

RAGHU ENGINEERING COLLEGE (Autonomous)

(Approved by AICTE, New Delhi & Permanently Affiliated to JNTUGV, Vizianagaram) NBA and NAAC 'A+' grade accredited Institute.

Dakamarri, Bheemili Mandal, Visakhapatnam – 531162, A.P. Phone: 08922-248001 www.raghuenggcollege.com

INSTITUTE VISION

"Envisioning to be a world class technical institution by synergizing quality education with ethical values"

INSTITUTE MISSION

- To encourage training and research in cutting-edge technologies.
- To develop and strengthen strategic links with the industry.
- To kindle the zeal among the students and promote their quest for academic excellence.
- To encourage extra-curricular activities along with good communication skills.

QUALITY POLICY

"RAGHU Engineering College underscores ethical values along with innovative teaching through an interactive, activity-based pedagogy; establishes the best of infrastructural facilities, inculcates engineering temper among the students through the use of the latest Information and Communication Technologies, and strives for an efficient, responsive and transparent administration in all areas"

DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

VISION

"To produce Electrical and Electronics Engineers through quality education with exposure to state of art technology and innovation with ethical values"

MISSION

- M1 : Empowering students and professionals with state-of-art knowledge and Technological skills.
- M2 : To prepare students for higher studies and entrepreneurship.
- M3 : To impart essential skills of leadership, teamwork, communication and ethics among the students.

PROGRAMME EDUCATIONAL OBJECTIVES (PEOs)

• **PEO 1:**

Domain Knowledge:

Graduates will have knowledge in basic science, mathematical tools and fundamental engineering stream with contemporary problem solving, critical analysis in Electrical and Electronics Engineering and its allied areas.

• **PEO 2**:

Communication Skills & Employability:

Graduates will have careers in the diversified sectors of electrical power industry, software industries and also encouraged for higher education and research.

• **PEO 3**:

Life Long Learning & Social Concern:

Graduates will be able to communicate effectively, adopt lifelong learning act with integrity and have inter personal skills needed to engage in, lead and nurture diverse teams with commitment to their ethical and social responsibilities.

MAPPING OF MISSION STATEMENTS WITH PEOS

MS/PEO	PEO 1	PEO 2	PEO 3
M1	3	3	2
M2	2	2	3
M3	2	3	2

1-Slight, 2- Moderate, 3- Substantial

PROGR	AMME OUTCOMES									
Graduates	Graduates of Electrical and Electronics Engineering Will:									
PO 1	Engineering knowledge:									
	Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems									
DO A										
PO 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.									
PO 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.									
PO 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.									
PO 5	Modern tool usage:									
	Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools									
	including prediction and modelling to complex engineering activities with an understanding of the									
	limitations.									

PO 6	The engineer and society:													
	Apply re	easonir	ng info	rmed t	y the	contex	tual kr	owled	ge to a	issess	societal	, health,	safety, le	egal and
	cultural	issues a	and the	conse	- quent r	respons	ibilitie	s relev	ant to tl	he prof	essional	enginee	ring pract	ice.
PO 7	Environ	ment	and s	ustaina	_ ability:					•				
	Understa	and th	e imp	act of	the	profes	sional	engine	eering	solutio	ns in so	ocietal a	nd enviro	nmental
	contexts	, and d	emonst	rate th	e know	vledge	of, and	need f	or susta	ainable	develop	oment.		
PO 8	Ethics:					0								
	Apply ethical principles and commit to professional ethics and responsibilities and norms of the													
	engineering practice.													
PO 9	Individual and team work:													
	Function effectively as an individual, and as a member or leader in diverse teams, and in													
DO 10	multidis	ciplina	ry setti	ngs.										
PO 10	Communication:													
	Commu	nicate e	effectiv	ely on	compl	lex eng	ineerin	ig activ	vities w	ith the	enginee	ering coi	nmunity a	and with
	society a	it large,	, such a	s, bein	g able f	to com	orehend	d and w	vrite eff	tective	reports a	and desig	gn docume	entation,
DO 11	make eff	ective	presen	tations	, and g	ive and	receiv	e clear	Instruc	tions.				
PO 11	Project	manag	gement	and fi	nance:			_	_					
	Demons	trate ki	nowled	ge and	under	standin	g of th	e engii	neering	and n	nanagen	nent prin	nciples an	d apply
	these to	one's c	own wo	ork, as	a mem	ber and	l leade	r in ate	eam, to	manag	e projec	ets and in	multidisc	ciplinary
	environn	nents.												
PO 12	Life-lon	g leari	ning:											
	Recogni	ze the	need t	or, and	have	the pro	eparati	on and	ability	to en	gage in	indepen	dent and I	ife-long
DDOCD	learning	in the	broades	st conte	ext of t	ecnnol		cnange	•					
		SPEC.						<u></u>	.1	1		1 11	· 1	. 1 . 1
PSO I: OI	1 success	ful cor	npletio	n of tr	е В. I	ech. (I	EEE) F	rogran	n, the g	gradua	tes will	be able	to apply	technical
knowledge	and usag	ge of n	nodern	hardw	are &	softwa	re tool	s relate	ed to E	lectrica	al and E	lectron	cs Engine	ering for
solving rea	l world p	roblem	1S.		<u> </u>									
PSO 2: On	successf	ul com	pletion	of the	B. Tec	h. (EEI	E) Prog	ram, th	ne gradi	uates w	ill be ab	ble to ana	alyse, com	prehend,
design & d	levelop E	Electric	al subs	ystems	s/syster	ms for	a varie	ty of e	enginee	ring ap	plicatio	ns and t	hus demo	nstrating
profession	al ethics a	and cor	ncern fo	or socie	etal we	llbeing								
MAPPINC	G OF PE	COS W	ITH	POS A	ND F	SOS :						1 = -		
PEO/POs	PO-	PO- 2	PO- 2	PO- 1	PO- 5	PO- 6	PO- 7	PO-	PO- a	PO- 10	PO- 11	PO-	PSO-1	PSO-2
PEO 1	3	3	3	3	5	U	,	0	,	10	11	14	3	3
	5	5	5	5		3	2	2	3	2	3		2	2
PEO 2						5	3	3	5	3	5			<i>∠</i>

PEO 31-Slight,2- Moderate,3- Substantial

	23ES106 - ELECTRO MAGNETI	C FIE	LD THEORY	Y								
	(for EEE only)										
Programme	B.Tech & EEE	Sem	Category	L	Т	Р	Credit					
& Branch												
Prerequisites	Concepts of Differential Equations,	3	PC	3	0	0	3					
	Vector Calculus and Basic Electrical											
	Circuits											
Course Objecti	Course Objectives:											
Students will ge	t exposure:			_								
1. To study pro	duction of electric field and potentials due	to diffe	rent configura	tion	s of s	static	charges.					
2. To study the	e properties of conductors and dielectric	es, calc	ulate the cap	pacit	ance	of	different					
configuration	as. Understand the concept of conduction an	nd conv	vection curren	t der	isitie	s.						
3. To study the	e magnetic fields produced by currents i	n diffe	rent configur	atior	ns, a	pplic	ation of					
Ampere's law	w and the Maxwell's second and third equ	ations,	magnetic for	ce ar	nd to	rque	through					
Lorentz force	e equation in magnetic field environment li	ke cond	luctors and of	her c	urre	nt loo	ops.					
4. To develop the	he concept of self and mutual inductances a	and the	energy stored									
5. To study tim	e varying and Maxwell's equations in diffe	erent to	rms and Max	well	's fo	urth	equation					
for the induce	ed EMF.	•										
Preamble: The	purpose of this course is to understand and	interpr	et the phenom	neno	n per	tiner	it to					
electrical engine	ering using electric and magnetic intensitie	s.										
Course Content	ts:				C		4 II					
Unit-1	vector Analysis					ntac	t Hours: 9					
Vector Algebra:	Scalars and Vectors, Unit vector, Vector ac	dition	and subtraction	on, P	ositi	on an	d distance					
vectors, Vector	multiplication, Components of a vector.		•									
Coordinate Syste	ems: Rectangular, Cylindrical and Spherica	l coord	inate systems		1	р.	C					
Vector Calculus	: Differential length, Area and Volume. De	opera	tor, Gradient	of sc	alar,	Dive	ergence of					
a vector and Div	ergence theorem (definition only). Curl of	vector a	and Stoke's th	eore	m (a	emni	tion only).					
Electrostatics:	and Electric field intensity (EEI) EEI due	to Con	tinuous chora	o di	trib	ition	(line and					
Coulonio s law a	Electric flux density Work done in mov	io Con	ninuous charge			uion:	s (inte and					
Flootric Potentia	1 properties of potential function. Potentia	l gradic	ont Gauss's l	m an	Joy	20108	alle firet					
equation ∇D^{\rightarrow}	-ov) I aplace's and Poison's equations	i gradic	in, Gauss s la	iw (1	VIAXV	ven :	5 11151					
equation, v.D	-pv), Laplace's and roison's equations.											
Unit-2	Conductors – Dielectrics and	Capac	itance		Co	ntac	t Hours : 9					
Behaviour of co	nductor in Electric field, Electric dipole an	d dipol	e moment – l	Poter	ntial	and l	EFI due to					
an electric dipol	e, Torque on an Electric dipole placed in a	an elect	tric field, Cur	rent	dens	ity-c	onduction					
and convection of	current densities, Ohm's law in point form,	Behavi	iour of condu	ctors	in a	n ele	ctric field,					
Polarization, die	electric constant and strength, Continuity	y equat	tion and rela	xatio	on ti	me,	Boundary					
conditions betw	een conductor to dielectric, dielectric t	o diele	ectric and co	nduc	ctor	to fi	ree space,					
Capacitance of	parallel plate, coaxial and spherical capac	citors, E	Energy stored	and	den	sity	in a static					
electric field.						•						
Unit-3	Magneto statics, Ampere's Law and Fo	orce in	magnetic fie	lds	Cor	tact	Hours: 9					
Biot-Savart's lav	w and its applications viz. Straight current	carryin	g filament, ci	rcula	ir, so	uare	, rectangle					
and solenoid cur	rent carrying wire – Magnetic flux density	and M	axwell's seco	nd E	quat	ion ($\nabla . B^{\rightarrow} = 0),$					
Ampere's circui	tal law and its applications viz. MFI due	to an ir	nfinite sheet.	long	fila	nent.	solenoid,					
toroidal current	carrying conductor, point form of Amper	re's cir	cuital law, M	[axw	ell's	third	l equation					
$(\nabla \times H \rightarrow =J).$,				Ŧ					
Magnetic force,	moving charges in a magnetic field – Lorer	ntz forc	e equation, fo	rce c	on a c	urre	nt element					
in a magnetic fie	eld, force on a straight and a long current of	carrying	g conductor ir	n a m	agne	etic f	ield, force					
between two stra	aight long and parallel current carrying con	nductor	s, Magnetic d	lipol	e, M	agne	tic torque.					
and moment.												

	Unit-4	Self and mutual inductance	Cont	act Hours: 9						
Self a	nd mutual ind	uctance – determination of self-inductance of a solenoid, toroi	id, coay	kial cable and						
mutua	al inductance	between a straight long wire and a square loop wire in the sa	ame pla	ane – Energy						
stored	l and energy d	ensity in a magnetic field.								
	Unit-5	Time Varying Fields	Conta	ct Hours: 9						
Farad	Faraday's laws of electromagnetic induction, Maxwell's fourth equation ($\nabla \times E^{\rightarrow} = -\partial B^{\rightarrow} \partial t$), integral									
and p	and point forms of Maxwell's equations, statically and dynamically induced EMF, Displacement									
curren	current, Modification of Maxwell's equations for time varying fields, Poynting theorem and Poynting									
vector	r.									
			Tot	al Hours: 45						
Text	Books:									
1	"Principles o Asian Edition	f Electromagnetics" by Matthew N O Sadiku, S.V Kulakarni, n, 6th edition, 2022.	Oxford	l Publications,						
2	"Principles o Asian Edi	f Electromagnetics" by Matthew N O Sadiku, S.V Kulakarni, tion, 6th edition, 2022.	Oxford	l Publications,						
Refer	ence Books:	· · · · ·								
1	Introduction	to Electro Dynamics" by D J Griffiths, Prentice-Hall of India	Pvt. Lt	d,4th						
	edition,2020									
2	Schaum's Ou	tline of Electromagnetics by Joseph A. Edminister, Mahamoo	d Navi	,4th						
	Edition,2014									
Web	References:									
1	https://archiv	e.nptel.ac.in/courses/108/106/108106073								
2	https://nptel.a	ac.in/courses/117103065								
Cours	se Outcomes:			BT Mapped						
Upon	completion of	f the course, students shall have ability to		(Highest						
				Level)						
CO 1	Compute of Poisson's	electric fields and potentials using Gauss law/ solve Laplace' equations for various electric charge distributions.	s or	L3						
CO	Analyze th	he behaviour of conductors in electric fields, electric diploe and	l the	L3						
	capacitanc	e and energy stored in dielectrics.								
	Calculate	the magnetic field intensity due to current carrying conductor	and	L3						
COS	3 understand	ling the application of Ampere's law, Maxwell's second and the	hird							
	law magne	etic force and Equations								
CO	4 Estimate s	elf and mutual inductances and the energy stored in the magn	netic	L3						
	field.									
CO	5 Understan	d the concepts of Faraday's laws, Displacement current, Poyn	ting	L3						
	theorem an	nd Poynting vector.	-							

Mapping of Cos with POs and PSOs

COs/POs	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PSO	PSO
	-1	-2	-3	-4	-5	-6	-7	-8	-9	-10	-11	-12	-1	-2
CO 1	1	2	2										2	1
CO 2	1	2	2										2	1
CO 3	1	2	2										2	1
CO 4	1	2	2										2	1
CO 5	1	2	2										2	1
1 – Slight, 2 –	1 – Slight, 2 – Moderate, 3 – Substantial, BT- Bloom's Taxonomy													

Assessm	Assessment Pattern - Theory											
TEST	Rememberin	Understanding	Applying	Analyzing	Evaluating	Creating	Total					
IESI	g (K1)%	(K2)%	(K3)%	(K4)%	(K5)%	(K6)%	%					
Mid-1	12	8	80				100					
Mid-2	12	8	80				100					
SEE	12	8	80				100					
	*± 3% may be varied											