Course Code: D2516601					
SAGI RAMA KRISHNAM RAJU ENGINEERING COLLEGE (A)					**R25**
I M.Tech. I Semester MODEL QUESTION PAPER					
POWER SYSTEM OPERATION & CONTROL					
(for Power Systems & Automation)					
Time: 3 Hrs.					**Max. Marks: 60 M**
Answer **ONE Question** from **EACH UNIT**					
All questions carry equal marks					
Assume suitable data if necessary					
			CO	**KL**	**M**
		UNIT-1			
1.	**a).**	Explain the various constraints in unit commitment problem?	**1**	**3**	**5**
	b).	Obtain the economic schedule for the two units, the production costs of which are given follows to supply a load of 3MW, in steps of 1MW. C_1=0.8 P_1+25P_1; C_2= 1.2P_2+22P_2 use dynamic programming method.	**1**	**3**	**7**
		OR			
2.	**a).**	Explain the major differences between load flow and OPF problem formulation when inequality constraints are neglected?	**1**	**3**	**5**
	b).	Derive the OPF formulation considering generator real power limits and reactive power limits.	**1**	**3**	**7**
		UNIT-2			
3.	**a).**	Explain briefly about modeling of single area load frequency control with a neat sketch	**2**	**3**	**8**
	b).	Find the static frequency drop if the load is suddenly increased by 25MW on a system having the following data: Rated capacity is 500MW, operating load is 250MW, inertia constant is 5s, governor regulation R= 2 Hz/p.u MW, frequency is 50Hz. Also find the additional generation?	**2**	**3**	**4**
		OR			
4.	**a).**	Draw the block diagram of a single-area system with PI control. Explain the roles of proportional and integral actions in correcting frequency deviations and eliminating steady-state error.	**2**	**3**	**7**
	b).	Two generators of rating 100MW and 200MW are operated with a droop characteristic of 6% from no load to full load. Find the load shared by each generator, if a load of 270MW is connected across the parallel combination of those generators?	**2**	**3**	**5**
		UNIT-3			
5.	**a).**	Explain the static response of two area system for uncontrolled case?	**3**	**3**	**7**
	b).	Find the frequency of oscillations of the tie line power deviation for a two identical area system given the following data: R=3.0Hz/p.u; H=5s; f_o=60Hz. The tie line has a capacity of 0.1p.u and is operating at a power angle of 45^o?	**3**	**3**	**5**
		OR			
6.	**a).**	Explain about the Load Frequency Control (LFC) and Economic	**3**	**3**	**4**

		Dispatch Control.			
	b).	Derive the steady-state relation between frequency deviation and tie-line power deviation for a two-area interconnected system.	**3**	**3**	**8**
		UNIT-4			
7.	**a).**	Explain gradient search technique for economic dispatch with relevant expressions.	**4**	**3**	**7**
	b).	Derive the composite generation protection cost function?	**4**	**3**	**5**
		OR			
8.	**a).**	Explain in brief, take-or-pay fuel contract system used in power generation with necessary expressions.	**4**	**3**	**5**
	b).	Explain how the fuel scheduling is done by linear programming?	**4**	**3**	**7**
		UNIT-5			
9.	**a).**	Explain the concept of power pools with an example?	**5**	**3**	**5**
	b).	Explain about the economy inter change evaluation with an example?	**5**	**3**	**7**
		OR			
10.	**a).**	Discuss about interchange evaluation with unit commitment	**5**	**3**	**6**
	b).	Explain the following i) Diversity interchange. ii)Emergency power interchange	**5**	**3**	**6**

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

NOTE: Questions can be given as **A,B splits** or as a **Single Question** for 12 marks

					Course Code: D2516602
SAGI RAMA KRISHNAM RAJU ENGINEERING COLLEGE (A)					**R25**
I M.Tech. I Semester MODEL QUESTION PAPER					
SMART GRID TECHNOLOGIES					
(for Power System & Automation)					
Time: 3 Hrs.					**Max. Marks: 60 M**
Answer **ONE Question** from **EACH UNIT**					
All questions carry equal marks					
Assume suitable data if necessary					
		UNIT-1	**CO**	**KL**	**M**
1.	**a).**	Explain the evolution of the electric grid and discuss the key differences between conventional and smart grids.	**1**	**2**	**6**
	b).	Summarize the functions, opportunities, and barriers associated with the adoption of smart grids.	**1**	**2**	**6**
		OR			
2.	**a).**	Illustrate the concept of a resilient and self-healing grid with suitable diagrams or examples.	**1**	**3**	**6**
	b).	Compare international policies and present developments on smart grid deployment.	**1**	**4**	**6**
		UNIT-2			
3.	**a).**	Explain the architecture and working of smart meters and their role in real-time pricing.	**2**	**2**	**6**
	b).	Illustrate the functioning of smart appliances and their contribution to energy efficiency.	**2**	**3**	**6**
		OR			
4.	**a).**	Compare the benefits of smart sensors and home/building automation in enhancing consumer participation.	**2**	**4**	**6**
	b).	Analyze the role of Plug-in Hybrid Electric Vehicles (PHEVs) and Vehicle-to-Grid (V2G) technologies in balancing demand and supply.	**2**	**4**	**6**
		UNIT-3			
5.	**a).**	Explain the significance of smart substations in the operation of modern distribution networks.	**3**	**2**	**6**
	b).	Describe the role of Intelligent Electronic Devices (IEDs) in monitoring, protection, and automation of substations.	**3**	**2**	**6**
		OR			
6.	**a).**	Illustrate the importance of Geographic Information Systems (GIS) in feeder automation and outage management.	**3**	**3**	**6**
	b).	Analyze the contribution of smart storage technologies like batteries, SMES, pumped hydro, and CAES to grid reliability.	**3**	**4**	**6**

		UNIT-4			
7.	**a).**	Explain the concept of microgrids and their role in modern electrical networks.	**4**	**2**	**6**
	b).	Discuss the various applications of microgrids in urban, rural, and remote areas.	**4**	**2**	**6**
		OR			
8.	**a).**	Illustrate the process of formation and architecture of a microgrid with suitable diagrams.	**4**	**3**	**6**
	b).	Compare different protection schemes suitable for microgrid operation.	**4**	**4**	**6**
		UNIT-5			
9.	**a).**	Explain the significance of power quality in smart grids and its effect on sensitive loads.	**5**	**2**	**6**
	b).	Illustrate the principle and working of power quality conditioners used in smart grids.	**5**	**3**	**6**
		OR			
10.	**a).**	Describe common power quality issues associated with renewable energy integration.	**5**	**2**	**6**
	b).	Analyze the electromagnetic compatibility (EMC) challenges in smart grids.	**5**	**4**	**6**

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

NOTE: Questions can be given as **A,B splits** or as a **Single Question** for 12 marks

					Course Code: D2516603
		SAGI RAMA KRISHNAM RAJU ENGINEERING COLLEGE (A)			**R25**
		I M.Tech. I Semester MODEL QUESTION PAPER			
		REACTIVE POWER COMPENSATION AND MANAGEMENT			
		(for Power System & Automation)			
Time: 3 Hrs.					**Max. Marks: 60 M**
		Answer **ONE Question** from **EACH UNIT**			
		All questions carry equal marks			
		Assume suitable data if necessary			
		UNIT-1	**CO**	**KL**	**M**
1.	**a).**	Demonstrate how phase balancing and power factor correction can be applied to an unsymmetrical load to improve system efficiency	**1**	**3**	**12**
		OR			
2.	**a).**	What are reactive characteristics of ideal load compensator? Discuss its objectives.	**1**	**3**	**6**
	b).	Explain how a Load Compensator works as a voltage regulator	**1**	**3**	**6**
		UNIT-2			
3.	**a).**	Discuss about the four characteristic time periods of a transient state in a compensated transmission line.	**2**	**3**	**6**
	b).	Explain how the voltage is controlled with shunt reactors	**2**	**3**	**6**
		OR			
4.	**a).**	Explain how shunt compensation is obtained by means of Mid-point shunt reactor or capacitor in transmission lines	**2**	**3**	**12**
		UNIT-3			
5.	**a).**	Explain the concept of quality of power supply with reactive power coordination.	**3**	**3**	**6**
	b).	List and explain briefly the basic methods of load shaping in demand side.	**3**	**3**	**6**
		OR			
6.	**a).**	Explain the various System losses and the loss reduction methods used in Demand side management	**3**	**3**	**6**
	b).	Explain about : a) Retrofitting of capacitor banks b) Deciding factors	**3**	**3**	**6**
		UNIT-4			
7.	**a).**	Explain the various system losses and the loss reduction methods used in distribution side reactive power management	**4**	**3**	**6**
	b).	Explain kVAR requirements for domestic appliances in User side reactive power management	**4**	**3**	**6**
		OR			
8.	**a).**	What is the purpose of using capacitors on user side reactive power management and also explain in detail the types of available capacitors	**4**	**3**	**12**

		with their characteristics and limitations?			
		UNIT-5			
9.	**a).**	Explain the power factor of an electric arc furnace	**5**	**3**	**6**
	b).	Demonstrate how furnace transformers are applied in arc furnace operations to handle fluctuating loads.	**5**	**3**	**6**
		OR			
10.	**a).**	Draw typical layouts of Ac traction systems and explain its operation	**5**	**3**	**6**
	b).	Discuss on the filter requirements for the reactive power in arc furnace	**5**	**3**	**6**

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

NOTE: Questions can be given as **A,B splits** or as a **Single Question** for 12 marks

					Course Code: D25166A0
		SAGI RAMA KRISHNAM RAJU ENGINEERING COLLEGE (A)			**R25**
		I M.Tech. I Semester MODEL QUESTION PAPER			
		ELECTRICAL DISTRIBUTION AUTOMATION			
		(Power System & Automation)			
Time: 3 Hrs.					**Max. Marks: 60 M**
		Answer **ONE Question** from **EACH UNIT**			
		All questions carry equal marks			
		Assume suitable data if necessary			
		UNIT-1	**CO**	**KL**	**M**
1.	**a).**	Analyze the importance of load factor, demand factor, diversity factor, and coincidence factor in planning of distribution systems.	**1**	**4**	**6**
	b).	Analyze the role of computers in distribution system planning and load modelling.	**1**	**4**	**6**
		OR			
2.	**a).**	Analyze the relationship between load factor and loss factor with a practical example.	**1**	**4**	**6**
	b).	Examine the classification of loads (Residential, Commercial, Agricultural, Industrial) and analyze their impact on distribution system design.	**1**	**4**	**6**
		UNIT-2			
3.	**a).**	Analyze feeder loading and voltage level selection in distribution feeder design.	**2**	**4**	**6**
	b).	Analyze the design considerations of radial and loop feeders and justify which type is more reliable.	**2**	**4**	**6**
		OR			
4.	**a).**	Analyze the factors influencing the location and rating of distribution substations.	**2**	**4**	**6**
	b).	Justify the benefits derived through optimal substation location with an example.	**2**	**4**	**6**
		UNIT-3			
5.	**a).**	Explain the general procedure for coordination of protective devices in distribution system.	**3**	**3**	**6**
	b).	Explain the main objectives of distribution system protection.	**3**	**3**	**6**
		OR			
6.	**a).**	Explain the coordination procedure between protective devices such as fuse and circuit breaker.	**3**	**3**	**6**
	b).	Enumerate the common faults in distribution systems and outline the procedure for fault calculation.	**3**	**3**	**6**
		UNIT-4			
7.	**a).**	Explain the effect of shunt capacitors (fixed and switched) on power	**4**	**3**	**6**

		factor correction and system losses.			
	b).	Describe the procedure to determine the best location of capacitors in a distribution system.	**4**	**3**	**6**
		OR			
8.	**a).**	Explain different voltage control equipment used in distribution systems such as AVRs, line drop compensators, and series capacitors.	**4**	**3**	**6**
	b).	Explain the economic benefits of installing capacitors in distribution networks.	**4**	**3**	**6**
		UNIT-5			
9.	**a).**	Explain the architecture and functions of SCADA in distribution automation.	**5**	**3**	**6**
	b).	Describe the applications of synchro-phasors in monitoring and control of power systems.	**5**	**3**	**6**
		OR			
10.	**a).**	Explain the functional scope of Distribution Management Systems (DMS) and Energy Management Systems (EMS) in distribution automation.	**5**	**3**	**6**
	b).	Describe the role of Geographic Information Systems (GIS) and AM/FM functions in distribution automation.	**5**	**3**	**6**

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

NOTE: Questions can be given as **A,B splits** or as a **Single Question** for 12 marks

					Course Code: D25166A1
SAGI RAMA KRISHNAM RAJU ENGINEERING COLLEGE (A)					**R25**
I M.Tech. I Semester MODEL QUESTION PAPER					
ADVANCED POWER SYSTEM PROTECTION					
(for Power System & Automation)					
Time: 3 Hrs.					**Max. Marks: 60 M**
Answer **ONE Question** from **EACH UNIT**					
All questions carry equal marks					
Assume suitable data if necessary					
		UNIT-1	**CO**	**KL**	**M**
1.	**a).**	Draw and explain the Schmitt Trigger circuit. How does it function as a level detector?	**1**	**4**	**6**
	b).	Draw and describe the operation of a zero-crossing detector circuit.	**1**	**4**	**6**
		OR			
2.	**a).**	Compare UJT triggering circuit and RC triggering circuit for thyristors.	**1**	**4**	**6**
	b).	State and explain the principle of duality in comparator circuits.	**1**	**4**	**6**
		UNIT-2			
3.	**a).**	What is a Phase Splitting Amplitude Comparator? Derive the condition under which it operates.	**2**	**4**	**6**
	b).	Write the generalized equation for phase comparison. Show how discrimination depends on the angle between inputs.	**2**	**4**	**6**
		OR			
4.	**a).**	Explain the working principle of Vector Product type Phase comparator. How does it achieve discrimination?	**2**	**4**	**6**
	b).	Explain how the characteristics of amplitude comparators influence relay performance.	**2**	**4**	**6**
		UNIT-3			
5.	**a).**	Explain the principle of operation of static distance relays and classify them into impedance, reactance, and mho relays.	**3**	**4**	**6**
	b).	Draw the block diagram of a multi-input comparator used in static relays and explain its role in decision-making.	**3**	**4**	**6**
		OR			
6.	**a).**	What is meant by "zone of protection" in distance relays? How is it set for a transmission line?	**3**	**4**	**6**
	b).	What is a power swing? Why can it cause unwanted tripping of distance relays?	**3**	**4**	**6**
		UNIT-4			
7.	**a).**	Explain the principle of the circulating current scheme in wire pilot protection?	**4**	**4**	**6**
	b).	What are the advantages and disadvantages of the half wave comparison scheme?	**4**	**4**	**6**

		OR			
8.	**a).**	Explain the working of the translay scheme in differential pilot wire protection.	**4**	**4**	**6**
	b).	Explain phase comparison type carrier current protection and how does it operate?	**4**	**4**	**6**
		UNIT-5			
9.	**a).**	Explain the working principle of microprocessor-based impedance relay and its applications in power system protection.	**5**	**4**	**6**
	b).	Describe the Mann-Morrison technique used in numerical relaying algorithms.	**5**	**4**	**6**
		OR			
10.	**a).**	Describe the operation of microprocessor-based reactance relay and explain why it is not affected by fault arc resistance.	**5**	**4**	**6**
	b).	Explain the differential equation technique and how it is applied in numerical protection algorithms.	**5**	**4**	**6**

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

NOTE: Questions can be given as **A,B splits** or as a **Single Question** for 12 marks

					Course Code: D25166A2
		SAGI RAMA KRISHNAM RAJU ENGINEERING COLLEGE (A)			**R25**
		I M.Tech. I Semester MODEL QUESTION PAPER			
		ELECTRIC VEHICLES			
		(for Power System & Automation)			
Time: 3 Hrs.					**Max. Marks: 60 M**
		Answer **ONE Question** from **EACH UNIT**			
		All questions carry equal marks			
		Assume suitable data if necessary			
			CO	**KL**	**M**
		UNIT-1			
1.	**a).**	Classify fundamentals of vehicles and the components of conventional vehicles	**1**	**2**	**6**
	b).	List different types of propulsion loads and explain rolling resistance.	**1**	**2**	**6**
		OR			
2.	**a).**	List out the historical development of electric vehicles.	**1**	**2**	**6**
	b).	Compare conventional, electric, and hybrid vehicles with respect to efficiency, emissions, and running cost.	**1**	**2**	**6**
		UNIT-2			
3.	**a).**	Define a Plug-in Hybrid Vehicle (PHEV). Explain how it differs from a conventional HEV.	**2**	**2**	**6**
	b).	Define a Fuel Cell Electric Vehicle (FCEV). Explain its working principle.	**2**	**2**	**6**
		OR			
4.	**a).**	Distinguish between a conventional drivetrain and an electric drivetrain.	**2**	**2**	**6**
	b).	Compare BEV, HEV, PHEV, and FCEV with respect to efficiency, emissions, and range.	**2**	**2**	**6**
		UNIT-3			
5.	**a).**	Explain why motor selection is critical in EV performance.	**3**	**3**	**6**
	b).	Explain why PMSM or BLDC motors are widely used in modern EVs.	**3**	**3**	**6**
		OR			
6.	**a).**	Define regenerative braking. Explain its working principle in EVs.	**3**	**3**	**6**
	b).	Discuss the motor control requirements of two-wheelers and four-wheelers.	**3**	**2**	**6**
		UNIT-4			
7.	**a).**	Discuss the application of a buck converter in HEVs with an example.	**4**	**2**	**6**
	b).	Draw and explain the circuit of a Voltage Source Inverter used in HEVs.	**4**	**3**	**6**
		OR			
8.	**a).**	What is an isolated bidirectional DC–DC converter? List its	**4**	**3**	**6**

		constituents.			
	b).	Compare a conventional rectifier with a PWM rectifier in HEV applications.	**4**	**3**	**6**
		UNIT-5			
9.	**a).**	Define energy storage. List and explain key parameters such as energy density, power density, efficiency, and cycle life.	**5**	**3**	**6**
	b).	Explain the working of a pumped hydroelectric energy storage system with a neat sketch.	**5**	**3**	**6**
		OR			
10.	**a).**	Compare ultra-capacitors with batteries in terms of performance characteristics.	**5**	**3**	**6**
	b).	What is compressed air energy storage? Explain its principle of operation.	**5**	**3**	**6**

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

NOTE: Questions can be given as **A,B splits** or as a **Single Question** for 12 marks

					Course Code: D25166B0
		SAGI RAMA KRISHNAM RAJU ENGINEERING COLLEGE (A)			**R25**
		I M.Tech. I Semester MODEL QUESTION PAPER			
		HVDC TRANSMISSION			
		(for Power System & Automation)			
Time: 3 Hrs.					**Max. Marks: 60 M**
		Answer **ONE Question** from **EACH UNIT**			
		All questions carry equal marks			
		Assume suitable data if necessary			
			CO	**KL**	**M**
		UNIT-1			
1.	**a).**	What are the applications of DC Transmission and also mention the modern trends in HVDC technology	**1**	**2**	**6**
	b).	Explain the basic conversion principles with neat circuit diagrams?	**1**	**2**	**6**
		OR			
2.	**a).**	Mention the advantages of HVDC technical economical reliability aspects?	**1**	**2**	**6**
	b).	Explain the types of HVDC links and its purpose with a neat diagram?	**1**	**2**	**6**
		UNIT-2			
3.	**a).**	Explain the rectifier and inverter operation of a power converter and also write the equivalent circuit of converter?	**2**	**2**	**6**
	b).	Illustrate the circuit diagram analysis of a 12-pulse converter. And also calculate	**2**	**3**	**6**
		OR			
4.	**a).**	Illustrate the schematic diagram of 3-phase bridge rectifier	**2**	**3**	**6**
	b).	Discuss the combine characteristics for the Rectifier and Inverter.	**2**	**2**	**6**
		UNIT-3			
5.	**a).**	Discuss about the modes of Converter Control Characteristics.	**3**	**2**	**6**
	b).	Analyse and draw the diagram for Current and Extinction Angle control.	**3**	**3**	**6**
		OR			
6.	**a).**	Explain the diagram of system control hierarchical structure of HVDC Link.	**3**	**2**	**6**
	b).	Discuss about the Harmonics characteristics calculation procedure with suitable expression.	**3**	**3**	**6**
		UNIT-4			
7.	**a).**	Explain the interaction between HVAC & DC systems?	**4**	**3**	**6**
	b).	Briefly explain what are the different harmonic instability problems?	**4**	**2**	**6**
		OR			
8.	**a).**	Mention the importance of multi-terminal DC links?	**4**	**2**	**6**

	b).	Explain series connected multi terminal DC link with suitable diagram?	**4**	**2**	**6**
		UNIT-5			
9.	**a).**	Explain about over voltage and over current protection in the converter station?	**5**	**2**	**6**
	b).	Explain in brief converter faults and protection in HVDC system	**5**	**2**	**6**
		OR			
10.	**a).**	Explain briefly about surge arrester and their application?	**5**	**2**	**6**
	b).	Discuss about over voltage protection.	**5**	**3**	**6**

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

NOTE: Questions can be given as **A,B splits** or as a **Single Question** for 12 marks

					Course Code: D25166B1
SAGI RAMA KRISHNAM RAJU ENGINEERING COLLEGE (A)					**R25**
I M.Tech. I Semester MODEL QUESTION PAPER					
POWER ELECTRONIC CONVERTERS					
(Power System & Automation)					
Time: 3 Hrs.					**Max. Marks: 60 M**
Answer **ONE Question** from **EACH UNIT**					
All questions carry equal marks					
Assume suitable data if necessary					
		UNIT-1	**CO**	**KL**	**M**
1.	**a).**	What is deferent between MOSFET and IGBT	**1**	**3**	**6**
	b).	Describe the switching characteristics of power MOSFET and what are the requirements of gate Drive circuit to get less turn off and turn on times?	**1**	**3**	**6**
		OR			
2.	**a).**	Describe the operation of GTO and draw its static characteristics.	**1**	**3**	**6**
	b).	Describe the operation of GaN and draw its V-I characteristics.	**1**	**3**	**6**
		UNIT-2			
3.	**a).**	Define and distinguish between continuous conduction mode (CCM) and discontinuous conduction mode (DCM) in a single-phase fully controlled bridge converter feeding an RL load.	**2**	**4**	**6**
	b).	A single-phase full converter is supplied from 230V, 50Hz source. The load consists of R=10ohms and E=100V and a large inductor so as to maintain the load current constant. For a firing angle of 45, find i) Average output voltage ii) Average output current iii) Average and R.M.S values of thyristor currents. iv) Input Power factor.	**2**	**4**	**6**
		OR			
4.	**a).**	Derive the expression for the average DC output voltage, for a three-phase fully controlled bridge in CCM.	**2**	**4**	**6**
	b).	Explain the structure and working of a three-phase dual converter, defining both circulating-current and non-circulating-current modes.	**2**	**4**	**6**
		UNIT-3			
5.	**a).**	Define phase displacement control in single-phase inverters. How is the output voltage adjusted using this method?	**3**	**4**	**6**
	b).	Describe the difference between bipolar and unipolar PWM modes in single-phase full-bridge inverters.	**3**	**4**	**6**
		OR			
6.	**a).**	A unipolar PWM inverter is fed from a 230 V DC bus and modulated at 50 Hz. What are the advantages of using unipolar over bipolar PWM	**3**	**4**	**6**

		in terms of harmonic reduction and switching losses?			
	b).	Define space vector modulation and explain how it synthesizes the reference voltage vector using switching states.	**3**	**4**	**6**
		UNIT-4			
7.	**a).**	Define a multilevel inverter and explain why they are gaining popularity over traditional two-level inverters in high-voltage, high-power applications.	**4**	**4**	**6**
	b).	Explain the principle of operation of a diode-clamped inverter and how output voltage levels are generated using clamping diodes and capacitor voltage divisions.	**4**	**4**	**6**
		OR			
8.	**a).**	Describe the operating principle of the cascaded H-bridge Mult Inverter, including its modular series of full H-bridge cells.	**4**	**4**	**6**
	b).	Explain the structure and working principle of the Modular Multilevel Converter (MMC), emphasizing its use of multiple submodules and ability to generate high-quality multilevel output with scalable modular design.	**4**	**4**	**6**
		UNIT-5			
9.	**a).**	What are the effects on output harmonic content and switching losses compared to PWM techniques?	**5**	**3**	**6**
	b).	Why is capacitor voltage balancing critically important in diode-clamped multilevel inverters?	**5**	**3**	**6**
		OR			
10.	**a).**	Explain how SPWM works in the context of a diode-clamped MLI, including the generation of switching pulses using a reference sine wave and triangular carriers.	**5**	**3**	**6**
	b).	How does PSPWM affect THD and voltage sharing among H-bridge cells compared to level-shifted methods?	**5**	**3**	**6**

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

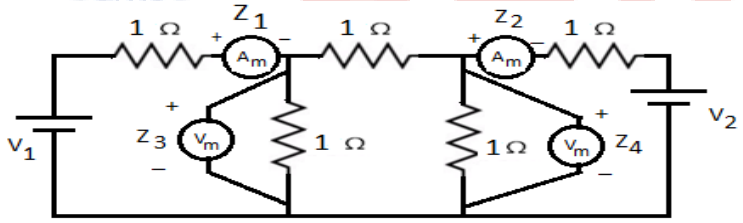
NOTE: Questions can be given as **A,B splits** or as a **Single Question** for 12 marks

				Course Code: D25166B2	
SAGI RAMA KRISHNAM RAJU ENGINEERING COLLEGE (A)					**R25**
I M.Tech. I Semester MODEL QUESTION PAPER					
PROGRAMMABLE LOGIC CONTROLLERS & APPLICATIONS					
(for Power Systems & Automation)					
Time: 3 Hrs.				**Max. Marks: 60 M**	
Answer **ONE Question** from **EACH UNIT**					
All questions carry equal marks					
Assume suitable data if necessary					
			CO	**KL**	**M**
		UNIT-1			
1.	**a).**	Explain the architecture of a typical PLC system.	1	3	6
	b).	With the help of a neat diagram, describe the construction of PLC ladder diagrams.	1	3	6
		OR			
2.	**a).**	Compare the various types of programming equipment used for PLCs.	1	3	6
	b).	List and explain the devices commonly connected to I/O modules of a PLC.	1	3	6
		UNIT-2			
3.	**a).**	Illustrate the use of input and output instructions in PLC programming.	2	3	6
	b).	With neat sketches, construct the ladder diagram and design the flow chart for a spray process system.	2	3	6
		OR			
4.	**a).**	Discuss the role of digital logic gates in PLC programming.	2	3	6
	b).	Describe the operational procedure of a drill press using PLC programming.	2	3	6
		UNIT-3			
5.	**a).**	Define PLC registers and explain their characteristics.	3	3	6
	b).	Explain different timer functions in PLCs and demonstrate their application in industrial processes.	3	3	6
		OR			
6.	**a).**	Describe the working of counters in PLC programming. Illustrate counter functions with at least two industrial applications.	3	3	6
	b).	Explain arithmetic, number comparison, and number conversion functions in PLC programming.	3	2	6
		UNIT-4			
7.	**a).**	Explain the functions of SKIP, Master Control Relay (MCR), and Jump instructions in PLCs.	4	2	6
	b).	Write detailed notes on FIFO, FAL, ONS, CLR, and Sweep functions.	4	2	6
		OR			

8.	**a).**	Illustrate how bit pattern manipulation and sequence functions are implemented in industrial control systems.	4	3	6
	b).	Discuss how PLCs are used in controlling two-axis and three-axis robots.	4	2	6
		UNIT-5			
9.	**a).**	Explain the operation of analog modules and systems in PLCs.	5	2	6
	b).	Demonstrate the procedure for PID tuning with suitable examples.	5	3	6
		OR			
10.	**a).**	Examine how multi-bit data processing is handled in PLC systems.	5	3	6
	b).	Explain the working of a position indicator with PID control.	5	2	6

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

NOTE: Questions can be given as **A,B splits** or as a **Single Question** for 12 marks

					Course Code: D2526601
		SAGI RAMA KRISHNAM RAJU ENGINEERING COLLEGE (A)			**R25**
		I M.Tech. II Semester MODEL QUESTION PAPER			
		REAL TIME CONTROL OF POWER SYSTEMS			
		(for Power Systems & Automation)			
Time: 3 Hrs.					**Max. Marks: 60 M**
		Answer **ONE Question** from **EACH UNIT**			
		All questions carry equal marks			
		Assume suitable data if necessary			
			CO	**KL**	**M**
		UNIT-1			
1.	**a).**	Explain different types of state estimations in detail	1	2	6
	b).	Give the procedure for data processing algorithm(WLS) for converting redundant meter readings into estimate of states of a system and use the following data - In the DC circuit of figure below, the meter readings are z1=9.01 A, z2=3.02A, z3=6.98V and z4=5.01V. Assuming the ammeters are more accurate than the voltmeters, let us assign the measurement weights w1=100, w2=100, w3=50 and w4=50, respectively. 	1	4	6
		OR			
2.	**a).**	In estimating the states explain about various criterions of state estimation?	1	2	6
	b).	Write procedure for detection, identification and elimination of bad data measurement by using a suitable test.	1	4	6
		UNIT-2			
3.	**a).**	Explain about network sensitivity factors by using linear power flow solution.	2	4	6
	b).	What is a contingency? Explain basic process in analyzing contingency in power system	2	4	6
		OR			
4.	**a).**	Discuss the generator contingency analysis. Explain its effects on power systems	2	4	6
	b).	Explain about the Bounding and Concentric Relaxation	2	4	6
		UNIT-3			
5.	**a).**	Explain about the operating states of power system with its state diagram	3	3	6

	b).	What is energy control center? Explain its function in detail	3	2	6
		OR			
6.	**a).**	Explain about major elements of modern energy management system in detail	3	3	6
	b).	Discuss various functions of SCADA in power system network	3	2	6
		UNIT-4			
7.	**a).**	What are P-V and V-Q curves? Discuss how these help in studying voltage stability of power system.	4	4	6
	b).	Discuss different methods of improving voltage stability of power system.	4	4	6
		OR			
8.	**a).**	What is Voltage collapse? Explain about the different types of voltage stabilities	4	3	6
	b).	Explain about voltage stability static indices	4	4	6
		UNIT-5			
9.	**a).**	What is PMU? Explain its functions and placement in power system network.	5	2	6
	b).	Explain about the estimation of phasor and frequency using PMU	5	4	6
		OR			
10.	**a).**	By using Phasor measurement how to assess the voltage stability in power system	5	4	6
	b).	Write procedure of detecting faults in power system network using PMU.	5	4	6

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

NOTE: Questions can be given as **A,B splits** or as a **Single Question** for 12 marks

					Course Code: D2526602
		SAGI RAMA KRISHNAM RAJU ENGINEERING COLLEGE (A)			**R25**
		I M.Tech. II Semester MODEL QUESTION PAPER			
		RESTRUCTURED POWER SYSTEMS			
		(for Power System & Automation)			
Time: 3 Hrs.					**Max. Marks: 60 M**
		Answer **ONE Question** from **EACH UNIT**			
		All questions carry equal marks			
		Assume suitable data if necessary			
		UNIT-1	**CO**	**KL**	**M**
1.	**a).**	Discuss the concept of deregulation in the power sector and examine the economic, technical, and policy conditions required to implement successfully.	1	2	6
	b).	Analyze the role of least-cost operation and incremental cost analysis in ensuring system-wide optimality, especially under deregulated conditions.	1	4	6
		OR			
2.	**a).**	Explain in detail the differences between market architecture and market structure in deregulated power systems, providing suitable diagrams**.**	1	2	6
	b).	Evaluate critically the benefits and drawbacks of deregulated electricity markets with respect to consumer cost, reliability, and investor confidence.	1	3	6
		UNIT-2			
3.	**a).**	List and discuss in detail the various ownership and management models in the electricity industry, explaining their operational philosophies	2	2	6
	b).	Evaluate the regulatory, social, and infrastructural challenges faced by governments when transitioning from a monopoly-based structure to retail competition.	2	2	6
		OR			
4.	**a).**	Explain the monopoly model of electricity supply and assess its long-term effects on consumers, utilities, and the government.	2	2	6
	b).	Illustrate and describe the working of a purchasing agency model with the help of a block diagram, elaborating on its advantages and shortcomings.	2	2	6
		UNIT-3			
5.	**a).**	Explain the principle of Locational Marginal Pricing (LMP) with a case-study-based example and discuss its role in managing transmission congestion.	3	2	6

	b).	Compare comprehensively bilateral trading and pool-based markets with respect to operational flexibility, pricing fairness, and risk allocation	3	3	6
		OR			
6.	**a).**	Explain the concepts of bilateral and pool markets, highlighting their differences in terms of flexibility, transparency, and risk-sharing	3	2	6
	b).	Evaluate the effectiveness of LMP-based markets in achieving congestion management, providing evidence from international practices.	3	3	6
		UNIT-4			
7.	**a).**	Explain in essay form the concept of power wheeling and analyze its economic significance in deregulated electricity markets.	4	2	6
	b).	Compute and explain transmission cost allocation for different participants under wheeling arrangements.	4	4	6
		OR			
8.	**a).**	Illustrate the process of congestion management using the market splitting approach, highlighting its operational steps with diagrams	4	2	6
	b).	Compare market splitting and counter-trading in detail, presenting their relative merits and drawbacks in terms of cost and effectiveness.	4	3	6
		UNIT-5			
9.	**a).**	List and describe in detail various ancillary services required in deregulated power systems, elaborating on their roles in system security.	5	2	6
	b).	Illustrate and describe frequency regulation as an ancillary service, showing how automatic generation control (AGC) contributes to system balance.	5	2	6
		OR			
10.	**a).**	Explain comprehensively the importance of system security in deregulated markets with reference to blackouts and reliability indices.	5	2	6
	b).	Evaluate the regulatory challenges in ensuring that deregulated markets maintain fairness, security, and consumer protection.	5	2	6

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

NOTE: Questions can be given as **A,B splits** or as a **Single Question** for 12 marks

				Course Code: D2526603	
SAGI RAMA KRISHNAM RAJU ENGINEERING COLLEGE (A)					**R25**
I M.Tech. II Semester MODEL QUESTION PAPER					
FLEXIBLE AC TRANSMISSION SYSTEMS					
(for Power System & Automation)					
Time: 3 Hrs.					**Max. Marks: 60 M**
Answer **ONE Question** from **EACH UNIT**					
All questions carry equal marks					
Assume suitable data if necessary					
		UNIT-1	**CO**	**KL**	**M**
1.	**a).**	Explain the concept of controllable parameters in an AC power transmission system. Why are they important for system performance	**1**	**2**	**6**
	b).	Explain the basic types of FACTS controllers with their working principle.	**1**	**2**	**6**
		OR			**6**
2.	**a).**	Discuss in detail about dynamic stability considerations in controlling power systems	**1**	**2**	**6**
	b).	Discuss in detail about the benefits of Facts Controllers in the power systems	**1**	**2**	**6**
		UNIT-2			**6**
3.	**a).**	Compare the current source converters and voltage source converters	**2**	**2**	**6**
	b).	Explain in detail about the objectives of shunt compensation	**2**	**2**	**6**
		OR			**6**
4.	**a).**	Explain in detail about the methods of VAR generation	**2**	**2**	**6**
	b).	Explain in detail about the methods about power oscillation damping methods in power systems	**2**	**2**	**6**
		UNIT-3			**6**
5.	**a).**	Derive the transfer function of a FACTS-based compensator	**3**	**3**	**6**
	b).	Discuss the importance of FACTS devices in transient stability enhancement.	**2**	**3**	**6**
		OR			**6**
6.	**a).**	Discuss in detail about Transient Stability Enhancement and Power Oscillation Damping	**2**	**3**	**6**
	b).	Explain about Variable Impedance Type Static Var Generators	**2**	**3**	**6**
		UNIT-4			**6**
7.	**a).**	Explain in detail about the objectives of series compensation	**2**	**4**	**6**
	b).	Discuss about GTO thyristor controlled series capacitor (GSC) to compensate series compensation	**2**	**4**	**6**
		OR			**6**
8.	**a).**	Discuss in detail about thyristor switched series capacitor (TSSC)	**2**	**4**	**6**
	b).	Explain in detail about thyristor controlled series capacitor (TCSC)	**2**	**4**	**6**
		UNIT-5			**6**
9.	**a).**	Discuss in detail about operating principle of conventional transmission	**2**	**5**	**6**

		control capabilities			
	b).	Explain in detail about independent real and reactive power flow control	**2**	**5**	**6**
		OR			**6**
10.	**a).**	Compare unified power flow controller (UPFC) with series compensators and phase angle regulators.	**2**	**5**	**6**
	b).	Explain in detail about operation of Inter line Power Flow Controller (IPFC)	**2**	**5**	**6**

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

NOTE: Questions can be given as **A,B splits** or as a **Single Question** for 12 marks

					Course Code: D25266A0
		SAGI RAMA KRISHNAM RAJU ENGINEERING COLLEGE (A)			**R25**
		I M.Tech. II Semester MODEL QUESTION PAPER			
		GENERATION AND MEASUREMENT OF HIGH VOLTAGES			
		(for Power Systems & Automation)			
Time: 3 Hrs.					**Max. Marks: 60 M**
		Answer **ONE Question** from **EACH UNIT**			
		All questions carry equal marks			
		Assume suitable data if necessary			
			CO	**KL**	**M**
		UNIT-1			
1.	**a).**	What are the different dielectric materials according to their physical nature?	**1**	**3**	**6**
	b).	Discuss briefly the "Charge Simulation Method" for solving Field Problems and estimation of potential distribution.	**1**	**3**	**6**
		OR			
2.	**a).**	Discuss the different numerical methods available for estimation of electric field distribution in dielectric media.	**1**	**3**	**6**
	b).	What is "Finite Element Method"? Give the outline of this method for solving the field problems.	**1**	**3**	**6**
		UNIT-2			
3.	**a).**	Explain with neat diagram the principle of operation, application and limitations of Vande Graff generator.	**2**	**3**	**6**
	b).	What is the principle of operation of a resonant transformer? How is it advantageous over the cascade connected transformers?	**2**	**3**	**6**
		OR			
4.	**a).**	Why is a Cockcroft-Walton circuit preferred for voltage multiplier circuits? Explain its working with a schematic diagram.	**2**	**3**	**6**
	b).	An impulse current generator has total capacitance of 15μF, the charging voltage 125 kv, the circuit inductance 2mH and the dynamic resistance 1ohm. Determine the peak current and wave shape of the wave.	**2**	**3**	**6**
		UNIT-3			
5.	**a).**	Give the Marx circuit arrangement for multistage impulse generation. How is the basic arrangement modified to accommodate the wave time control resistances?	**3**	**3**	**6**
	b).	Explain the different methods of producing switching impulses in test laboratories.	**3**	**3**	**6**
		OR			
6.	**a).**	How are the wave-front and wave-tail times controlled in impulse generator circuits?	**3**	**3**	**6**
	b).	A 12-stage impulse generator has 0.126 βF capacitors. The wave-front and the wave-tail resistances connected are 800 ohms and 5000 ohms respectively. If the load capacitor is 1000 pF , find the front and tail times	**3**	**3**	**6**

		of the impulse wave produced.			
		UNIT-4			
7.	**a).**	Explain the principle and construction of an electrostatic voltmeter for very high voltages. What are its merits and demerits for high-voltage ac measurements?	**4**	**3**	**6**
	b).	Describe the generating voltmeter used for measuring high dc voltages. How does it compare with a potential divider for measuring high dc voltages?	**4**	**3**	**6**
		OR			
8.	**a).**	Discuss the different methods of measuring high dc voltages. What are the limitations in each method?	**4**	**3**	**6**
	b).	Compare the relative advantages and disadvantages of using a series resistance microammeter and a potential divider with an electrostatic voltmeter for measuring high dc voltages?	**4**	**3**	**6**
		UNIT-5			
9.	**a).**	Give the schematic arrangement of an impulse potential divider with an oscilloscope connected for measuring impulse voltages. Explain the arrangement used to minimize errors.	**5**	**3**	**6**
	b).	Explain the different methods of high current measurements with their relative merits and demerits.	**5**	**3**	**6**
		OR			
10.	**a).**	Give the basic circuit for measuring the peak voltage of (a) ac voltage, and (b) impulse voltage. What is the difference in measurement technique in the above two cases?	**5**	**3**	**6**
	b).	What are the different types of resistive shunts used for impulse current measurements? Discuss their characteristics and limitations.	**5**	**3**	**6**

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

NOTE: Questions can be given as **A,B splits** or as a **Single Question** for 12 marks

				Course Code: D25266A1	
SAGI RAMA KRISHNAM RAJU ENGINEERING COLLEGE (A)					**R25**
I M.Tech. II Semester MODEL QUESTION PAPER					
EVOLUTIONARY ALGORITHMS IN POWER SYSTEMS					
(Power System & Automation)					
Time: 3 Hrs.					**Max. Marks: 60 M**
Answer **ONE Question** from **EACH UNIT**					
All questions carry equal marks					
Assume suitable data if necessary					
		UNIT-1	CO	KL	M
1.	**a).**	**Differentiate** the classical computing and swarm computing	**1**	**3**	**6**
	b).	**Discuss** the concepts of **e**xploitation and exploration in population-based algorithms	**1**	**3**	**6**
		OR			
2.	**a).**	**Illustrate** the mechanism of population-search based algorithms to eliminate the local minima and maxima with a suitable example	**1**	**4**	**8**
	b).	**Explain** the need for soft computing techniques in power systems	**1**	**2**	**4**
		UNIT-2			
3.	**a).**	**Explain** the crossover and mutation operations in GA with numerical examples	**2**	**2**	**6**
	b).	**Discuss** the common and control parameters of PSO	**2**	**4**	**6**
		OR			
4.	**a).**	**Implement** the design procedure of solution of economic load dispatch problem using GA	**2**	**4**	**12**
		UNIT-3			
5.	**a).**	**Explain** the Ant colony optimization with the help of its flow chart and provide the updating mechanism of the solutions with a numerical example. (Assume necessary data)	**3**	**3**	**12**
		OR			
6.	**a).**	**Apply** Artificial Bee Colony Algorithm to a control design problem and explore the procedure to identify the PI controller gains	**3**	**3**	**12**
		UNIT-4			
7.	**a).**	**Illustrate** the behavior of microbats in BAT algorithm	**4**	**3**	**6**
	b).	**Explain** various control parameters of the BAT algorithm	**4**	**3**	**6**
		OR			
8.	**a).**	**Elaborate** the procedure of global exploration in shuffled frog leaping algorithm.	**4**	**3**	**6**
	b)	**Explain** various control parameters of the shuffled frog leaping algorithm.	**4**	**3**	**6**

		UNIT-5			
9.	**a).**	**Explain** the Concept of Pareto optimality.	**5**	**3**	**12**
		OR			
10.	**a).**	**Expla**in NSGA-II algorithm in detail	**5**	**3**	**12**

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

NOTE: Questions can be given as **A,B splits** or as a **Single Question** for 12 marks

				Course Code: D25266A2	
SAGI RAMA KRISHNAM RAJU ENGINEERING COLLEGE (A)					**R25**
I M.Tech. II Semester MODEL QUESTION PAPER					
ENERGY AUDIT CONSERVATION & MANAGEMENT					
(for Power Systems & Automation)					
Time: 3 Hrs.				**Max. Marks: 60 M**	
Answer **ONE Question** from **EACH UNIT**					
All questions carry equal marks					
Assume suitable data if necessary					
		UNIT-1	**CO**	**KL**	**M**
1.	**a).**	Explain the objectives and importance of energy audits in industries.	**1**	**3**	**6**
	b).	Describe the use and significance of Sankey diagrams in energy auditing.	**1**	**3**	**6**
		OR			
2.	**a).**	What are energy conservation schemes? Describe with examples from industrial or commercial sectors.	**1**	**3**	**6**
	b).	Explain the different types of energy audits and highlight their differences.	**1**	**3**	**6**
		UNIT-2			
3.	**a).**	Elaborate the functions and qualities required in an energy manager.	**2**	**3**	**6**
	b).	Explain the role of energy audit in an energy management programme.	**2**	**3**	**6**
		OR			
4.	**a).**	Describe the necessary steps involved in implementing an effective energy management programme.	**2**	**3**	**6**
	b).	Discuss the principles of energy management.	**2**	**3**	**6**
		UNIT-3			
5.	**a).**	Describe methods for achieving energy-efficient lighting in commercial and industrial buildings.	**3**	**3**	**6**
	b).	What are different lighting control methods used for energy saving?	**3**	**3**	**6**
		OR			
6.	**a).**	What are energy-efficient motors? Explain types, selection criteria, and economic impact.	**3**	**3**	**6**
	b).	What is over motoring**?** Why should it be avoided in energy management?	**3**	**3**	**6**
		UNIT-4			
7.	**a).**	Define power factor**.** Explain two methods of power factor improvement with neat diagrams.	**4**	**3**	**6**
	b).	What factors influence the location of capacitors in a power system?	**4**	**3**	**6**
		OR			
8.	**a).**	Discuss the impact of harmonics on power factor and suggest corrective measures.	**4**	**3**	**6**
	b).	Differentiate between pyrometers and thermocouples in temperature measurement.	**4**	**3**	**6**

		UNIT-5			
9.	**a).**	Discuss the use of the net present value (NPV) method**.**	**5**	**3**	**6**
	b).	Define the time value of money**.** Why is it important in economic analysis of energy projects?	**5**	**3**	**6**
		OR			
10.	**a).**	Explain the concept of life cycle costing (LCC)**.**	**5**	**3**	**6**
	b).	Define return on investment (ROI)**.** How is it used for decision making in energy efficiency projects?	**5**	**3**	**6**

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

NOTE: Questions can be given as **A,B splits** or as a **Single Question** for 12 marks

				Course Code: D25266B0	
SAGI RAMA KRISHNAM RAJU ENGINEERING COLLEGE (A)					**R25**
I M.Tech. II Semester MODEL QUESTION PAPER					
POWER QUALITY ENHANCEMENT USING CUSTOM POWER DEVICES					
(for Power System & Automation)					
Time: 3 Hrs.				**Max. Marks: 60 M**	
Answer **ONE Question** from **EACH UNIT**					
All questions carry equal marks					
Assume suitable data if necessary					
		UNIT-1	**CO**	**KL**	**M**
1.	**a).**	**Define** power quality and explain its importance in modern electrical systems.	1	3	6
	b).	**Explain** the effect of nonlinear loads on power quality and their impact on harmonics.	1	3	6
		OR			
2.	**a).**	What are voltage sags, swells and flicker? **Explain** their effects and mitigation methods.	1	3	6
	b).	**Discuss** the causes of voltage and current interruptions in electrical networks. How can these be minimized?	1	3	6
		UNIT-2			
3.	**a).**	**Explain** various lightning protection schemes used in transmission systems.	2	3	6
	b).	**Explain** the different devices used for voltage regulation in distribution systems with their working principles and applications.	2	3	6
		OR			
4.	**a).**	**Analyse** load switching transient problems. How can they be minimized in industrial power systems?	2	4	6
	b).	**Describe** the role of distributed generation in regulating utility voltage. Explain challenges and solutions when integrating DG into distribution systems.	2	4	6
		UNIT-3			
5.	**a).**	What are inter-harmonics? **Explain** their causes and impacts on electrical systems.	3	3	6
	b).	**Differentiate** between harmonics and transients. How does system response vary for each?	3	4	6
		OR			
6.	**a).**	**Discuss** the effects of harmonic distortion on: (i) Power factor (ii) Transformers (iii) Capacitors and (iv) Protective devices.	3	3	6
	b).	**Explain** devices used for controlling harmonic distortion in power systems.	3	4	6

		UNIT-4			
7.	**a).**	**Define** custom power. **Explain** the need for custom power devices in modern distribution systems.	4	3	6
	b).	**Explain** how static series and shunt compensators work for power quality improvement.	4	4	6
		OR			
8.	**a).**	**Explain** the working principle of voltage source inverters (VSI) and their role in custom power devices with neat diagrams.	4	3	6
	b).	**Describe** the various reactive power and harmonic compensation devices used in distribution systems.	4	4	6
		UNIT-5			
9.	**a).**	**Explain** the operation and control strategy of an Interline Power Flow Controller (IPFC) with necessary diagrams.	5	4	6
	b).	**Describe** the Unified Power Quality Conditioner (UPQC) with control strategies and applications in power systems.	5	4	6
		OR			
10.	**a).**	What is a Dynamic Voltage Restorer (DVR)? **Discuss** its main components and functions.	5	3	4
	b).	**Design** and explain the control strategy for a Dynamic Voltage Restorer based on P–Q theory.	5	4	8

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

NOTE: Questions can be given as **A,B splits** or as a **Single Question** for 12 marks

					Course Code: D25266B1
SAGI RAMA KRISHNAM RAJU ENGINEERING COLLEGE (A)					**R25**
I M.Tech. II Semester MODEL QUESTION PAPER					
RENEWABLE ENERGY TECHNOLOGIES					
(for Power System & Automation)					
Time: 3 Hrs.					**Max. Marks: 60 M**
Answer **ONE Question** from **EACH UNIT**					
All questions carry equal marks					
Assume suitable data if necessary					
		UNIT-1	**CO**	**M**	**KL**
1.		Explain the concept of Distributed Generation (DG) using renewable energy sources and write the benefits & challenges of when integrating it into the conventional power grid.	1	12	3
		OR			
2.		Analyze the role of Demand-Side Management (DSM) and Supply-Side Management (SSM) in improving the efficiency and reliability of renewable energy–based power systems.	1	12	4
		UNIT-2			
3.	**a).**	Explain the principle of operation of an induction generator. How does it differ from an induction motor in terms of slip and power flow?	2	6	3
	b).	Illustrate the self-excitation process of the induction generator and explain effect of capacitance on it.	2	6	3
		OR			
4.		Explain Frequency, Speed &Voltage Control and Load Control Versus Source Control for Induction Generators.	2	12	4
		UNIT-3			
5.	**a).**	Derive the maximum power generated by the wind rotor with its Betz Limit.	3	6	3
	b).	Explain Multiple-Blade Turbines and Drag Turbines (Savonius).	3	6	3
		OR			
6.		Illustrate generators and speed control used in wind Power energy.	3	12	4
		UNIT-4			
7.	**a).**	Illustrate Photovoltaic Effect of PV cell.	4	6	3
	b).	Explain Perturb and Observe (P&O) MPPT method of a PV system.	4	6	3
		OR			
8.	**a).**	Explain Incremental Conductance (INC) MPPT methods of MPPT of a PV system.	4	6	3
	b).	Illustrate Residential and Public Illumination applications of Photovoltaic Solar Energy.	4	6	4

		UNIT-5			
9.	**a).**	Explain the construction and working principle of a Proton Exchange Membrane Fuel Cell (PEMFC).	5	6	3
	b).	Explain the aspects of Hydrogen as Fuel.	5	6	3
		OR			
10.		Draw the equivalent circuit of the dynamic behavior of a fuel cell and explain Practical Determination of the Equivalent Model Parameters.	5	12	3

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

NOTE: Questions can be given as **A,B splits** or as a **Single Question** for 12 marks

		Course Code: D25266B2			
		SAGI RAMA KRISHNAM RAJU ENGINEERING COLLEGE (A)			**R25**
		I M.Tech. II Semester MODEL QUESTION PAPER			
		BATTERY MANAGEMENT SYSTEMS AND CHARGING STATIONS			
		(for Power Systems & Automation)			
Time: 3 Hrs.					**Max. Marks: 60 M**
		Answer **ONE Question** from **EACH UNIT**			
		All questions carry equal marks			
		Assume suitable data if necessary			
			CO	**KL**	**M**
		UNIT-1			
1.	**a).**	Describe the construction and working principle of a Sodium-Sulphur battery.	**1**	**3**	**6**
	b).	How do series and parallel connections of cells influence battery pack voltage, current, and safety considerations?	**1**	**3**	**6**
		OR			
2.	**a).**	Describe the construction and working principle of a Ni-MH and Li-ion batteries.	**1**	**3**	**8**
	b).	Discuss the advantages and limitations of sodium-based batteries such as Na-S and Na-$NiCl_2$ (Zebra) for electric mobility.	**1**	**3**	**4**
		UNIT-2			
3.	**a).**	Differentiate between CC, CV, and CC/CV charging modes with suitable applications.	**2**	**3**	**6**
	b).	Discuss pulse charging techniques for lead-acid, NiCd/NiMH, and Li-ion batteries, highlighting their advantages and challenges	**2**	**3**	**6**
		OR			
4.	**a).**	What are the key charging termination techniques to prevent overcharging and extend battery life?	**2**	**3**	**6**
	b).	Compare passive and active balancing methods for EV battery packs	**2**	**3**	**6**
		UNIT-3			
5.	**a).**	Discuss the design requirements and features of a fast-charging station**.**	**3**	**3**	**6**
	b).	Compare the operational cost and efficiency of battery swapping stations versus plug-in fast charging stations.	**3**	**3**	**6**
		OR			
6.	**a).**	Explain the concept of battery swapping stations and their role in reducing EV downtime.	**3**	**3**	**6**
	b).	What is a move-and-charge zone, and how does it impact future EV charging solutions?	**3**	**3**	**6**
		UNIT-4			

7.		Explain various battery-pack topologies and their suitability for EV applications.	**4**	**3**	**12**
		OR			
8.	**a).**	Describe the roles of voltage, current, and temperature sensing in ensuring safe battery operation.	**4**	**3**	**6**
	b).	How does CAN bus communication facilitate monitoring and control in a BMS?	**4**	**3**	**6**
		UNIT-5			
9.	**a).**	Explain the general approach to modeling batteries for EV applications.	**5**	**3**	**6**
	b).	Explain how battery modeling helps in predicting SOC and SOH	**5**	**3**	**6**
		OR			
10.	**a).**	Describe the structure and functionality of a simulation model for a rechargeable Li-ion battery.	**5**	**3**	**8**
	b).	How does parameterization of NiCd battery models improve simulation accuracy?	**5**	**3**	**4**

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

NOTE: Questions can be given as **A,B splits** or as a **Single Question** for 12 marks

					Course Code: D2536601
SAGI RAMA KRISHNAM RAJU ENGINEERING COLLEGE (A)					**R25**
II M.Tech. I Semester MODEL QUESTION PAPER					
RESEARCH METHODOLOGY AND IPR					
(for Power Systems & Automation)					
Time: 3 Hrs.					**Max. Marks: 60M**
Answer **ONE Question** from **EACH UNIT**					
All questions carry equal marks					
Assume suitable data if necessary					
			CO	KL	M
UNIT-1					
1.	**a).**	Write briefly about good Research criteria.	1	2	6
	b).	What are the errors in selecting a research problem?	1	2	6
OR					
2.	**a).**	Describe briefly the Research process with a neat sketch.	1	2	6
	b).	Describe the scope and objectives of research problems in academic and industrial contexts.	1	3	6
UNIT-2					
3.	**a).**	Write briefly about Effective Literature studies approaches.	2	2	6
	b).	Explain about Research ethics.	2	2	6
OR					
4.	**a).**	Write briefly about Effective technical writing.	2	3	6
	b).	Explain about the Format of research proposal.	2	3	6
UNIT-3					
5.	**a).**	Write about the various steps in acquisition of trademarks rights.	3	2	6
	b).	Discuss research ethics and its role in maintaining academic integrity.	3	3	6
OR					
6.	**a).**	Write briefly about International cooperation on Intellectual Property.	3	2	6
	b).	Explain the procedure for grants of patents.	3	2	6
UNIT-4					
7.	**a).**	Explain about patent information and databases.	4	2	6
	b).	Define Intellectual Property Rights (IPR) and explain patents, designs, trademarks, and copyrights.	4	2	6
OR					
8.	**a).**	Write briefly about scope of patent rights.	4	2	6
	b).	Write briefly about Licensing and transfer of technology.	4	2	6
UNIT-5					
9.	**a).**	Write briefly about Administration in the patent system.	5	2	6
	b).	Explain the scope of patent rights, licensing, and technology transfer.	5	3	6
OR					

10.	**a).**	Write briefly about New developments in IPR.	5	2	6
	b).	Explain IPR case studies involving IITs and their significance in technology commercialization	5	3	6

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

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