SAGI RAMA KRISHNAM RAJU ENGINEERING COLLEGE
(AUTONOMOUS)
(Affiliated to JNTUK, Kakinada), (Recognized by AICTE, New Delhi)
UG Programmes CE,CSE,ECE,EEE,IT & ME are Accredited by NBA
CHINNA AMIRAM (P.O):: BHIMAVARAM :: W.G.Dt., A.P., INDIA :: PIN: 534 204
Estd:1980

Regulation: R20	

ELECTRICAL & ELECTRONICS ENGINEERING (Honors)

SCHEME OF INSTRUCTION & EXAMINATION
(With effect from 2020-21 admitted Batch onwards)

Course Code	Course Name	Year/ Sem	Cr	L	T	P	Int. Marks	Ext. Marks	Total Marks
B20EEH101	Semiconductor Devices	II-II	4	3	1	0	30	70	100
B20EEH201	EHVAC Transmission	III-I	4	3	1	0	30	70	100
B20EEH301	Power Quality Enhancement	III-II	4	3	1	0	30	70	100
B20EEH401	High Voltage Engineering	IV-I	4	3	1	0	30	70	100
B20EEH501	*MOOCS-I	II-II to IV-II	2	--	--	--	--	--	100
B20EEH601	*MOOCS-II	II-II to IV-II	2	--	--	--	--	--	100
		TOTAL	**20**	**12**	**4**	**0**	**120**	**280**	**600**

*Two MOOCS courses of any ELECTRICAL & ELECTRONICS ENGINEERING related Program Core Courses from NPTEL/SWAYAM with a minimum duration of 8 weeks (2 Credits) courses other than the courses offered need to be taken by prior information to the concern. These courses should be completed between II Year II Semester to IV Year II Semester

Code	Category	L	T	P	C	I.M	E.M	Exam
B20EEH101	**Honors**	**3**	**1**	**--**	**4**	**30**	**70**	**3 Hrs**

SEMICONDUCTOR DEVICES

(Honors Degree course in EEE)

Course Objectives: Students will learn

1.	About the fundamental knowledge and expose to the field of semiconductor theory and devices.
2.	About the operation and protection circuit of Power Diode and BJT.
3.	About the operation and design the protection circuits for MOSFET and IGBT.
4.	About the semiconductor devices for Solar Cells.
5.	About the applications of semiconductor devices.

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

S.No	Outcome	Knowledge Level
1.	**Explore** the basic properties of semiconductors.	K3
2.	**Analyze** the principle, characteristics, driver and snubber circuits of power diode and BJT.	K4
3.	**Analyze** semiconductor devices like MOSFET and IGBT.	K4
4.	**Illustrate** the working of various photonic devices like photodetectors, solar-cells.	K3
5.	**Explore** the semiconductor materials used for LED applications.	K3

SYLLABUS

UNIT-I (10Hrs)	**Introduction to Semiconductor Materials** Types of semiconductors, Energy Band formation, Electrons and hole pair generation, Direct and Indirect band gap semiconductors, Effective mass in semiconductors, Intrinsic carrier density, Doping and Extrinsic semiconductors, Fermi level in extrinsic semiconductors, Temperature dependence of fermi level, Charge and Neutrality relationship, Semiconductors band in electric field, Diffusion current, Non-uniform doping, General expression for current in a semiconductor, Energy bands under electric fields.
UNIT-II (10Hrs)	**Power diode and BJT** PN junction introduction, PN junction electrostatics, energy band diagram of a PN Junction, PN junction electrostatics, Forward and reverse bias PN junction, minority carrier injection, ideal diode equation. I-V & Switching characteristics of Power diode, Structure and Switching characteristics of Power BJT, Breakdown voltage considerations, operating limits and Safe operating area, Drive circuits for BJT, Snubber design for Power diode.
UNIT-III (10 Hrs)	**IGBT, POWER JFET & MOSFETs** Basic structures, I-V characteristics, physics of device operation, switching characteristics,

	Safe operating area of IGBT and Power JFET & MOSFET - Drive circuits and Protection, Loss in switching devices.
UNIT-IV (10Hrs)	**Optoelectronic Devices** Optoelectronic devices in daily life, optical absorption and band gap, introduction to solar cells, efficiency of solar cells, Types of Photo detectors, Positive Intrinsic Negative (PIN) and avalanche photodetectors, photo detector metrics.
UNIT-V (10Hrs)	**Light Emitting Devices** Heterostructures, LEDs and their luminescent efficiency, double heterostructure and population inversion, diode lasers, LI characteristics and threshold current.
Text Books:	
1.	Semiconductor Device Fundamentals, R. F. Pierret, Prentice-Hall, 1996.
2.	Neamen, Donald A. Semiconductor physics and devices: basic principles. New York, NY: McGraw-Hill, 2012.
Reference Books:	
1	Rashid M.H., "Power Electronics Circuits, Devices and Applications", Prentice Hall India, Third edition, New Delhi 2004.

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			Course Code: B20EEH101		
		SAGI RAMA KRISHNAM RAJU ENGINEERING COLLEGE (A)			**R20**
		II B. Tech. II Semester MODEL QUESTION PAPER			
		SEMICONDUCTOR DEVICES			
		(Honors Degree Course in EEE)			
Time: 3 Hrs.				**Max. Marks: 70 M**	
		Answer **ONE Question** from **EACH UNIT**			
		All questions carry equal marks			
		Assume suitable data if necessary			
			CO	**KL**	**M**
		UNIT-I			
1.	**a).**	Define a hole in a semiconductor? Indicate how a hole contributes to conduction pictorially?	**1**	**3**	**7**
	b).	Explain about Fermi level in intrinsic and extrinsic semiconductors?	**1**	**3**	**7**
		OR			
2.	**a).**	Derive the general expression for current in a semiconductor?	**1**	**3**	**7**
	b).	Find the concentration of holes and electrons in n-type silicon at 300 0K, if the conductivity is 300 S/cm. Also find these values for p-type silicon. Given that for silicon at 300 0K, ni = 1.5 X 1010 /cm^3 , µn = 1300 cm2 /V-s and µp = 500 cm 2 / V-s.	**1**	**3**	**7**
		UNIT-II			
3.	**a).**	Write a brief note on snubber design used for power diode	**2**	**4**	**7**
	b).	Explain with neat diagram the structure and switching characteristics of BJT	**2**	**4**	**7**
		OR			
4.	**a).**	Analyze PN diode characteristics in forward bias and reverse bias regions	**2**	**4**	**7**
	b).	Derive the ideal diode equation and analyze the I-V characteristics	**2**	**4**	**7**
		UNIT-III			
5.	**a).**	Analyze the switching characteristics of IGBT	**3**	**4**	**7**
	b).	Compare IGBT and MOSFET with its static and switching characteristics	**3**	**4**	**7**
		OR			
6.	**a).**	With neat circuits, analyze the turn-on and turn-off characteristics of MOSFET?	**3**	**4**	**7**
	b).	Analyze any gate protection circuit used for MOSFET?	**3**	**4**	**7**
		UNIT-IV			
7.	**a).**	Explain various optoelectronic devices used in daily life? Explain in	**4**	**3**	**7**

		brief any one optoelectronic device?			
	b).	Write a short note on PIN and avalanche photo detectors	**4**	**3**	**7**
		OR			
8.	**a).**	Explain the type of semiconductor used for solar cell and why its efficiency is low?	**4**	**3**	**7**
	b).	Explain the construction and working of photo detector and also explain its classification?	**4**	**3**	**7**
		UNIT-V			
9.	**a).**	Plot the characteristics of LED's	**5**	**3**	**7**
	b).	Write a brief note on laser diode and its applications	**5**	**3**	**7**
		OR			
10.	**a).**	Explain the double hetero structure LED's structure and working?	**5**	**3**	**7**
	b).	Write a brief note on LEDs and their luminescent efficiency,	**5**	**3**	**7**

CO-COURSE OUTCOME **KL-KNOWLEDGE LEVEL** **M-MARKS**

NOTE: Questions can be given as A,B splits or as a single Question for 14 marks

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Code	Category	L	T	P	C	I.M	E.M	Exam
B20EEH201	**Honors**	**3**	**1**	**--**	**4**	**30**	**70**	**3 Hrs**

EHVAC TRANSMISSION

(Honors Degree course in EEE)

Course Objectives: Students will learn

1.	About EHVAC transmission voltages and line parameters.
2.	About conductor surface voltage gradients.
3.	About Corona and its effects.
4.	About the theory of travelling waves on transmission lines.
5.	About lightning phenomenon and Lightning protection.

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

S.No	Outcome	Knowledge Level
1.	**Derive** the parameters of EHVAC transmission lines.	K3
2.	**Derive** voltage gradients on conductor surface.	K3
3.	**Illustrate** corona and its effects.	K3
4.	**Analyze** the travelling wave phenomenon on transmission lines.	K4
5.	**Explore** the lightning phenomenon and protection against lightning.	K3

SYLLABUS

UNIT-I (10 Hrs)	**INTRODUCTION** Role of EHV AC transmission – Standard Transmission Voltages – Power handling capacity and line losses - Mechanical considerations – Resistance of conductors – Properties of bundled conductors – Bundle spacing and bundle radius - Simple Problems. Line and ground reactive parameters: Line inductance and capacitances – Sequence inductances and capacitances.
UNIT-II (10 Hrs)	**SURFACE VOLTAGE GRADIENT ON CONDUCTORS** Single-conductor, Two-conductor bundle, Maximum surface voltage gradient for multi-conductor bundle, Mangoldt formulae, Simple Problems.
UNIT-III (10 Hrs)	**CORONA EFFECTS** Corona loss formulae – Charge voltage diagram, Audio Noise (AN): Generation and Characteristics – limits and measurements of AN– Relation between 1-phase and 3-phase AN Levels. Radio interference (RI) – corona pulses, Generation and Properties, Frequency spectrum – Limits.

UNIT-IV (10 Hrs)	**THEORY OF TRAVELLING WAVES** Travelling waves at power frequency, Differential Equations and solutions, Open Ended line - Open end voltage, Bewley Lattice Diagram, Double exponential response, Response to sinusoidal Excitation, Reflection and refraction of travelling waves, Simple problems.
UNIT-V (10 Hrs)	**LIGHTNING AND LIGHTNING PROTECTION** Lightning strokes to lines, Lightning stroke mechanism, General Principles of the Lightning Protection Problem, Tower Footing Resistance, Insulator Flashover and withstand voltage, Probability of occurrence of lightning stroke currents, Lightning Arrestors and protective characteristics, Operating characteristics of Lightning arrestors, Insulation Coordination Based on Lightning.
Text Books:	
1.	"EHVAC Transmission Engineering" by R. D. Begamudre, New Age International (p) Ltd, 3rd Edition, 2008.
2.	"EHV-AC, HVDC Transmission and Distribution" by S. Rao, KHANNA publications, 3rd edition, 2009.

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			Course Code: B20EEH201		
		SAGI RAMA KRISHNAM RAJU ENGINEERING COLLEGE (A)			**R20**
		III B. Tech. I Semester MODEL QUESTION PAPER			
		EHVAC TRANSMISSION			
		(Honors Degree Course in EEE)			
Time: 3 Hrs.					**Max. Marks: 70 M**
		Answer **ONE Question** from **EACH UNIT**			
		All questions carry equal marks			
		Assume suitable data if necessary			
			CO	**KL**	**M**
		UNIT-I			
1.	**a).**	**Explain** the power handling capability and line losses in EHV lines and discuss the useful conclusions from it.	**1**	**3**	**7**
	b).	**Derive** the expression for inductance of a Multi conductor line used in EHV AC transmission line	**1**	**3**	**7**
		OR			
2.	**a).**	**Explain** different mechanical considerations that are taken in to account for transmission line performance.	**1**	**3**	**7**
	b).	**Explain** the effect of resistance of conductor in EHV AC transmission system.	**1**	**3**	**7**
		UNIT-II			
3.	**a).**	**Explain** surface voltage gradient on conductors in a bundle.	**2**	**3**	**7**
	b).	**Derive** the expression for voltage (charge voltage relation) of two conductor line.	**2**	**3**	**7**
		OR			
4.	**a).**	Starting from the fundamentals **derive** the expression for potential relations for multi conductor lines.	**2**	**3**	**7**
	b).	For a 400KV line, **calculate** the maximum surface voltage gradients on the center and outer phases in horizontal configuration at the maximum operating voltage of 420KV, r.m.s line to line. The other dimensions are H = 13m, S = 11m, N = 2, r = 0.0159m, B = 0.45m.	**2**	**3**	**7**
		UNIT-III	**3**	**3**	**7**
5.	**a).**	**Explain** in detail generation characteristics and limits of AN	**3**	**3**	**7**
	b).	**Explain** the generation and measurement of audio noise due to corona in EHV lines.			
		OR			
6.	**a).**	**Discuss** the Corona loss formulae.	**3**	**3**	**7**
	b).	The field strength on the surface of a sphere of 1 cm radius is equal to the corona inception gradient in air of 30 KV/cm. **Find** the charge on	**3**	**3**	**7**

		the sphere.			
		UNIT-IV			
7.	**a).**	**Derive** the differential equation and its solution for a travelling wave.	**4**	**4**	**7**
	b).	**Explain** about Bewley Lattice Diagram.	**4**	**4**	**7**
		OR			
8.	**a).**	**Explain** the double – exponential response of an open – ended line.	**4**	**4**	**7**
	b).	**Derive** the response to sinusoidal excitation of an open – ended line.	**4**	**4**	**7**
		UNIT-V			
9.	**a).**	**Explain** the general principles of the lightning protection problem.	**5**	**3**	**7**
	b).	It is necessary to obtain a tower footing resistance of 20ohms in a soil of resistivity 100phm -m using the three different types of electrodes are hemisphere, vertical driven rod and horizontal counterpoise. Take a radius of 1.25cm for rods and counterpoise and a depth of 0.5m for the counterpose. **Calculate** the required dimensions.	**5**	**3**	**7**
		OR			
10.	**a).**	**Explain** about lightning arresters and protective characteristics.	**5**	**3**	**7**
	b).	For a 750KV line, take V_w = 3000KV, crest, travelling on the lin and V_p = 1700KV. The line surge impedance is 300ohms. **Calculate** (a) the current flowing in the line before reaching the arrester (b) the current through the arrester (c) the value of arrester resistance for this condition and verify the reflection and refraction coefficients giving rise to the voltage and current conditions.	**5**	**3**	**7**

CO-COURSE OUTCOME **KL-KNOWLEDGE LEVEL** **M-MARKS**

NOTE: Questions can be given as A,B splits or as a single Question for 14 marks

Code	Category	L	T	P	C	I.M	E.M	Exam
B20EEH301	**Honors**	**3**	**1**	**--**	**4**	**30**	**70**	**3 Hrs**

POWER QUALITY ENHANCEMENT

(Honors Degree course in EEE)

Course Objectives: Students will learn

1.	About the significance of Power Quality improvement and standards
2.	About Passive Shunt Series Compensators
3.	About the Operation and Control of Active Shunt Compensators
4.	About Active Series Compensators for Power Quality Enhancement
5.	About analysis and Design of Unified Power Quality Compensators

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

Sl.no	Outcome	Knowledge Level
1.	**Apply** the knowledge of Power Quality issues to explore and classify mitigation techniques	K3
2.	**Illustrate** the Passive Shunt and Series Compensators for power quality enhancement	K3
3.	**Analyze** the Active Series Compensators for mitigation of power quality issues	K4
4.	**Analyze** the topologies and operation of Active Shunt Compensators	K4
5.	**Analyze** the working of Unified Power Quality Compensators	K4

SYLLABUS

UNIT-I (10 Hrs)	**INTRODUCTION** Introduction, State of Art on Power Quality, Causes and effects of Power Quality, Classification of mitigation techniques of power quality, State of Art on Power Quality standards and monitoring, power quality terminology, Power quality definitions, standards and monitoring.
UNIT-II (10 Hrs)	**PASSIVE SHUNT AND SERIES COMPENSATION** Introduction, state of art on passive shunt and series compensators, classification and principle of shunt and series compensators, Analysis and Design of single-phase passive shunt compensators, Simple Numerical Problems.
UNIT-III (10 Hrs)	**ACTIVE SHUNT COMPENSATION** Introduction, State of Art on DSTATCOMs, Classification of DSTATCOMs - Two-wire DSTACOM, A three-leg VSC based three-phase three-wire DSTATCOM, Principle of Operation and Control of DSTATCOMs (single-phase PQ and DQ theory-based control algorithms), Analysis and Design of DSTATCOMs.

UNIT-IV (10 Hrs)	**ACTIVE SERIES COMPENSATION** Introduction, State of the Art on Active Series Compensators, Classification of Active Series Compensators, Principle of Operation and Control of Active Series Compensators- Synchronous reference frame theory-based control, Analysis and Design of Active Series Compensators
UNIT-V (10 Hrs)	**UNIFIED POWER QUALITY COMPENSATORS** Introduction, State of the Art on Unified Power Quality Compensators, Classification of Unified Power Quality Compensators, Principle of Operation and Control of Unified Power Quality Compensators - Synchronous reference frame theory-based control, Analysis and Design of Unified Power Quality Compensators.
Text Books:	
1.	Bhim Singh, Ambrish Chandra, Kamal Al-Haddad, "Power Quality Problems and Mitigation Techniques" Wiley Publications, 2015.
2.	Power Quality Enhancement Using Custom Power Devices – Power Electronics and Power Systems, Gerard Ledwich, Arindam Ghosh, Kluwer Academic Publishers, 1st ed,2002.
Reference Books:	
1.	Understanding Power Quality Problems: Voltage Sags and Interruptions, Bollen M H J, First Edition, IEEE Press; 2000.
2.	e-resource: Power Quality - Course (nptel.ac.in)

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				Course Code: B20EEH301	
		SAGI RAMA KRISHNAM RAJU ENGINEERING COLLEGE (A)			**R20**
		III B. Tech. II Semester MODEL QUESTION PAPER			
		POWER QUALITY ENHANCEMENT			
		(Honors Degree Course in EEE)			
Time: 3 Hrs.				**Max. Marks: 70 M**	
		Answer **ONE Question** from **EACH UNIT**			
		All questions carry equal marks			
		Assume suitable data if necessary			
			CO	**KL**	**M**
		UNIT-I			
1.	**a).**	**Classify** the general power quality problems and explain	**1**	**3**	**7**
	b).	**Explain** the objectives of power quality monitoring	**1**	**3**	**7**
		OR			
2.	**a).**	**Classify** the general mitigation techniques of power quality	**1**	**3**	**7**
	b).	**Explain** various terminologies that are defined to quantify power quality problems	**1**	**3**	**7**
		UNIT-II			
3.	**a).**	**Explain** the principle of operation of passive shunt compensation.	**2**	**3**	**7**
	b).	**Illustrate** the design of Shunt Compensators for Power Factor Correction	**2**	**3**	**7**
		OR			
4.	**a).**	**Classify** and explain the supply system based passive shunt compensation	**2**	**3**	**7**
	b).	A single-phase load having $Z_L=(4.0+j1.0)$ pu is fed from an AC supply with an input AC voltage of 230V at 50 Hz and a base impedance of 4.15Ω. It is to be realized as a unity power factor load on the AC supply system using a shunt connected lossless passive element (L or C). **Calculate** (a) the value of the compensator element (in farads or henries) and (b) equivalent resistance (in ohms) of the compensated load.	**2**	**3**	**7**
		UNIT-III			
5.	**a).**	Explain how reference current is generated using instantaneous PQ theory	**3**	**4**	**7**
	b).	Explain topology-based classification of DSTATCOM	**3**	**4**	**7**
		OR			
6.	**a).**	Explain the design procedure of a three phase three wire DSTATCOM	**3**	**4**	**7**
	b).	Explain the design procedure of DSTATCOM	**3**	**4**	**7**

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		UNIT-IV			
7.	**a).**	Discuss the state of art of series active compensators	**4**	**4**	**7**
	b).	Explain synchronous reference frame based control strategy for DVR	**4**	**4**	**7**
		OR			
8.	**a).**	Classify different types of series active compensators	**4**	**4**	**7**
	b).	Explain the design procedure of DVR	**4**	**4**	**7**
		UNIT-V			
9.	**a).**	What are the advantages of UPQC compared to STATCOM and DVR	**5**	**4**	**7**
	b).	Explain the principle and operation of UPQC	**5**	**4**	**7**
		OR			
10.	**a).**	Explain the design procedure of a UPQC	**5**	**4**	**7**
	b).	Explain synchronous reference frame based control strategy for UPQC	**5**	**4**	**7**

CO-COURSE OUTCOME **KL-KNOWLEDGE LEVEL** **M-MARKS**

NOTE: Questions can be given as A,B splits or as a single Question for 14 marks

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Code	Category	L	T	P	C	I.M	E.M	Exam
B20EEH401	**Honors**	**3**	**1**	**--**	**4**	**30**	**70**	**3 Hrs**

HIGH VOLTAGE ENGINEERING

(Honors Degree course in EEE)

Course Objectives: Students will learn

1.	About various types of over voltages in power systems, electric field distribution and computation in different configuration of electrode systems.
2.	To understand HV breakdown phenomena in gases, liquids and solid dielectrics.
3.	About the generation of HV DC, AC and Impulse voltages and currents.
4.	Different methods of measuring HV AC, DC and Impulse voltages and currents
5.	About the HV testing apparatus and industrial applications.

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

Sl.no	Outcome	Knowledge Level
1.	**Apply** the knowledge of over voltages, electric stress and field configuration to compute electric fields.	K3
2.	**Explore** the breakdown behaviour of solid, liquid and gaseous dielectric materials.	K3
3.	**Illustrate** the generation of High AC, DC & Impulse voltages and currents.	K3
4.	**Apply** different methods to measure High AC, DC & Impulse voltages and currents.	K3
5.	**Analyse** the different electrical apparatus used in HV engineering and industrial applications.	K4

SYLLABUS

UNIT-I (10Hrs)	**INTRODUCTION TO HIGH VOLTAGE ENGINEERING** Electric Field Stresses – Uniform and non–uniform field configuration of electrodes – Estimation and control of electric Stress – Numerical methods for electric field computation. Over voltages in power systems: Causes of over voltages and its effects on power system – Lightning, switching surges and other abnormal conditions, Corona and its effects
UNIT-II (10Hrs)	**BREAK DOWN PHENOMENON FOR UNIFORM FIELDS IN GASEOUS, LIQUID AND SOLID INSULATION** Gases as insulating media – Collision process – Ionization process – Townsend's criteria of breakdown in gases – Paschen's law – Liquid as Insulator – Pure and commercial liquids –

	Breakdown in pure and commercial liquid – Intrinsic breakdown – Electromechanical breakdown – Thermal breakdown –Breakdown of solid dielectrics in practice.
UNIT-III (10Hrs)	**GENERATION OF HIGH VOLTAGES AND HIGH CURRENTS** Generation of High DC voltages: Rectifiers, voltage multipliers, Van de graf generators: generation of high impulse voltages: single and multistage Marx circuits- generation of high AC voltages: cascaded transformers, resonant transformers and tesla coils. Generation of high impulse currents – triggering and control of impulse generators.
UNIT-IV (10Hrs)	**MEASUREMENT OF HIGH VOLTAGES AND HIGH CURRENTS** High resistance with series ammeter – dividers, resistance, capacitance and Mixed dividers – peak voltmeter, Generating voltmeters – capacitance voltage transformers, Electrostatic voltmeters – sphere gaps, measurement of high current – resistive shunts, Rogowski coil.
UNIT-V (10Hrs)	**HIGH VOLTAGE ELECTRICAL APPARATUS** Measurement of DC resistivity – Measurement of dielectric constant and loss factor – Partial discharge measurements. Industrial Applications to High Voltage Engineering Electro Static applications – Electro static precipitator, Electro static separator, Electro static coating, pulsed power engineering.

Text Books:	
1.	M S Naidu and V Kamaraju, “High Voltage Engineering”, Tata McGraw Hill, 3rd Edition, 2004.
2.	C L Wadhwa, “High Voltage Engineering”, New Age Publications, 3rd Edition, 2012.
Reference Books:	
1.	E Kuffel and W S Zaengl, “High Voltage Engineering Fundamentals”, Pergamon Press, Oxford, London, 1986.
2.	E Kuffel and M Abdullah, “High Voltage Engineering”, Pergamon Press, Oxford, 1970.

		Course Code: B20EEH401			
		SAGI RAMA KRISHNAM RAJU ENGINEERING COLLEGE (A)			**R20**
		IV B. Tech. I Semester MODEL QUESTION PAPER			
		HIGH VOLTAGE ENGINEERING			
		(Honors Degree Course in EEE)			
Time: 3 Hrs.					**Max. Marks: 70 M**
		Answer **ONE Question** from **EACH UNIT**			
		All questions carry equal marks			
		Assume suitable data if necessary			
			CO	**KL**	**M**
		UNIT-I			
1.	**a).**	Describe Finite Element Method for evaluation of field distribution.	**1**	**3**	**7**
	b).	Explain the mechanism of lighting stroke.	**1**	**3**	**7**
		OR			
2.	**a).**	What is Boundary Element Method? How does it differ from Charge Simulation Method?	**1**	**3**	**7**
	b).	Explain different theories of charge formation in clouds.	**1**	**3**	**7**
		UNIT-II			
3.	**a).**	State and explain Paschen's law. How do you account for the minimum voltage for breakdown under a given, p*d‟ condition?	**2**	**3**	**7**
	b).	Explain thermal breakdown in solid dielectrics and its significance.	**2**	**3**	**7**
		OR			
4.	**a).**	Describe the current growth phenomenon in a gas subjected to uniform electric fields.	**2**	**3**	**7**
	b).	Explain the various breakdown theories involved in commercial liquids.	**2**	**3**	**7**
		UNIT-III			
5.	**a).**	Describe the principle of operation, application and limitations of a Van de Graf generator.	**3**	**3**	**7**
	b).	Derive the expressions for voltage ripple and regulation in a voltage multiplier circuit.	**3**	**3**	**7**
		OR			
6.	**a).**	Describe Cockroft- Walton voltage multiplier circuit in detail. Derive the expression for voltage regulation for an n-stage voltage multiplier.	**3**	**3**	**7**
	b).	How are damped high frequency oscillations obtained from a Tesla Coil?	**3**	**3**	**7**
		UNIT-IV			
7.	**a).**	Tabulate and explain the methods used for the measurement of high	**4**	**3**	**7**

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		voltages and high currents.			
	b).	Explain how a sphere gap can be used to measure the peak value of voltages?	**4**	**3**	**7**
		OR			
8.	**a).**	What is CVT? Explain how CVT can be used for high voltage AC measurements.	**4**	**3**	**7**
	b).	Explain the constructional features and operation of a generating type voltmeters.	**4**	**3**	**7**
		UNIT-V			
9.	**a).**	Briefly explain how partial discharges in an insulation system can be detected and displayed	**5**	**4**	**7**
	b).	Explain briefly about electro static coating.	**5**	**4**	**7**
		OR			
10.	**a).**	Explain with neat diagram, the method to measure the specific resistivity of an insulation specimen, along with dielectric constant and loss factor.	**5**	**4**	**7**
	b).	Explain briefly about electro static separator.	**5**	**4**	**7**

CO-COURSE OUTCOME **KL-KNOWLEDGE LEVEL** **M-MARKS**

NOTE: Questions can be given as A,B splits or as a single Question for 14 marks

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