NARAYANA ENGINEERING COLLEGE::NELLORE

AUTONOMOUS

B.Tech-Electrical and Electronics Engineering(E.E.E)

Course Structure

&

SYLLABUS

(2021-22 academic year)

(NECR B.Tech 21)

(w.e.f AY: 2021-22)

NARAYANA

ENGINEERING COLLEGE

(AUTONOMOUS)

NARAYANA ENGINEERING COLLEGE::NELLORE

AUTONOMOUS

INSTITUTE VISION & MISSION

VISION

- To be one of the nation's premier Institutions for Technical and Management Education and a key contributor for Technological and Socio-economic Development of the Nation.

MISSION

- To produce technically competent Engineers and Managers by maintaining high academic standards, world class infrastructure and core instructions.
- To enhance innovative skills and multi disciplinary approach of students through well experienced faculty and industry interactions.
- To inculcate global perspective and attitude of students to face real world challenges by developing leadership qualities, lifelong learning abilities and ethical values.

Department of E.E.E –

(Electrical and Electronics Engineering)

DEPARTMENT VISION & MISSION

VISION OF THE DEPARTMENT

To impart knowledge in the field of Electrical and Electronics Engineering to meet the technical challenges of industry and society with strong innovative skills, leadership qualities and ethics.

MISSION OF THE DEPARTMENT

M1. To provide standard training and effective teaching learning process to the students by using the state-of-the-art laboratories, core instruction and efficient faculty.

M2. To enhance competent, innovative and technical skills amongst the students through training programs by industry and external participation.

M3. To inculcate leadership qualities, ethical values and lifelong learning skills in learners to serve the society and nation for overall development through value based education**.**

PEOs, POs, PSOs

POs

1. Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

2. 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.

3. 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.

4. Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

5. Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

6. The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the

professional engineering practice.

7. 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.

8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

9. Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

11. Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

12: 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.

PEOs

PEO 1: To solve composite problems using mathematics, basic sciences and engineering principles in the domains of testing, design and manufacturing.

PEO 2: To achieve higher positions in their profession by demonstrating leadership qualities, research and innovative abilities.

PEO 3: To contribute in the field of Electrical and Electronics Engineering to find solutions for societal problems through their lifelong learning skills and ethical values.

PSOs

PSO_1: Provide alternate solutions to address the problems with specific requirements in the field of Electrical and Electronics Engineering.

PSO_2: Be ready to work professionally in relevant industries like power systems, control systems and software industries

NARAYANA ENGINEERING COLLEGE::NELLORE

AUTONOMOUS

DEPARTMENT OF ELECTRICAL AND ELETRONICS ENGINEERING

Course Structure for B.Tech E.E.E w.e.f AY: 2021-22

SEMESTER I

Course Code	Category	Course Title	Contact Periods per week				Credits	Scheme of Examination Max. Marks		
			L	T	P	Total		Int. Marks	Ext. Marks	Total Marks
21MA1001	BS	Algebra and Calculus	3	1	0	4	4	40	60	100
21PH1001	BS	Applied Physics	3	0	0	3	3	40	60	100
21ES1003	ES	Basic Electrical Circuits	3	0	0	3	3	40	60	100
21ES1001	ES	Problem Solving and Programming	3	0	0	3	3	40	60	100
21PH1501	BS	Applied Physics Lab	**0**	**0**	**3**	**3**	**1.5**	40	60	100
21ES1506	ES	Basic Electrical Circuits Lab	0	0	**2**	**2**	**1**	40	60	100
21ES1505	ES	Engineering and IT Workshop	0	0	**3**	**3**	**1.5**	40	60	100
21ES1501	ES	Problem Solving and Programming Lab	**0**	**0**	**3**	**3**	**1.5**	40	60	100
21EN1502	**HS**	Communication skills lab	**0**	**0**	**2**	**2**	**1**	40	60	100
21MC8001	**MC**	Mandatory course I :Induction Program	Induction Program							
		Counseling/Mentoring	0	0	1	1	0	--	--	--
		Sports/Hobby Clubs/Activities	0	0	2	2	0	--	--	--
		Activity Point Programme	During the Semester					20 Points		
		Total	**12**	**1**	**16**	**29**	**19.5**	**360**	**540**	**900**

SEMESTER II

Course Code	Category	Course Title	Contact Periods per week				Credits	Scheme of Examination Max. Marks		
			L	T	P	Total		Int. Marks	Ext. Marks	Total Marks
21CH1001	BS	Chemistry	3	0	0	3	3	40	60	100
21MA1003	BS	Vector Calculus Complex Variables and Transforms	3	1	0	4	4	40	60	100
21ES1005	ES	Python Programming and Data Science	3	0	0	3	3	40	60	100
21EN1001	HS	English	2	0	0	2	2	40	60	100
21CH1501	BS	Chemistry Lab	0	0	3	3	1.5	40	60	100
21ES1503	ES	Engineering Graphics	0	1	4	5	3	40	60	100
21ES1508	ES	Python Programming and Data Science Lab	0	0	3	3	1.5	40	60	100
21EN1501	HS	English Language Lab	0	0	3	3	1.5	40	60	100
		Counseling/Mentoring	0	0	1	1	0	--	--	--
		Sports/Hobby Clubs/Activities	0	0	2	2	0	--	--	--
		Activity Point Programme	During the Semester					20 Points		
		Total	**11**	**2**	**16**	**29**	**19.5**	**320**	**480**	**800**

SEMESTER III

Course Code	Category	Course Title	Contact Periods per week				Credits	Scheme of Examination Max. Marks		
			L	T	P	Total		Int. Marks	Ext. Marks	Total Marks
21MA1006	BS	Probability Statistics and Numerical Methods	3	0	0	3	3	40	60	100
21ES1009	ES	Data Structures and Algorithms	3	0	0	3	3	40	60	100
21ES1010	ES	Electronic Devices and Circuits	3	0	0	3	3	40	60	100
21EE2001	PC	DC Machines and Transformers	3	0	0	3	3	40	60	100
21EE2002	PC	Electrical Circuit Analysis	2	0	0	2	2	40	60	100
21EE2003	PC	Power System Architecture	3	0	0	3	3	40	60	100
21ES1513	ES	Data Structures and Algorithms Lab	0	0	3	3	1.5	40	60	100
21ES1514	ES	Electronics Devices and Circuits Lab	0	0	2	2	1	40	60	100
21CD6001	SC	Career competency Development I	0	0	2	2	1	40	60	100
21CC6001	SC	Value added course/Certificate course I	0	0	0	0	1	40	60	100
21MC8002-13	MC	Mandatory course II	2	0	0	2	0	--	--	--
		Counseling/Mentoring	0	0	1	1	0	--	--	--
		Sports/Hobby Clubs/Activities	0	0	2	2	0	--	--	--
		Activity Point Programme	During the Semester					20 Points		
		Total	**19**	**0**	**10**	**29**	**21.5**	**400**	**600**	**1000**

SEMESTER IV

Course Code	Category	Course Title	Contact Periods per week				Credits	Scheme of Examination Max. Marks		
			L	T	P	Total		Int. Marks	Ext. Marks	Total Marks
21EN1002	HS	Universal Human Values	3	0	0	3	3	40	60	100
21EE2004	PC	AC Machines	3	0	0	3	3	40	60	100
21EE2005	PC	Analog Electronic Circuits	3	0	0	3	3	40	60	100
21EE2006	PC	Engineering Electromagnetics	3	0	0	3	3	40	60	100
21EE2007	PC	Linear Control Systems	3	0	0	3	3	40	60	100
	OE	Open elective I	3	0	0	3	3	40	60	100
21EE2501	PC	DC Machines and Transformers Lab	0	0	3	3	1.5	40	60	100
21EE2502	PC	Electrical Circuits and Simulation Lab	0	0	3	3	1.5	40	60	100
21EE2503	PC	Linear Control Systems and Simulation Lab	0	0	3	3	1.5	40	60	100
21CD6002	SC	Career competency Development II	0	0	2	2	1	40	60	100
21IC6001	SC	Industry Oriented Course I	0	0	0	0	1	100	--	100
		Counseling/Mentoring	0	0	1	1	0	--	--	--
		Sports/Hobby Clubs/Activities	0	0	2	2	0	--	--	--
		Activity Point Programme	During the Semester					20 Points		
		Total	**18**	**0**	**14**	**32**	**24.5**	**500**	**600**	**1100**

SEMESTER V

Course Code	Category	Course Title	Contact Periods per week				Credits	Scheme of Examination Max. Marks		
			L	T	P	Total		Int. Marks	Ext. Marks	Total Marks
21EE2008	PC	Digital Electronics and logic design	2	0	0	2	2	40	60	100
21EE2009	PC	Power Distribution and Distributed Generation	3	0	0	3	3	40	60	100
21EE2010	PC	Power Electronics	3	0	0	3	3	40	60	100
	OE	Open elective II	3	0	0	3	3	40	60	100
21EE4001-05	PE	Professional Elective I	3	0	0	3	3	40	60	100
21EE2504	PC	AC Machines Lab	0	0	3	3	1.5	40	60	100
21EE2505	PC	Analog Electronics and Simulation Lab	0	0	3	3	1.5	40	60	100
21EE2506	PC	Power Electronics and Simulation Lab	0	0	2	2	1	40	60	100
21CD6003	SC	Career competency Development III	0	0	2	2	1	40	60	100
21CC6002	SC	Value added course/Certificate Course II	0	0	0	0	1	40	60	100
21EE7501	PR	Internship/skill development Training I	0	0	0	0	1.5	00	100	100
21MC8002-13	MC	Mandatory course III	2	0	0	2	0	00	00	00
		Counseling/Mentoring	0	0	1	1	0	--	--	--
		Sports/Hobby Clubs/Activities	0	0	2	2	0	--	--	--
		Activity Point Programme	During the Semester					20 Points		
		Total	**16**	**0**	**13**	**29**	**21.5**	**400**	**700**	**1100**

SEMESTER VI

Course Code	Category	Course Title	Contact Periods per week				Credits	Scheme of Examination Max. Marks		
			L	T	P	Total		Int. Marks	Ext. Marks	Total Marks
21EE2011	PC	Advanced Power System Analysis	3	0	0	3	3	40	60	100
21EE2012	PC	Electrical Measurements and Instrumentation	2	0	0	2	2	40	60	100
21EE2013	PC	Switch Gear and Protection	3	0	0	3	3	40	60	100
	OE	Open Elective III	3	0	0	3	3	40	60	100
21EE4006-10	PE	Professional Elective II	3	0	0	3	3	40	60	100
21EE40011-15	PE	Professional elective III	3	0	0	3	3	40	60	100
21EE2507	PC	Electrical Measurements and Instrumentation Lab	0	0	2	2	1	40	60	100
21EE2508	PC	Power Systems Lab	0	0	3	3	1.5	40	60	100
21CD6004	SC	Career competency Development IV	0	0	2	2	1	40	60	100
21IC6002	SC	Industry Oriented Course II	0	0	0	0	1	100	--	100
		Counseling/Mentoring	0	0	1	1	0	--	--	--
		Sports/Hobby Clubs/Activities	0	0	2	2	0	--	--	--
		Activity Point Programme	During the Semester					20 Points		
		Total	**17**	**0**	**10**	**27**	**21.5**	**460**	**540**	**1000**

SEMESTER VII

Course Code	Category	Course Title	Contact Periods per week				Credits	Scheme of Examination Max. Marks		
			L	T	P	Total		Int. Marks	Ext. Marks	Total Marks
21EN5001-5	HS	Humanities and Social Science Elective	2	0	0	2	2	40	60	100
21EE2014	PC	Solid State Electric Drives	3	0	0	3	3	40	60	100
21EE2015	PC	Power System Operation and Control	3	0	0	3	3	40	60	100
	OE	Open Elective IV	3	0	0	3	3	40	60	100
21EE40016-20	PE	Professional elective IV	3	0	0	3	3	40	60	100
21EE40021-25	PE	Professional elective V	3	0	0	3	3	40	60	100
21EE2509	PC	Electronic systems design lab	0	0	2	2	1	40	60	100
21EE2510	PC	Power Systems Simulation Lab	0	0	3	3	1.5	40	60	100
21CD6005	SC	Career competency Development V	0	0	2	2	1	40	60	100
21CC6501	SC	Skill development Training	0	0	2	2	1	40	60	100
21EE7502	PR	Internship II/on job training/Com Ser Project	0	0	0	0	1.5	00	100	100
21MC8002-13	MC	Mandatory course IV	2	0	0	2	0	--	--	--
		Counseling/Mentori	0	0	1	1	0	--	--	--
		Sports/Hobby Clubs/Activities	0	0	2	2	0	--	--	--
		Activity Point Programme	During the Semester					20 Points		
		Total	**19**	**0**	**12**	**31**	**23**	**400**	**700**	**1100**

SEMESTER VIII

Course Code	Category	Course Title	Contact Periods per week				Credits	Scheme of Examination Max. Marks		
			L	T	P	Total		Int. Marks	Ext. Marks	Total Marks
21EE7503	PR	Project work, seminar and internship	0	0	0	0	12	60	140	200
			0	**0**	**0**	**0**	**12**	**60**	**140**	**200**

OPEN ELECTIVES (OE) Offered by EEE Department

Department	Course Code	Open Elective
Electrical and Electronics Engineering	21EE3001	Artificial Neural Networks and Fuzzy Logic
	21EE3002	Basic Electrical and Electronics Engineering
	21EE3003	Energy Audit and Demand side Management
	21EE3004	Electrical Measurements and Instrumentation
	21EE3005	Utilization of Electrical Energy
	21EE3006	Industrial Automation Engineering
	21EE3007	Industrial Electrical Systems
	21EE3008	Renewable Energy Conversion Systems
	21EE3009	Power Quality

PROFESSIONAL ELECTIVES (PE)

Elective Track/Group	Professional Elective-1	Professional Elective-2	Professional Elective-3	Professional Elective-4	Professional Elective-5
Advanced Power systems	Industrial Electrical Systems (21EE4001)	Power System Planning (21EE4006)	Reactive Power Compensation and Management (21EE4011)	Power Quality (21EE4016)	Smart Grid Technologies (21EE4021)
Control Systems	System Modeling and Identification (21EE4002)	Advanced Control systems (21EE4007)	Digital Signal Processing (21EE4012)	Multivariable Control System (21EE4017)	Real Time Control System (21EE4022)
Electromechanical Systems	Machine Modeling and Analysis (21EE4003)	Electrical Machine Design (21EE4008)	Programmable Control Devices and Applications (21EE4013)	Hybrid Electrical Vehicles (21EE4018)	Automotive Electrical Engineering (21EE4023)
Energy Systems	Renewable Energy Conversion Systems (21EE4004)	Solar and Fuel Cell Energy Systems (21EE4009)	Wind and Biomass Energy Systems (21EE4014)	Utilization of Electrical Energy (21EE4019)	Energy Audit and Demand side Management (21EE4024)
Power Electronics	Advanced Power Electronics (21EE4005)	Advanced Electrical Drives (21EE4010)	HVDC and FACTS (21EE4015)	Advanced Power Converters (21EE4020)	Advanced Power Semiconductor Devices and Protection (21EE4025)

LIST OF HONOR SUBJECTS

S.NO	Course code	Course Name	L-T-P	Credits
1	21EEH001	Adaptive Control Systems	3-1-0	4
2	21EEH002	AC Drives	3-1-0	4
3	21EEH003	Advanced Power System Protection	3-1-0	4
4	21EEH004	Power System Wide area Monitoring and Control	3-1-0	4
5	21EEH005	Restructed Power Systems	3-1-0	4

LIST OF MINOR SUBJECTS

S.NO.	Course code	Course Name	L-T-P	Credits
1	21EEM001	Electrical Technology	3-1-0	4
2	21EEM002	Electrical Measurements and Instrumentation	3-1-0	4
3	21EEM003	Power System Architecture	3-1-0	4
4	21EEM004	Utilization of Electrical Energy	3-1-0	4
5	21EEM005	Linear Control Systems	3-1-0	4

Humanities and Social Science Elective

S. NO	Course code	Course Name	CREDITS
1	21EN1001	Managerial Economics & Financial Analysis	3
2	21EN1002	Management Science	3
3	21EN1003	E-Business	3
4	21EN1004	Organizational Behavior	3
5	21EN1005	Enterprise Resource Planning	3

PROFESSIONAL ELECTIVES (PE)

SEMESTER	Course code	SUBJECT	CREDITS
V Sem	21EE4001-05	Professional Elective I	3
VI Sem	21EE4006-10	Professional Elective II	3
	21EE4011-15	Professional Elective III	3
VII Sem	21EE4016-20	Professional Elective IV	3
	21EE4021-25	Professional Elective V	3
		TOTAL	**15**

OPEN ELECTIVES (OE)

SEMESTER	SUBJECT	CREDITS
IV Sem	Open Elective I	3
V Sem	Open Elective II	3
VI Sem	Open Elective III	3
VII Sem	Open Elective IV	3
	TOTAL	**12**

SKILL ORIENTED COURSE (SC)

SEMESTER	Course code	SUBJECT	CREDITS
III Sem	21CD6001	Career Competency Development I	1
	21CC6001	Value Added Course/Certificate Course I	1
IV Sem	21CD6002	Career Competency Development II	1
	21CC6001	Industry Oriented Course I	1
V Sem	21CD6003	Career Competency Development III	1
	21CC6002	Value Added Course/Certificate Course II	1
VI Sem	21CD6004	Career Competency Development IV	1
	21CC6002	Industry Oriented Course II	1
VII Sem	21CD6005	Career Competency Development V	1
	21CC6501	Skill Development Training	1
		TOTAL	**10**

PROJECT (PR)

SEMESTER	Course code	SUBJECT	CREDITS
V Sem	21EE7501	Internship I/on job training/Com Ser Project	1.5
VII Sem	21EE7502	Internship II/on job training/Com Ser Project	1.5
VIII Sem	21EE7503	Project work, seminar and internship	12
		TOTAL	**15**

HUMANITIES AND SOCIAL SCIENCES (HS)

SEMESTER	Course code	SUBJECT	CREDITS
I	21EN1502	Communication skills lab	1
II	21EN1001	English	2
	21EN1501	English Language Lab	1.5
IV	21EN1002	Universal Human Values	3
VII	21EN5001-8	Humanities and social Science Elective	2
		TOTAL	**9.5**

BASIC SCIENCES (BS)

SEMESTER	Course code	SUBJECT	CREDITS
I	21MA1001	Algebra and Calculus	4
	21PH1001	Applied Physics	3
	21PH1501	Applied Physics Lab	1.5
II	21CH1001	Chemistry	3
	21MA1003	Vector Calculus, Complex Variables and Transforms	4
	21CH1501	Chemistry lab	1.5
III	21MA1006	Probability Statistics and Numerical Methods	3
		TOTAL	**20**

ENGINEERING SCIENCES (ES)

SEMESTER	Course code	SUBJECT	CREDITS
I	21ES1003	Basic Electrical Circuits	3
	21ES1001	Problem Solving and Programming	3
	21ES1506	Basic Electrical Circuits Lab	1
	21ES1505	Engineering and IT Workshop	1.5
	21ES1501	Problem Solving and Programming Lab	1.5
II	21ES1005	Python Programming and Data Science	3
	21ES1503	Engineering Graphics	3
	21ES1508	Python Programming and Data Science Lab	1.5
III	21ES1009	Data Structures and Algorithms	3
	21ES1010	Electronic Devices and Circuits	3
	21ES1513	Data Structures and Algorithms Lab	1.5
	21ES1514	Electronics Devices and Circuits Lab	1
		Total	**26**

PROFESSIONAL CORE (PC)

SEMESTER		SUBJECT	CREDITS
III	21EE2001	DC Machines and Transformers	3
	21EE2002	Electrical Circuit Analysis	2
	21EE2003	Power System Architecture	3
		8	
IV	21EE2004	AC Machines	3
	21EE2005	Analog Electronic Circuits	3
	21EE2006	Engineering Electromagnetics	3
	21EE2007	Linear Control Systems	3
	21EE2501	DC Machines and Transformers Lab	1.5
	21EE2502	Electrical Circuits and Simulation Lab	1.5
	21EE2503	Linear Control Systems and Simulation Lab	1.5
		16.5	
V	21EE2008	Digital Electronics and logic design	2
	21EE2009	Power Distribution and Distributed Generation	3
	21EE2010	Power Electronics	3
	21EE2504	AC Machines Lab	1.5
	21EE2505	Analog Electronics and Simulation Lab	1.5
	21EE2506	Power Electronics and Simulation Lab	1
		12	
VI	21EE2011	Advanced Power System Analysis	3
	21EE2012	Electrical Measurements and Instrumentation	2
	21EE2013	Switch Gear and Protection	3
	21EE2507	Electrical Measurements and Instrumentation Lab	1
	21EE2508	Power Systems Lab	1.5
		10.5	
VII	21EE2014	Solid State Electric Drives	3
	21EE2015	Power System Operation and Control	3
	21EE2509	Electronic systems design lab	1
	21EE2510	Power Systems Simulation Lab	1.5
		8.5	
		TOTAL	**55.5**

Overall Credits

S. NO	CATEGORY	CREDITS PER SEMESTER								Credits
		I	II	III	IV	V	VI	VII	VIII	
1	HS	1	3.5		3			2		**9.5**
2	BS	8.5	8.5	3						**20**
3	ES	10	7.5	8.5						**26**
4	PC			8	16.5	12	10.5	8.5		**55.5**
5	PE					3	6	6		**15**
6	OE				3	3	3	3		**12**
7	SC			2	2	2	2	2		**10**
8	PR					1.5		1.5	12	**15**
	TOTAL	**19.5**	**19.5**	**21.5**	**24.5**	**21.5**	**21.5**	**23**	**12**	**163**

NARAYANA ENGINEERING COLLEGE: NELLORE								
I-B. Tech	ALGEBRA AND CALCULUS (21MA1001)							R-2021
Semester	Hours / Week			Total hrs	Credit	Max Marks		
	L	T	P		C	CIE	SEE	TOTAL
I	3	1	0	64	4	40	60	100

Pre-requisite: Intermediate Mathematics

Course Objectives:

1. To familiarize the students with the theory of matrices and quadratic forms.
2. To analyze second order ordinary differential equations.
3. To explain the series expansions using mean value theorems and the concepts of multivariable calculus.
4. To summarize the procedure to solve the partial differential equations.
5. To explain the student with mathematical tools needed in evaluating multiple integrals and its applications.

Course Outcomes: After successful completion of the course, the student will be able to:

CO 1	**Make use** the concepts of Matrices **to solve various Engineering problems.** **(BL-3)**
CO 2	**Identify** different types of higher order differential equations and their applications **in solving engineering problems.** **(BL-3)**
CO 3	**Apply** Mean value theorems, Multi variable calculus **to solve engineering problems.** **(BL-3)**
CO 4	**Apply** a range of techniques **for solutions of first order Linear and non-Linear Partial Differential Equations (PDE).** **(BL-3)**
CO 5	**Apply** the techniques of multiple integrals **for the area and volume of the region bounded by curves.** **(BL-3)**

CO-PO Mapping

CO	PO												PSO	
	PO1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	3	3												
CO2	3	3												
CO3	3	3												
CO4	3	3												
CO5	3	3												

1- Low, 2-Medium, 3- High

COURSE CONTENT

MODULE – 1	Matrices	Hours: 16h(12L+4T)

Rank of a matrix by echelon form, normal form. Solving system of homogeneous and non-homogeneous linear equations. Eigen values and Eigenvectors and their properties (without proof), Cayley-Hamilton theorem (without proof), finding inverse and powers of a matrix by Cayley-Hamilton theorem, Diagonalization.

At the end of the Module 1, student will be able to:

1. Solving system of linear equations. (BL-3)
2. Determine the rank, eigen values and eigenvectors. (BL-3)
3. Find the inverse and powers of a square matrix by Cayley-Hamilton Theorem. (BL-1)

MODULE -2	Higher Order Ordinary Differential Equations with Constant Coefficients	Hours: 14h(11L+3T)

Definitions, homogenous and non-homogenous, Complimentary function, general solution, particular integral, method of variation of parameters. applications to L-C-R Circuits

At the end of the Module 2, students will be able to:

1. Identify the essential characteristics of linear differential equations with constant coefficients. (BL-3)
2. Solve the linear differential equations with constant coefficients by appropriate method. (BL-3)
3. Classify and interpret the solutions of linear differential equations. (BL-2)
4. Solve the higher order differential equation by analyzing physical situations. (BL-3)

MODULE-3	**Mean Value Theorems and Multivariable Calculus**	**Hours: 12h (9L+3T)**

Taylor's and Maclaurin's theorems with remainders (without proof), related problems, Partial differentiation, Chain rule, Total derivative, Jacobians, maxima and minima of functions of two variables, method of Lagrange's multipliers.

At the end of the Module 3, students will be able to:

1. Translate the given function as series of Taylor's and Maclaurin's with remainders. (BL-2)
2. Find the maximum and minimum values of the function for two variables. (BL-1)
3. Apply Jacobian concept to deal with problems in change of variables. (BL-3)

MODULE-4	**Partial Differential Equations**	**Hours: 10h (7L+3T)**

Introduction and formation of Partial Differential Equations by elimination of arbitrary constants and arbitrary functions, Solutions of first order linear partial differential equations using Lagrange's method, Solutions of first order non-linear partial differential equations- Standard forms-I, II, III and IV, Method of separation of variables.

At the end of the Module 4, students will be able to:

1. Identify the basic properties of partial differential equations. (BL-3)
2. Outline partial differential equations. (BL-2)
3. Solve the applications of PDE by using the method of separation of variables. (BL-3)
4. Apply the PDE techniques in various engineering fields. (BL-3)

MODULE-5	**Multiple Integrals**	**Hours: 12h(9L+3T)**

Double integrals, change of order of integration, change of variables. Evaluation of Triple integrals, change of variables between Cartesian, Cylindrical and Spherical polar coordinates. Finding areas and volumes using double and triple integrals.

At the end of the Module 5, students will be able to:

1. Find the area bounded by a region using double integration. (BL-1)
2. Solve triple integrals. (BL-3)
3. Make Use of multiple integral techniques in engineering problems. (BL-3)

Total hours	**64h (48L+16T)**

Content beyond syllabus:

1. L-U decomposition.
2. Deflection of Beams.
3. Taylor's series for function of two variables.
4. Homogeneous Linear Partial differential equations with constant coefficients.
5. Calculation of mass, Centre of gravity, moment of inertia.

Self-Study:
Contents to promote self-Learning:

SNO	Topic	CO	Reference
1	Matrices	CO1	https://youtu.be/P2pL5VThrzQ
2	Higher Order Ordinary Differential equations with constant coefficients	CO2	https://youtu.be/P7gVp333B6M https://youtu.be/btOCUmJkrrg
3	Mean value theorems & Multivariable Calculus	CO3	https://youtu.be/bJPuy0QZ-tE https://youtu.be/0apMXhWG_W8
4	Partial Differential Equations	CO4	https://youtu.be/kZ7Oa7iMiCs
5	Multiple Integrals	CO5	https://youtu.be/mIeeVrv447s

Text Books:

1. Erwin Kreyszig, Advanced Engineering Mathematics, 10/e, John Wiley & Sons, 2011.
2. B.S. Grewal, Higher Engineering Mathematics, 44/e, Khanna publishers, 2017.

Reference Book(s):

1. R. K. Jain and S. R. K. Iyengar, Advanced Engineering Mathematics, 5/e, 2019 Narosa Publishing house
2. B. V. Ramana, Higher Engineering Mathematics, McGraw Hill Education,2017
3. H. K. Das, Er. RajnishVerma, Higher Engineering Mathematics, S. Chand,2014
4. N. Bali, M. Goyal, C. Watkins, Advanced Engineering Mathematics, Infinity Science Press,9th edition 2020.

Online Resources/ Web References:

1. **http://www.macs.hw.ac.uk/~simonm/linalg.pdf**
2. **http://www.e-booksdirectory.com/details.php?ebook=7400re**
3. **http://www.efunda.com/math/math_home/math cfm**
4. **http://www.ocw.mit.edu/resources/#Mathematics**
5. **http://www.sosmath.com/**
6. **http://www.mathworld.wolfram.com/**

NARAYANA ENGINEERING COLLEGE (AUTONOMOUS) :: NELLORE

I-B.Tech	APPLIED PHYSICS (21PH1001)							R2021
Semester	Hours / Week			Total hrs	Credit	Max Marks		
	L	T	P		C	CIE	SEE	TOTAL
I	3	0	0	48	3	40	60	100

Pre-requisite: Mathematics Knowledge, Basics concepts of Physics

Course Objectives:

1. To understand optical phenomenon i.e. interference and diffraction related to their engineering applications.
2. To explain the concepts and difference between classical free electron theory and quantum theory.
3. To impart knowledge in basic concepts of free electron theory of metals and semiconductors.
4. To illustrate the concepts of superconductor and nanomaterials in functioning of electronic devices.
5. To familiarize the types of laser/optical fibres and their applications in communication engineering devices

Course Outcomes: After successful completion of the course, the student will be able to:		BTL
CO 1	Explain the conecpts of interference, diffraction using Huygen's wave theory	2
CO 2	Comprehend the conecpts of matter waves, wave functions and their interpretation for understanding the matter at atomic scale	1
CO 3	Summarize the importance of free electron theories in determining the properties of metals and semiconductors	1
CO 4	Understand the concepts of superconductor and nanomaterials to familarize their applications in relevant fields	2
CO 5	Realize the importance of the lasers and optical fibres in engineering and medical applications	2

CO-PO Mapping

CO	PO												PSO	
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	3	2												
CO2	3	2												
CO3	3	2											1	
CO4	3					1							1	
CO5	3	1				1							1	

1: Low, 2-Medium, 3- High

COURSE CONTENT

MODULE – 1 WAVE OPTICS 10 HOURS

Interference-Principle of Superposition, Interference of light, Conditions for sustained Interference, derivation of conditions for constructive and destructive interference of reflected light from a thin film, Newton's Rings-experimental arrangement, Determination of Wavelength; engineering applications of Interference

Diffraction-distinction between interference and diffraction, differences between Fresnel & Fraunhoffer diffractions, Fraunhoffer Diffraction at single slit(derivation, energy distribution curve) , Fraunhoffer Diffraction at a Double slit (derivation, energy distribution curve),Theory of Diffraction Grating, Engineering applications of diffraction

At the end of the Module 1, students will be able to:

1. **Explain** the need of coherent sources and the conditions for sustained interference (L2)
2. **Identify** engineering applications of interference including homodyne and heterodyne detection (L3)
3. **Analyze** the differences between interference and diffraction with applications (L4)

MODULE -2	INTRODUCTION TO QUANTUM MECHANICS	9 HOURS

Matter waves –de-Broglie hypothesis- properties, G.P.Thomson experiment, Phase and group velocities—Expression for group velocity; Heisenberg's uncertainty principle; Schrodinger's time dependent and independent wave equations – Physical significance of wave function-important characteristics of wave function, Eigen values and Eigen functions of a particle confined to one dimensional infinite square well (potential well).

At the end of the Module 2, students will be able to:

1. **Explain** Quantum Mechanics to understand wave particle dualism (L2)
2. **Necessity** of quantum mechanics to explore the behavior of sub atomic particles (L3)
3. **Evaluate** the Eigen values and Eigen functions of a particle (L2)

MODULE-3	FREE ELECTRON THEORY OF METALS & SEMICONDUCTORS	10 HOURS

Classical free electron theory-assumptions, expression for electrical conductivity, merits and demerits; Quantum free electron theory of metals-expression for electrical conductivity; Fermi-Dirac distribution, Mathiesson rule, causes of electrical resistance in metals, Bloch's theorem (Qualitative), Kronig - Penny Model (Qualitative), Classification of solids into conductors, semiconductors and insulators based on energy band gap.

Semiconductors- Introduction – Intrinsic and Extrinsic semiconductors– Density of charge carriers, Electrical conductivity, Fermi level of intrinsic semiconductors ; Hall effect – Hall coefficient – Applications of Hall effect.

At the end of the Module 3, students will be able to:

1. **Demonstrate** the success of quantum free electron theory over classical free electron theory (L2)
2. **Examine** the probability of occupancy of an electron in an energy state at different temperatures (L3)
3. **Outline** the properties of n-type and p-type semiconductors and charge carriers (L2)
4. **Identify** the type of semiconductor using Hall effect (L2)

MODULE-4	SUPERCONDUCTORS AND NANOMATERIALS	10 HOURS

Superconductors- Introduction – Properties of superconductors – Meissner effect – Type I and Type II superconductors – BCS theory – Josephson effects (AC and DC) – Applications of superconductors.

Nanomaterials– Significance of nanoscale , Properties of nanomaterials: Physical, mechanical, Magnetic, Optical ; Synthesis of nanomaterials: Top-down-Ball Milling, Bottom-up –Chemical vapour deposition ;Applications of Nano materials.

At the end of the Module 4, students will be able to:

1. **Explain** how electrical resistivity of solids changes with temperature (L2)
2. **Classify** superconductors based on Meissner's effect (L2)
3. **Explain** Meissner's effect, BCS theory & Josephson effect in superconductors (L2)
4. **Identify** the nano size dependent properties of nanomaterials (L2)
5. **Illustrate** the methods for the synthesis (L2)
6. **Apply** the basic properties of nanomaterials in various Engineering branches (L3).

MODULE-5	LASERS & OPTICAL FIBERS	9 HOURS

Lasers: Introduction, properties of lasers: monochromaticity, coherence, directionality, brightness; Spontaneous & stimulated emission of radiation, Einstein coefficients, Population inversion, Pumping methods, Types of lasers: Nd- YAG Laser, He–Ne Laser, Semiconductor laser; Applications.

Introduction to Optical Fibers-Total Internal Reflection-Critical angle of propagation-Acceptance angle-Numerical Aperture-Classification of optical fibers based on materials, modes and refractive index profile-Applications: fiber optic communication system and sensors.

At the end of the Module 5, students will be able to:

1. **Understand** the basic concepts of LASER light Sources (L2)
2. **Apply** the concepts to learn the types of lasers (L3)
3. **Identify** the Engineering applications of lasers (L2)
4. **Explain** the working principle of optical fibers (L2)
5. **Classify** optical fibers based on refractive index profile and mode of propagation (L2)

Total hours: 48 hours

Content beyond syllabus:

Types of magnetic materials and the applications.

Characterization of nano materials: (a) X-ray diffraction & Scanning electron microscope

Self-Study:

Contents to promote self-Learning:

S.No	Topic	CO	Reference
1	Wave optics	CO1	https://nptel.ac.in/courses/122/107/122107035/
2	Introduction to quantum mechanics	CO2	https://nptel.ac.in/courses/115/101/115101107/
3	Free electron theory of metal & Semiconductors	CO3	https://nptel.ac.in/courses/113/106/113106040/ https://nptel.ac.in/courses/115/102/115102025/
4	Superconductors and nanomaterials	CO4	https://nptel.ac.in/courses/115/101/115101012/ https://nptel.ac.in/courses/118/104/118104008/
5	Lasers & optical fibers	CO5	https://nptel.ac.in/courses/115/102/115102124/ https://nptel.ac.in/courses/115/107/115107095/

Text Book(s):

1. M. N. Avadhanulu, P.G. Kshirsagar & TVS Arun Murthy" AText book of Engineering Physics"- S. Chand Publications, 11th Edition 2019.
2. B.K. Pandey and S. Chaturvedi, Engineering Physics, Cengage Learning, 2012.
3. S.O.Pillai, "Solid State Physics", 8th edition, New Age International Publishers, 2018.

Reference Book(s):

1. Shatendra Sharma, Jyotsna Sharma, " Engineering Physics", Pearson Education,2018
2. N. Subrahmanyam, BrijLal, A Textbook of Optics, S. Chand, New Delhi, 2015
3. Kittel, C. Introduction to Solid State Physics‖. Wiley, 2005.
4. K. Thyagarajan, Engineering Physics, McGraw-Hill Education (India) Pvt. Ltd, 2016.
5. Ajoy Ghatak, Optics, 5th Edition, McGraw Hill, 2012
6. O. Svelto, "Principles of Lasers", Springer Science & Business Media, 2010.
7. William T. Silfvast, "Laser Fundamentals" 2nd edition, Cambridge University Press, 2004.
8. T. Pradeep, "A Text Book of Nanoscience and Nanotechnology", Tata Mc Graw Hill, 2003

Online Resources:

https://www.youtube.com/watch?v=-mNQW5OShMA
https://www.youtube.com/watch?v=TwlRVDM6bKY
https://www.youtube.com/watch?v=lH9SNnQCs54&t=58s

https://www.youtube.com/watch?v=Usu9xZfabPM&t=154s
https://www.youtube.com/watch?v=x4Nr93ALNjo
https://www.youtube.com/watch?v=FL4QCymhYDA
https://www.youtube.com/watch?v=PvN-cwQXBDc
https://www.youtube.com/watch?v=RAqgxH_pS7Y
https://www.youtube.com/watch?v=AhLATP5rYPs
https://www.youtube.com/watch?v=CjAVfW_6juw
https://www.youtube.com/watch?v=h6FYs_AUCsQ
https://www.youtube.com/watch?v=3-PQ8H-AI9c
https://www.youtube.com/watch?v=3-PQ8H-AI9c
https://www.youtube.com/watch?v=PNElByWIGNc
https://www.youtube.com/watch?v=1xWBPZnEJk8
https://www.youtube.com/watch?v=WgzynezPiyc
https://www.youtube.com/watch?v=T94BbyYyNpg
https://www.youtube.com/watch?v=aqazAcE19vw

Web Resources:

1. http://www.sfu.ca/phys/141/1134/Lectures/SP%20Lecture%2029%20-%20Interference&Diffraction.pdf
2. http://pages.physics.cornell.edu/~ajd268/Notes/QM-Notes.pdf
3. http://www-rjn.physics.ox.ac.uk/lectures/metalsnotes10.pdf
4. https://www.iare.ac.in/sites/default/files/lecture_notes/semiconductors%20lecture%20notes%20%281%29_0.pdf
5. http://www.gpcet.ac.in/wp-content/uploads/2018/09/UNIT-5-EP-PDF.pdf
6. https://galgotiacollege.edu/assets/pdfs/study-material/notes-Physics.pdf

NARAYANA ENGINEERING COLLEGE:NELLORE								
I-B.Tech	BASIC ELECTRICAL CIRCUITS (21ES1003)							R2021
Semester	Hours / Week			Total hrs	Credit	Max Marks		
	L	T	P		C	CIE	SEE	TOTAL
I	3	0	0	48	3	40	60	100

Pre-requisite: Fundamental of mathematics and physics

Course Objectives:

1. To study the basics of circuit analysis.
2. To study the magnetic circuits.
3. The concepts of real power, reactive power, complex power, phase angle and phase difference.
4. To understand frequency response in electrical circuits.
5. To understand the concept of graphical solution to electrical network.
6. To impart knowledge on solving circuit equations using network theorems.

Course Outcomes: After successful completion of the course, the student will be able to:

CO 1	Solve various electrical networks in presence of active and passive elements.(BL-3)
CO 2	Understand the fundamental behaviour of AC circuits and solve AC circuit problems.(BL-2)
CO 3	Explain the behaviour of the circuit at series & parallel resonance of circuit & the effect of resonance .(BL-2)
CO 4	Apply graph theory to formulate network equations.(BL-3)
CO 5	Solve electrical networks by using principles of network theorem.(BL-3)

CO-PO Mapping

CO	PO												PSO	
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	3	3	1									3	3	1
CO2	3	3	3										2	
CO3	3	3	3										3	3
CO4	3	3	3										2	3
CO5	3	3	2											

1: Low, 2-Medium, 3- High

COURSE CONTENT

MODULE – 1	INTRODUCTION TO ELECTRICAL & MAGNETIC CIRCUITS	11hours

Network elements, R, L and C Parameters, Kirchhoff's Laws - Independent and Dependent sources-Source Transformation, Network Reduction Techniques, Faraday's Laws of Electromagnetic Induction, Concept of Self and Mutual Inductance, Dot Convention, Coefficient of Coupling, Composite Magnetic Circuit, MMF Calculations.

At the end of Module 1, students will be able to:

1. Explain the network elements.(BL-2)
2. Understand the Voltage, Current, Power, Direct Current (DC), Alternating Current.(BL-2)
3. Explain the laws of electromagnetic induction.(BL-2)
4. Explain the Single phase AC circuits.(BL-2)

MODULE -2	SINGLE PHASE AC CIRCUITS	10hours

Introduction, R.M.S, Average Values and Form Factor for Different Periodic Wave Forms. Phase and Phase Difference, Steady State Analysis of R, L, C With series and parallel Sinusoidal Excitation.

At the end of the Module 3, students will be able to:

1. Understand the advantages of single phase AC system. (BL-2)
2. Explain the complex and polar forms representation.(BL-2)
3. Find the AC circuits in order to determine the voltage, current and power for the given problem. (BL-2)

MODULE -3	RESONANCE & LOCUS DIAGRAMS	10hours

Resonance: Introduction, Series Resonance and parallel resonance, resonance frequency, Q-factor, Bandwidth, Locus diagrams of RL, RC and RLC circuits and problems.

At the end of the Module 4, students will be able to:

1. Explain AC circuits along with resonance and locus diagrams.(BL-2)
2. Understand the effect of resonance on series and parallel resonance circuits.(BL-2)
3. Explain the frequency response for a resonant circuits.(BL-2)

MODULE -4	NETWORK TOPOLOGY	9hours

Definitions – Graph – Tree, Incidence Matrix, Basic Cutset and Tieset matrices for planar networks - Nodal Analysis, Mesh Analysis, Super Node and Super Mesh Analysis for Dependent and Independent Voltage and Current Sources and DC & AC Excitations - Duality and Dual Networks.

At the end of the Module 5, students will be able to:

1. Understand the overview of topology for a given network. (BL-2)
2. Find the graph for the given electrical network. (BL-2)
3. Apply graph theory to solve network equations. (BL-3)

MODULE-5	NETWORK THEOREMS	08hours

Superposition theorem, Compensation theorem, Thevenin's theorem, Norton's theorem, Maximum power transfer theorem, Tellegen's theorem, Millman's theorem, Reciprocity theorem; Application of network theorems in solving DC and AC circuits.

At the end of the Module 6, students will be able to:

1. Understand the way of approaching to solve for a given network. (BL-2)
2. Solve theorems for finding the solutions of network problem.(BL-3)
3. Explain the application of network theorems.(BL-2)

Total hours:	48hours

Content beyond syllabus:

1. Three Phase circuits and its Importance in Electrical Engineering.
2. Real time applications of network theorems.

Self-Study:

Contents to promote self-Learning:

SNO	Topic	Reference
1	Introduction to the electrical & magnetic circuits	https://nptel.ac.in/courses/117/106/117106108/
2	Single phase AC circuit	https://nptel.ac.in/courses/108/105/108105053/
3	Locus diagram and resonance	https://nptel.ac.in/courses/108/105/108105112/
4	Analysis of electrical circuit and Graph theory	https://nptel.ac.in/courses/108/105/108105159/
5	Network theorem	https://nptel.ac.in/courses/117/106/117106108/

Text Book(s):

1. A Sudhakar and Shyam Mohan S P, “Circuits and Networks: Analysis and Synthesis”, TMH, 5th Edition, New Delhi, 2015.
2. Ravish R., Network Analysis and Synthesis, 2/e, McGraw-Hill, 2015

Reference Book(s):

1. S.Sivanagaraju, G.Kishore & C.Srinivasa Rao, "Electrical Circuit Analysis", Cengage Learning, 1st Edition, 2010.
2. A. Chakrabarti : Circuit Theory (Analysis and Synthesis), Dhanpat Rai &Co
3. Joseph A. Edminister and Mahmood Nahvi, “Electric Circuits Schaum’s Outline Series”, 6th Edition, Tata McGraw-Hill, 2014, New Delhi.
4. Electric Circuits by N.Sreenivasulu, REEM Publications

Online Resources / Web Reference:

1. https://nptel.ac.in/courses/108/105/108105159/
2. https://nptel.ac.in/courses/108/102/108102042/
3. https://nptel.ac.in/content/storage2/courses/108105053/pdf/L-21(TB)(ET)%20((EE)NPTEL).pdf
4. https://en.wikibooks.org/wiki/Circuit_Theory
5. http://www.mathtutordvd.com/products/Engineering-Circuit-Analysis-Volume-1.cfm
6. http://ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-002-circuits-andelectronics-spring-2007/video-lectures/lecture-2/
7. http://www.facstaff.bucknell.edu/mastascu/elessonsHTML/Circuit/Circuit1.html
8. https://opencourses.emu.edu.tr/course/view.php?id=3

NARAYANA ENGINEERING COLLEGE::NELLORE								
Semester	PROBLEM SOLVING AND PROGRAMMING							R2021
	Hours / Week			Total hrs	Credit	Max Marks		
	L	T	P		C	CIE	SEE	TOTAL
I	3	0	0	48	3	30	70	100

Pre-requisite: Mathematics Knowledge, Analytical and Logical skills

Course Objectives:

1. To understand various steps in Program development.
2. To understand the basic concepts in C Programming Language.
3. To learn how to write modular and readable C Programs.
4. To learn the syntax and semantics of a C Programming language.
5. To learn structured programming approach for problem solving.

Course Outcomes: After successful completion of the course, Student will be able to:

CO 1	Identify methods to solve a problem through computer programming. (BL - 3)
CO 2	Understand the use of basic elements of C language. (BL - 2)
CO 3	Understand the usage of various control statements and the modular approach for solving the problems. (BL - 2)
CO 4	Apply the Arrays and Pointers for solving problems. (BL - 3)
CO 5	Explain User-Defined Data Types and Files. (BL - 2)

CO-PO Mapping

CO	PO												PSO	
	PO 1	PO 2	PO3	PO4	PO5	PO6	PO 7	PO 8	PO9	PO10	PO11	PO12	PSO 1	PSO 2
CO1	3	3											1	
CO2	1	2	1										1	
CO3	1	2	3	2	2							2	2	2
CO4	3	3	2	2								1	2	
CO5	2	2	2	2								1	2	

1: Low, 2-Medium, 3- High

COURSE CONTENT		
MODULE – 1	**Fundamentals of Computers and Programming**	**9 H**

Introduction to Programming, Algorithms and Flowcharts: Programs and Programming, Programming languages, Compiler, Interpreter, Structured Programming Concept, Algorithms, Flowcharts, How to Develop a Program.

Fundamental Algorithms: Exchanging the values of Two Variables, Counting, Summation of a set of numbers, Factorial computation, Generation of the Fibonacci Sequence, Reversing the digits of an integer.

At the end of the Module 1, students will be able to:

1. Solve problems using language independent notations. (BL - 3)
2. Understand the compilers and interpreters. (BL - 2)
3. Understand Structured Programming. (BL - 2)
4. Develop algorithms and flowcharts for problems. (BL - 3)

MODULE -2	Basic Elements of C	9 H

Basics of C: Introduction**,** Character Set, Structure of a C Program, A Simple C Program, Variables, Data Types and Sizes, Declaration, How does The Computer Store Data in Memory, Identifiers, Keywords, Constants, Assignment, and Initialization.

Operators and Expressions: Arithmetic Operators, Relational Operators, Logical Operators, Bitwise Operators, Conditional Operator, Comma operator, sizeof operator, Expressions, L values and R values, Expression Evaluation- Precedence and Associativity, Type Conversion.

At the end of the Module 2, students will be able to:

1. Understand the basic structure of a program in C. (BL - 2)
2. Understand tokens in C language. (BL - 2)
3. Illustrate the working of expressions. (BL - 2)
4. Understand the precedence and Associativity rules of operators. (BL - 2)
5. Understand the rules of type conversion. (BL - 2)

MODULE-3	Data Input / Output, Control Statements and Functions	11 H

Input and Output: Basic Screen and Keyboard I/O in C, Formatted Input and Output, Unformatted Input and Output Functions

Control Statements: Selection Statements - if, Nested if, if-else, Nested if-else, else-if ladder, switch, Looping Statements - while, do-while, for, Nested loops, Unconditional Statements - goto, break, continue, return.

Functions: Introduction, Using Functions, Passing Arguments to a Function, Working with Function, Scope and Extent, Recursion, The C Preprocessor, Storage classes, Multifile programs.

At the end of the Module 3, students will be able to:

1. Explain the Formatted and Unformatted I/O functions. (BL - 2)
2. Understand Selection Statements. (BL - 2)
3. Understand Looping Statements. (BL - 2)
4. Explain Unconditional Statements. (BL - 2)
5. Understand the basic concept of functions. (BL - 2)
6. Understand concept of Recursion and Preprocessor. (BL - 2)
7. Explain storage specifiers. (BL - 2)

MODULE-4	Arrays and Pointers	10 H

Arrays and Strings: Introduction, One-Dimensional Array, Multidimensional Arrays, Passing Arrays to Function, Strings - Declaration, Initialization, Printing Strings, String Input, Character Manipulation, String Manipulation, Arrays of Strings.

Pointers: Fundamentals, Pointer Declarations, Operations on pointers, Passing Pointers to a Function, Pointers and Arrays, Arrays of Pointers, Pointer to Pointer, Pointer to Functions, Command line arguments, Dynamic Memory Management.

At the end of the Module 4, students will be able to:

1. Understand the concept of Arrays. (BL - 2)
2. Understand the concept of pointers. (BL - 2)
3. Explain Dynamic Memory Management. (BL -2)

MODULE-5	**User-Defined Data Types and Files**	**9 H**

Structures and Unions: Basics of Structures, Nesting of Structures, Arrays of Structures, Structures and Pointers, Structures and Functions, Self-Referential Structures, Unions, Bit-fields, Enumerations, typedef.

Files: Introduction, Using Files in C, Working with Text Files, Random Accesses to Files of Records.

At the end of the Module 5, students will be able to:

1. Explain user defined data types. (BL - 2)
2. Understand the concept of Self-Referential Structures. (BL - 2)
3. Understand the working of files. (BL - 2)

Total hours:	**48 HOURS**

Content Beyond Syllabus:

1. Analysis of Algorithms
2. Binary Files
3. Variable Length Argument Lists

Self-Study:

Contents to promote self-Learning:

SNo	Module	Reference
1	Fundamentals of Computers and Programming	https://nptel.ac.in/courses/106/106/106106127/ [Lec 1] https://nptel.ac.in/courses/106/105/106105171/ [Week 1 - Lec 1 To 4]
2	Basic Elements of C	https://nptel.ac.in/courses/106/105/106105171/ [Week 1 - Lec 10] https://nptel.ac.in/courses/106/105/106105171/ [Week 2 - Lecture 7 To 10] https://nptel.ac.in/courses/106/105/106105171/ [Week 3 - Lec 11 To 14] https://nptel.ac.in/courses/106/106/106106127/ [Lec 12] https://nptel.ac.in/courses/106/106/106106127/ [Lec 13] https://nptel.ac.in/courses/106/106/106106127/ [Lec 14]

3	Data Input / Output, Control Statements and Functions	https://nptel.ac.in/courses/106/106/106106127/ [Lec 20] https://nptel.ac.in/courses/106/105/106105171/ [Week 4 - Lec 25] https://nptel.ac.in/courses/106/105/106105171/ Week 4 - Lec 26 To 28] [Week 5 - Lec 21 To 25] https://nptel.ac.in/courses/106/106/106106127/ [Lec 26 & 27]
4	Arrays and Pointers	https://nptel.ac.in/courses/106/105/106105171/ [Week 5 - Lec 30 To 32] [Week 6 - Lec 32 To 34] [Week 6 - Lec 35,36] https://nptel.ac.in/courses/106/106/106106127/ [Lec 37,38]
5	User-Defined Data Types and Files	https://nptel.ac.in/courses/106/105/106105171/ [Week 11 - Lec 40,41] https://nptel.ac.in/courses/106/106/106106127/ [Lec 43,44] https://nptel.ac.in/courses/106/106/106106127/ [Lec 47]

Text Book(s):

1. Pradip Dey, and Manas Ghosh, "Programming in C", 2018, Oxford University Press.
2. Byron Gottfried, Schaum's Outline of Programming with C, 4th Edition, 2018, McGraw-Hill

Reference Books :

1. Brian W. Kernighan, and Dennis M. Ritchie, "The C Programming Language", 2nd Edition, Pearson.
2. Ajay Mittal, Programming in C: A Practical Approach , 3/e, Pearson Publication
3. SCHILDT and HERBERT, C: The Complete Reference,4th Edition, McGraw Hill, 2020
4. SOMASHEKARA, M. T., GURU, D. S., MANJUNATHA, K. S., Problem Solving with C,2nd Edition, PHI Learning, 2018
5. Paul Deitel, Deitel& Harvey Deitel, C How to Program,6th Edition, Pearson Education
6. Jeri R. Hanly, Elliot B. Koffman, Ashok Kamthane and A.Ananda Rao, Programming in C and Data Structures, 1st Edition, Pearson Education, 2010.
7. H.Cheng, C for Engineers and Scientists, Mc.Graw-Hill International Edition Education / PHI, 2009
8. Yashavant P. Kanetkar, Let us C, 16th Edition, BBP Publications, Delhi, 2017.
9. R.G. Dromey, "How to Solve it by Computer". Pearson,2014.
10. Anita Goel, Computer Fundamentals, Pearson Publication,2010.

NARAYANA ENGINEERING COLLEGE:NELLORE

I-B.Tech	Applied Physics lab (21PH1501)							R2021
Semester	Hours / Week			Total hrs	Credit	Max Marks		
	L	T	P		C	CIE	SEE	TOTAL
I	0	0	2	36	1.5	40	60	100

Pre-requisite: Nil

Course Objectives:

1. To provide student to learn about some important experimental techniques in physics with knowledge in theoretical aspects so that they can excel in that particular field. To prepare students for performing requirement analysis and design of variety of applications.
2. To enable the students to understand the concepts of interference and diffraction and their applications.
3. To educate students to recognize the applications of laser in finding the wavelength, slit width and its role in diffraction studies
4. To make the students to understand the important parameters of optical fibres and metals

Course Outcomes: After successful completion of the course, the student will be able to:

CO 1	learn important concepts of physics through involvement in the experiments by applying theoretical knowledge.
CO 2	understand the concepts of interference and diffraction and their applications.
CO 3	recognize the applications of laser in finding the wavelength, slit width and its role in diffraction studies
CO 4	understand the important parameters of optical fibres and metals

CO-PO Mapping

CO	PO												PSO	
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	2	1												
CO2	2	1												
CO3	2	1				1								
CO4	2	1				1								

1: Low, 2-Medium, 3- High

COURSE CONTENT	CO
Task -1 Determination of Hall voltage and Hall coefficient of a given semiconductor using Hall effect.	
The objective :To determine a) sign of the charge carriers, b) charge carrier concentration, c) mobility of the charge carriers of a given semiconductor	CO 1
Task - 2 To determine the resistivity of semiconductor by Four probe method	
Objective: To determine the resistivity of semiconductor by Four probe method	CO 1
Task -3 Determine the energy gap of a given semiconductor diode.	
Objective:To plot characteristics between reverse saturation current and 103 /T and find out the approximate value of Energy Band Gap in PN junction diode	CO 1
TASK -4 Measurement of radius of curvature of a lens by Newton's rings method.	

Objective:To determine the wavelength of sodium light by Newton's Ring method The key idea behind Newtons ring experiment is the thin film formation between a plane-convex lens and a glass plate. Due to this thin film of air a path difference occurs in the waves which reflect from the lower surface of the lens and the top surface of the glass plate. As a result of it, they superimpose and develop the interference pattern.	CO 2
TASK -5. Determine the thickness of the wire using wedge shape method	
Objective: To calculate the thickness of a thin wire by forming interference fringes using an air wedge arrangement. The key idea behind this experiment is the formation of thin wedge shaped film between two plane glass plates. Due to this thin film of air, a path difference occurs between waves reflected from top and bottom surface of the film. On superimposition of these waves an interference pattern containing a number of straight line fringes will be produced	CO 2
TASK-6 Determination of wavelength by plane diffraction grating normal incidence method	
Objectives: 1.To understand the types of diffraction 2.To familiarize with the principle of diffraction in plane transmission grating 3. To know the procedure for standardization of the grating 4.To determine the wavelengths of prominent spectral lines of mercury spectrum. An arrangement, which is equivalents in its action to a large number of parallel slits of same width separated by equal opaque spaces is called diffraction grating. It is constructed by ruling fine equidistant parallel lines on an optically plane glass plate with the help of a sharp diamond point.	CO 2
TASK -7 Dispersive power of a diffraction grating	
objective: To determine Dispersive power of a diffraction grating When white light passes through a grating, different wavelengths undergo different angles of diffraction. Hence white light split up into different colours and diffraction spectra of different orders will be produced. The angular dispersion or dispersive power of a grating is defined as the rate of change of angle of diffraction with the change of wavelength in a particular order of the spectrum.	CO 2
TASK -8 Determination of wavelength of LASER light using diffraction grating	
Objectives :1. To determine the concept of diffraction 2. To determine the wavelength of the given Laser source.	CO 3
TASK -9 . Laser: Diffraction at a single slit	
Objective:Determination of width of a given single slit using laser diffraction method Laser beam has high monochromaticity,coherence and directionality. Hence it forms a clear diffraction pattern and we can measure width of a single slit accurately.	CO 3
TASK -10 To determine the numerical aperture and acceptance angle of a given optical fibre	
Objective: To determine the numerical aperture and acceptance angle of a given optical fiber. In optical fibres light travel by multiple total internal reflections. Numerical aperture represents light gathering powerof optical fibre. Acceptance angle represents maximum limiting angle at one end of optical fibre for the liglht ray to travel by multiple total internal reflections through the core region of thefibre. 1. Optical fibers may be used for accurate sensing of physical parameters and fields like pressure, temperature and liquid level. 2. For military applications like fiber optic hydrophones for submarine and underwater sea application and gyroscopes for applications in ships, missiles and aircrafts.	CO4

Additional Experiments:	
TASK -11 Laser: Diffraction at a double slit	
Objective:Determination of width of a given double slit using laser diffraction method. With this experiment we can demonstrate diffraction nature of lasers and measure width of a double slit accurately.	CO 3
TASK -12: Determination of Fermi energy of a metal.	
Objective: To determine Fermi energy of a metal. Fermi energy represents highest energy level occupied by the electron at 0 K in a metal.	CO4
Virtual lab: 1) Laser beam divergence and spot size https://vlab.amrita.edu/?sub=1&brch=189&sim=342&cnt=1 Michelson's Interferometer- Wavelength of laser beam https://vlab.amrita.edu/?sub=1&brch=189&sim=1106&cnt=1 Anderson's Bridge https://vlab.amrita.edu/?sub=1&brch=192&sim=859&cnt=1	

Self-Study:

Contents to promote self-Learning:

SNO	Topic	Reference
1	Newton rings	**https://youtu.be/PU-SeNfIRcs**
2	Diffraction grating experiment – Wavelength of mercury spectrum	**https://youtu.be/N0lxwqANsd4**
3	Experiment – Laser Grating-Determination of Wavelength of Given Laser Source	**https://youtu.be/764Fr0mnOrQ**

Text Book(s):

1. C. L. Arora, "Practical Physics", S. Chand & Co., New Delhi, 3rd Edition, 2012.
2. Vijay Kumar, Dr. T. Radhakrishna, "Practical Physics for Engineering Students", S M Enterprises, 2nd Edition, 2014.

Reference Book(s):

S. Balasubramanian, M.N. Srinivasan "A Text book of Practical Physics"- S Chand Publishers, 2017.
C.H. Bernard and C.D. Epp, John Wiley and Sons, "Laboratory Experiments in College Physics" Inc., New York, 1995.
Dr.Ruby Das, C.S.Robinson, Rajesh Kumar and Prasanth Kumar "A text book of Engineering Physics Practical", 1st edition, Sahu University Science Press, 2010.
4.Jayaraman, "Engineering Physics Laboratory Manual", 1st edition, Pearson Education, 2014.

Web Resources:

1. https://www.scribd.com/doc/143091652/ENGINEERING-PHYSICS-LAB.
2. https://www3.nd.edu/~wzech/LabManual_0907c.pdf.
3. https://www.morebooks.de/store/gb/book/engineering-physics-lab-manual/isbn/978-3-330-34402.

NARAYANA ENGINEERING COLLEGE:NELLORE								
I-B.Tech.	BASIC ELECTRICAL CIRCUIT LAB (21ES1506)							R2021
Semester	Hours / Week			Total hrs	Credit	Max Marks		
	L	T	P		C	CIE	SEE	TOTAL
I	0	0	2	32	1	40	60	100

Pre-requisite: Network Analysis

Course Objectives:

1. Fundamentals of Ohm's law, Kirchhoff's current and voltage laws and its practical implementation.
2. Measurement of voltage, current, power and impedance of any circuit.
3. Analysis of a given circuit depending on types of elements.

Course Outcomes: After successful completion of the course, the student will be able to:

CO 1	Apply the KCL and KVL for circuit analysis and verify the results theoretically (BL= 3)
CO 2	Experimentally determine self inductance, mutual inductance and coefficient of coupling.(BL=3)
CO 3	Practically determine band width, Q-factor and verify with theoretical values. (BL=3)
CO 4	Able to draw locus diagrams, waveforms and phasor diagrams for lagging and leading networks.(BL-2)
CO 5	Apply suitable theorems for the given Electrical circuit and verify with theoretical values.(BL=3)

CO-PO Mapping														
CO	**PO**												**PSO**	
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**
CO1	2	2	2	1	1		1	2		1		2	2	2
CO2	2	2	2	1	1		1	2		1		2	2	2
CO3	2	2	2	1	1		1	2		1		2	2	2
CO4	2	2	2	1	1		1	2		1		2	2	2
CO5	2	2	1				1						2	3
1: Low, 2-Medium, 3- High														

COURSE CONTENT	**CO**
Task 1 – Verification of Kirchhoff's laws	
Objective: To verify the KCL and KVL for a given circuit	CO 1
TASK-2 Determination of Self, Mutual Inductances and Coefficient of Coupling	
Objective: To determine the self and mutual inductances and coefficient of coupling for two inductive coils.	CO 1
TASK-3 Measurement of current in various branches of RLC series and draw the phasor	CO 2
diagram.	
Objective: To Analyze the series and parallel RLC circuits	
TASK-4 Locus Diagrams of RL, RC Series Circuit.	
Objective: To Plot the current locus diagrams for Series RL,RC circuit.	CO 2
TASK-5 Frequency response of series & parallel resonance circuit with analysis and design	
Objective: To determine resonant frequency, band width and Q-factor for series & parallel RLC circuits	CO 3

TASK-6 Verification of Thevenin's and Norton's theorems	
Objective: To verify the Thevinins and Norton's Theorem	CO 4
TASK-7 Verification of Reciprocity and Millman's Theorems	
Objective: To verify the reciprocity and Millman's Theorems	CO 4
TASK-8 Verification of Superposition Theorem	
Objective: To verify the superposition theorem	CO 4
TASK-9 Verification of Maximum Power Transfer Theorem	
Objective: To verify the Maximum power transfer theorem	CO 4
TASK-10 Verification of compensation Theorem	
Objective: To verify the compensation theorem	CO 4

Additional Experiments:	
TASK-11 Verification of mesh & nodal analysis using digital simulation.	CO 1
Objective: To verify mesh analysis using digital simulation.	
TASK-12 Verification of different theorems using digital simulation.	CO 1
Objective: To verify different theorems using digital simulation	
Virtual Labs: 1. Parallel RC Circuits 2. Parallel LC Circuits 3. Thevenin's theorem 4. Series RL Circuits 5. Norton's Theorem 6. Series LCR Circuit	
Self-Study: Contents to promote self-Learning:	

SNO	Topic	CO	Reference
1	Thevinins and nortons	CO1	https://www.youtube.com/watch?v=7JfoDFk61o8
2	Series Resonance in RLC Circuit	CO2	https://www.youtube.com/watch?v=YLGrugmDvc0
3	Phasor Diagram of RL, RC and RLC Circuits	CO3	https://www.youtube.com/watch?v=HaFrY0qQ-NU

Text Book(s):

1. A Chakrabarthy, “Electric Circuits”, Dhanpat Rai & Sons, 6th Edition, 2010.
2. A Sudhakar, Shyammohan S Palli, “Circuits & Networks”, Tata McGraw- Hill, 4th Edition, 2010

Reference Book(s):

1. Willam Hayt.jr, Jack E.kemmerly,Steven M.Durbin, “Engineering Circuit analysis” Tata McGraw- Hill, 8th Edition2012
2. Rudrapratap, “Getting Started with MATLAB: A Quick Introduction for Scientists and Engineers”, Oxford University Press, 1 st Edition, 1999.

Web References:

1. https://www.ee.iitkgp.ac.in/
2. http://www.vlab.co.in/lab_ready_for_use.php
3. http://vlab.amrita.edu/?sub=1&brch=75

NARAYANA ENGINEERING COLLEGE:NELLORE								
I-B.Tech	ENGINEERING & ITWORK SHOP (21ES1505)							R2021
PART – A ENGINEERING WORK SHOP								
Semester	Hours / Week			Total hrs	Credits	Max Marks		
	L	T	P		C	CIE	SEE	TOTAL
I	0	0	3	48	1.5	40	60	100

Pre-requisite: Basic mathematics and electronic devices.

Course Objectives:

1. To know basic workshop processes and adopt safety practices while working with various tools and equipments
2. To identify, select and use various marking, measuring, holding, striking and cutting tools & equipments.
3. To know about the internal parts of a computer, assembling a computer from the parts, preparing a computer for use by installing the operating system
4. To gain knowledge about the usage of tools like Word processors, Spreadsheets, Presentations
5. To learn about Networking of computers and use Internet facility for Browsing and Searching

Course Outcomes: After successful completion of the course, the student will be able to:

CO1	**Understand** the safety aspects in using the tools and equipments.(BL-2)
CO2	**Apply** tools for making models in respective trades of engineering workshop.(BL-3)
CO3	**Apply** basic electrical engineering knowledge to makes imple housewiring circuits And check their functionality.(BL-3)
CO4	**Understand** to disassemble and assemble a Personal Computer and prepare the Computer ready to use(BL-2)
CO5	**Apply** knowledge to Interconnect two or more computers for information sharing (BL-3)

CO-PO Mapping

	PO												PSO	
CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	2				3								1	3
CO2	2				3								1	3
CO3	2				3								1	3
CO4	2				3								1	3
CO5	2				3								1	3

1: Low, 2-Medium, 3- High

COURSE CONTENT (TRADES FOR PRACTICE)

Trade -1 Carpentry (6 H)

Familiaritywithdifferenttypesofwoodsandtoolsusedinwoodworkingandmakefollowingjointsfromoutof 300x40x25 mms of two od stock.

a) Half–Lapjoint.

b) Mortise and Tenonjoint

Trade-2 Fitting (6 H)

i.]Familiarity with different types of tools used in fitting and do the fitting exercises out of 80 x 50 x 5 mm M.S. stock

a) V-fit b) Dovetail fit

Trade – 3 Sheet Metal Work (6 H)

Familiarity with different types of tools used in sheet metal working, Developments of following sheet metal job from out of 22 or 20 guage G.I. sheet
a) Tapered tray b) Conical funnel

Trade – 4 Electrical House Wiring (6 H)

Familiarities with different types of basic electrical circuits and make the following electrical connections
a) Two lamps in series
b) Two way switch
c) Tube light
d) Two lamps in parallel with 3 pin plug and switches

Trade 5 – Welding

Familiarity with different types of tools used in welding and do the following welding exercises
1. Single V butt joint
2. Lap joint

Text Book(s):

1. Hajra Choudhury S.K., Hajra Choudhury A.K., Nirjar Roy S.K. "Elements of WorkshopTechnology"Vol-I2008&Vol-II2010MediaPromoters&Publishers Pvt.Limited,Mumbai.
2. KalpakjianS.andStevenS.Schmid,"Manufacturing Engineering and Technology" 4thEdition, Pearson Education IndiaEdition,2002.
3. P. Kannaiah&K. L. Narayana "Workshop manual" 2ndEd., Scitech publications Pvt.Ltd.,Hyderabad,2008.

Reference Book(s):

2. Gowri P., Hariharan and Suresh Babu A., "Manufacturing Technology-I", Pearson Education2008.

WebResources:

1. https://www.muet.edu.pk/sites/default/files/images/users/41/Workshop%20Intro.pdf
2. http://ecoursesonline.iasri.res.in/mod/page/view.php?id=98826

PART-B IT WORKSHOP LAB

Course Objectives:

1. To provide Technical training on Productivity tools like Word processors, Spreadsheets, Presentations.
2. To make the students know about the internal parts of a computer, assembling, installing the operating system.
3. To teach connecting two or more computers.

Course Outcomes: After successful completion of the course, the student will be able to:

CO 1	Understand functionalities of a computer and operating system. (BL-2)
CO 2	Practice Word processors, Presentation and Spreadsheet tool. (BL-2)
CO 3	Connect computer using wired and wireless connections. (BL-2)

CO-PO Mapping

	PO												PSO	
CO	**PO 1**	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**
CO1	1													
CO2	1													
CO3	1													

1: Low, 2-Medium, 3- High

COURSE CONTENT	CO
Task-1 Learn about Computer (4H)	
Identify the internal parts of a computer and its peripherals. Represent the same in the form of diagrams including Block diagram of a computer. Write specifications for each part of a computer including peripherals and specification of Desktop computer. Submit it in the form of a report.	CO 1
Task -2 Assembling a Computer (4H)	
Disassemble and assemble the PC back to working condition. Troubleshoot the computer and identify working and non-working parts. Identify the problem correctly by various methods available (eg: beeps). Record the process of assembling and trouble-shooting a computer.	CO 1
Task-3 Install Operating system (2H)	CO 1
Install Linux, any other operating system (including proprietary software) and make the system dual boot or multi boot. Record the entire installation process.	
TASK-4 Operating system features (2H)	CO 1
Record various features that are supported by the operating system(s) installed. Submit a report on it. Access CD/DVD drives, write CD/DVDs, access pen drives, print files, etc. Install new application software and record the installation process.	
TASK-5 Word Processor (6H)	CO 2
Create documents using the word processor tool. Tasks to be performed are inserting and deleting the characters, words and lines, Alignment of the lines, Inserting header and Footer, changing the font, changing the colour, including images and tables in the word file, making page setup, copy and paste block of text, images, tables, linking the images which are present in other directory, formatting paragraphs, spell checking, etc. Prepare project cover pages, content sheet and chapter pages at the end of the task using the features studied. Submit a report of the word processor considered. Create documents using the word processor tool. Mail Merge in word processor for	

creating appointment orders for 10 employee records in excel.	
TASK-6 Spreadsheet (4H)	CO 2
To create, open, save the spreadsheet and format them as per the requirement. Some of the tasks to be practiced are Managing the worksheet environment, creating cell data, inserting and deleting cell data, format cells, adjust the cell size, applying formulas and functions, preparing charts, sorting cells, working with pivot tables and charts. Submit a report of the Spreadsheet application considered.	
TASK-7 Presentations (6H)	CO 2
To create, open, save and run the presentations, Select the style for slides, format the slides with different fonts, colors, create charts and tables, insert and delete text, graphics and animations, bulleting and numbering, hyperlink, set the time for slide show, Record slide show. Submit a report of the Presentation tool considered.	
TASK-8 Wired network & Wireless network (4H)	CO 3
Select a LAN cable, Identify the wires in the cable, Define the purpose of each wire, Study the RJ45 connecter, Use crimping tool to fix the cable to the connecter, Test the cable using LAN tester, Connect two or more computers using cross and straight cables, Configure the computers, share the data between the computers.	

Additional Experiments:	
TASK -1 IoT	CO 3
Raspberry Pi Study the architecture of Raspberry pi, configure software, Install SD card, Connect the cables, Install Raspbian (or any other) operating system, Configure Wi-Fi, Remotely connect to your Raspberry Pi.	
TASK -2 OUTLOOK, MACROS	CO 3
Practice the following tasks and submit report A. Configure outlook and access mails. B. Create Macros in word and spreadsheet tools	

Text Book(s):

1. B.Govindarajulu, "IBM PC and Clones Hardware Trouble shooting and Maintenance",2nd edition, Tata McGraw-Hill, 2002
2. "MOS study guide for word, Excel, Powerpoint& Outlook Exams", Joan Lambert, Joyce Cox, PHI.
3. "Introduction to Information Technology", ITL Education Solutions limited, Pearson Education.

Reference Book(s):

1. Rusen, "Networking your computers and devices", PHI
2. Bigelows, "Trouble shooting, Maintaining & Repairing PCs", TMH.

On-line/Web Resources:

https://turbofuture.com/computers/Dissassembling-and-Assembling-the-computer-system
https://www.instructables.com/id/Disassemble-a-Computer/
https://www.windowscentral.com/how-do-clean-installation-windows-10
https://www.tutorialspoint.com/ms_excel_online_training/index.asp
https://www.raspberrypi.org

NARAYANA ENGINEERING COLLEGE::NELLORE								
I-B.Tech	Problem Solving and Programming Lab (21ES1501)							R2021
Semester	Hours / Week			Total hrs	Credit	Max Marks		
	L	T	P		C	CIE	SEE	TOTAL
I	0	0	3	48	1.5	40	60	100

Pre-requisite: Mathematics Knowledge, Analytical & Logical Skills

Course Objectives:

1. To work with the compound data types
2. To explore dynamic memory allocation concepts
3. To design the flowchart and algorithm for real world problems
4. To write C programs for real world problems using simple and compound data types
5. To employee good programming style, standards and practices during program development

Course Outcomes: After successful completion of the course, Student will be able to:

CO 1	Translate algorithms into programs (In C language) (BL - 2)
CO 2	Code and debug programs in C program language using various constructs.(BL - 3)
CO 3	Solve the problems and implement algorithms in C. (BL - 3)
CO 4	Make use of different data types to handle the real time data (BL - 3)

CO-PO Mapping

CO	PO												PSO	
	PO1	PO2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO1	PSO 2
CO1	1	2											1	
CO2	2	2	2										2	1
CO3	2	2	3	1	2								2	2
CO4	2	2	3	1	1								2	2

1: Low, 2-Medium, 3- High

COURSE CONTENT	CO
TASK-1 (3H)	
1Practice DOS and LINUX Commands necessary for execution of C Programs. 2Study of the Editors, Integrated development environments, and Compilers in chosen platform. 3Write, Edit, Debug, Compile and Execute Sample C programs to understand the Programming environment.	CO 1
TASK-2 (3H)	
1. Practice programs: Finding the sum of three numbers, exchange of two numbers, largest of two numbers, to find the size of data types, Programs on precedence and Associativity of operators, sample programs on various library functions.	CO 1
TASK-3 (6H)	

1.Write a program to find the roots of a Quadratic equation. 2.Write a C program to calculate the factorial of a given positive integer. 3.Fibonacci sequence is defined as follows: the first and second terms in the sequence are 0 & 1. Subsequent terms are found by adding the preceding two terms in the sequence. Write a C program to generate the first n terms of the sequence.	CO1
TASK-4 (6H)	
4.Write a C program to find the sum of individual digits of a positive integer. 1. Write a program to reverse the digits of a number. 2. Write a program to generate the series of prime numbers in the given range. 7.Write a program to check for number palindrome.	CO 2
TASK-5 (6H)	
1.Write a C program for the following that use both recursive & non-recursive functions: a. To calculate the factorial of a given positive integer. b. To find the greatest common divisor of two given integers. c. To generate Fibonacci series. 2.Illustrate the use of auto, static, register and external variables.	CO 2
TASK-6 (3H)	
1.Write a program to find the sum of positive and negative numbers in a given set of numbers. 2.Write C code to reverse the elements of the array. For example, [1,2,3,4,5] should become [5,4,3,2,1] 3.Write a program to find the maximum of a set of numbers.	CO 3
TASK-7 (6H)	
1.Write a C program that use pointers to find Addition of Two Matrices 2.Write a C program that use functions to find Multiplication of Two Matrices	CO 3
TASK-8 (3H)	
1.Write a program to accept a line of characters and print the number of vowels, Consonants, blank spaces, digits and special characters. 2. Write a C program to check whether a given string is a palindrome or not, without using any built-in functions.	CO 3
TASK-9 (6H)	
1.Write a C program to find the length of a given string using pointers. 2.Write a C program to add two distances in feet and inches using structure 3.Write a C program to read and print an employee's detail using structure 4. Write a C program to read and print book information using union	CO 4
TASK-10 (6H)	
1.Write a program to split a "file" into two files, say file1 and file2. Write lines into the 'file' from standard input. Read the contents from 'file' and write odd numbered lines into file1 and even numbered lines into file2. 2.Write a program to merge two files.	CO 4
ADDITIONAL TASKS	
1.Write a program to find the Abundant Number 2.Write a program to insert the element in a given position	

Virtual Labs:

1. Problem Solving Lab (IIIT HYDERABAD) : http://ps-iiith.vlabs.ac.in/

List of Experiments

1. Numerical Representation	6. Recursion
2. Beauty of Numbers	7. Advanced Arithmetic
3. More on Numbers	8. Searching and Sorting
4. Factorials	9. Permutation
5. String Operations	10. Sequences

2. Computer Programming Lab (IIIT HYDERABAD) : http://cse02-iiith.vlabs.ac.in/

List of Experiments

1. Numerical Approximation	6. Basic Control Flow
2. Functions	7. Pointers
3. Advanced Control Flow	8. Recursion
4. Arrays	9. Expression Evaluation
5. Structures	

Text Book(s):

1."How to Solve it by Computer", R.G. Dromey, 2014, Pearson.

2.Programming in C and Data Structures, J.R.Hanly, Ashok N. Kamthane and A.Ananda Rao, Pearson Education, 1st Edition, 2010.

Reference Book(s):

1."The C Programming Language", Brian W. Kernighan, Dennis M. Ritchie, 2nd Edition, Pearson.

2."Let us C", Yeswant Kanetkar, BPB publications

3."Pointers in C", Yeswant Kanetkar, BPB publications, 16th Edition, 2017

4.Computer Science, A Structured Programming Approach Using C by Behrouz Forouzan & Richard F. Gilberg, 3rd Edition, Cengage Learning

5.C Programming A Problem-Solving Approach, Behrouz A. Forouzan & E.V. Prasad,

6.F. Gilberg, 3rd Edition, Cengage Learning

7.Programming with C Rema Theraja, Oxford, 2018

8.Programming in C, 3rd Edition, 2015, Ashok N. Kamthane, Pearson Education

9.Programming in C, 3/e : A Practical Approach by Ajay Mittal, Pearson Publication

10.Problem Solving with C by SOMASHEKARA, M. T., GURU, D. S., MANJUNATHA, K. S., PHI Learning, 2nd Edition, 2018

11.C Programming with problem solving, J.A. Jones & K. Harrow, Dreamtech Press, 2001

12.Byron Gottfried, Schaum's Outline of Programming with C, 4th Edition, 2018, McGraw- Hill

Web Resources:

1. https://www.includehelp.com/c-programs/advacnce-c-examples.aspx
2. https://www.programiz.com/c-programming/examples
3. https://www.javatpoint.com/c-programs
4. https://www.w3resource.com/c-programming-exercises/
5. https://www.sanfoundry.com/simple-c-programs/
6. https://www.includehelp.com/c-programming-examples-solved-c-programs.aspx
7. http://www.c4learn.com/c-programs/tag/c-programs-typical-programs

NARAYANA ENGINEERING COLLEGE::NELLORE								
I-B.Tech	Communication skills Lab (21EN1502)							R2021
Semester	Hours / Week			Total hrs	Credit	Max Marks		
	L	T	P		C	CIE	SEE	TOTAL
I	0	0	2	36	1	40	60	100
Pre-requisite: English								
Course Outcomes: After successful completion of the course, Student will be able to:								
CO 1	**To develop knowledge, skills, and judgment** around human communication that facilitates their ability to work collaboratively with others.							
CO 2	**Develop their public speaking abilities** to speak both formally and informally.							
CO 3	**Understand the nuances of English language and skills** required for effective Participation in group activities.							

CO-PO Mapping													
CO	PO												PSO
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1									2	3				
CO2									2	3				
CO3									2	3				
1: Low, 2-Medium, 3- High														

TASK – 1

Ice - Breaking Activity, Introducing Oneself and Others – Role Plays - Oral Description of Pictures, Photographs, Products, and Process

Practice-1 : - Ice Breaking Activity, Introducing Oneself and Others.

Practice-2 : Role Plays

Practice-3 : Oral Description of Pictures, Photographs, Products, and Process

TASK – 2

What is Debate, How to Debate, Tips for Debate, Debate Practice, Explanation of Debate Techniques, Debate Videos Presentation-Telephone Etiquette, Making an Appointment, Telephone Talk and Tips

Practice-4: Debate (Planned & Extempore)

Practice-5: Telephonic Conversation Practice

TASK – 3

What is Group Discussion, Types of Group Discussion, Tips and Techniques for Effective Group Discussion, Group Discussion Videos Presentation

Practice-6: Group Discussions (Planned & Extempore)

Practice-7 : Group Discussions ()

TASK – 4

Email writing - Resume Writing: Cover Letter – Structure of Resumes – Types of Resumes

Practice-8 : Cover Letter
Practice-9 : Resume Writing

TASK – 5

Oral presentations (individual and group) through Seminars / PPTs - Importance of Body Language - Poster Presentation - Public Speaking Tips, Effective Presentation of renowned speakers.
Practice-10 : Public Speaking / Oral Presentations
Practice-11 : Presentation using PPTs
Practice-12 : Poster Presentation

NARAYANA ENGINEERING COLLEGE::NELLORE								
I-B.Tech	CHEMISTRY (21CH1001)							R2021
Semester	Hours / Week			Total hrs	Credit	Max Marks		
	L	T	P		C	CIE	SEE	TOTAL
II	3	0	0	48	3	40	60	100

Pre-requisite: Basic concepts in chemistry, Advanced engineering materials, chemistry in day to day life, Fossil fuels

Course Objectives:

1. To impart technological aspects of modern chemistry and its applications.
2. Understand the chemistry behind electrochemical energy systems.
3. To train the students on the principles and applications of polymers.
4. To acquire knowledge of engineering materials and fuels.

Course Outcomes: After successful completion of the course, the student will be able to:

CO 1	**Understand** the **fundamental concepts of chemistry to predict the structure and bonding of materials.(BL-2)**
CO 2	**Discuss** various kinds of **electro chemical cells**.**(BL-3)**
CO 3	**Compare** the **materials of various energy storage devices and emerging technologies**.**(BL-3)**
CO 4	**Demonstrate** the **mechanism and applications of different polymers in electronic devices**.**(BL-3)**
CO 5	**Explain calorific values, refining of petroleum and cracking of oils**.**(BL-2)**

CO-PO Mapping

CO	PO												PSO	
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO1	PSO 2
CO1	3													
CO2	3													
CO3	3						3							
CO4	3						3							
CO5	3						3							

1: Low, 2-Medium, 3- High

COURSE CONTENT

MODULE – 1	Structure and Bonding Models	10 Hrs

Structure and Bonding Models: Dual nature of matter- De Broglie's equation, Schrodinger wave equation, Molecular orbital theory – bonding in homo and hetero nuclear diatomic molecules– energy level diagrams of O_2 and CO, etc. π-molecular orbital's of butadiene and benzene, calculation of bond order and magnetic properties, Crystal field theory – salient features – splitting in octahedral and tetrahedral complex.

At the end of the Module 1, student will be able to:

1. **Understand** the fundamental concepts of chemistry to predict the structure, properties and bonding of Engineering materials**.(BL-2)**
2. **Explain** the calculation of bond order of O_2 and Co molecules**.(BL-2)**
3. **Discuss** the magnetic behavior and colour of coordination compounds**.(BL-2)**

MODULE -2	**Electro Chemistry**	**10 Hrs**

Electro chemistry: Electrode potential, EMF of an electrochemical cell, Nernst equation, Electrodes – concepts, reference electrodes (standard hydrogen, Calomel electrode, and glass electrode), potentiometry- potentiometric titrations (red ox titrations), concept of conductivity, conductometric titrations (acid- base titrations). PV Cell and its applications.

At the end of the Module 2, students will be able to:

1. **Demonstrate** competency in the basic concepts of electrochemical cells. **(BL-3)**
2. **Explai**n the significance of electrode potentials. **(BL-2)**
3. **List** the different types of electrodes. **(BL-1)**
4. **Differentiate** between Potentiometric and conductometric titrations. **(BL-2)**
5. **Illustrate** the construction of PV cell. **(BL-3)**

MODULE-3	**Battery Technology**	**09 Hrs**

Battery Technology: Introduction, classification of batteries, Important applications of batteries, Modern batteries- zinc-air, lithium cells,Li- MnO_2 cell, Ni-Cd cell, lead acid storage cell. Fuel cells- Introduction – classification, hydrogen - oxygen fuel cell, methanol - oxygen fuel cell, SOFC - Merits and demerits of fuel cell.

At the end of the Module 3, students will be able to:

1. **Classify** batteries into different types. **(BL-3)**
2. **Explain** the concept involved in the construction of batteries. **(BL-2)**
3. **Identify** the significance of batteries**.(BL-1)**
4. **Compare** the merits of different fuel cells. **(BL-2)**

MODULE-4	**Polymer Chemistry**	**10 Hrs**

Polymer Chemistry: Introduction to polymers, polymerization, types of polymerization, mechanism of polymer formation. Plastics - Thermoplastics and Thermosetting, Preparation, properties and applications of –PVC,PTFE, Bakelite, Urea- formaldehyde resin, Nylons. Natural Rubber, processing, vulcanization. Elastomers–Buna-S, Buna-N–preparation, properties and applications. Conducting polymers – poly acetylene, poly aniline, mechanism of conduction and applications.

At the end of the Module 4, students will be able to:

1. **Identify** different types of polymers. **(BL-1)**
2. **Distinguish** between thermoplastic and thermo setting resins. **(BL-2)**
3. **Explain** the preparation, properties and applications of some plastic materials. **(BL-2)**
4. **Apply** the knowledge of advanced polymers, conducting polymers for different Applications. **(BL-3)**

MODULE-5	**Fuel Technology**	**09 Hrs**

Fuel Technology: Introduction, Types of fuels, characteristics of good fuel, units, calorific value, HCV &LCV, Solid fuels, Analysis of coal-proximate and ultimate. Liquid Fuels: refining of petroleum, synthetic petrol preparation by Fischer- tropsch Process,Gaseous fuels;Natural gas,water gas,producer gas and coal gas.

At the end of the Module 5, students will be able to:

1. **Differentiate** petroleum, petrol, synthetic petrol and have knowledge how they are produced. **(BL-2)**
2. **Select** suitable fuels for IC engines. **(BL-1)**
3. **Explain** calorific values, octane number, refining of petroleum and cracking of oils. **(BL-2)**

Total hours:	**48 Hours**

Content beyond syllabus:

1. Valency bond theory
2. Compounding of natural rubber
3. Fuel analysis and methods for preparation of synthetic petrol

Self-Study:

Contents to promote self-Learning:

SNO	Module	Reference
1	Molecular orbital theory	https://www.youtube.com/watch?v=FMxuss0RXOU
2	Reference electrodes	https://www.youtube.com/watch?v=WMfXlncyMDc
3	Battreies	https://nptel.ac.in/courses/103/108/103108162/
4	Plastics	https://www.youtube.com/watch?v=FATc12opDCA
5	Refining of petroleum	https://www.youtube.com/watch?v=INqhbIl8r4Q

Text Book(s):

1. P. C. Jain & Monika Jain, *Engineering Chemistry*, Dhanpat Ray Publishing Company (P) Ltd, New Delhi, 16th edition, 2013.
2. K. N. Jayaveera, G. V. Subba Reddy and C. Ramachandraiah, *Engineering Chemistry*, McGraw Hill Publishers, New Delhi.
3. Energy scenario beyond2100,by S.Muthu Krishna Iyer.

Reference Book(s):

1. J. D. Lee, *Concise Inorganic Chemistry*, Oxford University Press, 5th edition 2010.
2. Skoog and West, *Principles of Instrumental Analysis*, Thomson, 6th edition, 2007.
3. Peter Atkins, Julio de Paula and James Keelar, *Atkins' Physical Chemistry*, Oxford University Press, 10th edition, 2010.

Online Resources /Web References:

1. https://drive.google.com/file/d/0Bz82vSA0C1xlWC11WkpsTmlwQVk/view
2. https://www.cgaspirants.com/2017/08/engineering-chemistry-by-jain-jain.html
3. https://www.pdfdrive.com/concise-inorganic-chemistry-d33405948.html
4. https://chemistry.com.pk/books/skoog-principles-of-instrumental-analysis1/
5. https://www.thermalfluidscentral.org/e-books/book-intro.php?b=39
6. file:///C:/Users/DELL/Downloads/HandbookOfInstrumentalTechniquesForAnalyticalChemistryPDFDrive.com.pdf
7. https://nptel.ac.in/courses/104/106/104106096/
8. https://youtu.be/KHh_IX1G6uA
9. https://www.youtube.com/watch?v=MfbxR9ZDs0s&feature=youtu.be
10. https://nptel.ac.in/courses/113/105/113105028/
11. https://www.youtube.com/watch?v=15MY7abeCDk

NARAYANA ENGINEERING COLLEGE: NELLORE								
I-B. Tech	**VECTOR CALCULUS COMPLEX VARIABLES & TRANSFORMS (21MA1003)**							R-2021
Semester	Hours / Week			Total hrs	Credit	Max Marks		
	L	T	P		C	CIE	SEE	TOTAL
II	3	1	0	64	4	40	60	100

Pre-requisite: inter mathematics

Course Objectives: This course aims to providing the knowledge for the student about on

1. To enlighten the learners in the concept of vector differentiation and integration.
2. To understand the concept the limit, continuity & differentiation of complex variable
3. To Evaluate the improper integrals by complex integration
4. To understand the concepts of Laplace transforms and Inverse Laplace transforms & its properties.
5. To understand the concepts of Fourier series, Fourier transforms and its properties.

Course Outcomes: After successful completion of the course, the student will able to:

CO 1	Interpret the different operators such as gradient, curl and divergence to find out point function (L-3)
CO 2	Understand the concept the limit, continuity & differentiation of complex variable (L-3)
CO 3	Evaluate the integral by using contour integration .(L-5)
CO 4	Apply the Laplace transform to convert time domain into frequency domain & Inverse Laplac transforms techniques to solve the differential equations. (L-3)
CO 5	Develop the Fourier Series to the given periodic functions (L-3)

CO-PO Mapping

CO	PO												PSO	
	PO1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	3	3												
CO2	3	3												
CO3	3	3												
CO4	3	3												
CO5	3	3												

1- Low, 2-Medium, 3- High

COURSE CONTENT

MODULE – 1	Vector Calculus	Hours: 12h(9L+3T)

Scalar and vector point functions, vector operator del, del applies to scalar point functions Gradient, del applied to vector point functions-Divergence and Curl, Line integra circulation-work done, surface integral-flux, Green's theorem in the plane (without proof), Stoke's theorem (without proof), volume integral, Divergence theorem (without proof) and applications of these theorems.

At the end of the Module 1, students will be able to:

1. Apply del to Scalar and vector point functions (L-3)
2. Illustrate the physical interpretation of Gradient, Divergence and Curl (L-2)
3. Apply del to scalar and vector point functions. (L-3)
4. Illustrate the physical interpretation of gradient, divergence and curl. (L-2)

MODULE -2	Complex variables – Differentiation	Hours: 12h(9L+3T)

Introduction to functions of complex variable-concept of Limit & continuity Differentiation, Cauchy-Riemann equations, analytic functions, harmonic functions finding harmonic conjugate-construction of analytic function by Milne Thomson method.

At the end of the Module 2, students will be able to:

1. Find the work done in moving a particle along the path over a force field (L-1)
2. Evaluate the rates of fluid flow along and across curves. (L-5)
3. Evaluation of surface areas integrals by applying Green`s theorems. (L-5)
4. Evaluation of volume integrals by applying Gauss theorems. (L-5)
5. Evaluation of line integrals by applying Stokes theorems. (L-5)

MODULE-3	Complex variables – Integration	Hours: 12h(9L+3T)

Line integral-Contour integration, Cauchy's integral theorem (without proof) Cauchy Integral formula (without proof), zeros of analytic functions, singularities Laurent's series; Residues, Cauchy Residue theorem (without proof), Evaluation of definite integral involving sine and cosine, Evaluation of certain improper integrals (around unit circle semi-circle with f(z) not having poles on real axis).

At the end of the Module 3, students will be able to:

1. Understand the integration of complex functions. (L-3)
2. Apply Cauchy's integral theorem and Cauchy's integral formula. (L-3)
3. Understand singularities of complex functions. (L-3)
4. Evaluate improper integrals of complex functions using Residue theorem. (L-3)

MODULE-4	Laplace Transforms	Hours: 16h(12L+4T))

Definition-Laplace transform of standard functions-existence of Laplace Transform Inverse transform – First shifting Theorem, transforms of derivatives and integrals Unit step function– Second shifting theorem–Dirac's delta function Convolution theorem Laplace transform of Periodic function. Differentiation and integration of transform solving Initial value problems to ordinary differential equations with constant coefficients using Laplace transforms

At the end of the Module 4, students will be able to:

1. Understand the concept of Laplace transforms and find the Laplace transforms of elementary functions. (L-3)
2. Find the Laplace transforms of general functions using its properties. (L-2)
3. Understand Laplace transforms of special functions (Unit step function, Unit Impulse & Periodic). (L-3)
4. Apply Laplace transforms to solve Differential Equations. (L-3)

MODULE-5	Fourier Transform Fourier Series & Fourier Transforms	Hours: 12h(9L+3T)

Fourier Series: Determination of Fourier coefficients (Euler's)–Dirichlet conditions for the existence of Fourier series–functions having discontinuity-Fourier series of Even and odd functions – Half-range Fourier sine and cosine expansions.

Fourier Transform: Fourier integral theorem (without proof)–Fourier sine and cosine integrals-complex form of Fourier integral. Fourier transform Fourier sine and cosine transforms Properties – Inverse transforms.

At the end of the Module 5, students will be able to:

1. Understand the concepts of Fourier transforms. (L-2)
2. Apply the properties of Fourier transforms to various engineering problems. (L-3)
3. Apply the concepts of Fourier transforms to Find impulse. (L-3)
4. Make use of the Fourier transforms and its inverse in practical applications of electronics engineering. (L-3)

Total hours	64

Content beyond syllabus

1. Complex Fourier series.
2. Parseval's Identity for Fourier Transforms.

Self-Study:

Contents to promote self-Learning:

SNO	Topic	CO	Reference
1	Vector Differentiation & vector integration	**CO1**	https://youtu.be/a19x_YG0oLg
2	Complex differentiation	**CO2**	https://youtu.be/pfCwRLK29h4https://youtu.be/KHiw9Vs-aLM
3	Complex integration	**CO3**	https://youtu.be/luJMl37-nsohttps://youtu.be/EDVJotmT584
4	Laplace transform &Inverse Laplace transforms	**CO4**	https://youtu.be/9NqdBXNyJPkhttps://youtu.be/0ZlThUd-yyw
5	Fourier series & Fourier transforms	**CO5**	https://youtu.be/4cSZDHxyBf4

Text Book(s):

1. B.S. Grewal, "Higher Engineering Mathematics", Khanna Publishers.
2. Ramana B.V., "Higher Engineering Mathematics", McGraw Hill Publishers.

Reference Book(s):

1. Erwin Kreyszig, "Advanced Engineering Mathematics", John Wiley.
2. Veerarajan T., "Engineering Mathematics", Tata McGraw-Hill.
3. N.P. Bali and Manish Goyal,"AText ook of Engineering Mathematics",Laxmi Publication

.

Online Resources/ Web References:

1. http://keralatechnologicaluniversity.blogspot.in/2015/06/erwin-kreyszig-advanced-engineering-mathematics-ktuebook-download.html
2. http://www.faadooengineers.com/threads/13449-Engineering-Maths-II-eBooks .
3. http://www.efunda.com/math/math_home/math.cfm
4. http://www.ocw.mit.edu/resources/#Mathematics
5. http://www.sosmath.com/
6. http://www.mathworld.wolfram.com

NARAYANA ENGINEERING COLLEGE::NELLORE								
I-B.Tech	PYTHON PROGRAMMING AND DATA SCIENCE (21ES1005)							R2021
Semester	Hours / Week			Total hrs	Credit	Max Marks		
	L	T	P		C	CIE	SEE	TOTAL
II	3	0	0	48	3	40	60	100

Pre-requisite: Basics of programming Language.

Course Objectives:

1. To learn about Python programming language syntax, semantics, and the runtime environment
2. To be familiarized with general computer programming concepts like conditional execution, loops & functions
3. To learn about mutable and immutable types.
4. To learn about the data science related functions in NUMPY.
5. To solve data science problems using PANDAS.

Course Outcomes: After successful completion of the course, Student will be able to

CO 1	Demonstrate various **operators, data types and decision structures** in python. (BL - 3)
CO 2	Solve problems using **Functions and data structures** in Python (BL - 3)
CO 3	Implement the concept of **Files and Modules** (BL - 3)
CO 4	Implement Data Science queries using **NUMPY** module (BL - 3)
CO 5	Solve data manipulation task using **PANDAS** module (BL - 3)

CO-PO Mapping

CO	PO												PSO	
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	3	1											1	
CO2	2	2											2	
CO3	2	1											2	
CO4	2	2											1	
CO5	2	2											1	1

1: Low, 2-Medium, 3- High

COURSE CONTENT

MODULE – 1	I/O and Decision Structures	10H

Input and Output: Introduction to Python and installation, Input and Output, Comments, Variables, Operators. Type conversions, Expressions, Data types.

Decision Structures and Boolean Logic: if, if-else, if-elif-else Statements, Nested Decision Structures. Looping: while loop, for loop, Nested Loops.

At the end of the Module 1, students will be able to:

1. **Describe** python expressions, data types (BL-2)
2. **Perform** various Arithmetic calculations using Operators in Python(BL-3)
3. **Demonstrate** the usage of looping structures in python Language.(BL-3)

MODULE -2	Functions and Data structures	10H

Functions: Definition, Function Arguments, Anonymous Function, Scope of the variable and namespacing, Recursion, Map, Filter and Reduce Functions

Strings, **Lists, Tuples and Dictionaries**: String Methods and Operations, Lists: Operations and Methods, Tuples: Operations and Methods, Dictionaries: Operations and Methods.

At the end of the Module 2, students will be able to:

1. **Implement Functions** to solve problems.(BL-3)
2. **Describe** various **String** handling functions in python(BL-2)
3. **Describe** the various **Lists, Tuples and Dictionaries** in python(BL-2)

MODULE-3	**Files and Modules**	10H

Files: Text Files, File Operations, File Functions, Copying the Files, Two Files Merging into Single File.
Modules: Modules, Standard Modules, Packages.

At the end of the Module 3, students will be able to:

1. Describe the concepts of Files (BL-2).
2. Describe the importance of Modules and packages (BL-2).

MODULE-4	**Introduction to Numpy**	9H

Introduction to Numpy: Fixed-Type Arrays in Python, Creating Arrays from Lists, Creating Arrays from Scratch Numpy Standard Data Types, The Basics of Numpy Arrays, Numpy Array Attributes.
Array Indexing: Accessing Single Elements, Array Slicing: Accessing Subarrays, Reshaping of Arrays, Array Concatenation and Splitting. Computation on Numpy Arrays: Universal Functions.

At the end of the Module 4, students will be able to:

1. Describe the concept of **Numpy** Module(BL-2)
2. Solve numerical problems related to data science using **Numpy Arrays.(BL-3)**
3. Apply **Universal Functions** for Data Science problems(BL-3)

MODULE-5	**Data Manipulation with Pandas**	**9H**

Data Manipulation with Pandas: Installing and Using Pandas, Introducing Pandas Objects, Pandas Series Object, Pandas DataFrame Object, Pandas Index Object, Data Indexing and Selection Data Selection in Series.
Data Selection in DataFrame Operating on Data in Pandas Ufuncs: Index Preservation UFuncs: Index Alignment, Operations Between DataFrame and Series, Handling Missing Data, Trade-Offs in Missing Data Conventions, Missing Data in Pandas, Operating on Null Values.

At the end of the Module 5, students will be able to:

1. Describe the concept of **Data Manipulation** (BL-2).
2. Describe the concept of **Pandas** for Data Science(BL-2)
3. Apply Ufunctions in pandas to generate **DataFrame** (BL-3)
4. Implement Pandas Module to handle **Missing Data**(BL-3)

Total hours:	**48 HOURS**

Content Beyond Syllabus:

1. Regular Expressions
2. Matplotlib

Self-Study:

Contents to promote self-Learning:

S No	Module	Reference
1	I/O and Decision Structures	https://www.youtube.com/watch?v=JBc8LLW5KLQ https://www.youtube.com/watch?v=PqFKRqpHrjw
2	Functions and Data structures	https://www.youtube.com/watch?v=XjfvaFnJ4zk https://www.youtube.com/watch?v=m9n2f9lhtrw
3	Files and Modules	https://www.youtube.com/watch?v=ixEeeNjjOJ0

		https://www.youtube.com/watch?v=jZ5agHjNR3U
4	Introduction to Numpy	https://www.youtube.com/watch?v=8vVNq6JzGl8 https://www.youtube.com/watch?v=rN0TREj8G7U
5	Data Manipulation with Pandas	https://www.youtube.com/watch?v=8uK65aNfQ3I https://www.youtube.com/watch?v=B42n3Pc-N2A

Text Books:

1. Fundamentals of Python First Programs, Kenneth. A. Lambert, Cengage.
2. Python Data Science Hand Book, Jake Vanderplas, First Edition, Oreilly

Reference Book(s):

1. Introduction to Python Programming, Gowrishankar. S, Veena A, CRC Press.
2. Python Programming: A Modern Approach, Vamsi Kurama, Pearson.
3. Python for Data Analysis-Wes McKinney, 2nd-Edition, Oreilly.
4. Python Programming: A Modern Approach, Vamsi Kurama, Pearson. Braun W. J., Murdoch D. J., A First Course in Statistical Programming with R, Cambridge University Press, 2007

Online Resources / Web Resources:

1. www.tutorialpoint.com/Python
2. www.geeksforgeeks.org/python
3. www.programiz.com/python-programming
4. https://numpy.org
5. https://pandas.pydata.org

NARAYANA ENGINERING COLLEGE:NELLORE

ENGLISH (21EN1001)

I-B.Tech Semester	Hours / Week			Total hrs	Credit	Max Marks		
	L	T	P		C	CIE	SEE	TOTAL
II	2	0	0	32	2	40	60	100

Pre-requisite: ENGLISH

Course Objectives :

1. To explore the students to develop knowledge and awareness of English sentence structure, construction and improvement.
2. To develop the students in getting the information of word power and able them to fit for the competition.
3. To enhance the ability of writing the structural English among the students.
4. To demonstrate the ability to write error free written communication.
5. To distinguish main ideas from specific details and make use of contextual clues to inform meanings of un familiar words.

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Course Outcomes: After successful completion of the course, the student will able to:

CO 1	**Acquire**in-depth knowledge on formulating appropriate sentences with Grammatical accuracy and also develop concept of word formation. .(BL2)
CO 2	**Use**coherent and unified paragraphs with adequate support and detail and can write a topic sentence, support and concluding sentence. (BL2)
CO 3	**Analyze**the concepts of various real time scenarios to represent in an effective model. (BL – 4)
CO 4	**Understand** the grammar rules for synthesisof sentences and use pre writing strategies to plan to write dialogues, reviews and edit the text effectively.(BL – 2)
CO 5	**Relate** the skills and sub skillsof reading effectively and provide knowledge on the structure and format of technical writing.(BL – 2)

COURSE CONTENT

MODULE – 1

Grammar: Parts of Speech – Kinds of Sentences – Sentence structures: Identifying the sentences,SentencePattern,SentenceImprovementandConstruction,SentenceCompletion,SentenceArrangement,Joiningsentences,Parajumbles.

Vocabulary: Concept of word formation – Synonyms& Antonyms – HomonymsHomophones –Prefixes&suffixes–CommonlyconfusedWords–Onewordsubstitutes–Idioms&PhrasalVerbs.

After the completion of this Module 1 students are able to:

1. write the sentence on his/her own (L2)
2. understand the structure of the sentencesand usage(L2)

3. know the formation of words by using Affix(L1)
4. Understand the similar words and their usage in different words(L1)
5. enhance the knowledge of idiomatic language and its usage(L2)

MODULE -2

Grammar&Vocabulary: Cohesivedevices-linkers,signpostsandtransitionsignals-Articles – Prepositions – Gerund – Verbs: Auxiliary verbs (Primary & Modal) – Tenses – Subject Verbagreement.

Writing : Principles of writing: clarity, simplicity, brevity, single focus, organization of thoughts –sequencing the ideas – Punctuation – Question formation (Wh- questions, Yes or No questions, Tagquestions) – Letters (Formal & Informal) and Emails : Structure / template of common formal lettersandemails:inquiry/complaint/placingan order.

At the end of the Module 2, students are able to:

1. use the sign posts and transition signals in his/her daily life (L2)
2. develop the knowledge in the use of preposition and Articles. (L2)
3. Know the use the different types of tenses in his/her conversation.(L2)
4. Improve the knowledge grammar and can be able to attain the success in competitive exams (L2)
5. attain the idea of how to write the different types of letters which can improve his/her writing skills (L2)
6. possess the knowledge of writing and formation of E mails (L2)

MODULE-3

Grammar : Active and Passive Voice – Direct & Indirect Speech – Comparison of Adjectives –Causeandeffect–VerbnounCollocations&Adjective-NounCollocations.

Writing: Note Making – Summarizing –Paragraph Writing – Paraphrasing:Techniques ofparaphrasing-Replacementofwordsandphrases,changeofsentencestructures.

At the end of this Module 3, students are able to:

1. Speak or write the sentences either in active form or in passive form.(L2).
2. Develop the knowledge of verbal and adjective collocations.(L2).
3. Know how to summarize paragraphs.(L2).
4. Enhance the writing skills by using the techniques of paragraph writing. (L2).

MODULE-4

Grammar : Misplaced modifiers – If Clauses – Simple,Compound,ComplexSentences – SpottingErrors.

Writing : Dialogue writing (Formal & Informal) –compareandcontrast paragraphs- Writing ofReviews:Book/ Play/Movie

At the end of the Module 4, students are able to:

1. develop the writing skills by using simple compound, complex sentences.(L2)
2. spot the error of the writing and speaking skills.(L2)
3. make conversations in formal and informal situations.(L2)
4. Write the reviews by using good writing skills.(L2)

MODULE-5

Reading Skills : Types of reading: Skimming, Scanning, Intensive & Extensive Reading – ReadingComprehension-ScrambleSentences-CompletethepassageusingcontextualcluesIdentifyingMainIdeas using Scanning – Technique Identifying Specific Ideas using Skimming Technique – Studyingthe use of graphic elements in texts to convey information, reveal trends/patterns/relationships,communicateprocessesordisplaycomplicated data.

Writing: Describing–ReportWriting:definition-purpose–types– structure-formalandinformalreports-stagesindevelopingreport-proposal,progressandfinalreports– examples.

After the completion of this module 5 students are able to:

1. gain the knowledge of different types of reading.(L2)
2. attain the good writing skills by using skimming and scanning.(L2)
3. enhance the idea of getting the information by using pie, cycle, tree, graph, flow charts.(L2)
4. write good reports on various incidents of her/his life.(L2)

Self-Study:

Contents to promote self-Learning:

SNO	Topic	CO	Reference
1	**Grammar, vocabulary**	CO1	https://www.youtube.com/watch?v=nQkwdAxF4xA https://www.youtube.com/watch?v=rl85jxktfms
2	Grammar, writing	CO2	https://www.youtube.com/watch?v=XzkbcWh8s4w https://www.youtube.com/watch?v=t6eQAQE1F10
3	Grammar, writing	CO3	https://www.youtube.com/watch?v=0IFDuhdB2Hk https://www.youtube.com/watch?v=yqyZwm6QDWI
4	Grammar, writing	CO4	https://www.youtube.com/watch?v=-ouWOpo2Uh8 https://www.youtube.com/watch?v=RnTpYKOLca4
5	Grammar, writing	CO5	https://www.youtube.com/watch?v=yqyZwm6QDWI

Total hours: 32 hours

1 TextBooks:

1. Contemporary EnglishGrammar– StructuresandCompositionbyDavidGreen,MacMillanIndia,2014.

2. EffectiveTechnicalCommunicationbyAshraf,Mrizvi,TataMcGraw-Hill,2006.

Reference Book(s):

1. EnglishConversationPracticebyGrantTaylor,TataMcGrawHill,2009.
2. PracticalEnglishUsagebyMichaelSwan,OUP,4th Edition.
3. TechnicalCommunicationbyMeenakshiRaman&SangeetaSharma,OxfordUniversityPress,2009.
4. EnglishVocabularyinUseAdvancedbyMichaelMcCarthy,FelicityO'Dell,CambridgeUniversityPress,2008.
5. EnglishforTechnicalCommunicationforEngineeringStudents,AyshaVishwamohan, TataMcGraw-Hill2009.

Online Resources:

https://www.youtube.com/watch?v=nQkwdAxF4xA
https://www.youtube.com/watch?v=rl85jxktfms
https://www.youtube.com/watch?v=XzkbcWh8s4w
https://www.youtube.com/watch?v=t6eQAQE1F10
https://www.youtube.com/watch?v=0IFDuhdB2Hk
https://www.youtube.com/watch?v=yqyZwm6QDWI

Web Resources:

- *Grammar/Listening/Writing1-language.com*
- *http://www.5minuteenglish.com/*
- *https://www.englishpractice .com/Grammar/Vocabulary*
- *English Language LearningOnline*
- *http://www.bbc.co.uk/learningenglish/*
- *http://www.better-english.com/*
- *BBC Vocabulary Games*
- *Free Rice Vocabulary GameReading*
- *https://www.usingenglish.com/comprehension/*
- *https://www.englishclub.com/reading/short-stories.htm*

Online Dictionaries

- *Cambridge dictionary online :https://dictionary.cambridge.org/*
- *MacMillan dictionary :https://www.macmillandictionary.com/*
- *Oxford learner's dictionaries :https://www.oxfordlearnersdictionaries.com/*

NARAYANA ENGINEERING COLLEGE:NELLORE								
I-B.Tech	CHEMISTRY LAB (COMMON TO CSE,ECE & EEE) (21CH1501)							R2021
Semester	Hours / Week			Total hrs	Credit	Max Marks		
	L	T	P		C	CIE	SEE	TOTAL
II	0	0	3	48	1.5	40	60	100

Pre-requisite: Nil

Course Objectives: The objective of the laboratory sessions is to enable the learners to get hands-on experience on the principles discussed in theory sessions and to understand the applications of these concepts in engineering.

Course Outcomes: After successful completion of the course, the student will be able to:

CO 1	**Determine** the cell constant and conductance of solutions
CO 2	Perform quantitative analysis using instrumental methods
CO 3	Utilize the fundamental laboratory techniques for analyses such as titrations, separation purification and Spectroscopy
CO 4	Analyze and gain experimental skill.

CO-PO Mapping

CO	PO												PSO	
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	3													
CO2	3													
CO3	3													
CO4	3													

1: Low, 2-Medium, 3- High

COURSE CONTENT	CO
Task-1: Estimation of Ferrous Ion by using Potassium Dichromate	
Objective: 1. Determine the percentage of ferrous iron in an unknown sample by redox titration with potassium dichromate solution. 2. The student will pre-treat the sample to obtain the iron in the reduced (+2 oxidation) state**.** 3.The student will use a solution of primary standard as the titrant	CO 3
Task-2: Conductometric titration of Weak acid vs. Strong base	
Objective: 1.Perform a conduct metric titration of Weak acid with a strong base, 2. Determine the equivalence point of the titration by plotting titration curve using conductance values and amount of the base added during titration, 3. State the advantages conduct metric titrations.	CO 2
Task-3 : Conductometric titration of strong acid vs. strong base	
Objective: 1.Perform a conductometric titration of strong acid with a strong base, 2. Determine the equivalence point of the titration by plotting titration curve using conductance values and amount of the base added during titration, 3. State the advantages conduct metric titrations.	CO2
Task-4 : Determination of cell constant and conductance of solutions	
Objective: 1. To determine conductivity of the given water sample. by using conductivity meter 2. To understand the specific conductance.	CO 1

Task-5 : Potentiometry - Determination of red-ox potentials and emfs	
Objective: 1. Determine the concentration of an unknown iron(II) solution. By using potentiometer 2. Discuss how the potential changes with relative concentration of oxidised/reduced from, 3. Perform a red-ox titration of ammonium iron (II) sulphate using potassium dichromate as oxidizing agent, 4. Determine the equivalence point of the redox titration by plotting titration curve using potential change values and amount of oxidizing agent added during titration	CO 3
Task-6 : Determination of Strength of an acid in Pb-Acid battery	
Objective: 1. To determine the half –reactions involved in spontaneous oxidation –reduction reactions. 2. Explain the function of the lead storage and dry cell batteries …electrolysis involving two lead strips immersed in sulfuric acid.	CO 4
Task-7 : Preparation of a Bakelite	
Objective: To prepare phenol formaldehyde resin. (Bakelite) 1. Understand the differences between linear and cross linked polymers. 2. Compare and contrast the recycling properties of linear and cross linked polymers. 3. Compare the combustion properties of various types of material. 4. Define the following terms: polymer, monomer, repeat unit, cross linking, biopolymer	CO 4
Task-8: Determination of percentage Moisture content in a coal sample	
Objective: **1.**To provide practical knowledge for developing experimental skill in using desicator to estimate moisture content in coal **2.** Understand percentage of moisture in Coal sample.	CO4
Task-9: Determination of percentage of Iron in Cement sample by colorimetry	
Objective: 1.To use spectroscopy to relate the absorbance of a colored solution to its concentration. 2. To prepare a Beer's Law Plot to determine the concentration of an unknown.	CO 2
Task-10: Estimation of Copper by complexo metric method	
Objective: 1. Determine the percentage of Copper in an unknown sample by Complex metric titration with EDTA solution. 2. The student will pre-treat the sample to obtain the Copper in the reduced state**.** 3.The student will use a solution of primary standard as the titrant	CO 3

Additional Experiments:	
Task-11 : Determination of hardness of ground water sample	
Objective **1.** Determine the total hardness (total calcium and magnesium ion concentration). 2. Learn how to titrate with EDTA solution. 3.Determine permanent hardness and the temporary hardness	CO1
Task-12: pH metric titration of (i) strong acid vs. strong base, (ii) weak acid vs. strong base	
Objective: 1. To perform a pH metric titration of an acidic solution of known molarity. 2. To graph the volume of base added vs. the pH and to determine the equivalence point 3. To calculate the morality of the basic solution	CO 2
Virtual Labs: 1. http://vlab.amrita.edu/?sub=2&brch=190&sim=338&cnt=1 2. http://vlab.amrita.edu/?sub=2&brch=190&sim=339&cnt=1	

3. http://vlab.amrita.edu/?sub=2&brch=190&sim=606&cnt=1

Self-Study:

Contents to promote self-Learning:

SNO	Topic	CO	Reference
1	Estimation of Ferrous Iron by Dichrometry.	CO 1	https://www.youtube.com/watch?v=LxgZsMhuyNM
2	Colorometry	CO 1	https://youtu.be/efIGmPWP-X8
3	Polymer Preparation	CO 4	https://www.youtube.com/watch?v=PSSK5VGcC_0

Text Book(s):

1.A Textbook of Quantitative Analysis, Arthur J. Vogel.

2. Jain & Jain. Engineering Chemistry: Dhanapathrai Publications., 2015.

3.S.S.Dara, Experiments and Calculations in Engineering Chemistry: S-Chand Publications, Revised Edition, 2008.

Reference Book(s):

1. S.K. Bhasin and Sudha Rani, "Laboratory Manual on Engineering Chemistry", Dhanpat Rai Publishing Company, New Delhi, 2nd edition.
2. Sunitha Rattan, "Experiments in Applied Chemistry", S.K. Kataria & Sons, New Delhi, 2nd edition.

Web References:

1. https://nptel.ac.in/courses/122101001/23
2. https://nptel.ac.in/courses/104103071/39

NARAYANA ENGINEERING COLLEGE:NELLORE								
I-B.Tech	ENGINEERING GRAPHICS (21ES1503)							R2021
Semester	Hours / Week			Total hrs	Credits	Max Marks		
	L	T	P		C	CIE	SEE	TOTAL
II	0	1	4	80	3	40	60	100

Pre-Requisite: Basic Mathematics (Geometry)

Course Objectives:

1. To impart skills on using drawing instruments
2. To convey exact and complete information of any physical object.
3. To Construct Engineering Curves.
4. To Learn and practice basic AutoCAD commands.
5. To Instruct the utility of drafting & modelling packages in orthographic and isometric drawings

Course Outcomes: At the end of the course, student will be able to:	
CO 1	Define the qualities of precision and accuracy in engineering drawing. (BL-1)
CO 2	Draw engineering curves with different methods(BL-3).
CO 3	Develop the orthographic projection of points and straight lines(BL-3)
CO 4	Construct the planes and simple solids.(BL-3).
CO 5	Understand and practice basic AUTOCAD commands (BL-2)

COURSE CONTENT

Part-A Manual Drawing

TASK– 1	**Introduction and Conic sections**	10 Hours

Introduction to Engineering graphics: Principles of Engineering Graphics and their significance; various instruments used, drawing sheet sizes and title block, lettering, BIS conventions, types of lines and dimensioning methods.

Geometrical constructions: simple constructions, construction of Pentagon, Hexagon by general Method only.

Conic Sections:. Types of conics: Ellipse, Parabola and Hyperbola (Eccentricity method only),

TASK–-2	**Orthographic Projections**	10 Hours

Objectives and Principle of projection, Methods of projections, Comparison between firstangle and third angle projection.

Projections of points: Projection of points placed in different quadrants.

Projection of straight lines: Fundamental concepts**,** Line parallel, perpendicular and inclined to one and two reference planes placed in first quadrant only.

TASK–3	**Projections of Solids**	15 Hours

Projections of planes: Projection of planes (Triangle, Square, Pentagon, Circle) parallel,Perpendicular and inclined to one and two reference planes placed in first quadrant only.

Types of solids ; Polyhedra, Solids of revolution,

Projections of regular solids (Prisms, Pyramids, Cylinders and Cone),with its axis Perpendicular to one plane and parallel to other plane, Axis inclined to one plane and parallel to other plane.

TASK–4	**Isometric and Orthographic views**	10Hours

Isometric Projections: Principles, Isometric scale, Isometric views, Conventions, Isometric views of lines, planes, simple solids (Cube, Cylinder, and Cone), and Conversion of Isometric views to Orthographic views.

Part B Computer Aided Drafting

TASK–5	**Introduction to AutoCAD**	17 Hours

Basic drawing and editing commands: line, circle, rectangle, erase, view, undo, redo, snap, object editing, moving, copying, rotating, scaling, mirroring, layers, templates, polylines, trimming, extending, stretching, fillets, arrays, dimensions. Dimensioning principles and conventional representations.

TASK–6	**Orthographic and Isometric Projections**	18 Hours

Transformation of Isometric Projections into orthographic projections such as simple solids such ascylinder, cone, square prism, pentagonal pyramid

Draw 3D model of mechanical components such as Stepped block, Bush bearing,

Total hours:	**80 hours**

Text Book(s):

1. Bhatt N.D. "Elementary Engineering Drawing", Charotar Publishers, 2014.
2. Shah and Rana, Engineering Drawing, 2/e, Pearson Education, 2009
3. K.L.Narayana & P.Kannaiah, Engineering Drawing, 3/e, Scitech Publishers, Chennai,2012.
4. Engineering Drawing by Dr AVS Sridhar Kumar, Dr. Krishnaiah, T P Vara Prasad. ,Spectrum education, Sun techno Publications, 2019

Reference Book(s):

1. Engineering Drawing and Graphic Technology -International Edition, Thomas E.French, Charles J. Vierck, Robert J. Foster, McGraw-Hill, 2014
2. Venugopal.K "Engineering Drawing and Graphics", New Age International (P)Ltd., New Delhi,2010

NARAYANA ENGINEERING COLLEGE:NELLORE

I-B.Tech	Python Programming and Data Science Lab (21ES1508)						R2021
Semester	**Hours / Week**			**Total hrs**	**Credit**	**Max Marks**	
	L	**T**	**P**		**C**	**CIE**	**SEE**	**TOTAL**
II	0	0	3	48	1.5	40	60	100

Pre-requisite: Programming Knowledge

Course Objectives:

1. To gain knowledge on python program basics
2. To prepare students for building programs using control statements
3. To prepare students for solving the problems involving functions and files.
4. To gain knowledge Python Numpy module to solve complex mathematical problems involving matrices.
5. To gain Knowledge of data cleaning using Pandas.

Course Outcomes: After successful completion of the course, the student will be able to:

CO1	Understanding and use of python- Basic Concepts**(BL -2)**
CO2	Solve the problems using python Iterative Statements**(BL -3)**
CO3	Understand the concepts of files, modules**(BL -2)**
CO4	Solve the Numerical problems that involve Matrices **(BL -3)**
CO5	Provide solutions for data cleaning tasks**(BL-3)**

CO-PO Mapping

CO	PO												PSO	
	PO1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**
CO1	1	1	2										1	
CO2	2	3	2	2									2	1
CO3	2	2	3	2	2								3	2
CO4	2	2	2	1	1								3	2

1-Low, 2-Medium, 3- High

COURSE CONTENT	**CO**
Task-1 - Python Basics (4 H)	
1. Running instructions in Interactive interpreter and a Python Script 2. Write a program to purposefully raise Indentation Error and Correct it 3. Write a program to compute distance between two points taking input from the user (Pythagorean Theorem) 4. Write a program to convert a Binary number to Decimal number and verify if it is a Perfect number.	CO 1
Task-2 - Conditional Statements (2 H)	
1. Write a program to determine if a given string is a Palindrome or not 2. Write a program for Fibonacci sequence is generated by adding the previous two terms by starting with 1 and 2, the first 10 terms will be: 1, 2, 3, 5, 8, 13, 21, 34, 55, 89,	CO 1
TASK-3 - Functions (2 H)	
1. Write a function that draws a Pyramid with # symbols # # # # # # # # # # # # # # # # 2. Choose any five built-in string functions of C language. Implement them on your own in Python. You should not use string related Python built-in functions.	CO 2
TASK-4 -Strings (4H)	

1. Write a program to use split and join methods in the string and trace a birthday with Dictionary data structure. 2. Write a program using map, filter and reduce functions	CO 2
TASK-5 - Lists (2H)	
1. Write program which performs the following operations on lists. Don't use built-in functions a) Updating elements of a list b) Concatenation of list's c) Check for member in the list d) Insert into the list e) Sum the elements of the list f) Push and pop element of list g) Sorting of list h) Finding biggest and smallest elements in the list i) Finding common elements in the list	CO 2
TASK-6 - Files (4H)	
1. Write a program to read the file content and count the number of vowels, consonants, digits and special characters in a given file. 2. Write a program to perform the following operations in Files: a. Copy from one file to another file b. Merge two files	CO3
TASK-7 –- Introduction to Numpy (4 H)	
1. Write a NumPy program to compute the outer product of two given vectors. 2. Write a Numpy program to compute the determinant of a given square array.	CO 4
TASK-8 - Introduction to Numpy (2H)	
1. Write a Numpy program to calculate the difference between the maximum and the minimum values of a given array along the second axis. Expected Output: Original array: [[0 1 2 3 4 5] [6 7 8 9 10 11]] Difference between the maximum and the minimum values of the said array: [5 5]	CO 4
TASK-9 - Introduction to Pandas (4 H)	
1. Write a Pandas program to convert a Panda module Series to Python list and it's type. 2. Write a Pandas program to display most frequent value in a given series and replace everything else as 'Other' in the series	CO 5
TASK-10 - Introduction to Pandas (4 H)	
1. Write a Pandas program to identify the column(s) of a given DataFrame which have at least one missing value. 2. Write a Pandas program to replace NaNs with a single constant value in specified columns in a DataFrame.	CO 5

ADDITIONAL EXPERIMENTS	
TASK – 11 – Lists, Strings, Tuples	
1. Write a python programs on lists 2. Write a python program on strings	CO2

3. Write a python program on tuples	
TASK – 12 - Pandas	
1. Write a Pandas program to interpolate the missing values using the Linear Interpolation method in a given DataFrame. 2. Write a Pandas program to import excel data (coalpublic2013.xlsx) into a Pandas DataFrame.	CO5

Virtual Labs	
Python Lab (IIT Bombay) : 1. http://vlabs.iitb.ac.in/vlabs-dev/labs/python-basics/experimentlist.html 2. https://pythoninstitute.org/free-python-courses/?gclid=EAIaIQobChMI4u7Uw-mZ8wIVTR0rCh0CYw2FEAAYAiAAEgL5GPD_BwE	
List of Experiments	
1. Arithmetic Operations 2. Built-in Functions 3. Loops 4. Data Types 5. Strings	6. Classes and Objects 7. Built-in Modules 8. Constructors and Inheritance 9. Numpy basics. 10. Pandas

Text Book(s):

1. Python Programming: A Modern Approach, Vamsi Kurama, Pearson, 2017
2. Learning Python, Mark Lutz, Orielly, 5th Edition, 2013

Reference Book(s):

1. Think Python, Allen Downey, Green Tea Press, 2nd Edition
2. Core Python Programming, W.Chun, Pearson, 2nd Edition, 2007
3. Fundamentals of Python, Kenneth A. Lambert, Cengage Learning, 1st Edition, 2015
4. R. Nageswara Rao, "Core Python Programming", 2nd edition, Dreamtech Press, 2019
5. Allen B. Downey, "Think Python", 2ndEdition, SPD/O'Reilly, 2016
6. Martin C.Brown, "The Complete Reference: Python", McGraw-Hill, 2018.
7. Michael Dawson, ―Python Programming for absolute beginners, 3rd Edition, CENGAGE Learning Publications, 2018.
8. Taming Python by Programming, Jeeva Jose,Khanna Publishing House, 1st Edition, 2018
9. Introduction to Computing and Problem Solving with Python, J. Jose, Khanna Publications, 1st Edition, 2019.
10. Guido Van Rossum and Fred L. Drake Jr, "An Introduction to Python – Revised and updated for Python 3.2, Network Theory Ltd., 2011.

Web References:

1. https://www.tutorialspoint.com/python/index.htm
2. https://www.w3schools.com/python/
3. https://www.javatpoint.com/python-tutorial
4. https://www.geeksforgeeks.org/python-programming-language/

NARAYANA ENGINEERING COLLEGE:NELLORE								
I-B.Tech	English Language Lab (21EN1501)							R2021
Semester	**Hours / Week**			**Total hrs**	**Credit**	**Max Marks**		
	L	**T**	**P**		**C**	**CIE**	**SEE**	**TOTAL**
II	0	0	3	48	1.5	40	60	100
Course Outcomes: After successful completion of the course, the student will be able to:								
CO1	**Understand how speech sounds are used** to create meaning. Apply their knowledge of English phonetics and phonology to improve their own pronunciation.							
CO2	**Recognize and use pitch patterns** to signal complete and incomplete thought groups and Speak confidently and intelligibly within groups and before an audience.							
CO3	**Learn, practice and acquire the skills** necessary to deliver effective, presentation with clarity and enable them to prepare resume with cover letter.							

CO-PO Mapping

CO	PO												PSO	
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO1**	**PSO2**
CO1									2	3				
CO2									3	2				
CO3									3	3				
1: Low, 2-Medium, 3- High														

TASK – 1

Introduction to Phonetics: Introduction to Sounds of Speech – Vowels – Consonants.

Practice-1: Listening Sounds of Speech – Vowels – Consonants with a focus on pronunciation
Practice-2: Highlighting the sounds of Vowels and Consonants

TASK – 2

Syllabification: Word Stress, Rules of word stress

Practice-3: Practice on Intonation and Stress

TASK – 3

Listening Skills: Types of Listening Skills- Active listening and anticipating the speaker

Practice-4: Listening for Specific & General Details

Practice-5: Listening Comprehension

TASK – 4

Defining & Describing: Objects, Places and Events - Video Speech Writing- Review (Oral) (Books / Movies / Products..etc.,)

Practice-6: Describing: Objects and Places

Practice-7: Describing: Events and Process

Practice-8: Review (Oral) : Books / Movies / Products..etc.,

Practice-9: Video Speech Writing

TASK – 5

Reading Comprehension- Information Transfer.

Practice-10: Reading practice for practice of Pronunciation – understanding;

Practice-11: writing paragraph- graphs, flow charts, diagrams - Information Transfer

TASK – 6

Giving and Asking Directions - Poster Presentation

Practice-12: Giving and Asking Directions

NARAYANA ENGINEERING COLLEGE: NELLORE								
II-B. Tech	PROBABILITY STATISTICS AND NUMERICAL METHODS							R-2021
Semester	Hours / Week			Total	Credit	Max Marks		
I	L	T	P	hrs	C	CIE	SEE	TOTAL
20MA1006	3	0	0	48	3	40	60	100

Pre-requisite: inter mathematics

Course Objectives: This course aims to providing the knowledge for the student about on

1. The theory of Probability Distributions is used to Determine the expected values and analysis the data.
2. The Statistical methods used to test the product under the specifications or not.
3. To solving an algebraic and transcendental equations by applying Various numerical methods.
4. To interpolating the values through the polynomials.
5. To evaluation of integral values through the numerical methods.
6. To solve ordinary differential equations through the numerical methods.

Course Outcomes: After successful completion of the course, the student will able to:

CO 1	Apply the probability distributions in life testing, expected failures for various engineering applications. (L-3)
CO 2	Test the data by applying large samples inferential techniques. (L-4)
CO 3	Test the data by applying small samples inferential techniques. (L-4)
CO 4	solve algebraic and transcendental equations and interpolate the trend value (L-3)
CO 5	To Solve ordinary differential equations by using numerical methods (L-3)

CO-PO Mapping

CO	PO												PSO	
	PO1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	3	3				2								
CO2	3	3	2			2								
CO3	3	3				2								
CO4	3	3	2											
CO5	3	3				2								

1- Low, 2-Medium, 3- High

COURSE CONTENT

MODULE – 1	Random Variables and Probability Distributions	Hours:10

Basics concepts of Probability, Random variables, Expectation–Discrete and continuous Distributions, Distribution function. Binomial, Poisson, Normal and Exponential distribution–Related properties (without proof).

At the end of the Module 1, students will be able to:

5. Apply the probability basic concepts to predict some information. (L-3)
6. Acquire the knowledge about classification of the variables (L-3)
7. To find the expected and variance values. (L-1)
8. Apply an appropriate probability distribution to the given data. (L-3)
9. find expected mean life time of the product by using normal distribution. (L-1)

MODULE -2	Large Sample Tests	Hours:10

Population and Sample - Null and Alternative hypothesis - Level of significance, Errors of sampling, Critical region, one tailed and two tailed tests, Procedure for testing of hypothesis, large sample tests for single mean, two means and single proportion, two proportions, Confidence interval for mean and proportions.

At the end of the Module 2, students will be able to:

1. Apply the testing of hypothesis techniques, to decide the product is good or bad. (L-3)
2. How much of sample size is required for testing (L-1)
3. Determine the control limits for the product. (L-3)
4. Select appropriate test statistic to analysis the data. (L-3)

MODULE-3	**Small Sample Tests**	**Hours:8**

t-test for single mean, difference of two means and paired t-test, F-test and Chi-square test one sample variance test, testing of goodness of fit and independence of attributes.

At the end of the Module 3, students will be able to:

5. Determine the product came from same company or not. (L-3)
6. Applying t-test techniques, to determine the experimentation useful or not (L-3)
7. Use the chi-square test techniques to select the appropriate distribution (L-3)
8. Applying the chi-square test to test whether the attributes are independent or not (L-3)

MODULE-4	**Solution of Algebraic, Transcendental Equations & Interpolation**	**Hours:10**

Introduction-Bisection method, Regula-falsi method, Newton Raphson method, Finite differences-Newton's forward and backward interpolation formulae – Lagrange's formulae.

At the end of the Module 4, students will be able to:

1. Solve an algebraic or transcendental equation using an appropriate numerical method. (L-3)
2. Understand the use of different operators in interpolation. (L-2)
3. Find interpolating polynomials using Newton's forward and backward formulae. (L-2)
4. Understand the theoretical and practical aspects, the use of numerical methods. (L-2)

MODULE-5	**Numerical integration & Solution of ordinary differential equations**	**Hours:10**

Numerical Integration: Trapezoidal rule – Simpson's 1/3 Rule – Simpson's 3/8 Rule Numerical solution of Ordinary Differential equations: Solution by Taylor's series-Picard's Method of successive Approximations-Modified Euler's Method- Runge-Kutta Method.

At the end of the Module 5, students will be able to:

5. Apply numerical differentiation and integration techniques to various engineering problems. (L-3)
6. Understand the techniques of Trapezoidal rule, Simpson's 1/3 Rule, Simpson's 3/8 Rule and its applications (L-2)
7. Work out numerical differentiation whenever and wherever routine methods are not (L-1)
8. Apply Runge-kutta method in engineering problems (L-3)

Total hours	**48**

Content beyond syllabus:

3. Analysis variance.
4. lognormal distribution.
5. regression analysis .

Self-Study:

Contents to promote self-Learning:

SNO	Topic	CO	Reference
1	Probability distribution	CO1	https://www.youtube.com/watch?v=6x1pL9Yov1k
2	Large sample tests	CO2	https://www.youtube.com/watch?v=80YzzIm8NK8
3	Small sample tests	CO3	https://www.youtube.com/watch?v=c5YTyGWpcmw
4	Solution of Algebraic and Transcendental Equations	CO4	https://www.youtube.com/watch?v=apuEXUAntJo
5	Numerical Integration and solution of Ordinary differential equations	CO5	https://www.youtube.com/watch?v=0rtaUUonwkU https://www.youtube.com/watch?v=QugqSa3Gl-w

Text Book(s):

3. Iyengar T.K.V., Krishna Gandhi B. & Others., (2013), Numerical Methods, Second Revised Edition, New Delhi, S.Chand & Co.Ltd.
4. Miller and Freund's, Probability and Statistics for Engineers, 8/e, Pearson, 2016.
5. 3. S.S. SASTRY, Introductory Methods of Numerical Analysis, 5/e, PHI learning private limited, 2012.
6. B S Grewal, Higher Engineering Mathematics, 44th Edition, New Delhi, Khanna Publications,2017.

Reference Book(s):

4. S. Ross, a First Course in Probability, Pearson Education India, 10th editon,2018.
5. Fundamentals of Mathematical Statistics" SC Gupta and V K Kapoor ,2016.
6. W. Feller, An Introduction to Probability Theory and its Applications, Wiley, 2019.

.

Online Resources/ Web References:

7. https://www.vfu.bg/en/e-Learning/Math_Soong_Fundamentals_of_probability and statistics for engineers.pdf
8. http://www.math.ust.hk/~machas/numerical-methods.pdf
9. https://www.khanacademy.org/math/statistics-probability
10. http://www.randomservices.org/random/dist/index.html
11. https://global.oup.com/uk/orc/biosciences/maths/reed/01student/numerical_tutorials/pdf

NARAYANA ENGINEERING COLLEGE::NELLORE								
II-B.Tech	DATA STRUCTURES AND ALGORITHMS (21ES1009)							R2021
Semester	Hours / Week			Total hrs	Credit	Max Marks		
	L	T	P		C	CIE	SEE	TOTAL
I	3	0	0	48	3	40	60	100

COURSE CONTENT		
MODULE – 1	**Introduction to Data Structures**	**9H**
Introduction: Overview of Data Structures, Implementation of Data Structures, Algorithm Specifications, Analysis of an Algorithm, Asymptotic Notations, Time-Space trade off, Arrays. **Searching:** Introduction, Basic Terminology, Linear Search and Binary Search Techniques and their complexities.		
MODULE – 2	**Stacks and Queues**	**9H**
Stacks: Introduction, Representation of a Stack, Stack Operations, Applications of Stacks. **Queues:** Introduction, Representation of a Queue, Queue Operations, Various Queue Structures: Circular Queue, Double Ended Queue, Priority Queue, Applications of Queues.		
MODULE – 3	**Linked Lists and Sorting**	**10H**
Introduction, Singly linked lists, Doubly Linked Lists, Circular Linked Lists, Linked Stacks and Queues, Applications of Linked Lists. **Sorting:** Introduction, Bubble Sort, Selection Sort, Insertion Sort, Merge Sort, Quick Sort		
MODULE – 4	**Trees**	**10H**
Introduction, Basic Terminologies, Definition and concepts, Representation of Binary Tree, operations on a Binary Tree, Binary Search Tree, Height balanced Binary Tree, B Trees.		
MODULE – 5	**Graphs & Hashing**	**10H**
Graphs: Introduction, Graph Terminologies, Representation of Graphs, Graph Operations, Shortest Paths, Topological Sorting, Minimum Spanning Trees – Kruskal's and Prim's algorithms. Hashing: Introduction to Hash Table, Static Hashing, Dynamic Hashing.		
	Total hours:	**48 hours**

TEXTBOOK:

1. D. Samanta, **Classic Data Structures**, 2nd Edition, Prentice-Hall of India, Pvt. Ltd., India, 2012.
2. Ellis Horowitz and Sartaj Sahni, **Fundamentals of Data Structures in C**, 2nd Edition, Universities Press, 2008.

REFERENCES:

1. Data Structures A Pseudo code Approach with C, Second Edition by Richard F. Gilberg, Behrouz A. Forouzan, Cengage Learning.
2. Data Structures and Algorithms Using C++ by Ananda Rao Akepogu, Radhika Raju Palagiri, Pearson, 2010.
3. Data Structures and Algorithms Made Easy by Narasimha Karumanchi, Careermonk Publications, 2016
4. Peter Bras, "Advanced Data Structures", Cambridge University Press, 2014
5. Data Structures, RS Salaria, Khanna Publishing House, 3rd Edition, 2017
6. Data Structures through C, Yashwant Kanetkar, BPB Publications, 3rd Edition, 2019
7. Expert Data Structures with C, RB Patel, Khanna Publications, 2019

NARAYANA ENGNEERING COLLEGE::NELLORE		
ELECTRONIC DEVICES AND CIRCUITS (21ES1010)		
MODULE-1	**SEMICONDUCTOR DIODES**	**10h**
Semiconductor diode: Principle and structure of PN junction diode, Open circuited PN junction diode, Energy band diagram of PN diode, Diode current equation, Volt-Ampere characteristics, Temperature dependence of Volt-Ampere characteristics, Diode capacitance. Special semiconductor devices: Principle of operation and characteristics of Varactor diode, Tunnel diode, Photo diode, LED, SCR.		
MODULE-2	**RECTIFIERS & FILTERS**	**10h**
Diode applications: P-N junction diode as a rectifier - Half wave rectifier, Full wave rectifier, Bridge rectifier, Rectifier parameters, Harmonic components in rectifier circuits, Clippers and clampers (Qualitative Treatment only) filters: Inductor filters, Capacitor filters, L- section filters, π- section filters, Bleeder resistor.		
MODULE-3	**BIPOLAR JUNCTION TRANSISTOR**	**9h**
Bipolar junction transistor: Construction, Principle of operation, Transistor current components, Transistor configurations, Transistor h-parameter model, Calculation of h-parameters from characteristics, Transistor as a switch, TRansistor as an amplifier.		
MODULE-4	**TRANSISTOR BIASING**	**10h**
Transistor Biasing: Need for biasing, Operating point, Load line analysis, Stabilization against variations in I_{CO}, V_{BE} and β, Biasing and stabilization techniques: Fixed bias, Collector to base bias, Voltage divider bias, Bias compensation techniques, Thermal runaway, Heat sink and thermal		

stability.

MODULE-5 METAL OXIDE SEMICONDUCTOR FIELD-EFFECT TRANSISTOR 9h

MOSFET: Construction of depletion mode and enhancement mode of NMOS and PMOS, Drain characteristics of MOSFET, Transfer characteristics of MOSFET, MOSFET as a switch, CMOS inverter and it's characteristics.

Text Book(s):

1. J. Milliman and C Halkias, "Integrated electronics", 2nd edition, Tata McGraw Hill, 1991.
2. Donald A Neamen, "Electronic Circuits – analysis and design", 3rd edition, McGraw Hill (India), 2019.

Reference Book(s):

1. Behzad Razavi, "Microelectronics", Second edition, Wiley, 2013.
2. R. L. Boylestad and Louis Nashelsky, "Electronic Devices and Circuits," 9th Edition, Pearson, 2006.

NARAYANA ENGINEERING COLLEGE:NELLORE

II-B.Tech	DC MACHINES AND TRANSFORMERS (21EE2001)							R2021
Semester	Hours / Week			Total hrs	Credit	Max Marks		
	L	T	P		C	CIE	SEE	TOTAL
I	3	0	0	48	3	40	60	100

Pre-requisite: Nil

Course Objectives:

1. To understand the constructional features of DC machines.
2. To understand the phenomena of armature reaction and commutation.
3. To understand the characteristics and parallel operation of dc machines.
4. To understand the methods for speed control of DC motors and applications of DC motors.
5. To understand the various types of losses that occurs in DC machines and how to calculate efficiency.
6. To understand the constructional features of a single phase transformer.
7. To understand the efficiency and voltage regulation of a transformer.
8. To understand the Autotransformers Construction & Comparison with two winding transformer.
9. To suggest a suitable three phase transformer connection for a particular operation.
10. To understand the tap changing of transformers.

Course Outcomes: After successful completion of the course, the student will be able to:

CO 1	Study construction, different phenomena like: armature reaction, commutation in DC machines.
CO 2	Understand about different types of dc generators and significance of OCC.
CO 3	Develop mathematical relations for torque developed by dc motor and learn about speed – torque characteristics of different types of DC motor. Gain knowledge of about different testing methods of dc machines.
CO 4	Identification of physical components of single phase transformer.
CO 5	Learn difference between two windings and auto transformers. Identification of three phase transformers circuits.

CO-PO Mapping

CO	PO												PSO	
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	2	2	2	2		2				1	1	2	2	1
CO2	2	2	2	2		2				1	1	2	1	2
CO3	2	2	2	2		2				1	1	2	2	1
CO4	2	3	3	2		2				1	1	2	2	1
CO5	3	3	3	3		2				1	1	2	1	2

1: Low, 2-Medium, 3- High

COURSE CONTENT

MODULE – 1

Principle of Electromechanical Energy Conversion, Energy balance equation, Introduction to DC Generator, principle of operation, Construction details, Design of Armature winding, E.M.F Equation- Numerical problems. Armature Reaction- Cross Magnetizing and De-Magnetizing AT/Pole, Compensating Winding, Commutation, Reactance Voltage, Methods of Improving Commutation.

At the end of the Module 1, students will be able to:

- Able to understand the electromechanical energy conversion system
- Able to understand the construction, operation and armature windings of a DC generator
- Able to understand the Armature Reaction & Commutation

MODULE -2
Methods of Excitation – Separately Excited and Self Excited Generators, Build-Up of E.M.F - Critical Field Resistance and Critical Speed, Causes for Failure to Self Excite and Remedial Measures, Characteristics & Applications of Generators. Parallel Operation of D.C shunt Generators, Series Generators-Use of Equalizer Bar and Cross Connection of Field Windings – Load Sharing.
At the end of the Module 2, students will be able to: ▪ Able to analyze the types of DC generators ▪ Able to analyze the characteristics of DC generators ▪ Able to understand the Parallel of operation of DC generators
MODULE-3
D.C Motor – Principle of Operation, Back Emf, Torque and power developed by armature, Types, Characteristics and Applications of dc Motors, speed control of DC motors(Armature control and Flux control methods), Necessity of starters, constructional details of 3-point and 4-point starters, Calculation of Starter Steps for D.C Shunt Motors. Power stages in a dc machine, Losses – Constant & Variable Losses, Calculation of Efficiency, Condition for Maximum Efficiency & Numerical Problems. Methods of Testing - Brake Test, Swinburne's Test, Hopkinson's Test, Field's Test, Retardation Test.
At the end of the Module 3, students will be able to: ▪ Analyze the types of DC motors ▪ Analyze the characteristics & speed control of DC motors. ▪ Able to understand the calculation of starter resistance in steps. ▪ Analyze Power stages and types of losses in a DC machines. ▪ Able to understand the calculation of Efficiency in DC machines. ▪ Able to Analyze the testing of DC machines.
MODULE-4
Principle, construction and operation of single-phase transformers, EMF equation, equivalent circuit, phasor diagrams(no load and on load), losses and efficiency, voltage regulation, All Day Efficiency , Testing -open circuit, short circuit tests & Sumpner's test, separation of hysteresis and eddy current losses. Parallel operation of single-phase transformers.
At the end of the Module 5, students will be able to: ▪ Able to understand the construction & operation of transformer ▪ To predetermine the efficiency and voltage regulation of a transformer ▪ Able to understand the parallel operation of single phase transformers.
MODULE-5
Autotransformers-construction, principle, applications and comparison with two winding transformer. Three-phase transformer – construction, types of connection and their comparative features, Phase conversion - Scott connection, Tap-changing transformers - No-load and on-load tap changing of transformers.
At the end of the Module 6, students will be able to: ▪ Able to understand the Autotransformers ▪ Able to understand and analyze the phase conversions ▪ Analyze the tap changing of transformers
Total hours: 60 hours

Term work:
DC Machines- Lab & Transformers- Filed Work
Content beyond syllabus: 1. Advanced Speed control techniques for DC Motors.

2. Zigzag/star and V/V connections in a 3-Phase Transformers

Self-Study:

Contents to promote self-Learning:

SNO	Topic	CO	Reference
1	DC Machines Introduction & Constructional features	CO1	https://nptel.ac.in/courses/108/102/108102146/
2	DC Generator Characteristics	CO2	https://www.youtube.com/watch?v=TaZjv_sy_jo
3	DC Motor	CO3	https://www.youtube.com/watch?v=GQatiB-JHdI
4	Testing of DC Machines	CO4	https://www.youtube.com/watch?v=8WCbTZPjcTE
5	Transformers	CO5	https://nptel.ac.in/courses/108/105/108105155/
6	Auto Transformers	CO6	https://www.youtube.com/watch?v=lltVwhoPvh0

Text Book(s):

1. Electrical Machinery, P.S. Bimbhra, Khanna Publishers, 7th Edition, 2011.
2. Electrical Machines, S K Bhattacharya, Mc Graw Hill Education (India) Pvt. Ltd., 4th Edition, 2014, 3rd Reprint 2015.
3. I. J. Nagrath and D. P. Kothari, “Electric Machines”, McGraw Hill Education,2010.

Reference Book(s):

1..Electric Machines 4th edition, D.P.Kothari and I.J. Nagrath, Mc Graw Hill Education (India) Pvt. Ltd., 4th Edition, 2010, 16th Reprint 2015.
2.A. E. Fitzgerald and C. Kingsley, "Electric Machinery”, New York, McGraw Hill Education, 2013.
3. A. E. Clayton and N. N. Hancock, “Performance and design of DC machines”, CBS Publishers, 2004.

Online Resources:

1. http://175.101.102.82/moodle/
2. https://www.accessengineeringlibrary.com/
3. https://www.slideshare.net/
4. https://easyengineering.net/electrical-machinery-by-bimbhra/
5.https://books.google.co.in/books?id=dh_gDwAAQBAJ&lpg=PR1&dq=electrical%20machines%20by%20kothari%202020&pg=PR8#v=onepage&q&f=false

Web Resources:

1. https://electrical-engineering-portal.com/
2. https://www.electrical4u.com/
3. http://vlabs.iitb.ac.in/vlabs-dev/vlab_bootcamp/bootcamp/Sadhya/experimentlist.html
4. https://www.engineering.com/

NARAYANA ENGINEERING COLLEGE:NELLORE

II-B.Tech	Electrical Circuit Analysis (21EE2002)							R2021
Semester	Hours / Week			Total hrs	Credit	Max Marks		
	L	T	P		C	CIE	SEE	TOTAL
I	3	0	0	48	3	40	60	100

Pre-requisite: Nil

Course Objectives:

1. To know the analysis of three phase balanced and unbalanced circuits and to measure active and reactive powers in three phase circuits.
2. Knowing how to determine the transient response of R-L, R-C, R-L-C series circuits for D.C and A.C excitations.
3. To introduce the various two-port networks parameters for a given circuit.
4. To evaluation of poles and zeros of a given transfer function.
5. To study the different types of filters

Course Outcomes: After successful completion of the course, the student will be able to:

CO 1	Understand the analysis of three phase balanced and unbalanced circuits.
CO 2	Solve the problems in DC transient response for the given circuit.
CO 3	Solve the problems in AC transient response for the given circuit.
CO 4	Analyze the given network using different two port network parameters.
CO 5	Explain about the fundamental and types of filters.

CO-PO Mapping

CO	PO												PSO	
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	3	3	3	2									3	3
CO2	3	3	3	2									3	3
CO3	3	3	3	2									3	2
CO4	3	3	3	2									1	2
CO5	2	2	3	2									2	1

1: Low, 2-Medium, 3- High

COURSE CONTENT

MODULE – 1

Balanced Three phase circuits

Three phase circuits: Phase sequence- Star and delta connection-Relation between line and phase voltages and currents in balanced systems-Analysis of balanced three phase circuits-Measurement of Active and Reactive power in balanced Three phase systems.

Unbalanced Three phase circuits

Analysis of Three Phase unbalanced circuits-Loop Method- Application of Millman's Theorem-Star Delta Transformation Technique – Two Wattmeter Method of measurement of three phase power, Advantages of Three Phase System.

At the end of the Module 1, students will be able to:

1. Explain about advantages of 3-ϕ circuits over 1-ϕ circuits
2. Distinguish between balanced and unbalanced circuits
3. Explain the phasor relationships of voltage, current, power in star and delta connected.
4. Measure the active, reactive powers in balanced circuits
5. Understand the analysis of unbalanced circuits and power calculations

MODULE-2

Transient Analysis

Transient Analysis in DC and AC circuits Transient response of R-L, R-C, R-L-C circuits for DC excitations, Solution using differential equations and Laplace transforms.

At the end of the Module 2, students will be able to:

1. Distinguish between classical method and Laplace transform approach in analysing transient phenomenon in DC excitations
2. Distinguish between classical method and Laplace transform approach in analysing transient phenomenon in sinusoidal excitations

MODULE-3

Transient Analysis in DC and AC circuits Transient response of R-L, R-C, R-L-C circuits for AC excitations, Solution using differential equations and Laplace transforms.

At the end of the Module 3, students will be able to:

9. Distinguish between classical method and Laplace transform approach in analysing transient phenomenon in AC excitations
10. Distinguish between classical method and Laplace transform approach in analysing transient phenomenon in sinusoidal excitations

MODULE-4

Two Port Network Parameters: Impedance, Admittance, Transmission and Hybrid Parameters and their relations, reciprocity and symmetry conditions, concept of transformed network, Two Port Network parameters using Transformed Variables

At the end of the Module 4, students will be able to:

1. Understand the concept of two port network theory
2. Find the transmission line networks for designing the transmission lines.

MODULE-5

Filters

Filters – Low Pass – High Pass and Band Pass – RC, RL filters– derived filters and composite filters design – Attenuators – Network functions for one port and two port networks, pole-zeros of network functions and network stability.

At the end of the Module 5, students will be able to:

1. Understand about Filter, Classification, where they can be used, etc.
2. Understand about attenuators and equalizers used in electronic high frequency circuits
3. Understand the basic of network synthesis.
4. Understand the properties of network function.

Total hours:	**48 hours**

Term work:

Must be submit at least two assignments.

Content beyond syllabus:

1.Locus diagram and Electro magnetism

Self-Study:

Contents to promote self-Learning:

SNO	Topic	CO	Reference
1	Analysis of Three Phase balanced circuits	CO1	https://www.youtube.com/watch?v=xaeob9lTXS0
2	Analysis of Three Phase unbalanced circuits	CO2	https://www.youtube.com/watch?v=xaeob9lTXS0

3	Transient response for RL and RC circuits	CO3	https://www.youtube.com/watch?v=2MaPC8Iw7nc
4	Fourier Theorem	CO4	https://nptel.ac.in/courses/108/104/108104139/
5	RC, RL filters	CO5	https://www.youtube.com/watch?v=AGyjYG88LlE
6	basic synthesis procedure	CO6	https://nptel.ac.in/courses/108/102/108102042/

Text Book(s):

1. William Hayt, Jack E. Kemmerly and Jamie Phillips, "Engineering Circuit Analysis", Mc Graw Hill, 9th Edition, 2019.
2. A. Chakrabarti, "Circuit Theory: Analysis & Synthesis", Dhanpat Rai & Sons, 2008.

Reference Book(s):

1. M.E. Van Valkenberg, "Network Analysis", 3rd Edition, Prentice Hall (India), 1980.
2. V. Del Toro, "Electrical Engineering Fundamentals", Prentice Hall International, 2009.
3. Charles K. Alexander and Matthew. N. O. Sadiku, "Fundamentals of Electric Circuits" Mc Graw Hill, 5th Edition, 2013.
4. Mahamood Nahvi and Joseph Edminister, "Electric Circuits" Schaum's Series, 6th Edition, 2013.
5. John Bird, Routledge, "Electrical Circuit Theory and Technology", Taylor & Francis, 5th Edition, 2014.
6. Sudhakar, A., Circuits and Networks, Tata McGraw
7. Suresh Kumar, K.S. Electrical circuits and Networks, Pearson Education.
8. Network Analysis and Synthesis – Umesh Sinha- Satya Prakashan Publications
9. A. Anand Kumar, Network Analysis and Synthesis, PHI publication

Online Resources:

1. http://www.acadmix.com/eBooks_Download
2. http://www.freetechbook.com/software-engineering-f15.html

Web References:

1) http://www.mathtutordvd.com/products/Engineering-Circuit-Analysis-Volume-1.cfm
2) http://ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-002-circuits-andelectronics-spring-2007/video-lectures/lecture-2/
3) http://www.facstaff.bucknell.edu/mastascu/elessonsHTML/Circuit/Circuit1.html

NARAYANA ENGINEERING COLLEGE::NELLORE							
II-B.Tech	POWER SYSTEM ARCHITECTURE (21EE2003)						R2021
Semester	Hours / Week			Total hrs	Credit	Max Marks	
	L	T	P		C	CIE	SEE	TOTAL
I	0	0	3	48	3	40	60	100

Pre-requisite: Basic concepts of electrical circuits and theorems

Course Objectives:

1. To understand the structure, essential components and their layout in non renewable generating stations.
2. To understand the electrical power generation from renewable energy sources as sun, wind and ocean.
3. To understand the calculation of different transmission line parameters and their use.
4. To understand the various effects in transmission line.
5. To understand the modeling of transmission line.

Course Outcomes: On successful completion of the course, student will be able to:

CO 1	Describe the working principle and operation of Nonrenewable generating stations. **(BL-2)**
CO 2	Discuss the working principle and operation of various Renewable energy sources. **(BL-2)**
CO 3	Analyze and compute the transmission line parameters. **(BL-4)**
CO 4	Estimate the performance of a given transmission line **(BL-5)**
CO 5	Analyze the performance of transmission lines **(BL-4)**

CO-PO Mapping

CO	PO												PSO	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	1	2	2										2	2
CO2	2	3											3	2
CO3	3	2											3	2
CO4	2	3	1		1								1	3
CO5	3	3											1	1

1: Low, 2-Medium, 3- High

MODULE – 1	NON RENEWABLE GENERATING STATIONS	11 hrs

Thermal Power plant: Importance of electrical power generation-Sources of energy-Conventional and non-conventional sources-Block Diagram of Thermal Power Station (TPS).

Hydro Power plant: Merits and demerits of hydroelectric power plants, Selection of site. Generalarrangement of hydel plant, Classification of the plants.

Nuclear Power plant: Introduction, Merits and demerits, selection of site, Nuclear reaction, Nuclear fuels, Nuclear plant and layout.

MODULE-2	RENEWABLE GENERATING STATIONS	9 hrs

Solar Power Generation: Solar Cell Fundamentals, Solar Cell Characteristics, Solar Cell Classification, Maximizing the Solar PV Output and Load Matching. Maximum Power Point Tracker, Solar PV Systems. **Wind Power Generation**: Basic principles of wind energy conversion power in the wind-Forces on blades and thrust on turbines – Wind energy conversion – site selection considerations– types of wind energy collectors. **Bio Energy:** Biomass conversion technologies , Bio gas generation , Factors affecting bio digestion or generation of gas , Classification of bio gas plants.

MODULE-3	TRANSMISSION LINE PARAMETERS	8 hrs

Types of Conductors, Resistance For Solid Conductors – Skin Effect- Calculation of Inductance for Single Phase and Three Phase, Concept of GMR & GMD, Symmetrical and Asymmetrical Conductor Configuration with and without Transposition, Numerical Problems, Capacitance Calculations for Symmetrical and Asymmetrical Single and Three Phase, Effect of Ground on Capacitance.

MODULE-4	MODELING OF TRANSMISSION LINES	10 hrs

Classification of Transmission Lines and their equivalent circuits- Nominal-T, Nominal-π. Mathematical Solutions to Estimate Regulation and Efficiency. Evaluation of A,B,C,D Constants, Surge Impedance & its Loading , Wavelengths and Propagation , Ferranti Effect , Charging Current.

MODULE-5	PERFORMANCE OF TRANSMISSION LINE	10 hrs

Insulators: Types of Insulators, String Efficiency and Methods for Improvement, and numerical problem. **Corona:** Corona Phenomenon, Factors Affecting Corona, Critical and disruptive Voltages and Power Loss, Radio Interference. **Sag and Tension Calculations:** Sag and Tension Calculations with Equal and Unequal Heights of Towers, Effect of Wind and Ice on Weight of Conductor, Stringing Chart, Sag Template .

	Total hours:	48 hours

Text Book(s):

1. Power System Engineering by M.L.Soni, P.V.Gupta, U.S.Bhatnagar and A.Chakraborti, Dhanpat Rai & Co. Pvt. Ltd., 1999
2. Non Conventional Energy Sources by G.D. Rai, Khanna Publishers, 2000.

Reference Book(s):

1. Principles of power systems by V.K.Mehta,Rohith Mehta S.Chand(P), 4th Edition
2. "Generation of Electrical Energy"- by B.R Gupta-S.Chand Publications,6th Edition(Reprint 2014)
3. Electrical Power Systems for Industrial Plants, Kamalesh Das, JAICO Publishing House, 2008.
4. Electrical power systems, C.L.Wadhwa, New Age International (P) Limited, 6th Edition, 2014

Content beyond syllabus:

1. Betz criterion, wind energy applications.
2. Underground Cables.

Text Book(s):

1. Power System Engineering by M.L.Soni, P.V.Gupta, U.S.Bhatnagar and A.Chakraborti, Dhanpat Rai & Co.Pvt. Ltd., 1999.
2. Non Conventional Energy Sources by G.D. Rai, KhannaPublishers, 2000.

Reference Book(s):

1. Principles of power systems by V.K.Mehta, Rohith Mehta S.Chan(P), 4th Edition.
2. "Generation of Electrical Energy" – by B.R Gupta-S.Chand Publications, 6th Edition (Reprint 2014).
3. Electrical Power Systems for Industrial plants, Kamalesh Das, JAICO Publishing House, 2008.
4. Electrical Power Systems, C.L.Wadhwa, New Age International (P) Limited, 6th Edition, 2014.

Online Resources:

https://www.ibef.org/industry/power-sector-india
https://www.slideshare.net/sidhu007/non-conventional-sources-of-energy-30135444
https://www.energy.gov/eere/water/types-hydropower-plants
https://www.academia.edu/34930327/Insulators

Web Resources:

https://www.birdvilleschools.net
https://www.learnpick.in/prime/documents/ppts/details/4866/solar-cell-technology
https://courses.engr.illinois.edu
https://vikaspedia.in/energy/energy-production/wind-energy/types-of-wind-energy-conversion-devices
https://www.learnpick.in/prime/documents/ppts/details/3777/biomass-conversion-technologies

NARAYANA ENGINEERING COLLEGE::NELLORE								
II-B.Tech	DATA STRUCTURES AND ALGORITHMS LAB (21ES1513)							R2021
Semester	Hours / Week			Total hrs	Credit	Max Marks		
	L	T	P		C	CIE	SEE	TOTAL
I	0	0	3	48	1.5	40	60	100

COURSE CONTENT		
TASK-1		**3H**
1. Write a Program to Implement the following Searching Algorithms: a)Linear Search b) Binary Search		
TASK– 2		**6H**
1. Implement the following using arrays: A. Write a Program to Implement Stack Operations B. Write a Program to convert a given infix expression into its Postfix using stack. 2.Write a Program to evaluate the Postfix Expression using stack		
TASK-3		**3H**
1. Write a Program to Implement Queue Operations using Arrays 2.Write a Program to Implement Circular Queue Operations using Arrays		
TASK-4		**6H**
1. Write a Program to implement the operations of Singly Linked List 2.Write a Program to implement the operations of Doubly Linked List		
TASK-5		**6H**
1. Write a Program to implement stack operations using linked list 2.Write a Program to implement the operations of Circular Singly Linked List		
TASK-6		**3H**
1.Write a Program to Sort the set of elements: a) Insertion Sort b) Quick Sort		
TASK-7		**3H**
1. Write a Program to Sort the set of elements: a)Merge Sort b) Heap Sort		
TASK-8		**6H**
1. Write a Program to implement the following on trees a) Insertion and deletion operations b) Traversals 2.Write a Program to implement Binary Search Tree Operations.		
TASK-9		**6H**
1. Write a Program to implement the following Graph Traversal Algorithms: a) Depth first traversal b) Breadth first traversal		
TASK-10		**6H**
1. Write a Program to implement the following Minimum Spanning Tree Algorithms: a) Kruskal's Algorithm b) Prim's Algorithm		
Additional Experiments:		
1. Write Program to Implement Fibonacci Search 2. Write a Program to Implement Double Ended Queue Operations by using Array 3.Write a Program to Implement Tree traversal Techniques 4.Write a Program to Implement Radix Sort		

	48 hours

TEXTBOOK:

1. D. Samanta, "Classic Data Structures", 2nd Edition, Prentice-Hall of India, Pvt. Ltd., India, 2012.
2. Horowitz Sahni and Anderson-Freed —Fundamentals of Data Structures in C. 2nd Edition, Universities Press, 2008.

REFERENCES:

1. Richard F. Gilberg& B. A. Forouzan —Data Structures A Pseudocode Approcah with C, Second Edition, CENGAGE Learning.
2. Ananda Rao,Data Structures and Algorithms Using C++,Akepogu, Radhika Raju Palagiri, Pearson, 2010.
3. Mark Allen Weiss, Data structure and Algorithm Analysis in C. Addison Wesley Publication. 2006.

NARAYANA ENGINEERING COLLEGE::NELLORE								
II-B.Tech	ELECTRONICS DEVICES AND CIRCUITS LAB (21ES1514)							R2021
Semester	Hours / Week			Total hrs	Credit	Max Marks		
	L	T	P		C	CIE	SEE	TOTAL
I	0	0	2	32	1	40	60	100

Tasks List
Task-1: PN Junction Diode
Objective: To verify the Volt- Ampere characteristics of a PN junction diode and find static, dynamic and reverse resistances of the diode from the graphs.
Task-2: Zener Diode
Objective: To design a Zener diode based voltage regulator against variations of supply and load.
Task-3: Half Wave Rectifier
Objective: To design a half wave rectifier for the given specifications with and without filters and verify experimentally and draw suitable graphs.
Task-4: Full Wave Rectifier
Objective: To design a full wave rectifier for the given specifications with and without filters and verify experimentally and draw suitable graphs.
Task-5: Common Base Configuration
Objective: To **s**tudy and draw the input and output characteristics of BJT for common base configuration experimentally, and calculate h-parameters from the graph.
Task-6: Common Emitter Configuration
Objective: To verify the input and output characteristics of BJT common emitter configuration experimentally and find h-parameters from the graph.
Task-7: Common Collector Configuration
Objective: To verify the input and output characteristics of BJT common collector configuration experimentally and find h-parameters from the graph.
Task-8: MOSFET Characteristics
Objective: To study and draw the Volt Ampere characteristics of MOSFET.
Task-9: MOSFET As Switch

Objective: To study the switching characteristics.
Task-10: LED Characteristics
Objective: To study the characteristics of LED.
Additional Experiments
Task-13: Voltage- Divider Bias Circuit Using BJT.
Objective: To analyze and design the voltage- divider bias/self bias circuit using BJT.
Task-14: Clippers And Clamper Circuits
Objective: To verify clipping and clamper circuits using PN junction diode and draw the suitable graphs.
Text Book(s):
M. Morris Mano, M.D. Ciletti, "Digital Design", 5th edition, Pearson, 2018.
John F Wakely Digital Design Principles And Practices, Pearson Publication, Fourth edition
Z. Kohavi and N. K. Jha, "Switching and Finite Automata Theory", 3rd edition, Tata McGraw Hill, 2010.
Reference Book(s):
Charles H Roth (Jr), Larry L. Kinney, "Fundamentals of Logic Design", 5th edition, Cengage Learning India Edition, 2010.
John. M Yarbrough, "Digital Logic Applications and Design", Thomson Learning, 2006.
R. P. Jain, "Modern Digital Electronics", 4th edition, McGraw-Hill Education (India Private Limited), 2012.

NARAYANA ENGINEERING COLLEGE::NELLORE							
II-B.Tech	**Universal Human Values (21EN1002)**						R2021
Semester	Hours / Week			Total hrs	Credit	Max Marks	
	L	T	P		C	CIE	SEE	TOTAL
II	3	0	0	48	3	40	60	100

Pre-requisite: Basic concepts of electrical circuits and theorems

Course Objectives:

The objective of the course is four fold:

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

Course Outcomes: On successful completion of the course, student will be able to:

CO 1	Students are expected to become more aware of themselves, and their surroundings (family, society, nature) (BL-2)
CO 2	They would become more responsible in life, and in handling problems with sustainable solutions, while keeping human relationships and human nature in mind. (BL-2)
CO 3	They would have better critical ability. (BL-2)
CO 4	They would also become sensitive to their commitment towards what they have understood (human values, human relationship and human society). (BL-2)
CO 5	It is hoped that they would be able to apply what they have learnt to their own self in different day-to-day settings in real life, at least a beginning would be made in this direction. (BL-3)

CO-PO Mapping

CO	PO												PSO	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1								3	2	2				
CO2								3	2	2				
CO3								3	2	2				
CO4								3	2	2				
CO5								3	2	2				

1: Low, 2-Medium, 3- High

Unit 1:

Course Introduction - Need, Basic Guidelines, Content and Process for Value Education

. Purpose and motivation for the course, recapitulation from Universal Human Values-I

. Self-Exploration what is it? - Experiential Validation- as the process for self-exploration

. Continuous Happiness and Prosperity- A look at basic Human Aspirations

. Right understanding, Relationship and Physical Facility- the basic requirements for fulfilment of aspirations of every human being with their correct priority

. Understanding Happiness and Prosperity correctly- A critical appraisal of the current scenario

. Method to fulfil the above human aspirations: understanding and living in harmony at various levels.

Include practice sessions to discuss natural acceptance in human being as the innate acceptance for living with responsibility (living in relationship, harmony and co-existence)rather than as arbitrariness in choice based on liking-disliking

Unit 2:
Understanding Harmony in the Human Being - Harmony in Myself!

- Understanding human being as a co-existence of the sentient 'I' and the material 'Body'
- Understanding the needs of Self ('I') and 'Body' - happiness and physical facility
- Understanding the Body as an instrument of 'I' (I being the doer, seer and enjoyer)
- Understanding the characteristics and activities of 'I' and harmony in 'I'
- Understanding the harmony of I with the Body: Sanyam and Health; correct appraisal of Physical needs, meaning of Prosperity in detail
- Programs to ensure Sanyam and Health.

Include practice sessions to discuss the role others have played in making material goods available to me. Identifying from one's own life. Differentiate between prosperity and accumulation. Discuss program for ensuring health vs dealing with disease

Unit 3:

Understanding Harmony in the Family and Society- Harmony in Human- Human Relationship

- Understanding values in human-human relationship; meaning of Justice (nine universal values in relationships) and program for its fulfilment to ensure mutual happiness; Trust and Respect as the foundational values of relationship
- Understanding the meaning of Trust; Difference between intention and competence
- Understanding the meaning of Respect, Difference between respect and differentiation; the other salient values in relationship
- Understanding the harmony in the society (society being an extension of family): Resolution, Prosperity, fearlessness (trust) and co-existence as comprehensive Human Goals
- Visualizing a universal harmonious order in society- Undivided Society, Universal Order- from family to world family.

Include practice sessions to reflect on relationships in family, hostel and institute as extended family, real life examples, teacher-student relationship, goal of education etc. Gratitude as a universal value in relationships. Discuss with scenarios. Elicit examples from students' lives

Unit 4:

Understanding Harmony in the Nature and Existence - Whole existence as Coexistence

- Understanding the harmony in the Nature
- Interconnectedness and mutual fulfilment among the four orders of nature- recyclability and self-regulation in nature
- Understanding Existence as Co-existence of mutually interacting units in all-pervasive space
- Holistic perception of harmony at all levels of existence.

Include practice sessions to discuss human being as cause of imbalance in nature (film "Home" can be used), pollution, depletion of resources and role of technology etc.

Unit 5:

Implications of the above Holistic Understanding of Harmony on Professional Ethics

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

Include practice Exercises and Case Studies will be taken up in Practice (tutorial) Sessions eg. To discuss the conduct as an engineer or scientist etc.

Text Book

1. R R Gaur, R Asthana, G P Bagaria, "A Foundation Course in Human Values and Professional Ethics", 2nd Revised Edition, Excel Books, New Delhi, 2019. ISBN 978-93-87034-47-1

2. R R Gaur, R Asthana, G P Bagaria, "Teachers' Manual for A Foundation Course in Human Values and Professional Ethics", 2nd Revised Edition, Excel Books, New Delhi, 2019. ISBN 978-93-87034-53-2

Reference Books

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

NARAYANA ENGINEERING COLLEGE:NELLORE

II-B.Tech	AC MACHINES (21EE2004)						R2021
Semester	Hours / Week			Total hrs	Credit	Max Marks	
	L	T	P		C	CIE	SEE	TOTAL
II	3	0	0	48	3	40	60	100

Pre-requisite: Nil

Course Objectives:

1. To understand the Constructional details, principle of operation and the importance of slip in Induction motor operation
2. To understand the slip-torque characteristics and torque calculations of Induction motor
3. To understand the methods of starting and speed control of Induction motor
4. To understand the construction and principle of working of synchronous machines
5. To understand the different methods of predetermining the regulation of alternators
6. To understand the concepts and computation of load sharing among alternators in parallel.
7. To understand the performance characteristics of synchronous motors and their use as synchronous condensers for power factor improvement.
8. To understand the different types of single phase motors and special motors used in house hold appliances and control systems.

Course Outcomes: After successful completion of the course, the student will be able to:

CO 1	To acquire the basic knowledge of construction, working and operation of induction motor.
CO 2	Identify different speed controlling techniques of Induction motor for the given application.
CO 3	To impart knowledge on Construction and performance of salient and non – salient type synchronous generators and determine how several alternators running in parallel share the load on the system.
CO 4	Analyze the performance characteristics of synchronous motors.
CO 5	To impart knowledge on Construction, principle of operation and performance of single phase induction motors and special machines.

CO-PO Mapping

CO	PO												PSO	
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	3	2	1										2	2
CO2	3	2	2										2	2
CO3	3	2	2										2	2
CO4	3	2	1										2	2
CO5	3	2	1										2	2

1: Low, 2-Medium, 3- High

COURSE CONTENT

MODULE – 1
POLYPHASE INDUCTION MOTORS

Polyphase Induction Motors-Constructional Details of Cage and Wound Rotor Machines, Production of Rotating Magnetic Field, Principle of Operation, Slip, Rotor Power Input, Rotor Copper Loss and Mechanical Power Developed and Their Inter Relationship.

At the end of the Module 1, students will be able to:

- Able to Analyze Production of Rotating Magnetic Field.
- Able to understand Cage and Wound Rotor Machines.

MODULE -2
STARTING METHODS OF INDUCTION MOTORS

Torque Equation, Expressions for Torque, Torque Slip Characteristics, Load characteristics, Equivalent Circuit, Phasor Diagram, Crawling and Cogging, Circle Diagram.
Starting- Starting methods of squirrel cage and wound rotor induction motor. Speed Control- Various methods of speed control of squirrel cage and wound rotor induction motor.

At the end of the Module 2, students will be able to:

- Able to Analyze Torque Slip Characteristics
- Able to understand Starting Methods of Induction Motors

MODULE-3
SYNCHRONOUS GENERATORS

Principle and Constructional Features of Salient Pole and Round Rotor Machines – Armature Windings, E.M.F Equation- Armature reaction – Voltage Regulation Methods, Power Flow Equation in Alternators – Synchronizing Power and Torque – Parallel Operation and Load Sharing – Effect of Change of Excitation and Mechanical Power Input – Determination of X_d and X_q.

At the end of the Module 3, students will be able to:

- Able to understand the construction and principle of operation of synchronous generators.
- Able to understand the Voltage Regulation Methods.
- Able to understand the parallel operation of synchronous generators.
- Able to understand the Sub-Transient, Transient and Steady State Reactances.

MODULE-4
SYNCHRONOUS MOTORS

Synchronous Motors Operation – Phasor Diagram – Power Flow Equations in Synchronous Motors- Variation of Current and Power Factor with Excitation – V and Inverted V Curves – Hunting, and Methods to Eliminate Hunting – Starting Methods of Synchronous Motor.

At the end of the Module 4, students will be able to:

- Able to understand the operation of synchronous motors.
- Able to understand the Starting Methods of Synchronous Motor.

MODULE-5
SINGLE PHASE AND SPECIAL MOTORS

Single Phase Induction Motors - Constructional Features – Double Revolving Field Theory- Cross Field Theory – Split Phase Motors – Capacitor Start and Run Motors – Shaded Pole Motor. A.C Series Motor - Universal Motor – BLDC Motors , Reluctance Motor ,Stepper Motor.

At the end of the Module 5, students will be able to:

- Able to understand the operation of Single Phase Induction Motors.
- Able to understand the special Electrical Machines.

Total hours:	**48 hours**

Term work:

Synchronous machines & Induction machines- Power plants & Industrial visits.

Content beyond syllabus:

1. Advanced Speed Control methods for Poly phase Induction Motors.
2. Two Reaction Theory –Determination of Xd and X_q (Slip Test).
3. Principle of operation and control of Brushless DC motor.

Self-Study:

Contents to promote self-Learning:

SNO	Topic	CO	Reference

1	3-phase Induction Motors	CO1	https://nptel.ac.in/courses/108/102/108102146/
2	Circle Diagram	CO2	https://nptel.ac.in/courses/108/105/108105131/
3	Synchronous Generator	CO3	https://www.youtube.com/watch?v=b24jORRoxEc
4	Parallel operation of Alternators	CO4	https://www.youtube.com/watch?v=aZR7JsH9QnM
5	Synchronous motor	CO5	https://www.youtube.com/watch?v=fdMIuEqh48M&list=PLPpCFgQP7QKHSJQnSwaigL89gshecycXs
6	Single Phase Induction motors	CO6	https://nptel.ac.in/courses/108/102/108102146/

Text Book(s):

1. Electrical Machinery, P.S. Bimbhra, Khanna Publishers, 7th Edition, 2011.
2. Electric Machines 4th edition, D.P.Kothari and I.J. Nagrath, Mc Graw Hill Education (India) Pvt. Ltd., 4th Edition, 2010, 16th Reprint 2015.

Reference Book(s):

1. A. E. Fitzgerald and C. Kingsley, "Electric Machinery", New York, McGraw Hill Education, 2013.
2. A. E. Clayton and N. N. Hancock, "Performance and design of DC machines", CBS Publishers, 2004.
3. M. G. Say, "Performance and design of AC machines", CBS Publishers, 2002.
4. A. S. Langsdorf, "Alternating current machines", McGraw Hill Education, 1984.
5. Electrical Machines, S K Bhattacharya, Mc Graw Hill Education (India) Pvt. Ltd., 4th Edition, 2014, 3rd Reprint 2015.

Online Resources:

1. http://175.101.102.82/moodle/
2. https://www.accessengineeringlibrary.com/
3. https://www.slideshare.net/
4. https://easyengineering.net/electrical-machinery-by-bimbhra/
5.https://books.google.co.in/books?id=dh_gDwAAQBAJ&lpg=PR1&dq=electrical%20machines%20by%20kothari%202020&pg=PR8#v=onepage&q&f=false

Web Resources:

1. https://electrical-engineering-portal.com/
2. https://www.electrical4u.com/
3. http://vlabs.iitb.ac.in/vlabs-dev/vlab_bootcamp/bootcamp/Sadhya/experimentlist.html
4. https://www.engineering.com/

NARAYANA ENGINEERING COLLEGE:NELLORE								
II-B.Tech	ANALOG ELECTRONIC CIRCUITS (21EE2005)							R2021
Semester	Hours / Week			Total hrs	Credit	Max Marks		
	L	T	P		C	CIE	SEE	TOTAL
II	3	0	0	48	3	40	60	100

NARAYANA ENGINEERING COLLEGE::NELLORE		
ANALOG ELECTRONIC CIRCUITS		
MODULE-1	**WAVE SHAPING CIRCUITS**	**10h**
Linear Wave Shaping: High pass and low pass RC circuits and their response for sinusoidal, Step, Pulse, Square& Ramp inputs, High pass RC network as differentiator, Low pass RC circuit as an integrator.		
Non-Linear wave shaping: Diode clippers, Transistor clippers, Clipping at two independent levels. Clamping operation, Clamping circuit by considering source and diode resistances.		
MODULE-2	**FEEDBACK AMPLIFIERS & OSCILLATORS**	**10h**
Feedback amplifiers: Feedback principle and concept, Types of feedback, Feedback topologies, Characteristics of negative feedback amplifiers, Determination of input & output impedance of voltage series, Voltage shunt, Current series& current shunt configurations **.**		
Oscillators: Oscillator principle, Condition for oscillations, Types of oscillators, Hartley oscillator, Colpitt's oscillator, RC-phase shift oscillator, Wein bridge oscillator.		
MODULE-3	**SINGLE STAGE & MULTISTAGE AMPLIFIERS**	**9h**
Single stage amplifiers: Transistor hybrid model, Determination of h-parameters, Generalized analysis of transistor amplifier model using h-parameters, Analysis of CB, CE and CC amplifiers. Multi stage Amplifiers: Classification of amplifiers, Different coupling techniques, Cascaded amplifier, Cascode amplifier.		
MODULE-4	**POWER AMPLIFIERS**	**9h**
Classification, Series fed Class A large signal amplifier, Transformer coupled class A large signal amplifier, Amplifier distortion, Push- pull class B amplifier, Complementary symmetry class B amplifier, Push- pull class AB amplifier, Complementary symmetry class AB amplifier, Class D amplifier, Heat sink and thermal stability.		

MODULE-5	OP-AMP CHARACTERISTICS	10h
Introduction, Ideal and practical Op-amp, Op-amp characteristics – DC and AC characteristics, 741 Op-amp and its features, Modes of operation-inverting, Non-inverting, Differential. Basic applications of Op-amp, Instrumentation amplifier, Sample &hold circuits, Differentiator and integrator, Comparators, Schmitt trigger, Multi-vibrators, Introduction to voltage regulators.		

Text Book(s):

1. Millman, Halkias and Jit, "Electronic Devices and Circuits", 4th Edition, Mc Graw Hill Education (India) Private Ltd., 2015.
2. Donald A. Neaman, "Electronic Circuit Analysis and Design", McGraw-Hill.
3. Ramakanth A. Gayakwad, "Op-Amps & Linear Ics", 4th Edition, Pearson, 2017.

Reference Book(s):

1. Millman and Taub, Pulse, Digital and Switching Waveforms, 3rd edition, Tata McGraw-Hill Education, 2011.
2. J. Milliman, C. C. Halkias and Chetan Parikh, "Integrated Electronics", 2nd edition, McGraw-Hill, 2010.
3. Robert L. Boylestad and Louis Nashelsky, "Electronic Devices and Circuits Theory" Pearson/Prentice Hall, 9th edition, 2006.

NARAYANA ENGINEERING COLLEGE:NELLORE								
II-B.Tech	ENGINEERING ELECTROMAGNETICS (21EE2006)							R2021
Semester	Hours / Week			Total hrs	Credit	Max Marks		
	L	T	P		C	CIE	SEE	TOTAL
II	3	0	0	48	3	40	60	100

Pre-requisite: Nil

Course Objectives:

1. To review the fundamentals of the different coordinate systems, vector algebra and calculus
2. To teach the basic laws of electromagnetism
3. To learn to compute and visualize the electrostatic and magnetostatic fields for simple configurations
4. To analyse the time varying electric and magnetic fields and to understand Maxwell's equations
5. To understand the propagation of electromagnetic waves through different media

Course Outcomes: After successful completion of the course, the student will be able to:

CO 1	Ability to identify appropriate coordinate systems and visualize and understand the practical significance of vector calculus
CO 2	Understanding of the basic laws of electrostatics, Ability to compute, visualize electrostatic fields along with practical applications
CO 3	Understanding of the basic laws of magnetostatics
CO 4	Ability to compute, visualize magneto static fields along with practical applications
CO 5	Understanding of Maxwell's equations in different forms and medium

CO-PO Mapping

CO	PO												PSO	
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	3	3	2	2									2	1
CO2	3	3	2	2									2	1
CO3	3	3	1	1									2	1
CO4	3	3	2	2									2	1
CO5	3	3	2	2									2	1

1: Low, 2-Medium, 3- High

COURSE CONTENT

MODULE – 1

ELECTROSTATICS

Vector algebra , Coordinate systems, Vector calculus- Gradient, Divergence and Curl theorems and applications, Sources and effects of electromagnetic fields, Coulomb's Law – Electric field intensity – Field due to discrete and continuous charges – Gauss's law and its applications.

At the end of the Module 1, students will be able to:

1. Recollect the basic concepts Vectors
2. Understand the applications of Electrostatics
3. Illustrate the basic laws of Electrostatics

MODULE -2

ELECTRIC FIELD IN MATERIALS

Electric potential – Electric field and equipotential plots– Electric field in free space, conductors, dielectric –Dielectric polarization – Dielectric strength – Electric fields in multiple dielectrics – Boundary conditions, capacitance, Energy density, Poisson's and Laplace's equations.

At the end of the Module 2, students will be able to:

1. understand the concept of Electric potential
2. Differentiate between conductor and dielectric in electric field

MODULE-3

ELECTRO MAGNETIS

Magnetic field intensity (H) – Biot– Savart's Law – Ampere's Circuit Law – H due to straight conductors, circular loop, infinite sheet of current, Magnetic flux density (B) – Magnetic force, Lorentz force, force between two conductors,- Boundary conditions.

At the end of the Module 3, students will be able to:

1. Understand the basic laws of Magnetostatics
2. Analyze the concept of magnetic force

MODULE-4

MAGNETIC POTENTIAL

Scalar and vector potential, Poisson's Equation, Torque, Inductances and mutual inductances of solenoid and toroid, Neumann's formula, Energy density, Numerical problems.

At the end of the Module 4, students will be able to:

5. Apply the poisson's & Laplace's equations to different problems
6. Analyze the inductance of different coil combinations

MODULE-5

ELECTRODYNAMIC FIELDS

Magnetic Circuits – Faraday's law – Transformer and motional EMF – Displacement current – Maxwell's equations (differential and integral form) – Time varying potential.

At the end of the Module 5, students will be able to:

1. Understand the Faraday's law of electromagnetic induction
2. Analyze the Maxwell's equations for static and time varying fields

Total hours:	**60 hours**

Term work:

Content beyond syllabus:

1. Electric power transmission

Self-Study:

Contents to promote self-Learning:

SNO	Topic	CO	Reference
1	Gauss's law and its applications	CO1	https://www.youtube.com/watch?v=M0GInI0vNh8
2	Poisson's and Laplace's equations	CO2	https://www.youtube.com/watch?v=I-lKnLnnbY4

	3	Biot– Savart's Law	CO3	https://www.youtube.com/watch?v=X9mYh8aG2AQ
	4	Neumann's formula	CO4	https://www.youtube.com/watch?v=iVANETIf3cM
	5	Displacement current	CO5	https://www.youtube.com/watch?v=77PZPBXMl1w
	6	Wave parameters; velocity, intrinsic impedance, propagation constant	CO6	https://www.youtube.com/watch?v=z__L58oLkWc

Text Book(s):

1. Mathew N. O. Sadiku, S.V.Kulkarni, 'Principles of Electromagnetics', 6th Edition, Oxford University Press, 2015, Asian Edition
2. William H. Hayt and John A. Buck, 'Engineering Electromagnetics', Tata McGraw Hill ,8th Revised edition, 2014

Reference Book(s):

3. Bhag Singh Guru and Huseyin R. Hiziroglu "Electromagnetic field theory fundamentals",Cambridge University Press; Second Revised Edition, 2009.
4. . Ashutosh Pramanik, 'Electromagnetism – Theory and Applications', PHI Learning Private Limited, New Delhi, Second Edition-2009

3. Inan U. S. and A. S. Inan, Engineering Electromagnetics, Pearson Education, 2010.
4. Joseph. A.Edminister, 'Schaum's Outline of Electromagnetics, Third Edition (Schaum's Outline Series), Tata McGraw Hill, 2010

Online Resources:

1. http://alumni.media.mit.edu/~aggelos/papers/EM_Hayt_6th.pdf
2. https://nptel.ac.in/courses/108/106/108106073/

Web Resources:

1. https://www.youtube.com/watch?v=pGdr9WLto4A&list=PLl6m4jcR_DbOx6s2toprJQx1MORqPa9rG
2. https://www.youtube.com/watch?v=G5P6dInMTFg&list=PLuv3GM6-gsE3-hVNaw-YEb7EeY5XVPZdz

NARAYANA ENGINEERING COLLEGE:NELLORE								
II-B.Tech	LINEAR CONTROL SYSTEMS (21EE2007)							R2021
Semester	Hours / Week			Total hrs	Credit	Max Marks		
	L	T	P		C	CIE	CS	TOTAL
II	3	0	0	48	3	40	60	100

Pre-requisite: Basics concepts of Electrical Circuits & Basics of Laplace transform

Course Objectives:

1. To understand the merits and demerits of open and closed loop control systems
2. To understand the mathematical modeling of Electrical and mechanical control systems
3. To understand the step response of second order control systems
4. To plot Root locus for the given system transfer function
5. To understand the stability analysis from Bode plot, polar plots
6. To understand the state space analysis

Course Outcomes: After successful completion of the course, the student will be able to:

CO 1	Determine the transfer function for the given electrical or mechanical systems and also determine the transfer function of a system using block diagram reduction techniques and Mason's gain formula
CO 2	Analyze the system behaviour in time domain and step response to various dampings.
CO 3	Determine the stability of given system by applying Routh's stability criteria.
CO 4	Analyze the stability of given system by means of Bode plot and polar plot
CO 5	Determine the state model and assessment of controllability & observability from the given transfer function.

CO-PO Mapping

CO	PO												PSO	
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	3	2												1
CO2	2	1												1
CO3	2	1												1
CO4	2	1	1											1
CO5	2	1	1											1

1: Low, 2-Medium, 3- High

COURSE CONTENT

MODULE – 1

INTRODUCTION TO CONTROL SYSTEMS

Examples & Classification of control systems, merits and demerits of Open Loop and closed loop control systems, Effects of positive and negative feedback

Mathematical modelling and transfer function of Electrical and Mechanical systems, Analogous systems. **Control System Components**: DC Servo motor, AC Servo motor , Synchro Transmitter & Receiver **Block diagrams**: Block diagram representation of control systems, Block Diagram Reduction Rules .**Signal flow graph**: Definitions, Reduction using Mason's gain formula.

At the end of the Module 1, students will be able to:

1. Identify the difference between open loop and closed loop systems
2. Understand the effect of feedback on system performance
3. Model the given electrical or mechanical control system
4. Apply the block diagram reduction to simplify the given system
5. Apply the Signal flow graph reduction to simplify the given system
6. Derive the transfer function of Ac and DC servo motor

MODULE-2

TIME RESPONSE ANALYSIS

Standard test signals, Time response of first order and second order un damped, under damped, critically damped and over damped systems, Time domain specifications.

Error Analysis: Steady state Error**,** static error coefficient of type 0,1, 2 systems

At the end of the Module 2, students will be able to:

11. Identify the importance of basic test signals
12. Analyze the Time response of second order system with different dampings
13. compute steady state error for the given system for any input signal.

MODULE-3

STABILITY ANALYSIS

Stability: The concept of stability, Routh's stability criterion, limitations of Routh's stability.

Root locus plot: The root locus concept, construction of root loci, effects of adding poles and zeros to G(s)H(s) on the root loci.

At the end of the Module 3, students will be able to:

7. Understand various stability issues
8. Apply Routh's stability criteria to given system for stability assessment
9. Draw Root locus plot for the given system

MODULE-4

FREQUENCY RESPONSE ANALYSIS

Introduction, Frequency domain specifications, Bode plot, polar plot, Transfer function from the Bode Diagram, Stability Analysis from Bode Plots. Polar Plots, Nyquist Plots.

Compensation Techniques: Lag, Lead, Lag-Lead Compensators.

At the end of the Module 4, students will be able to:

1. Understand various frequency domain specifications.
2. Draw the Bode plot for the given system.
3. Determine the stability of given system from Bode plot and polar plot

MODULE-5

STATE SPACE ANLYSIS

Introduction: Concepts of state, state variables and state model, derivation of state models from differential equations, Diagonalization.

Solution of state equation: Solving the Time invariant state Equations, State Transition Matrix and it's Properties.

The concepts of controllability and observability.

At the end of the Module 5, students will be able to:

1. Understand the importance of state space analysis
2. Find the state model for the given transfer function through various techniques.
3. Determine the controllability and observability of given state model.

Total hours:	**48 hours**

Term work: Tutorials & quizzes

Content beyond syllabus:

1. Introduction to P,PI,PID controllers.
2. State space representation of Armature and Field controlled DC motor.

Self-Study:

Contents to promote self-Learning:

SNO	Topic	CO	Reference
1	Open Loop and closed loop control systems	CO1	https://www.tutorialspoint.com/control_systems/control_systems_introduction.htm
2	Block diagram rules	CO2	https://www.tutorialspoint.com/control_systems/control_systems_block_diagram_algebra.htm
3	Time response of second order system	CO3	https://www.tutorialspoint.com/control_systems/control_systems_time_response_analysis.htm
4	Routh's stability criteria	CO4	https://www.tutorialspoint.com/control_systems/control_systems_stability_analysis.htm
5	Frequency domain specifications	CO5	https://www.tutorialspoint.com/control_systems/control_systems_frequency_response_analysis.htm
6	Controllability and observability	CO6	https://www.tutorialspoint.com/control_systems/control_systems_state_space_analysis.htm

Text Book(s):

1. " Control Systems Engineering, I. J. Nagrath and M. Gopal, New Age International Publishers, 5th edition, 2007, Reprint 2012.
2. Control Systems by A. Anand Kumar, PHI Learning pvt. Ltd., second edition

Reference Book(s):

1. Norman S. Nise, "Control Systems Engineering", John Wiley & Sons PTE Ltd, 2013
2. 3. Modern Control Engineering, Katsuhiko Ogata, PEARSON, 1st Impression 2015.

Online Resources:

1. http://www.aoengr.com/SampleBook.pdf
2. http://www.ent.mrt.ac.lk/~rohan/teaching/EN5001/Reading/DORFCH1.pdf

Web Resources:

1. https://nptel.ac.in/courses/107/106/107106081/
2. https://www.tutorialspoint.com/control_systems/index.htm
3. https://www.youtube.com/watch?v=XYbrgwKP_6k

NARAYANA ENGINEERING COLLEGE:NELLORE								
II-B.Tech	**DC MACHINES AND TRANSFORMERS LAB (21EE2501)**							R2021
Semester	Hours / Week			Total hrs	Credit	Max Marks		
	L	T	P		C	CIE	CS	TOTAL
II	0	0	3	48	1.5	40	60	100

Pre-requisite: Basics concepts of Electrical Circuits & Basics of Laplace transform

Course Objectives:

1. To familiarize students about OCC and internal, external characteristics of dc shunt generator.
2. To know the performance characteristics and speed control method of dc shunt motor
3. To know how to predetermine the efficiency of dc shunt motor.
4. To find efficiency, losses and regulation of single phase transformer.
5. To know how to find motor and generator efficiency by connecting to dc shunt machines back to back
6. To familiarize students about characteristics of dc series motor

Course Outcomes: After successful completion of the course, the student will be able to:

CO 1	Determine the magnetization and load characteristics of a DC shunt generator
CO 2	Describe the efficiency and performance characteristics of DC motors
CO 3	Predetermination of transformer with different loads

CO-PO Mapping

CO	PO												PSO	
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	3	3	3	2	2				3	2		3	3	3
CO2	2	3	3	1	2				2	2		3	3	3
CO3	3	3	3	1	2				2	2		3	3	3

1: Low, 2-Medium, 3- High

List of Experiments Prescribed and Conducted:

1. Conduct an Experiment to obtain OCC Characteristics of dc Shunt generator.
2. Conduct Brake test on dc shunt motor to obtain performance characteristics.
3. Conduct speed control methods of dc shunt motor.
4. Conduct Swinburne's test on a DC Shunt machine.
5. Conduct OC and SC test on single phase transformer
6. Conduct Sumpner's test on two identical transformers
7. Conduct load test on single phase transformer
8. Conduct an Experiment to obtain internal and external characteristics of dc shunt generator.
9. Conduct an experiment from 3phase to 2 phase conversion by using Scott Connection
10. Conduct load test on dc series motor.

Total hours:	**30 hours**

NARAYANA ENGINEERING COLLEGE:NELLORE								
II-B.Tech	**ELECTRICAL CIRCUIT ANALYSIS AND SIMULATION LAB (21EE2502)**							R2021
Semester	Hours / Week			Total hrs	Credit	Max Marks		
	L	T	P		C	CIE	CS	TOTAL
II	0	0	3	48	1.5	40	60	100

Pre-requisite: Basics concepts of Electrical Circuits & Basics of Laplace transform

Course Objectives:

The objectives are to study:

1. To design electrical systems.
2. To analyze a given network by applying various Network Theorems.
3. To measure three phase Active and Reactive power.
4. To understand the locus diagrams

Course Outcomes: After successful completion of the course, the student will be able to:

CO 1	Analyze the three phase circuits for identification of utilization in Power system.
CO 2	Examine the transient response of series and parallel circuits with different combinations of R, L and C by using AC / DC supply.
CO 3	Identify the various parameters to analyze the transmission and distribution system in electrical engineering.
CO 4	Model the different types of filters for understand the pass band and attenuation of the various signals.

CO-PO & PSO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3				2		1	2	2	2	2	2	2
CO2	3	3			2	2			2	2	2		2	2
CO3	3	3				2			2	2	2	2	2	2
CO4	3	3	3		2	2		1	2	2			2	2

1 – Low Level; 2 – Moderate Level; 3 – High Level

List of Experiments

TASK- 1 - Analysis of three phase circuits

Objective:

To verify phase voltage and line voltage in balanced and unbalanced three phase circuits.

TASK -2 Measurement of Power in three phase Star and Delta Connected loads

Objective:

Measurement of active power of an 3- Φ balanced load using 1- Φ Wattmeter.

TASK-3 Measurement of 3-Phase Power by Two Wattmeter Method for Unbalanced Loads

Objective:

To measure the reactive power consumed by a 3 phase load using 2 wattmeter method.

Task -4 Transient response of RL and RC circuit

Objective:

To verify the **Transient response of RL circuit and to find the time constant of RL and RC network.**

TASK-5 Transient response of series and parallel RLC circuit

Objective:

To verify the Transient response of series and parallel RLC circuit

TASK-6 Low pass & High pass filter

Objective:

To design low pass filter and to plot output verses frequency characteristics

TASK-7 Z & Y parameters

Objective:

To calculate and verify Z -parameters and Y- parameters of given two-port network

TASK-8 Transmission and Hybrid Parameters

Objective:

To calculate and verify 'ABCD' parameters and h- parameters of given two-port network

TASK-9 Simulation of Transient Response of DC and AC circuits

Objective:

To simulate the transient response of simple DC and AC circuits using PSpice

TASK -10 Simulation of k and m- pass filters

Objective:

To simulate the k and m-pass filters using PSpice.

Additional Experiments:

Virtual Lab:

1. Parallel RC Circuits
2. Parallel LC Circuits
3. Series RL Circuits
4. Series LCR Circuit
5. Parallel LCR Circuits

Text Book(s):

1. Simulation of Power Electronics Circuit, M B Patil, V Ramanarayan and V T Ranganat, Alpha Science International Ltd., 2009.

Reference Book(s):

1. A Sudhakar, Shyammohan S Palli, “Circuits & Networks”, Tata McGraw- Hill, 4th Edition, 2010.

2. WillamHayt.jr, Jack E.kemmerly,Steven M.Durbin, “Engineering Circuit analysis” Tata McGraw- Hill, 8th Edition2012

3 A Chakrabarthy, “Electric Circuits”, Dhanpat Rai & Sons, 6th Edition, 2010.

4 Rudrapratap, “Getting Started with MATLAB: A Quick Introduction for Scientists and Engineers”, Oxford University Press, 1 st Edition, 1999.

NARAYANA ENGINEERING COLLEGE:NELLORE								
II-B.Tech	**LINEAR CONTROL SYSTEMS & SIMULATION LAB (21EE2503)**							R2021
Semester	Hours / Week			Total hrs	Credit	Max Marks		
	L	T	P		C	CIE	CS	TOTAL
II	0	0	3	48	1.5	40	60	100

Pre-requisite: Basics concepts of Electrical Circuits & Basics of Laplace transform

Course Objectives:

The objectives are to study:

1.To provide practical knowledge for Time response of second order system

2. Determine of transfer functions of various systems and control of it by different Methodologies

3. The characteristics of Magnetic Amplifier, servo mechanisms which are helpful in automatic control systems

4. Determine the stability analysis of different system by using PSPICE and MATLAB

5. To study the closed loop performance for the given plant using P, PD, PI, PID Controllers.

6. The design of controllers/compensators to achieve desired specifications.

Course Outcomes: After successful completion of the course, the student will be able to:

CO 1	Get the knowledge of feedback control and transfer function of DC servo motor
CO 2	Model the system and able to design the controllers and compensators
CO 3	Get the knowledge about the effect of poles and zeros location for second order systems

CO-PO Mapping

CO	PO												PSO	
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	3	2			3				2	2		3	3	3
CO2	2	3	3	3	3				3	2		3	3	3
CO3	2	2	3	2	3				2	2		3	3	2

1: Low, 2-Medium, 3- High

Task-1:Time Response of Second Order System

Objective: To study the response of a second order system considering a series RLC circuit.

Task-2: Characteristics of Synchro pair

Objective: To study the characteristics of synchro transmitter-Receiver pair.

Task-3: Characteristics of AC Servo Motor

Objective: To draw the characteristics of ac servo motor and to calculate parameters of motor K1 and K2

Task-4: Characteristics of DC Servo Motor

Objective: :

1.To obtain the Speed Vs voltage characteristics of the DC motor

2.To obtain Speed Vs Torque characteristics and Ia Vs Torque Characteristics

Task-5: Transfer Function of DC Machine

Objective:

1.To determine the Transfer function of a given DC motor.

2.To determine the transfer function of a D.C. generator after determining the various constants.

Task-6: Characteristics of Magnetic Amplifier

Objective: To determine the characteristics of magnetic amplifier in three modes

1) Series connected magnetic amplifier

2) Parallel connected magnetic amplifier

3) Self saturated magnetic amplifier.

Task-7: Lag and Lead Compensation – Magnitude and Phase Plot

Objective: To Plot Magnitude and Phase Plot

Task-8: Effect of P, PD, PI, PID Controller on a Second Order System.
Objective: To study the effect of P, PD, PI, PID controllers on a second order system.
Task-9: Temperature Controller Using PID
Objective: To study the closed loop PID control in a temperature process.
Task-10: Programmable Logic Controller.
Objective: To Study and Verification of Truth Tables of Logic Gates, Simple Boolean Expressions and Application of Speed Control of Motor

Any two simulation experiments are to be conducted:

Task-11: Linear System Analysis Using MATLAB.
Objective: To Determine the Time domain specification and Steady state errors for given linear systems theoretically and practically
Task-12: Stability Analysis (Bode, Root Locus, Nyquist) of Linear Time Invariant System Using MATLAB
Objective: To Plot the Root Locus, bode ,Nyquist) of a given Transfer Function using MATLAB

Text Book(s):

1. Simulation of Electrical and electronics Circuits using PSPICE - by M.H Rashid, M/S PHI Publications.
2. MATLAB and its Tool Books yser's manual and - Mathworks, USA
3. I. J. Nagrath and M. Gopal, "Control Systems Engineering"5th edition, New AgeInternational (P) Limited Publishers, 2007.