreement, Synonyms and Antonyms

Self-Study: Parajumbles andonewordsubstitution

UNIT– III	**8 Hours**

QuantitativeAptitude: Numbersystem,Percentage, Profit &Loss
LogicalReasoning: BloodRelations and Arrangements

Self-Study: SpeedMaths

CourseOutcomes: Oncompletionofthiscourse,studentsareable to:	
CO– 1:	Exhibitamplifiedlevelofconfidencetoexpressthemselvesin English
CO– 2:	Understandthecorrectusageoftensesandarticles
CO– 3:	Increasethe numberofwordsin his/her dayto day
CO– 4:	Solvelogical reasoningproblems basedon bloodrelations and arrangements
CO-5:	Solvetheproblemsbasedonnumbersystem, percentageandprofit&loss

Text Book(s):

1. WordPowerMadeEasyNewRevisedandExpandedEdition,FirstEdition,Norman Lewis, Goyal Publisher.
2. EssentialEnglishGrammarbyRaymondMurphy,CambridgeUniversityPress,newedition
3. The7 habits ofHighlyEffectivePeople byStephen R. Covey
4. QuantitativeaptitudebyDr.R. SAgarwal,publishedbyS.Chand privatelimited.
5. VerbalreasoningbyDr.R.S Agarwal , publishedbyS.Chandprivatelimited.

ReferenceBook(s):

1. QuantitativeAptitudebyArunSharma,McGrawHill Education PvtLtd
2. CATMathematics byAbhijithGuha, PHIlearning private limited.

Weband Video link(s):

1. ImproveYourEnglishCommunicationSkillsSpecialization https://www.coursera.org/specializations/improve-english

COURSEARTICULATIONMATRIX[EmployabilityEnhancementSkills(EES)-I]

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO-1	-	-	-	-	-	-	-	-	2	3	-	2
CO-2	-	-	-	-	-	-	-	-	-	2	-	2
CO-3	-	-	-	-	-	-	-	-	-	2	-	2
CO-4	2	-	-	-	-	-	-	-	-	-	-	-
CO-5	2	-	-	-	-	-	-	-	-	-	-	-

AppliedMathematicalMethods [AsperChoiceBasedCreditSystem(CBCS) &OBE Scheme] **SEMESTER–IV(CommontoEC,EE,CS,IS)**			
Course Code:	**21MA401B**	**Credits:**	**03**
TeachingHours/Week(L:T:P):	**2-2-0**	**CIE Marks:**	**50**
TotalNumberof TeachingHours:	**40**	**SEE Marks:**	**50**

CourseLearning Objectives:

- Adequateexposuretobasicsofengineeringmathematicssoastoenablethemto visualizetheapplications to engineering problems.
- Analyzethe conceptofcomplexvariablesinterms realvariables
- Understand the concept of statistical methods to fit curves of samples and correlation and regression analysis
- To have a insightinto numerical techniques to find solutionof equationshavingno analytic solutions
- Provideinsightintodevelopprobabilitydistributionofdiscreteandcontinuousrandom variables Testing hypothesis of sample distribution

UNIT– I	8 Hours

Calculus of complex functions: Introductiontofunctions of complex variables.Definitions of limit, continuity and differentiability, Analyticfunctions: Cauchy- Riemann equations in Cartesian and polar forms (no proof) and consequences. Applications to flow problems. Constructionof analytic functions: Milne-Thomson method-Problems.

Conformaltransformations:Introduction.Discussionoftransformations $w=z^2$, $w=e^z$, $w=z+1/z$, $(z\neq0)$.Bilineartransformations-Problems.

Self-study component:	DerivationofCauchy-Riemannequation inCartesianandpolarforms, transformations of reflection, translation and Inversion.

UNIT– II	8 Hours

Complexintegration:complexlineintegrals.Cauchytheorem,Cauchyintegralformula. Taylor's and Laurent's series (Statements only) and illustrative examples. Singularities, poles and residues. (Statement only).Examples.

Curve Fitting: Curve fitting by the method of least squares, fitting the curves of the forms

$y=ae^{bx}$, $y=ab^x$, $y=ax^b$, $y=ax^2+bx+c$

StatisticalMethods: Correlationandregression-KarlPearson'scoefficientofcorrelation and rank correlation- problems, Regression analysis, lines of regression, problems.

Self-study component:	ContourintegrationType-I&Type-II..

UNIT– III	8 Hours

Solution of algebraic and transcendental equations: Introduction, Bisection method, Regula-Falsi& Newton-Raphsonmethod :- Illustrative examples only.
Numerical solution of ordinary differential equations (ODE's): Numerical solutions of ODE'soffirstorderandfirstdegree–Introduction.Taylor'sseriesmethod.ModifiedEuler's method,Runge-Kuttamethodoffourthorder(Allformulaewithoutproof)**.**Illustrative

examplesonly.
Numericalmethodsforsystemoflinearequations-Gauss-Jacobiand Gauss-Seideliterativemethods.Determinationoflargesteigenvalueandcorresponding eigen vector by power method.

Self-study component:	Solutionofequationsusingsecantmethod,Picardsmethod

UNIT– IV	**8 Hours**

Random variables and Probability Distributions: Review of randomvariables. Discrete and continuous random variables-problems. Binomial, Poisson, Exponential and Normal distributions (with usual notation of mean and variance)-: problems.
Joint Probability Distributions : Introduction, Joint probability and Joint distribution of discrete random variables and continuous random variables

Self-study component:	GeometricandGammadistributions-problems.

UNIT– V	**8 Hours**

StochasticProcessesandsamplingtheory:
Markov Chains: Markov chains, Classification of Stochastic processes, Probability vector, Stochastic matrix, Regular stochastic matrix, Transition probabilities and Transition probabilitymatrix.
Testing of Hypothesis Sampling distributions-introduction. Standard error, Type-I and Type-II errors. Testing of hypothesis and confidence intervals for means. Student's ***t*** – distribution and Chi-square distribution as a test of goodness of fit - Illustrative examples only.

Self-study component:	ClassificationofStochasticprocess,BernoulliProcess,Poisson Process

CourseOutcomes: On completionofthecourse,studentshould beableto:

CO1	**Apply**theconcepts ofananalyticfunctionandtheirpropertiestosolvetheproblems arisinginengineeringfield
CO2	**Use**theconceptofcorrelationandregressionanalysistofitasuitablemathematicalmodelfor thestatisticalsamplesariseinengineeringfield
CO3	**Apply**theacquiredknowledgeofnumericaltechniquetosolveequationsapproximatelyhavingno analyticalsolutions.
CO4	**Explain**discreteandcontinuousprobabilitydistributionsinanalyzingtheprobabilitymodelsand solveproblemsinvolvingMarkovchains.

TEXTBOOKS

1. B.S.Grewal,HigherEngineeringMathematics (44thEdition2018),KhannaPublishers, New Delhi.
2. E.Kreysizig,AdvancedEngineering Mathematics,JohnWileyand sons,10th Ed.(Reprint) 2016.

REFERENCE BOOKS

1. V.Ramana:HigherEngineeringMathematics,McGraw–HillEducation,11thEd..
2. H.C.Taneja,AdvancedEngineeringMathematics,Volume I&II,I.K.

InternationalPublishingHousePvt.Ltd.,NewDelhi.
3.N.P.BaliandManishGoyal,AtextbookofEngineering Mathematics, LaxmiPublications,Reprint, 2010.

ONLINERESOURCES

1. http://www.nptel.ac.in
2. https://en.wikipedia.org
3. http://mcatutorials.com/mca-tutorials-numerical-methods-tutorial.php
4. https://www.iitg.ac.in/physics/fac/charu/courses/ph503/book.pdf

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	**3**	**3**										
CO2	**3**	**2**										
CO3	**3**	**3**										
CO4	**2**	**3**										
CO5	**3**	**3**										
Strengthofcorrelation: Low-1,Medium-2,High-3												

AnalogandDigitalCommunication
[AsperChoiceBasedCreditSystem(CBCS) &OBE Scheme]
SEMESTER–IV

Course Code:	**P21EC402**	**Credits:**	**03**
TeachingHours/Week(L:T:P):	**3 : 0: 0**	**CIE Marks:**	**50**
TotalNumberof TeachingHours:	**40**	**SEE Marks:**	**50**

CourseLearningObjectives: Thiscoursewillenable thestudents to:

- Analyze the elements of communication system provide basic knowledge of Modulation, generation,detectionandapplicationofAmplitudeandAnglemodulationofsignalintime domain and frequency domain.
- Explaintheaspectsofsamplingofsignalindigitalcommunication,themodelofdigital communication system and outline the use of correlation.
- Explainquantizationprocess,quantitiesandcommandingofsignalsinPCM system.
- DescribetheprincipleofDM,ADM,DPCM systems.
- Describeandcontrastvariousaspectsofdifferentdigitalcoherentandnon-coherent modulation schemes such as ASK, PSK, QPSK, DPSK and MSK.
- AnalyzedifferentcodingschemesadoptedinPAMsignalingandexplainthe causesforthe occurrence of ISI and advantages of pulse shaping and correlation coding.

UNIT– I	**8 Hours**

AMPLITUDE MODULATIONS AND DEMODULATIONS: Baseband versus carrier communications, Double-sideband amplitude modulation, Amplitude modulation, bandwidth-efficient amplitude modulations, Amplitude modulations: Vestigial sideband (VSB),Local carrier synchronization.

Text1:3.1-3.6

Self-studycomponent:	Singlesidebandmodulation**,**FrequencyDivisionMultiplexing**(FDM),** Phaselockedloop.

UNIT– II	**8 Hours**

ANGLE MODULATION AND DEMODULATION: Nonlinearmodulation,bandwidthofangle-modulated waves, generating FM waves, demodulation of FM signals, effects of nonlineardistortion and interference, super heterodyne analog AM/FM receivers.

Text1:4.1-4.7

Self-studycomponent:	FMbroadcastingsystem,QAM.

UNIT– III	**8 Hours**

SAMPLING: Sampling theorem, Signal Reconstructionfrom UniformSamples, Practical Issuesin Signal Sampling and Reconstruction, Maximum Information Rate: Two Pieces of Information per SecondperHertz,NonidealPracticalSamplingAnalysis,SomeApplicationsoftheSampling theorem,PulseCodeModulation(PCM),AdvantagesofDigitalCommunication,Quantizing,

PrincipleofProgressiveTaxation:NonuniformQuantization,TransmissionBandwidthandthe Output SNR, Digital Telephony: PCM in T1carrier systems.

Text1:5.1-5.3

Self-studycomponent:	RandomVariables, Matlab/Octave codefor Samplingand ReconstructionofLowpassSignals

UNIT– IV	**8 Hours**

ANALOG-TO-DIGITAL CONVERSION: Digital Multiplexing, Differential Pulse Code Modulation (DPCM), Adaptive Differential PCM (ADPCM), Delta Modulation.

PRINCIPLES OF DIGITAL DATA TRANSMISSION: Digital communication systems, Line coding, Pulse shaping, Scrambling, Digital receivers and regenerative repeaters.

Text 1: 5.4-5.7, 8.1-8.5 **DC Voltage Regulators:** Voltage Regulator Basics, Op–Amp Series Voltage Regulator, Adjustable Output Regulators, IC linear Voltage Regulators: 723 IC regulator and LM 317 IC regulator.

Text1:10.6,10.7,11.1,11.2,12.1, 12.2,12.3, 13.1,13.2, 13.3,13.5(Mentioned topics only)

Self-studycomponent:	Adaptivedeltamodulation**,**VideoCompression

UNIT– V	**8 Hours**

DIGITAL COMMUNICATION SYSTEM: Eye diagrams, PAM: M-ary baseband signaling for higher data rate, Digital carrier systems, M-ary digital carrier modulation, Optimum linear detector for binary polar signaling, general binary signaling, coherent receivers for digital carrier modulations, Signal space analysis of optimum detection.

Text1:8.6-8.9,9.1-9.4

Self-studycomponent:	NoiseinCommunication systems.

CourseOutcomes: Oncompletionofthiscourse,studentsareable to:

COs	**CourseOutcomes**with***Actionverbs***** fortheCourse topics	**Bloom's Taxonomy Level**	**Program Outcome Addressed(PO#) withBTL**
CO1	Applythebasicknowledgeofmathematics for Formulation and analysis of Analog and Digital communication system.	Remember	L2(PO1)
CO2	Analyze various aspects of sampling, quantizing, encoding and SNR of Analog / Digital signal modulation/transmissionanddemodulation/reception techniques.	Understanding	L3(PO2)

CO3	Analyze digital techniques like pulse shaping, coding and other digital communication systems	Understanding	L2(PO2)
CO4	Identify and Analyze different coherent receiver for digital modulation, Eye diagram, ISI and other digital communication signaling techniques.	Applying	L3(PO2)
CO5	**Apply** appropriate techniques, resources and modern tools to **examine** and **design** elementary communication system for various modulation schemes.	Applying	L4(PO2,PO5,PO9)

TextBook(s):

1. **"ModernDigitalandAnalogCommunicationSystems",**B.P.Lathi.ZhiDing,HariM.Gupta4th Edition ISBN-13:978-0-19-947628-2, ISBN-10:0-19-947628-4.

ReferenceBook(s):

1. **"AnIntroductionto analoganddigitalcommunications",**Simon Haykin, John Wiley and Sons, Inc.2013, ISBN:9788126536535.
2. **"Digital Communication",** P. Ramakrishna Rao, TATA cGraw Hill, 2011, ISBN:9780070707764.
3. **"PrinciplesofElectronicCommunicationSystems",**LouisE.Frenzel,Jr.TATA McGraw Hill ,Fourth Edition, ISBN : 978-0-07-337385-0

WebandVideo link(s):

1. **AnalogCommunication:https://archive.nptel.ac.in/courses/117/105/117105143/**
2. **DigitalCommunication:https://nptel.ac.in/courses/117105077**
3. **Modern Digital Communication Techniques: https://onlinecourses.nptel.ac.in/noc22_ee118/preview**

E-Books/Resources:

1. **https://www.skylineuniversity.ac.ae/pdf/computer/An%20Introduction%20to%20Digital%20Multimedia.pdf**
2. **https://edisciplinas.usp.br/pluginfile.php/5251120/mod_resource/content/1/B.%20P.%20Lathi%2C%20Zhi%20Ding%20%20Modern%20Digital%20and%20Analog%20Communication%20Systems-Oxford%20University%20Press%20%282009%29.pdf**

D.CourseArticulationMatrix

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
#1	3												3	
#2		3												3
#3		2												2
#4		2												2
#5		2			2				2					2

ElectromagneticFieldTheory
[AsperChoiceBasedCreditSystem(CBCS) &OBE Scheme]
SEMESTER–IV

Course Code:	**P21EC403**	**Credits:**	**03**
TeachingHours/Week(L:T:P):	**3:0:0**	**CIE Marks:**	**50**
TotalNumberof TeachingHours:	**40**	**SEE Marks:**	**50**

CourseLearningObjectives: Thiscoursewillenable thestudents to:

- Providethebasicknowledgeofelectromagneticfieldsandwavesofradiocommunication.
- Describethebasiclaws,propertiesandequationsofstaticelectricfieldusing3–dimensional vector method.
- Understandthebasiclaws,propertiesandequationsofstaticmagneticfieldusing3– dimensional vector method.
- Analysetheconceptsofmagneticforcesandinductance.
- ExtendtheMaxwell'sequationstotimevaryingelectromagnetic waves.
- Illustratethepropertiesofelectromagnetic waves.

UNIT – I	**8 Hours**

Electrostatic Fields Part1: Coulomb'slawandFieldintensity,ElectricfieldsduetoContinuouscharge distributions- line charge, surface charge, Electric Flux density, divergence of a vector and divergence theorem, Gauss law, Application of Gauss's Law: Point charge, Infinite Line charge.

Text1:3.6,4.2 to 4.6.

Self-studycomponent:	1. Vectors and Co-ordinate Systems: Cartesian Coordinates, Cylindrical Coordinates, Spherical Coordinates. 2. ApplicationsofGausslaw

UNIT– II	**8 Hours**

Electrostatic Fields Part 2: Electric potential, Del operator, gradient of a scalar, Relationship between E and V, An Electric Dipole and Flux lines.
ElectricFieldsinmaterialSpace: ConvectionandConductioncurrent,Continuityequationsand Relaxation time, Boundary conditions.
ElectrostaticBoundary–valueProblems: Poisson'sandLaplace'sequations,UniquenessTheorem
Text1:3.4,3.5, 4.7 to 4.9, 5.3, 5.8, 5.9, 6.2 to 6.3.

Self-studycomponent:	1. Energydensityinelectrostaticfields 2. Resistanceand Capacitance

UNIT– III	**8 Hours**

Magnetostatics Fields: Biot– Savart's law, Ampere's circuital law, applications of Ampere's law, magnetic flux density, Curl of a vector and Stroke theorem, Maxwell's equations for static fields, Magnetic scalar and vector potentials.
MagneticForces: Forcesduetomagneticfields,Amagneticdipole,magneticboundaryconditions.
Text1:7.2-7.7,3.7,8.2,8.4,8.7

Self-studycomponent:	1. Magnetictorqueandmoment. 2. Inductorsand inductance.

UNIT– IV	8 Hours

forces, displacement current, Maxwell's equations in final forms, Time Varying Potential.
Electromagnetic Wave Propagation: Introduction, Waves in general, Wave propagation in Lossy dielectrics, Plane waves in free space, Wave Polarization, Power and Poynting Vector.
Text1:9.2-9.6,10.2, 10.3,10.5,10.7, 10.8

Self-studycomponent:	1. PlanewavesinLossesdielectricsandGoodConductors. 2. Reflectionofplanewave innormalincidence.

UNIT– V	8 Hours

Basics of Wave Propagation: Introduction,DefinitionandBroadCategorization,BasicDefinition, Guided Waves, Unguided Waves, Different modes of wave propagation.
Ground Wave Propagation: Introduction, Space Wave and Surface Wave, Transition between Surface and Space Wave, Tilt of Wave Front due to Ground Losses.
Space Wave Propagation: Introduction, Field Strength Relation, Effects of Imperfect Earth, Effects of Curvature of Earth, Effects of Interference Zone, Shadowing Effect of Hills and Buildings.
Sky Wave Propagation: Introduction, Structural Details of the Ionosphere, Refraction and Reflection of Sky Waves by Ionosphere, Ray Path, Critical Frequency, MUF, LUF of,Virtual Height and Skip Distance, Relation between MUF and the Skip Distance.
Text2:22.1-22.2, 22.5**,** 23.1, 23.3to 23.5, 24.1 to 24.6,25.1, 25.2, 25.4, 25.5, 25.6.

Self-studycomponent:	1. Scattering Phenomena,Tropospheric Propagation,Fading,Path Loss Calculations. 2. Electromagnetic Interference (EMI) and Electromagnetic Compatibility (EMC).

CourseOutcomes: Oncompletionofthiscourse,studentsareable to:

COs	**CourseOutcomes** with***Action verbs***fortheCourse topics	**Bloom's Taxonomy Level**	**Level Indicator**
CO1	**Apply**theknowledgeofphysicsandVectorcalculusto understandEM fieldsand waves.	Remember	L3(PO1)
CO2	**Analyze**Electricfields,magneticfieldsandEMwavesandits effectinvariouschargedistributionofmedium.	Applying	L4(PO1,PO2)
CO3	**Compute**theelectricandmagneticfieldpotentialsdueto differentchargedistributionsandboundaryconditions.	Applying	L3(PO2,PO3)
CO4	**Discuss**time-varyingelectromagneticfieldsandwavesasgoverned by Maxwell's equations.	Understanding	L4(PO2)
CO5	**Examine**theeffectsandlossesofmediumonwaveand variousparametersinfluencingwave propagation	Understanding	L4(PO1,PO2)

TextBook(s):

1. **"PrinciplesofElectromagnetics"**Matthew N.O. Sadiku, S.V KulkarniOxford University Press 6th edition, 2018.ISBN-13: 978-0-19-946185-1, ISBN-10:0-19-946185-6
2. **"AntennasandWavePropagation",**JohnDKraus,RonaldJMarhefkaandAhmedSKhan, TataMcGrawHill,4thEdition,2015.ISBN:9780070671553.

ReferenceBook(s):

1. **"Electromagnetics with Application"**, John Kraus and Daniel .A. Fleischer, McGraw Hill, 5th edition 1999.ISBN: 9780071164290
2. **"Electromagnetics",**JosephAEdminister,Adaptedby:Vishnupriye.McGraw–Hill, Revised 2nd edition, 2013.ISBN:9780070353961
3. **"EngineeringElectromagnetics"**,WilliamH.HaytJr.JohnA.BuckandMJaleelAkhtar McGraw–Hill,8thedition,2015.ISBN:9789339203276.

WebandVideo link(s):

https://archive.nptel.ac.in/courses/108/106/108106073/

E-Books/Resources:

1. **ElectromagneticFieldsandEnergy ByHermannA.Haus|JamesR.Melcher|1998| PDF**
2. **ElectromagneticFieldTheory:AProblemSolvingApproach ByMarkusZahn|2003| 752 pages | PDF**
3. **IntroductiontoElectromagneticEngineeringbyRogerF.Harrington –McGraw-Hill, 1958**

D.CourseArticulationMatrix(CAM)

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
#1	3												3	
#2	2	3											2	3
#3		2	3											2
#4		3												3
#5	3	2											3	2

DigitalDesignUsingVerilogHDL

[AsperChoiceBasedCreditSystem(CBCS) &OBE Scheme]

SEMESTER–IV

Course Code:	**P21EC404**	**Credits:**	**04**
TeachingHours/Week(L:T:P):	**3:0:2**	**CIE Marks:**	**50**
TotalTheoryTeachingHours: **TotalLaboratoryHours:**	**40** **24**	**SEE Marks:**	**50**

CourseLearningObjectives: Thiscoursewillenable thestudents to:

- Explaintheworkingknowledgeofabroadvarietyof Verilogbasedtopicforglobal understating of Verilog HDL based design.
- DescribethepracticaldesignperspectiveofVerilogHDL.
- Explainthelogical progressionofVerilogHDLbased topics.
- Explainthebasics andsomeadvanced topicssuch as PLIandlogic synthesis.

UNIT– I	**8 Hours**

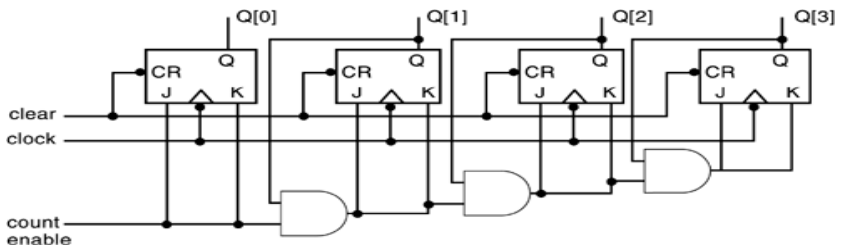
BasicConcepts: LexicalConventions,DataTypes,SystemTasksandCompilerDirectives.
Modulesand Ports: Modules,Ports,HierarchicalNames.
Gate-LevelModeling: GateTypes,GateDelays.
DataflowModeling: ContinuousAssignments,Delays,Expressions,Operators,andOperands, Operator Types, Examples.

Self-studycomponent:	Develop a Verilog code and test bench for following question and verify it by using any EDA tool (Xilinx/libero/vivado/ iverilogetc.). 1. Studytypical design flow for designingVLSICircuits. 2. Design2to1 muxusingbufif0and bufif1. 3. Design4bitmod13counteranddisplayallinputandoutput values in command window.
PracticalComponents (6 Hours)	1. WriteVerilogHDLcode torealizeallthelogicgates. 2. Write a Verilog HDL programfor the followingcombinational designs a. Decoder b. Encoder(with andwithoutpriority)

UNIT– II	**8 Hours**

Behavioral Modeling: Structured Procedures, Procedural Assignments, Timing Controls, Conditional Statements, Multiway Branching, Loops, Sequential and Parallel Blocks, Generate Blocks. Examples.
TasksandFunctions: DifferencebetweenTasksandFunctions,Tasks,Functions.

Self-studycomponent:	1. Design8-bitALUUsingtaskorfunction. 2. Designclockwithtimeperiod=80anddutycycleof40%using always & initial statement.
PracticalComponents (6 Hours)	1. WriteaVerilogHDLprogramforthefollowingcombinational designs. a. MultiplexerandDemultiplexer b. Codeconverter. c. Comparator. 2. WriteaVERILOGHDLcodetodescribethefunctionsofaFull

	Adder,paralleladderandsubtractorusingthreeModelingstyles.
UNIT– III	**8 Hours**
UsefulModelingTechniques: ProceduralContinuousAssignments,OverridingParameters, Conditional Compilation and Execution, Time Scales, Useful System Tasks. **Timing and Delays:** Types of Delay Models, Path Delay Modeling, Timing Checks, Delay Back-Annotation. **SwitchLevelModeling:**Switching-ModelingElements, Examples.	
Self-studycomponent:	1. Design16to1muxusing4to1muxanddisplayallinputandoutput values in command window. 2. Create a design that uses the full adder example above. Use a conditionalcompilation(`ifdef).Compilethefulladd4withdefparam statements if the text macro DPARAM is defined by the `define statement; otherwise, compile the fulladd4 with module instance parameter values. 3. Switch LevelVerilogDescriptionforXORgate.
PracticalComponents (4 Hours)	1. DevelopandsimulateaVERILOGHDLcodefor8-bitbooth Multiplier. 2. Develop the VERILOG HDL code for the following flip– flops, SR, D, JK, T and counter.
UNIT– IV	**8 Hours**
UserDefinedPrimitives:UDPbasics.CombinationalUDPs,SequentialUDPs,UDPTable Shorthand Symbols, Guidelines for UDP Design. **ProgrammingLanguageInterface:**UsesofPLI,LinkingandInvocationofPLI Tasks.Internal Data Representation, PLI Library Routines. **Logic Synthesis with Verilog HDL:** What Is Logic Synthesis? Impact of Logic Synthesis, Verilog HDL Synthesis, Synthesis Design Flow.	
Self-studycomponent:	1.Designthe4-bitsynchronouscountershownbelow(UsetheUDP jk_ff). 
PracticalComponents (4 Hours)	1. DesignanddevelopVERILOGHDLcodefora4-bitbinaryserial adder and simulate. 2. WriteVERILOGHDLcodetodisplaymessagesonthegivenseven

	segmentdisplayandLCD andacceptingHexkeypadinput data. 3.WriteVERILOGHDLcodetocontrolspeed,directionofDCand Stepper motor.

UNIT– V	**8 Hours**

LogicSynthesiswithVerilogHDL: VerificationoftheGate-LevelNetlist,ModelingTipsfor Logic Synthesis, Example of Sequential Circuit Synthesis.

AdvancedVerificationTechniques: TraditionalVerificationFlow,AssertionChecking,Formal Verification.

Self-studycomponent:	1. A1-bitfullsubtractorhasthreeinputsx,y,andz(previousborrow) and two outputs D(difference) and B(borrow). The logic equations for D and B are as follows: a. D =x'y'z+x'yz'+xy'z'+xyz b. B= x'y+ x'z+yz 2. Write the Verilog RTL description for the full subtractor. Synthesize the full subtractor, using any technology library available to you. Optimize for fastest timing. Applyidentical stimulus to the RTL and the gate-level netlist and compare the output.
PracticalComponents (4 Hours)	1. Write VERILOG HDL code to accept 8 channel Analog signals, Temperature sensors and display the data on LCD panel or seven segment display. 2. Write VERILOG HDL code to generate different waveforms (Sine, Square, Triangle, Ramp etc.,) using DAC change the frequency and amplitude. 3. WriteVERILOGHDLcodetosimulateElevator operations.

CourseOutcomes: Oncompletionofthiscourse,studentsareable to:

COs	**CourseOutcomes**with***Actionverbs***fortheCoursetopics	**Bloom's Taxonomy Level**	**Level Indicator**
CO1	To**apply**theknowledgeofdigitalfundamentalsto explain basic concepts used in Verilog HDL	Remember	L2(PO1)
CO2	To**write**aVerilogmodelforcombinationalandsequential circuits.	Apply	L2,L3(PO2,PO3)
CO3	To **analyse**the given digital circuit and develop Verilog model for given digital circuits.	Analyze	L3,L4(PO2)
CO4	To **design** any combinational and sequential circuits and develop Verilog model for the given inputs.	Design	L4,L5(PO3, PO4,PO5)
CO5	To **verify** the design through synthesis and demonstrate the application using EDA tools.	Evaluate	L4,L5 (PO3,PO5,PO9, PO10, PO12)

TextBook(s):

1. **"Verilog®HDL,AGuidetoDigitalDesignandSynthesis",**SamirPalnitkarPearson Education, Second Edition, ISBN 978-81-775-918-4.

ReferenceBook(s):

1. **"AdvancedDigitalDesignwiththeVerilogHDL",**MichaelDCiletti,PHI,ISBN: 9789332584464, 933258446X**.**
2. **"AVerilogHDLPrimer",**J.Bhaskar,BSPublications,ISBN:9788178000145, 8178000148
3. **"Fundamentals of Digital Logic with Verilog Design",** Stephen brown and ZvonkoVranesic, TMH, ISBN: 9780073380544, 0073380547

WebandVideo link(s):

1. https://youtu.be/VS9JzfJ6Oxg
2. https://youtu.be/wiNDn19GpRU

E-Books/Resources:

D.CourseArticulationMatrix

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
#1	2												2	
#2		2	3											2
#3		2												2
#4			2	2	2									
#5			2		2				3	1		1		

Microcontroller [AsperChoiceBasedCreditSystem(CBCS) &OBE Scheme] SEMESTER–IV			
Course Code:	**P21EC405**	**Credits:**	**04**
TeachingHours/Week(L:T:P):	**3:0:2**	**CIE Marks:**	**50**
TotalTheoryTeachingHours: **TotalLaboratoryHours:**	**40** **24**	**SEE Marks:**	**50**

CourseLearningObjectives: Thiscoursewillenable thestudents to:

- Providethebasicknowledgeofembedded systems.
- Outlinethe architectureof MSP430.
- Makeuseoftheinstruction setsand addressingmodesforwritingprograms.
- Understandworkingandapplicationsofinterrupts.
- UtilizetheLow-Power ModesfortheOperationofMSP430
- Summarizetheoperationandutilizationoftimers.

UNIT – I	**8 Hours**

Embedded Electronic Systems and Microcontrollers: What and where are embedded systems, Approaches to Embedded Systems, Small Microcontrollers, Anatomy of aTypical Small Microcontroller, Memory, and Software.

The Texas Instruments MSP430: The Outside View—Pin-Out, the Inside View—Functional Block Diagram, Memory, MemoryMapped input and output, Clock Generator, Exceptions: Interrupts and Resets.

Text1:1.1,1.2, 1.3, 1.4,1.5, 1.6, 2.1, 2.2,2.3, 2.5, 2.6, 2.7.

Self-study component:	1. Studyandunderstandtheapplicationof MSP430inrealtime applications. 2. Understandtheenvironmentaldevelopmenttodevelopprogramsfor microcontroller.
PracticalTopics: **(6 Hours)**	1. Arithmetic operation -Addition, Subtraction, multiplication, division, incrementing, decrementing operations. **2.** Data transfer-Block move andexchange,sorting,finding largest and smallest element in an array.

UNIT – II	**8 Hours**

Architecture of the MSP430 Processor: Central Processing Unit, Addressing Modes, Constant Generator and Emulated Instructions, Instruction set, Examples, Reflections on the CPU and Instruction Set, Resets, Clock system.

Text1:5.1,5.2, 5.3,5.4,5.5,5.6, 5.7, 5.8.

Self-study component:	1. Light LED'sinCandAssembly Language. 2. Accesstothemicrocontrollerforprogramminganddebugging

	alongwith demonstration boards
PracticalTopics: **(6 Hours)**	1. Boolean and logical instructions: AND, OR, XOR, NOT, rotate and swap operations, Conditional CALL and RETURN. Interfacing experiments: 2. Programtoblinkthe LED'susingon-chiptimer.

UNIT – III	**8 Hours**

Functions, Interrupts and Low-Power Modes: Functions and Subroutines, WhathappenswhenaSubroutineiscalled?,StorageforLocalVariables,PassingParameterstoa Subroutine and Returning a Result, Interrupts, what happens when an interrupt is requested?, Interrupt Service Routines, Issues Associated with Interrupts, Low-Power Modes of Operation.

Text1:6.1, 6.2, 6.3, 6.4,6.6, 6.7, 6.8, 6.9, 6.10.

Self-study component:	1. Studyof assembly language/ c-programming tools with programming exercises. 2. DevelopandImplementaassemblylevelprogramtoFlashLED's with frequency of 1Hz using software delay and subroutine.
PracticalTopics: **(4 Hours)**	1. Interfacingan LCDunittoMSP430F2013. 2. Generationofdifferent waveformsusingDACinterface.

UNIT – IV	**8 Hours**

Timers: Watchdog Timer, BasicTimer1, Timer_A, Measurement in the Capture Mode, Measurement of time: Press and Release of button, Output in the Continuous Mode, operation of Timer_A in the sampling mode, Timer_B, what Timer where?

Text1:8.1,8.2, 8.3,8.4,8.4.1, 8.5,8.8, 8.9, 8.10.

Self-study component:	1. Studyof ouput in the upmode-Edge-Aligned PWM. 2. Design and develop a assembly level program to generate pseudorandom stream of bits using shift register.
PracticalTopics: **(4 Hours)**	1. Steppermotorinterfaceandspeedcontrolofstepper motor. 2. Measurementofpressure,temperature, weight.

UNIT – V	**8 Hours**

Mixed signal system: Analog input and output: Comparator_A, Analog-to-Digital Conversion: General Issues, Analog-to-Digital Conversion: Successive Approximation, Operation of a switched capacitor SAR ADC. TheADC10 Successive-Approximation ADC, Basic Operation ofthe ADC10, ADC conversion Sigma-Delta.

Text1:9.1,9.2, 9.3, 9.3.1, 9.4, 9.5, 9.8.

Self-study component:	1. Studyof ADC12Successive-ApproximationADC. 2. Examine whether direct connection to a MSP430 is sufficient or further connection of the signal is required for conversions of analog signals to digital signals.
PracticalTopics: **(4 Hours)**	1. Measurementof timeand frequencyusingtimers and interrupts. 2. Temperaturemonitoringsystem.

CourseOutcomes: Oncompletionofthiscourse,studentsareable to:

COs	CourseOutcomeswith*Actionverbs*fortheCourse topics	Bloom's TaxonomyLevel	Program Outcome Addressed(PO#) withBTL
CO1	**Apply** the knowledge of logic design tounderstand the concept of 16-bit Microcontroller (MC), its instruction set, addressing modes and other features.	Remember	L1(PO1)
CO2	**Understandworkingof** differentperipheral components associated with MSP430 MC	Understanding	L2(PO1,PO2)
CO3	**Develop** logical skills to write programs using MSP430 instruction set and by using 'C' for the given Engineering Problems.	Apply,Analize ,Create	L3,L4,L6 (PO3)
CO4	To**analyze**thedevelopedcodeusingmodernengineering tools.	Applying	L2(PO3)
CO5	**Interface hardware modules** to F2013 MC and **develop** interfacing programs in C Programming language	Analize,Create	L3,L4,L6 (PO2, PO5,PO9, PO12)

TextBook(s):

1. **"MSP430MicrocontrollersBasics",**JohnH.Davies,Newnes(Elsevier Science), 2008, ISBN: 978-0-7506-8276-3

ReferenceBook(s):

1. ,**"Getting Started with the MSP430 Launchpad",** Adrian Fernandez, DungDang**,**Newnes (Elsevier Science), 2013, ISBN: 978-0-124116009
2. **"Programmable Microcontrollers with Applications: MSP430 LaunchPad with CCS and Grace"** CemUnsalan, H. DenizGurhan, McGraw Hill Publictions, 2013, ISBN: 978-0071830034.

WebandVideo link(s):

https://www.youtube.com/watch?v=l6M7aqN6dmo

E-Books/Resources:

https://www.academia.edu/38330666/MSP430_Microcontroller_Basics_John_H_Davies

D.CourseArticulationMatrix

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
#1	2												2	
#2	2	3											2	3
#3			2											
#4			2											
#5		2			2				2			1		2

AnalogandDigitalCommunicationLaboratory

[AsperChoiceBasedCreditSystem(CBCS) &OBE Scheme]

SEMESTER–IV

Course Code:	**P21ECL406**	**Credits:**	**01**
TeachingHours/Week(L:T:P):	**0-0-2**	**CIE Marks:**	**50**
ContactPeriod:	**Lab:36Hrs., Exam:3Hrs.**	**SEE Marks:**	**50**

CourseLearningObjectives(CLOs)

Thiscourseaimsto:

- Provide the basic practical knowledge of Analog and Digital Fiber Optic links, laser, diode characterization and attenuation.
- Demonstrate the measurement ofvarious parameters ofOptical fiberlosses, Numerical Aperture and WDM MUX- DEMUX.
- Demonstratethegenerationanddetectionofanalogsignalsusingvariousmodulation techniques such as AM, PAM.
- Providethebasicpracticalknowledgeofdigital modulation& demodulation.
- Design andAnalyzethefrequencyresponseofSecondorderactive filtersusingop- Amp and Astable multi-vibrators

Course Content

Allthefollowingexperimentshavetobeperformedusingdiscretecomponentsand modules.

1. AnalogandDigitalFibreopticlinks.Attenuation,BendinglossandNumerical aperture measurement of optical fibre.
2. CharacterizationofWDMMUXand DEMUX.
3. TimeDivisionMultiplexingofsignals (UsingPAM Kit).
4. AmplitudeModulationandDetectionintimedomainanditsobservationin frequency domain (Use Spectrum Analyser).
5. DemonstrationofASK,FSK,PSKand DPSKmodulationand Demodulation.
6. SimulationofQPSKtransmitterandreceivertakingintoaccountthephaseandthe frequency offset (Using WICOMM–T Kit).
7. Design anA-stableMulti-vibratorusingIC555Timer.
8. Design Second order active filters for different cut-off frequencies using op-Amp:LPF, HPF and BPF.

OpenEndedExperiments:

1. AnalyseandUnderstandtheHysteresisCurvegeneratedusingSchmittTriggerOp-amp Circuit.
2. DeterminetheBitErrorRate(BER)andAnalysetheEyePatterngeneratedinaDigital Transmission using Light Runner.

REFERENCEBOOKS:

1. **"Introduction to Fiber Optic",** A.Ghatak and K.Thygarajan,Cambridge University Press, Cambridge, UK 1988.
2. **"Fiber Optical Communication System",**3rdeditionGovindP.Agrawal,Johnwiley Sons Inc. 2002.
3. **"OpticalFiberCommunicationPrinciplesandSystems",** S.Kar,A.Selvarajanand T Sreenivas Tata McGraw Hill Publishing Company Ltd., New Delfi, 2002.
4. **"An Introduction to Analog and Digital Communication System",** Simon Hykin and John Wiley 2004.
5. **"AdvancedDigitalCommunicationLaboratoryManual",**PreethaSharan,RBhargava Rama Gowda, CBS Publishers & Distributors Pvt. Ltd., First Edition, 2013.

Course Outcomes

CO #	Course Outcome	Bloom's Taxonomy Level	Level indicator ProgramOutcome
CO1	**Apply**thebasicknowledgeofcommunication to determine attenuation, losses and other parameters.	**Apply**	**L2(PO1, PO2,PO9)**
CO2	**Analyze** by **applying** basic knowledge of communicationtheorytheworkingofTDM, WDM-MUXand WDM-DEMUX.	**Analyze**	**L3(PO1, PO2, PO9)**
CO3	**Analyze** the operation of different Analog and Digitalmodulation anddemodulation schemes.	**Analyze**	**L3(PO2,PO4,PO9, P12)**
CO4	Design and**Analyze**SecondOrderActive filtersand Multi-vibrator.	**Create**	**L4(PO2, PO3, PO9)**

D.CourseArticulationMatrix (CAM)

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
#1	**2**	**2**							**3**				**2**	**2**
#2	**2**	**2**							**3**				**2**	**2**
#3		**2**		**2**					**3**			**1**		**2**
#4		**2**	**2**						**3**					**2**

EmployabilityEnhancementSkills(EES)-IV
[Asper ChoiceBasedCreditSystem (CBCS)&OBE Scheme]
SEMESTER–IV

Course Code:	**P21HSMC408**	**Credits:**	**01**
TeachingHours/Week (L:T:P):	**0:2:0**	**CIE Marks:**	**50**
TotalNumberof TeachingHours:	**28**	**SEEMarks:**	**50**

CourseLearningObjectives: Thiscoursewillenablestudents to:

- Solveproblemsonages,mixturesandalligations andprogressions.
- UnderstandtheconceptsofDatainterpretation,cryptarithmetic anddatasufficiency.
- UnderstandthebasicconceptsofCprogramminglanguage.
- Applyprogramming constructs of C languageto solve thereal-worldproblem.
- Explore user-defined data structures like arrays, structures and pointers in implementing solutions to the problems.
- Design andDevelopsolutionstoproblemsusingfunctions.

UNIT– I	**10 Hours**

QuantitativeAptitude: Problems onAges,MixturesandAlligations, Progressions.
LogicalReasoning: Data Interpretation,Cryptarithmetic,Datasufficiency.

Self-Study: Sequential output tracing

UNIT– II	**08 Hours**

CProgramming: DatatypesandOperators,Controlstatements, Looping,Arrays andStrings

Self-Study: Pre-processors

UNIT– III	**10 Hours**

CProgramming: Functions,Recursion,Structure, Pointers,Memorymanagement.

Self-Study: Enum and Union

CourseOutcomes: Oncompletionofthiscourse,studentsareable to:

CO– 1:	Solvetheproblems basedonages, Mixtures,alligations and progressions.
CO– 2:	ApplysuitableprogrammingconstructsofC languageto solvethegivenproblem.
CO– 3:	DesignandDevelopsolutions toproblemsusingfunctions andrecursion.

Text Book(s):

1. QuantitativeaptitudebyDr.R. SAgarwal,publishedbyS.Chand privatelimited.
2. ExploringC byYashavantKanetkar, 2nd edition,BPB Publications
3. 3.Test YourCSkills byYashavantKanetkar,2nd edition, BPB Publications

ReferenceBook(s):

1. QuantitativeAptitudebyArunSharma,McGrawHill Education PvtLtd
2. ReemaThareja,ProgramminginC, 2ndEdition,OxfordUniversityPress,2016.
3. Schaum'soutlines,ProgrammingwithC,ByronGottfried,3rdEdition,TataMcGraw-Hill Publication, 2017.

Weband Video link(s):

1. NPTELCourse:ProblemSolvingthroughProgramminginC,Prof.AnupamBasu,IIT Kharagpur

https://nptel.ac.in/courses/106/105/106105171/

COURSEARTICULATIONMATRIX[EmployabilityEnhancementSkills(EES)-IV]

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO-1	2	-	-	-	-	-	-	-	-	-	-	-
CO-2	-	2	1	-	-	-	-	-	3	1	2	2
CO-3	-	1	2	-	-	-	-	-	-	2	-	1

Internship- I

[AsperChoiceBasedCreditSystem(CBCS) &OBE Scheme]

SEMESTER–IV

Course Code:	**P21INT409**	**Credits:**	**01**
TeachingHours/Week(L:T:P):	**0 : 0 :0**	**CIE Marks:**	**-**
Internshipduration:	**2 weeks**	**SEE Marks:**	**100**

All the students registered to II year of BE shall have to undergo a mandatory internship of 02 weeksduringtheinterveningvacationof IIand IIIsemestersorIIIand IVsemester.Internshipshall include Inter / Intra Institutional activities. A Semester End Examination (Presentation followed by question-answer session) shall be conducted during IV semester and the prescribed credit shall be included in IV semester. The internship shall be considered as a head of passing and shall be considered for the award of degree. Those, who do not take up / complete the internship shall be declared fail and shall have to complete during subsequent Semester End Examination after satisfying the internship requirements. (The faculty coordinator or mentor has to monitor the students' internship progress and interact to guide them for the successful completion of the internship.)

List ofActivities

1. Activities concerned with the works of Indian scholars like Charaka and Susruta, Aryabhata, Bhaskaracharya, Chanakya, Madhava, Patanjali, Panini and Thiruvalluvar, among numerous others. (Reference NEP 2020, page 04)
2. Activities such as training with higher Institutions or Soft skill training organized by Training and Placement Cell of the respective institutions.
3. Contributionatincubation/innovation/entrepreneurshipcelloftheinstitute.
4. Participationin conferences/workshops/ competitions etc.
5. LearningatDepartmental Lab/TinkeringLab/ Institutional workshop.
6. Andworkingforconsultancy/researchprojectwith-intheinstitute.[Serialnumbers2to6, AICTE Internship Policy.pdf page 8]
7. LearningMSWord,Excel,Microsoftequations,MSdrawingtools,MS Powerpoint, etc.
8. Coding.
9. Mini-projectsusingcommerciallyavailableassembledelectronicproducts.
10. Debates,quizzes, andgroup discussions:On technica
11. Essaycompetitions:BothinKannada andEnglishontechnicaltopicsalreadystudied.
12. Surveyandstudyofpublishedliteratureontheassignedtopic:Technicalpapersurvey, Preparation of synopsis. Exposure to technical paper publications.
13. AthleticsandSports.
14. Photography.
15. Shortfilmproduction:Contemporaryaspects,Technicalaspectsetc.
16. MusicCompetition(VocalandInstrumental):Classical–Indianandwestern,Sugama- Sangeetha (BhavaGeethegalu), Folk songs, film songs etc.
17. InternshipinDisasterManagement.[AICTEAPH2021-22pdf page166]

18. Solarenergyconnected activitiesthat help commonman. [AICTE APH2021-22 pdfpage166]
19. WorkingwithSmartCityAdministration.
20. Hackathon (it is a design sprint-like event in which computer programmers and others involved in software development, including graphic designers, interface designers, project managers,and others, often including domain experts, collaborate intensively on software projects).
21. IndustrialSafety,FireSafety,ElectricalSafety,ChemicalProcessSafety,FoodSafety etc.
22. Internshipandprojectworkin IndianKnowledge SystemrelatedAreas/Topics.
23. Industrial visits / small scale Industries / Factories / Cottage Industries / substation visit / short project tour, etc., and submission of report.

DocumentstobesubmittedbyStudentsforInternship Evaluation

I. **Student'sDiary**

The main purpose of writing a dailydiary is to cultivate the habit of documenting and to encourage the students to search for details. It develops the students' thought process and reasoning abilities. The students shall record in the daily training diary the day to day account of the observations, impressions,information gathered andsuggestionsgiven,if any, and activitiescarriedout. It should contain the sketches and drawings related to the observations made by the students. The daily training diary should be signed after every day or at least twice a week by the Faculty/ in charge of the section (external expert) where the student has been working.

The student's Diary should be submitted by the students along with attendance record. It shall be evaluated on the basis of the following criteria:

- **(i)** Regularityin themaintenanceof thediary.
- **(ii)** Adequacyand qualityofinformationrecorded.
- **(iii)** Drawings,sketches,and datarecorded.
- **(iv)** Thoughtprocessand recordingtechniquesused.
- **(v)** Organizationoftheinformation.

II. **Internship Report**

After completion of the Internship, the student shall prepare, with daily dairy as a reference, a comprehensive report in consultation with the evaluators to indicate what he has observed and learned in the training period along with the internship outcomes. The training report should be signed by the Evaluator.

The Internship report shall be evaluated on the basis of the following criteria and/or other relevant criteria pertaining to the activity completed.

- **(i)** Originality.
- **(ii)** Adequacyand purposeful write-up.
- **(iii)** Organization,format,drawings,sketches,style,languageetc.
- **(iv)** Varietyandrelevanceoflearningexperience.

Practicalapplicationsrelationshipswithbasictheoryandconceptstaughtinthecourse.

Table–1:IntraandInterInstituteActivitiesandAssessmentRubrics					
Sl No	**Sub Activity Head**	**Performance/ Appraisal**	**Assessment Rubrics (Allottedmarks decide the lettergrade)**	**Proposed Document as Evidence**	**Evaluatedby**
1	Inter/Intra Institutional Workshop/ Training.	Excellent	80to100	**(i)** Student'sDiary and **(ii)** Internship Report along with the certificate issued from relevantauthorized Authority	**i)** Institute Faculty together with External Expert if any. **(ii)** Training andPlacementOfficer. **(iii)** PhysicalEducation Officer or the concerned in charge Officer of the Activity
		Good	79 to 60		
		Satisfactory	59 to 40		
		Unsatisfactoryand fail	<39		

BasicEngineeringMathematics-II
[AsperChoiceBasedCreditSystem(CBCS)&OBE Scheme]
SEMESTER–IV(LateralEntry:Commontoallbranches)

Course Code:	**P21MDIP401**	**Credits:**	**00**
TeachingHours/Week(L:T:P):	**2-2-0**	**CIE Marks:**	**100**
TotalNumberof TeachingHours:	**40**	**SEE Marks:**	**-**

Course objective: Themandatory learning course **P21MADIP401**viz., **BASIC ENGINEERINGMATHEMATICS-II** aims to provide essential concepts of linear algebra, introductory concepts ofsecond & higher order differential equations along with various techniques/ methods to solve them, Laplace &inverseLaplace transforms and elementary probability theory.

UNIT– I	**8 Hours**

Linear Algebra: Introduction-Rank ofmatrix by elementaryrow operations - Echelon form of a matrix. Consistency of system of linear equations - Gauss elimination method. Gauss-Jordan and LU decomposition methods. Eigen values and Eigen vectors of a square matrix.

Self-study component:	ApplicationofCayley-Hamiltontheorem(withoutproof)tocomputethe inverse of a matrix-Examples.

UNIT– II	**8 Hours**

Higher order ODE's: Linear differential equations of second and higher order equations with constant coefficients. Homogeneous /non-homogeneous equations. Inverse differential operators. and variation of parameters. Solution of Cauchy's homogeneous linear equation and Legendre's linear differential equation.

Self-study component:	Methodof undeterminedcoefficients

UNIT– III	**8 Hours**

Multiple Integrals: Double and triple integrals-region of integration. Evaluation of double integrals by change of order of integration.

VectorIntegration: VectorIntegration:Integrationofvectorfunctions.Conceptofaline integrals,surfaceandvolumeintegrals.Green's,Stokes'sandGausstheorems(without proof) problems.

Self-study component:	Orthogonalcurvilinearcoordinates.

UNIT– IV	**8 Hours**

Laplace transforms: Laplace transforms of elementary functions. Transforms of derivatives and integrals, transforms of periodic function and unit step function-Problems only. Inverse Laplace transforms: Definition of inverse Laplace transforms. Evaluation of Inverse transforms by standard methods.

Self-study component:	Application to solutions of linear differential equations and simultaneous differential equations.

UNIT– V		8 Hours
Probability:Introduction.Samplespaceandevents.Axiomsofprobability.Additionand multiplication theorems. Conditional probability – illustrative examples.		
Self-study component:	StateandproveBayes'stheorem.	
CourseOutcomes: Afterthesuccessfulcompletionofthecourse,thestudentsare able to		
CO1	**Apply** matrix theoryfor solving systems of linear equations in the different areas of linear algebra.	
CO2	**Solve** second and higher order differential equations occurring in of electrical circuits,damped/un-damped vibrations.	
CO3	**Identify**-thetechnique ofintegrationtoevaluatedoubleandtripleintegralsbychangeof variables, and vector integration technique to compute line integral	
CO4	**Explore** the basic concepts of elementary probability theory and, apply the same to the problems ofdecision theory.	

TEXTBOOKS

1. B.S.Grewal,HigherEngineeringMathematics(44th Edition),KhannaPublishers,New Delhi.
2. B.V.Ramana,HigherEngineeringMathematics,TataMcGrawHillpublications, NewDelhi,11thReprint,2010.

REFERENCE BOOKS

1. ErwinKreyszig,AdvancedEngineeringMathematics(LatestEdition),Wiley Publishers, New Delhi.
2. H.C.Taneja,AdvancedEngineeringMathematics,Volume I&II,I.K.International Publishing HousePvt. Ltd., New Delhi.
3. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint,2010.
4. V.Krishnamurthy,V.P.MainraandJ.L.Arora,AnintroductiontoLinearAlgebra, Affiliated East–Westpress, Reprint 2005.
5. D.Poole,LinearAlgebra:AModernIntroduction,2ndEdition,Brooks/Cole,2005

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	**3**	**2**										
CO2	**3**	**2**										
CO3	**2**	**3**										
CO4	**2**	**2**										
CO5	**3**											
Strengthofcorrelation: Low-1,Medium-2,High-3												

EmployabilityEnhancementSkills(EES)-II
[Asper ChoiceBasedCreditSystem (CBCS)&OBE Scheme]
SEMESTER–IV

Course Code:	**P21HDIP408**	**Credits:**	**01**
TeachingHours/Week (L:T:P):	**0:2:0**	**CIEMarks:**	**100**
TotalNumberof TeachingHours:	**28**	**SEEMarks:**	**-**

CourseLearningObjectives: Thiscoursewillenablestudents to:

- Getintroducedtotheconceptsofteamworkandleadership
- Understandtheimportanceofprofessionaletiquettes
- Describethereadingwith comprehension
- Explainthepurpose,planandwaystoidentifyspecificdetailsinaparagraphforbetter comprehension
- Formgrammaticallycorrect sentences
- Explainthebasicconceptsincalculatingsimpleinterestandcompound interest
- Explainconceptsbehindlogicalreasoningmodulesofdirectionsense,coding& decoding, series and visual reasoning

UNIT– I	**10 Hours**

SoftSkills: Etiquette,PresentationSkills,IntroductiontoBodyLanguage,Interpersonaland Intrapersonal Skills, Team work, Leadership skills, Extempore

Self-Study: ConceptsofSympathyand Empathy

UNIT– II	**10 Hours**

VerbalAbility: VerbalAnalogies,Sentence completion&correction, Readingcomprehension

Self-Study: Paragraph sequencing

UNIT– III	**8 Hours**

QuantitativeAptitude: Simple&CompoundInterest, Ratio&Proportion, Time&Work
LogicalReasoning: DirectionSense,Coding and Decoding,Series, Visualreasoning

Self-Study: DirectionsandPythagorasTheorem,differencesbetweenmirrorandwater images

CourseOutcomes: Oncompletionofthiscourse,studentsareable to:

CO– 1: Exhibitamplifiedlevelofconfidencetoexpressthemselvesin English

CO– 2: Critical awareness of the importance of teamwork and development of the skills forbuilding effective teams

CO– 3: Solvethequestions underreadingcomprehensionconfidentlywithhigheraccuracy

CO– 4: Solvetheproblems based on interest, ratio &proportion, time&work

CO– 5: Solve logicalreasoning problemsbasedon direction sense, coding& decodingand series

Text Book(s):

1. WordPowerMadeEasyNewRevisedandExpandedEdition,FirstEdition,Norman Lewis, Goyal Publisher.
2. EssentialEnglishGrammarbyRaymondMurphy,CambridgeUniversityPress,new edition
3. The7 habits ofHighlyEffectivePeople byStephen R. Covey
4. QuantitativeaptitudebyDr.R. SAgarwal,publishedbyS.Chand privatelimited.
5. VerbalreasoningbyDr.R.S Agarwal , publishedbyS.Chandprivatelimited.

ReferenceBook(s):

1. QuantitativeAptitudebyArunSharma,McGrawHill Education PvtLtd
2. CATMathematicsbyAbhijithGuha, PHIlearning privatelimited.

Weband Video link(s):

1. Teamwork Skills: Communicating Effectively in Groups https://www.coursera.org/learn/teamwork-skills-effective-communication

COURSEARTICULATIONMATRIX[EmployabilityEnhancementSkills(EES)-II]

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO-1	-	-	-	-	-	-	-	-	2	3	-	2
CO-2	-	-	-	-	-	-	-	-	3	1	2	2
CO-3	-	-	-	-	-	-	-	-	-	2	-	1
CO-4	2	-	-	-	-	-	-	-	-	-	-	-
CO-5	2	-	-	-	-	-	-	-	-	-	-	-

BE–III/IVSemester–Commonto all

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9µ³oc³Ä¸³oa*Ãv³(CourseCode)	**P21KSK307/407**	**9g³ov³g³Dov³øa³ª³cË®¸ª³cÁ¥³£³eoa³n³æ³Ä**	**50**
soz³Aªg³a*l¨*sAzs³£Aeª³øü TeachinHours/Week (L:T:P)	**0-2-0**	**¸*9Ä¸³Ögïeov¸z³¥³øÃa*¸oc³Äeoa³n³æ³Ä**	**50**
sl¨*sÃzs³£³eª³øü	**25n³om*n³æ³Ä**	**sl¨eoa³n³æ³Ä**	**100**
a*.rmï(Credits)	**1**	**¥³øAa*¸oc³Aeª³øü**	**01n³om***

¸Áo¸³Ìlø&a³a³£³ßq³¥³o³¸za³°a*oc³Äwz*ÝÃ±³n³æ³Ä:

C.v'ÈwÛ¥'g'¥'z'99zÁ¸%tn'вÁRg'Äv'çz'øoz'a'£'ßq'¨sÁµ³¸¸Áœe'¸v'Äe'ÄÛa'£'ßq'z'¸Áo¸'Ìøwoc'Ä¥'øZ'oc'Äv'cÁra³sq'Äv'çz'Ä.

2.a'£'l‰q¦¸Áœe'¸z'¥'.zsÁ£'¨sÁn'vÁz'Dzs'Äea'¥'sv'tv'Äe'ÄÛDzs'Äea'aÁv'¸n'в'£'Äß¸Áoa³9wa'vÁR¥'øZ'°'øÄ¹ 9zÁ¸%tn'в'°è¸Áœe'¸v'Äe'ÄÛ¸Áo¸'Ìøwoc'Ä§n³Î9øv'ç°Án'sD¸'&Ûoc'Ä£'Äßv'Äsr¸'Äv'çz'Ä.

6.eÁow.av'¸&Ûn'в'¥'øZ'oc'Äv'£'Äß°Án's9v'g'Än'в'¸Áøü¹z'9µ'oc'Än'в'£'Äß¥'øZ'øÄ¸'Äv'çz'Ä

6.a'£'l‰q¦±'§¦¸'o¥'wÛ£¥'øZ'oc'Äv'Äe'ÄÛa'£'l‰q¨sÁ¶oc'Ä§в'&°Án'sa'£'ßq'z'°è¥'e'.v'¸v'°Ág'v'£'Äßw½¹a³sq'Äv'çz'Ä.

¨*sÃzs³£*ª³Äv³ÄÛa³°aÁª³¸ª³¸¦(Teaching-LearningProcess–GeneralInstructions):

ThesearesampleStrategies,whichteachercanusetoaccelerattheattainmentofthecourseoutcomes.

C.¸Áo¸'Ìøwaa'£'ßq'v'£'Äß¨³s9øü¸'®Äe'g'n'woc'Ä°è&a'¸a'g'Ä¥'.¸'ÄÛe'¥'Ä¸'Ûa'DzsÁø¹¨Áèaï¨³s9qït9zsÁ£'v'£'Äß 9£'Ä¸'ø¸'Äv'çz'Ä.¥'.v'ÄÄ&9o±'n'в'ZÁ¤ït'n'в'£Äße'oc'cÁø¸'®Ä9zÁ¸%tn'в'£'Äß¥³.9g³9¦¸'Äv'çz'Äv'Äe'ÄÛe'g'n'woc'Ä°è9 v'çn'в'£'ÄßZ'gt¸'®Ä9v'aÁ±'v'cÁra³sq'Äv'çz'Ä.

2.rw.9g£e'oe'.eÁÕ£'z'9£'Äa's®n'в'£'Äß§в'¹a³sв'Äv'çz'Ä–9oz'g³a'9-aÁv'¸¥'øZ'oc'Äz'°èa'9n'вge'.s v'Äe'ÄÛe³9&£'n'в'Äv'Äe'ÄÛa'¾³aÁv'¸n'в'v'Äs®9o±'n'½n³¸'o§ozs'¥'¤Özs',ege'.n'в'Ä,¸'o¨sÁµ'u³n'в'Ä,FnÁn'e³9re'g'9v' Ä±'ta'g'Ä§g³øg'Äv'9v'Ä±Áte'a'9µoc'Än'в'£'Äßn¦n,r9¤eïv'cÁzs'¸v'Än'в'v'ÄÄ6Áoe'g9±³è9¶¸'Äv'çz'Ä.

6.£'99£v'cÁz'øoc'Ä¸Áœe'¸¨³s9zs'£³n³¸'o§ozs'¥'¤Ö9zsÁ£n'в'£'Äß&a'¸a'g'Ä9zÁ%tn'½n³9£'Äa's®vÁn'Ävø9woc'Ä°è9в'v' r¹a³sв'î§°Äz'Ä.

W³la³–Ce*ÃR£³n³æ³Ä

C.a'£Át¤a'¸'o¸'Ìøw-°'o¥'£Án'gÁcoc'Ä¸

2. a'£Át¤a'z's&9a'g's:soz'Ä9¥'sv'tZ'øe³.–9.v³oa'¤¸'Ä§oc'Ä¸

3. Dq'½e'¨sÁµ³oc'cÁRa'£'ßq'–qÁ.ceï.wv'Äß9±'v'Äe'ÄÛ¥³s.9.9.a³9±'v'v'Äswt

¨*sÃzs³£*ª³Äv³ÄÛ a³°aÁ9zsÁ£¦	**¥³Ä¸³Ûa³DzsÁøv³¨Áèaï¨*sÃqï59zsÁ£³,¥³.ª³ÄÄReo±³n³æZÁmï5n³æ³£³Äß§æ³¸³Äª³Åz³Ä,¦¦nª³Äv³Ä Ûz³È±³¸ ª³cÁzs³¸ª³Äz³9roc*sÃn³æ³£³Äß§æ³¸³Äª³Åz³Ä,9zÁ¸%5n³æ*soøn*Z³lÄª³na*n³æ³ª³ÄÄ6Áov³g³Z³95¸ ³Äª³Åz³Ä.**

W³la³–2Dzs³Ä9a³¥³s³5z³aÁ³¸¨sÁn³	
C. v'Z'£'n'в'A:§¸'v's¸,9a'Ⅳ'A°z³99,9®ν'A¥'.¨s'A,Doc'AY&Iv'cAg'oc'A¸,e³9q'g'zA¹v'Aoc'A¸,Doc'AY&I®a'Iv'Aä. 2. &9e't£³n'в'Ä:9z'øoz³9£'Ä¥¦®rz'øoz³9£'Ä¥s'®- ¥'Ägoz'g'zÁ¸'g'Äe'®ès³¸'øg'Äa'oq'¸eÁв'Äv'Ä£'v³9– a'£a'zÁ¸'g'Ä 3. e'e',¥'z'n'в'Ä:¸Á9g'a³sq'n'в¸'Ä¤ÄÖ-&±'Ä£Áв'±'ø9¥s'	
¨*sÃzs³£*³Äv³ ÄÛ a³°aÁ9zsÁ £¦	¥³Ä¸³Ûa³DzsÁøv³¨Áèaï¨*sÃqï59zsÁ£³,¥³.³ÄÄReo±³n³æZÁmï5n³æ³£³Äß§æ³¸³Ä³Åz³Ä,¦¦n³Äv³Ä Ûz³È±³¸ ³cÁzs³¸³Äz³9roc*sÃn³æ³£³Äß§æ³¸³Ä³Åz³Ä,9zÁ¸%5n³æ*soøn*Z³lÄ³na*n³æ³Ä6Áov³g³Z³95¸³ Ä³Åz³Ä.
W³la³–6Dzs³Ä9a³aÁ³¸¯¯Án³	
C. r99g'v'g'v'Äoa'Äwv'Ä¦£a'n'Îøoz'Doc'ÄÝa³®v'ç¨sÁn'n'в'Ä 2. a'Äg'Äq'ÄaÁoZÁs:zÁ.gÁ.¨³9oz³. 3. °³s¸'¨Á½£R9e³:a'Äv³o¥'Ä	
¨*sÃzs³£*³Äv³ ÄÛ a³°aÁ9zsÁ £¦	¥³Ä¸³Ûa³DzsÁøv³¨Áèaï¨*sÃqï59zsÁ£³,¥³.³ÄÄReo±³n³æZÁmï5n³æ³£³Äß§æ³¸³Ä³Åz³Ä,¦¦n³Äv³Ä Ûz³È±³¸ ³cÁzs³¸³Äz³9roc*sÃn³æ³£³Äß§æ³¸³Ä³Åz³Ä,9zÁ¸%5n³æ*soøn*Z³lÄ³na*n³æ³Ä6Áov³g³Z³95¸³ Ä³Åz³Ä.
W³la³–6vÁo&.a³¸&Ûn³æ³¥³øZ³oc³Ä	
C.qÁ.¸'gï.co.9±³,9±',g'oc'Ä¸:v'¸&Ûv'Äe'ÄÛsw°'¸–cc£ïv'ÄswtgÁvï 2.a'g'a'Ä±'®a'e³n'в'Äv'Äe'ÄÛ¥'g'o¥'g³oc'Ä9eÁÕ£':a'ø9nËq'9ŸZ'£'°½î	
¨*sÃzs³£*³Äv³ ÄÛ a³°aÁ9zsÁ £¦	¥³Ä¸³Ûa³DzsÁøv³¨Áèaï¨*sÃqï59zsÁ£³,¥³.³ÄÄReo±³n³æZÁmï5n³æ³£³Äß§æ³¸³Ä³Åz³Ä,¦¦n³Äv³Ä Ûz³È±³¸ ³cÁzs³¸³Äz³9roc*sÃn³æ³£³Äß§æ³¸³Ä³Åz³Ä,9zÁ¸%5n³æ*soøn*Z³lÄ³na*n³æ³Ä6Áov³g³Z³95¸³ Ä³Åz³Ä.
W³la³–&a³x*³Äv³ÄÛ¥³.³Á¸³a³x³£¦	
C.oc'ÄÄnÁø:v'¸'Äzs³9oz'. 2.v³ÄnÁ£³co§Røc£¥'v'te':œ.g.¨³s9g'°on'oc'Ä¸	
¨*sÃzs³£*³Äv³ ÄÛ a³°aÁ9zsÁ £¦	¥³Ä¸³Ûa³DzsÁøv³¨Áèaï¨*sÃqï59zsÁ£³,¥³.³ÄÄReo±³n³æZÁmï5n³æ³£³Äß§æ³¸³Ä³Åz³Ä,¦¦n³Äv³Ä Ûz³È±³¸ ³cÁzs³¸³Äz³9roc*sÃn³æ³£³Äß§æ³¸³Ä³Åz³Ä,9zÁ¸%5n³æ*soøn*Z³lÄ³na*n³æ³Ä6Áov³g³Z³95¸³ Ä³Åz³Ä.

¸Áo¸³Ìø&a³a³£³ßq³a³°a*&Äoz³9zÁ¸%5n³½nDn³Ä¬¥³øuÁ³Än³æ³Ä(CourseOutcomes)

C.a'£¶q¨sÁµ³¸Ácee'¸v'Äe'ÄÛa'£'ßq'z'¸'o¸'Ìøwoc'Ä¥'øZ'oc'ÄvÁn'Äe'Ûz³.
2. a'£¶q¦¸Ácee'¸z'Dzs'Äea'¥'sv'tv'Äe'ÄÛDzs'Äea'aÁv'¸n'в'Äv'Äe'ÄÛ¸'o¸'Ìøwoc'Ä§n³ÎD¸'&¦oc'ÄÄv'Äsq'Äe'z³.
3. eÁow.av'¸&Ûn'в'¥'øZ'oc'ÄvÁn'Äe'z³.
4. a'£¶q¦¨¨sÁµÁ¨sÁ¸',¸Áv'cÁ£¦a'£¶q¦ºÁn'sDq'½e'a'£¶q'z'¥'z'n'в'¥'øZ'oc'ÄvÁn'Äe'Ûz³.

³cË®¸³cÁ¥³£³z³9zsÁ£¦(AssessmentDetails–bothCIEandSEE)

(methodsofCIE– MCQ,Quizzes,Openbooktest, Seminarormicro project)

TheweightageofContinuousInternalEvaluation(CIE)is50%andforSemesterEndExam(SEE)is

50%.Thestudenthasto obtainaminimumof40%marksindividuallybothinCIEand35%marks in SEE to pass. TheorySemester End Exam (SEE)is conducted for 50 marks (01 hour duration). Based on this grading will be awarded.

ContinuousInternal Evaluation:

TwoTests eachof**40Marks (duration01 hour)**

Twoassignmentseachof**10Marks**

CIEmethods/questionpaperisdesignedtoattainthedifferentlevelsofBlomm'staxonomy as Per the outcome defined for the course.

¸*9Ä¸³Ögïeov¦z³¥³øÃa*¸oc³ÄÄFa*æ³V£³o&g³Äv³Ûz*–SemesterendExam

SEEwillbeconductedasper thescheduledtimetable,withcommon questionpapersforthe subject,

1. Thequestion paper will have25questions.Each questionis setfor02marks.
2. SEEPatternwillbe inMCQModel for50marks.Durationofthe examis01 hour.

¥³o³¸¥³Ä¸³Ûa³:

¸Áo¸³Ìø&a³a³£³ßq³
qÁ.œ.g.¨³s9g'°on'oc'Ä¸v'Äe'ÄÛceï.wv³Ää9±',
¥'.¸ÁgÁon',9±³,9±'g'oc'Ä¸eÁoe'¸a9±',9zÁ¸®oc'Ä,¨³B'nÁ9

BE–III/IVSemester–Commonto all

§æ³a*a³£³ßq³–BalakeKannada(KannadaforUsage) a³£³ßq³a³°a*nÁV9n³ø¥³r¹z³¥³o³¸¥³Ä¸³Ûa³–(PrescribedTextbooktoLearnKannada)			
9µ³oc³Ä¸³oa*Ãv³(CourseCode)	P21KBK307/407	9g³ov³g³Dov³øa³ª³cË®¸ª³cÁ¥³£³ eoa³n³æ³Ä	50
soz³Aªag³a*l¨*sAzs³£Aeª³øü TeachinHours/Week(L:T:P)	0-2-0	¸*9Ä¸³Ögïeov¸z³¥³øÃa*¸oc³Äeoa³n³æ³Ä	50
sl¨*sÃzs³£³eª³øü	25n³om*n³æ³Ä	slëeoa³n³æ³Ä	100
a*.rmï(Credits)	1	¥³øAa*¸oc³Aeª³øü	01n³om*

§æ³a*a³£³ßq³¥³o³¸za³°a*oc³Äwz*ŸÄ±³n³æ³Ä(CourseLearningObjectives):

- Tocreatetheawarenessregardingthenecessityoflearninglocallanguageforcomfortable and healthy life.
- Toenablelearnersto ListenandunderstandtheKannadalanguageproperly.
- Tospeak,readandwriteKannadalanguageasper requirement.
- Torainthelearners forcorrectandpoliteconservation.

¨*sÃzs³£*ª³Äv³ÄÛa³°aÁ¸ª³¸(Teaching-LearningProcess–GeneralInstructions):

ThesearesampleStrategies,whichteachercanusetoacceleratetheattainmentofthecourseoutcomes.

C.§в'aa'£ßq'v'£Äße'g'n'e³oc'Ä°è&a'¸a'g'Ä¨³s9øü¸'®Äv'noc'ÄÄ¸'sg¹g'Ä¥'o'¸¥'Ä¸ßa'v'£'ÄßwŸ'oc³sR¸'¨³9a'Ä.

2. ¥'.v'ÄÄ&9o±'n'вZÁ¤ïtn'в'£'Äße'oc'cÁø¸'®Ä9zÁ¸%tn'в'£'Äßwe³Û99¸'Äv'çz'Äv'Äe'ÄÛe'g'n'woc'Ä°è9v'çn'в'£'Äß Z'gt¸'®Ä9v'aÁ±'v'cÁra³sq'Äv'çz'Ä.
3. ¥'.w9zÁ¸%t¥'Ä¸ßa'v'£'Äße'g'n'woc'Ä°è§в'¸'Äv'oe£³s9ra³sв'Äv'çz'Äv'Äe'ÄÛ¥'.e³¥Áo'v'Äe'ÄÛ¥'.v'Z'£'n'в'v'Äs®9o±'n '½n³¸'o§ozs'¥'¤Öoe³¥'sg'aZ'¤Äv'nª³n'½ne³sq'R¸'e'a'Ìz'ÄÝ.
4. r9¤eïe'oe'.eÁÕ£'z'v'ÄÄ6Áoe'g'rwÛ9Z³n³r9¤°9a'g'sn³sorg'Äv'¨¨sÁµßa'°a³oc'Ä9zsÁ£'n'в'£'Äß¦¦n v'Äe'ÄÛz'È±'¸v'cÁzs'¸v'Äz'v'ÄÄ6Áoe'g'Z'gt¸'®Äa'.v'Äaßn³sв'Äv'çz'Ä.rz'øoz'9zÁ¸%tn'в'£'Äße'g'n'woc'Ä°è°³Z'Ä saÁn'.e³øÄoz'¥Áo'a³9в'®Äv'Äe'ÄÛ9zs'¸oc'Ä£'z'°èe³sq'n'®Ä9£'Äa's®vÁn'Äe'z³.
&.¨sÁµÁa'°a³oc'Ä¥'.oc³s9nÁ®oc'Äz'v'ÄÄ6Áoe'g'§º'Ä¨³9n'aß'¨sÁµ³oc'Ä£'Äßa'°oc'Ä®Ä9£'Äa's®vÁn'Äv'oe³ aÁoc'ctZ'¤Äv'na³n'в'£'Äßv'Äe'ÄÛ&.oc'cÁoc³s9c£³n'в'£Äßg's¦¸'Äv'çz'Ä.

Module-1

1. Introduction,Necessityoflearningalocal language.MethodstolearntheKannadalanguage.
2. EasylearningofaKannadaLanguage:Afewtips.Hintsforcorrectandpoliteconservation, Listening and Speaking Activites
3. KeytoTranscription.
4. v³Êoc'Ä&Ûa',¸Á,v'Ä¸¸'sZ'a/¸'o§oøüe'¸Áv't£Áv'Än'в'Äv'Äe'ÄÛ¥'.±Áß¾'ta'¥'z'n'в'Ä–PersonalPronouns, PossessiveForms,Interrogativewords

¨*sÃzs³£*ª³Äv³ÄÛ a³°aÁ9zsÁ	¥³Ä¸³Ûa³DzsÁøv³¨Áèaï¨*sÃqï59zsÁ£³,¥³.ª³ÄÄReo±³n³æZÁmï5n³æ³£³Äß§æ³¸³Äª³Åz³Ä,¦¦nª³Äv³Ä Ûz³È±³¸ ª³cÁzs³¸ª³Äz³9roc*sÃn³æ³£³Äß§æ³¸³Äª³Åz³Ä,9zÁ¸%5n³æ*soøn*Z³lÄª³na*n³æ³ª³ÄÄ6Áov³g³Z³95¸

£	³Ä³Åz³Ä.

Module-2	
C.£Áv'Ä¥'z'n'в',¸'o§ozsÁ¾'ta'g's¥'n'в'Ä,¸'oz³9ºÁ¸'àz'¥'.±³ßn'в'Äv'Äe'ÄÛ¸'o§ozs'vÁZ'a'£Áv'Ä¥'z'n'в'Ä– Possessiveformsofnouns,dubitivequestionandRelativenouns 2. n'Äs,¥'øv'cÁsv'Äe'ÄÛv'st§s9±³9µ'sn'в'Ä,¸'o6Á¸vÁZ'a'n'в'ÄQualitativeandColour Adjectives,Numerals 3. aÁg'ag's¥'n'в'Äv'Äe'ÄÛ9¨¨s'¢¥'.e',¸oc'Än'в'Ä- ¸'¥'9Ä9¨¨'¢Û¥'.e',¸oc'Ä–(D,9z'Ä,9v'ç,9°è)Predictive Forms,LocativeCase	
¨*sÃzs³£*ª³Äv³ÄÛ a³°aÁ9zsÁ£'	¥³Ä¸³Ûa³DzsÁøv³¨Áèaï¨*sÃqï59zsÁ£³,¥³.ª³ÄÄReo±³n³æZÁmï5n³æ³£³Äß§æ³¸³Ä ª³Åz³Ä,¦¦n ª³Äv³ÄÛ z³È±³¸ª³cÁzs³¸ª³Äz³9roc*sÃn³æ£³Äß§æ³¸³Ä ª³Åz³Ä,9zÁ¸%5n³æsoønZ³lÄ ª³na*n³æ³ª³ÄÄ6Áov³g³ Z³95¸³Ä ª³Åz³Ä.
Module-3	
C.Z'e'Ä%t9¨s'¢Û¥'.e',¸oc'Äz'§в'a³v'Äe'ÄÛ¸'o6Á¸vÁZ'a'n'в'Ä–DativeCases,andNumerals 2. ¸'o6Á¸n'ÄsvÁZ'a'n'в'Äv'Äe'ÄÛ§º'Äv'Z'££Áv'Äg's¥'n'в'Ä–OrdinalnumeralsandPluralmarkers 3. £'s¸£'/eµ³9zsÁ¾'ta'&.oc'cÁ¥'z'n'в'Äv'Äe'ÄÛv'stn'ÄsvÁZ'a'n'в'Ä–Defective/NegativeVerbsand Colour Adjectives	
¨*sÃzs³£*ª³Äv³ÄÛ a³°aÁ9zsÁ£'	¥³Ä¸³Ûa³DzsÁøv³¨Áèaï¨*sÃqï59zsÁ£³,¥³.ª³ÄÄReo±³n³æZÁmï5n³æ³£³Äß§æ³¸³Ä ª³Åz³Ä,¦¦n ª³Äv³ÄÛz³È±³¸ ª³cÁzs³¸ª³Äz³9roc*sÃn³æ³£³Äß§æ³¸³Ä ª³Åz³Ä,9zÁ¸%5n³æ*soøn*Z³lÄ ª³na*n³æ³ª³ÄÄ6Áov³g³Z³95¸ ³Ä ª³Åz³Ä.
Module-4	
C.9¥'àu³/s¦àn³,ez³9t±'£',¥³s.9eÁ¸ºv'Äe'ÄÛseÁoc'Ä9¾'tg's¥'¥'z'n'в'Äv'Äe'ÄÛvÁa',n'в'Ä Permission,Commands,encouragingandUrgingwords(Imperativewordsandsentences) 2. ¸Áv'cÁ£',¸'o¨sÁµ'u³n'в'°èø,w9oc'Ä9¨¨s'¢¥'.e',¸oc'Än'в'Äv'Äe'ÄÛ¸'o¨s'v'e9oc'Ä¥'.aÁg'n'в'Ä AccusativeCasesandPotentialForms usedinGeneralCommunication 3. *"rg'Äv'Äe'ÄÛrg'®è",¸ºÁoc'Äa'&.oc'cÁ¥'z'n'в'Ä,¸'o¨sÁv',¸'sZ'a'v'Äe'ÄÛeµ³9zsÁ¾'ta&.oc'cÁ¥'z' n'в'Ä*– Helping Verbs "iru and iralla", Corresponding Future and Negation Verbs 4. °³s9°a³(e'g'e'v'Ä),¸'o§ozs'¸'sZ'a'v'Äe'ÄÛv'¸'ÄÛ¸'sZ'a'¥'.e',¸oc'Än'в'Äv'Äe'ÄÛeµ³9zsÁ¾'ta'¥'z'n'в'§в'a³– Comparative,Relationship,IdentificationandNegation Words	
¨*sÃzs³£*ª³Äv³ÄÛ a³°aÁ9zsÁ£'	¥³Ä¸³Ûa³DzsÁøv³¨Áèaï¨*sÃqï59zsÁ£³,¥³.ª³ÄÄReo±³n³æZÁmï5n³æ³£³Äß§æ³¸³Ä ª³Åz³Ä,¦¦n ª³Äv³ÄÛz³È±³¸ ª³cÁzs³¸ª³Äz³9roc*sÃn³æ³£³Äß§æ³¸³Ä ª³Åz³Ä,9zÁ¸%5n³æ*soøn*Z³lÄ ª³na*n³æ³ª³ÄÄ6Áov³g³Z³95¸ ³Ä ª³Åz³Ä.
Module- 5	
C. aÁ®v'Äe'ÄÛ¸'v'Äoc'Äz'°Án's¢.oc'cÁ¥'z'n'в'99zs¥'.aÁg'n'в'Ä–ifferinttypesofformsof Tense, TimeandVerbs 2. zï,-eï,-e'Ä,-re'Ä,-DR,-9®è,-nï,-aï,rz³,¢.oc'cÁ¥'.e'¸oc'Än'в³soø¨s'se',¨s'9µ'¸eïv'Äe'ÄÛ v'e'tv'cÁ£'aÁ®vÁa'¸g'Z'£³–Formation of past, Future and Present Tense Sentences with Verb Forms 3. KannadaVocabularyList:¸'o¨sÁµ'u³oc'Ä°èø£³s9¥'oc³s9Ra'£'ßq'¥'z'n'в'Ä–KannadaWordsin Conversation	

¨*sÃzs³£*ª³Äv³ ÄÛ a³ºaÁ9zsÁ £¦	¥³Ä¸³Ûa³DzsÁøv³¨Áèaï¨*sÃqï59zsÁ£³¸¥³.ª³ÄÄReo±³n³æZÁmï5n³æ³£³Äß§æ³¸³Äª³Åz³Ä¸¦¦n³Äv³Ä Ûz³È±³¸ ª³cÁzs³¸ª³Äz³9roc*sÃn³æ³£³Äß§æ³¸³Äª³Åz³Ä¸9zÁ¸%5n³æ*soøn*Z³lÄª³na*n³æ³ª³ÄÄ6Áov³g³Z³95¸ ³Äª³Åz³Ä.

§æ³a*a³£³ßq³¥³o³¸za³°a*&Aoz9zA¸%5n³½nDn³Aªe£³Aa³s®n³æ³Aª³Av³A¥s³ºvAo±³n³æ³A:

CourseOutcomes(CourseSkillSet): At theendof theCouse,TheStudentswillbeable

1. Tounderstand thenecessityof learningof local languagefor comfortablelife.
2. ToListenandunderstandtheKannadalanguage properly.
3. Tospeak,readandwriteKannadalanguageasper requirement.
4. Tocommunicate(converse)inKannadalanguageintheirdailylifewithkannadaspeake rs.
5. Tospeak inpoliteconservation.

(AssessmentDetails–bothCIEandSEE)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks). A studentshallbedeemedtohavesatisfiedthe academicrequirementsand aearnedthe creditsallotted toeachsubject/courseifthestudentsecuresnotlessthan35%(18Marksoutof50)inthesemester – end examination (SEE), and aminimum of 40%(40 maeks out of 100) in the sum total oftheCIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together

ContinuousInternal Evaluation:

TwoTests eachof**40Marks (duration01 hour)**
Twoassignmentseachof**10Marks**

CIEmethods/questionpaperisdesignedtoattainthedifferentlevelsofBlomm'staxonomy as per the outcome defined for the course.

¸*9Ä¸³Ögïeov¦z³¥³øÃa*¸oc³ÄÄFa*æ³V£³o&g³Äv³Ûz*–SemesterendExam(SEE)

SEEwillbeconducted asperthescheduledtimetable,withcommonquestion papersforthe subject,

1. Thequestion paper will have 25questions. Eachquestion is setfor02 marks.
2. SEEPatternwill bein MCQModel for50marks.Durationoftheexam is01 hour.

¥³o³¸¥³Ä¸³Ûa¦(Textbook):

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e³9&a'g'Ä:qÁ.ceï.wv³Ää9±',
¥'.¸ÁgÁon',9±³,9±'g'oc'Ä¸eÁoe'¸a9±',9zÁ¸®oc'Ä,¨³B'nÁ9

BE–III/IVSemester–Commonto all

ConstitutionofIndiaandProfessionalEthics(CIP)			
CourseCode	**P21CIP307/407**	**CIE Marks**	**50**
TeachinHours/Week (L:T:P)	**0-2-0**	**SEE Marks**	**50**
TotalHours ofPedagogy	**25 Hours**	**Total Marks**	**100**
Credits	**1**	**ExamHours**	**01Hour**

CourseObjectives: Thiscoursewillenablethe students

a. To know the fundamental political structure & codes, procedures, powers, and duties of Indiangovernmentinstitutions,fundamentalrights,directiveprinciples,andthedutiesof citizens.
b. Tounderstandengineeringethicsandtheirresponsibilities,identifytheirindividualroles and ethical responsibilities towards society.

Teaching-LearningProcess(GeneralInstructions)

ThesearesampleStrategies,whichteachercanusetoacceleratetheattainmentofthevariouscourse outcomes.

- ✓ Teachers shall adopt suitable pedagogyfor effective teaching - learning process. The pedagogyshallinvolvethecombinationofdifferentmethodologieswhichsuitmodern technological tools and software's to meet the present requirements of the Global employment market.
  (i) Directinstructionalmethod(Low/OldTechnology),
  (ii) Flippedclassrooms(High/advancedTechnologicaltools),
  (iii) Blendedlearning(combinationofboth),
  (iv) Enquiryandevaluationbasedlearning,
  (v) Personalized learning,
  (vi) Problemsbased learningthrough discussion,
  (vii) FollowingthemethodofexpeditionarylearningToolsandtechniques,

1. Apart from conventional lecture methods, various types of innovative teaching techniques throughvideos,animationfilmsmaybeadaptedsothatthedeliveredlessoncanenhancethestudents in theoretical applied andpractical skills in teaching of 21CIP39/49 in general.

Module-1

Introduction to IndianConstitution: Definitionof Constitution, Necessity of the Constitution, SocietiesbeforeandaftertheConstitutionadoption.IntroductiontotheIndianconstitution,Making ofthe Constitution,Role of the Constituent Assembly. Preamble of Indian Constitution & Key concepts of the Preamble. Salientfeatures of India Constitution.

Teaching-Learning Process	Chalkandtalkmethod,Videos,PowerPointpresentationtoteach.Creatingrealtime stations in classroom discussions, Giving activities and assignments (Connecting Campus& communitywithadministrationrealtimesituations).

Module-2	
FundamentalRights(FR's),DirectivePrinciplesofStatePolicy(DPSP's)andFundamental Duties (FD's): Fundamental Rights and its Restriction and limitations in different Complex Situations. DPSP's and its present relevance in Indian society. Fundamental Duties and its Scope and significance inNation building.	
Teaching-Learning Process	Chalkandtalkmethod,Videos,PowerPointpresentationtoteach.Creatingreal time stations in classroom discussions, Giving activities and assignments (ConnectingCampus &communitywithadministrationrealtimesituations).
Module-3	
UnionExecutive: ParliamentarySystem,UnionExecutive–President,PrimeMinister,Union Cabinet, Parliament - LS and RS, Parliamentary Committees, Important Parliamentary Terminologies. Supreme Courtof India, Judicial Reviews and Judicial Activism.	
Teaching-Learning Process	Chalkandtalkmethod,Videos,PowerPointpresentationtoteach.Creatingrealtime stations in classroom discussions, Giving activities and assignments (Connecting Campus& communitywithadministrationrealtimesituations).
Module-4	
StateExecutive&Elections,AmendmentsandEmergencyProvisions: StateExecutive,Election Commission, Elections & Electoral Process. Amendment to Constitution (Why and How) and Important ConstitutionalAmendments till today. Emergency Provisions.	
Teaching-Learning Process	Chalkandtalkmethod,Videos,PowerPointpresentationtoteach.Creatingrealtime stationsinclassroomdiscussions,Givingactivitiesandassignments(Connecting Campus & community withadministrationreal time situations).
Module- 5	
ProfessionalEthics: DefinitionofEthics&Values.Professional &EngineeringEthics.Positive andNegativeaspectsofEngineeringEthics.ClashofEthics,ConflictsofInterest.The impedimentsto Responsibility.ProfessionalRisks,ProfessionalSafetyandliabilityin Engineering.Trust&ReliabilityinEngineering, Intellectual Property Rights (IPR's).	
Teaching-Learning Process	Chalkandtalkmethod,Videos,PowerPointpresentationtoteach.Creatingrealtime stations in classroom discussions, Giving activities and assignments (Connecting Campus& communitywithadministrationrealtimesituations).

Course outcome(CourseSkillSet)

Attheendofthecoursethestudentshould:

CO1:Haveconstitutionalknowledgeandlegalliteracy.

CO2:UnderstandEngineeringandProfessionalethicsandresponsibilitiesofEngineers.

AssessmentDetails(bothCIEandSEE)

TheweightageofContinuousInternalEvaluation(CIE)is50%andforSemesterEndExam(SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks that is 20 marks.A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ courseifthestudent secures not less than35%(18Marksout of 50)inthe semester-end examination(SEE), and a minimumof 40% (40 marks outof100) inthesumtotal of the CIE and SEE taken together

ContinuousInternalEvaluation:

TwoTestseachof**40Marks(duration01hour**) Two

assignments each of **10 Marks**

Theaverageoftwotests,twoassignments,andquiz/seminar/groupdiscussionwillbeoutof50 marks

CIEmethods/questionpaperisdesignedtoattainthedifferentlevelsofBloom'staxonomyas per theoutcome defined for the course.

SemesterEndExamination:

SEEwillbeconductedbyUniversityasperthescheduledtimetable,withcommonquestionpapers for the subject.

- Thequestionpaperwillhave25questions.Eachquestionissetfor02marks.
- SEEPatternwillbeinMCQModel(MultipleChoiceQuestions)for50marks.Durationof the examination is 01 Hour.

Textbook:

1. **"Constitution of India & Professional Ethics"** Published by Prasaranga or published onVTU website with the consent of the university authorities VTU Belagavi.