

[M19 PS 1101]
SAGI RAMA KRISHNAM RAJU ENGINEERING COLLEGE (A)
I M. Tech I Semester (R19) Regular Examinations
ADVANCED POWER SYSTEM OPERATION AND CONTROL
Electrical & Electronics Engineering Department
MODEL QUESTION PAPER

TIME: 3Hrs.

Max. Marks: 75 M

Answer **ONE Question** from **EACH UNIT**.

All questions carry equal marks.

			C O	KL	M
UNIT-I					
1.	a).	Explain the gradient approaches hydro-thermal scheduling. ?	2	K2	7M
	b).	Discuss the base point & participation factors method of economic dispatch.	2	K2	8M
OR					
2.	a).	Derive the composite generation protection cost function?	1	K2	7M
	b).	Explain how the fuel scheduling is done by linear programming?	2	K2	8M
UNIT-II					
3.	a).	Obtain the solution of an optimal unit commitment problem with dynamic programming method?	3	K2	8M
	b).	Write the advantages of dynamic programming method over priority list scheme?	3	K2	7M
OR					
4.	a).	What are the various constraints in unit commitment problem? Explain them	3	K2	7M
	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.	3	K3	8M
UNIT-III					
5.	a).	Describe the application of Optimal power flow	6	K2	7M
	b).	Explain the flow diagram of Security constrained OPF.	6	K2	8M
OR					
6.	a).	Explain gradient method for optimal power flow	6	K2	7M
	b).	Discuss the strategy for solution of Linear Programming optimal power flow problem with the help of flow diagram	6	K2	8M
UNIT-IV					
7.	a).	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?	4	K3	7M

	b).	Explain briefly about modeling of single area load frequency control with a neat sketch	4	K2	8M
		OR			
8.	a).	Explain the static response of two area system for uncontrolled case?	4	K2	8M
	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 $R= 2\text{Hz/ p.u MW}$, frequency is 50Hz. Also find the additional generation?	4	K3	6M
		UNIT-V			
9.	a).	Explain the concept of power pools with an example?	5	K2	7M
	b).	Explain about the economy interchange evaluation with an example?	5	K2	8M
		OR			
10.	a).	Discuss about interchange evaluation with unit commitment	5	K2	7M
	b).	Explain the following i) Diversity interchange. ii) Emergency power interchange	5	K2	8M

[M19 PS1102]
SAGI RAMA KRISHNAM RAJU ENGINEERING COLLEGE (A)
I M. Tech I Semester (R19) Regular Examinations
POWER SYSTEM DYNAMICS AND STABILITY
(ELECTRICAL & ELECTRONICS ENGINEERING)
MODEL QUESTION PAPER

TIME: 3 Hrs.

Max. Marks: 75 M

Answer **ONE Question** from **EACH UNIT**

All questions carry equal marks

			CO	KL	M
UNIT - I					
1.	a).	Explain about the different subsystems of a power system and associated controls and operating states of power system.	1	K2	8
	b).	Explain the classical methods of analysis of power system stability.	1	K2	7
OR					
2.		Explain about the modelling of Synchronous machine using park's transformation.	2	K3	15
UNIT - II					
3.		Draw the functional and standard block diagram of excitation system and explain.	3	K4	15
OR					
4.		Explain about the modelling of Synchronous machine with model 1.1	2	K3	15
UNIT - III					
5.		Explain about the small signal stability of system by eigen value approach.	2	K3	15
OR					
6.		Draw the block diagram and Explain about the small signal stability for SMIB system with RH criterion.	2	K3	15
UNIT - IV					
7.		Explain about the Power system stabilizer with each component in PSS.	3	K4	15
OR					
8.		Draw and explain the modelling of SMIB system with and without PSS.	3	K4	15
UNIT - V					
9.		Explain about the concepts of multi machine stability	2	K3	15
OR					
10.		What are different solution techniques for transient stability and explain the modified Euler method for the determination of transient stability.	2	K3	15

[M19PS1103]
SAGI RAMA KRISHNAM RAJU ENGINEERING COLLEGE (A)
I M. Tech I Semester (R19) Regular Examinations
ELECTRIC POWER DISTRIBUTION SYSTEM
Electrical & Electronics' Engineering Department
MODEL QUESTION PAPER

TIME: 3Hrs.

Max. Marks: 75 M

Answer **ONE Question** from **EACH UNIT**.

All questions carry equal marks.

			CO	KL	M
UNIT-I					
1.		Explain about the concept of Distribution management system (D.M.S) and it advantages	1	K2	15M
OR					
2.		Explain different methods and constraints for reconfiguration of distribution networks	1	K2	15M
UNIT-II					
3.	a)	Write briefly about the interconnection of distribution system	1	K2	7M
	b)	Discuss about the remote metering in detail.	1	K2	8M
OR					
4.		Explain about the automatic meter reading concept and describe its implementation in distribution system.	1	K2	15M
UNIT-III					
5.		Explain detail architecture of SCADA using block diagram and its advantages in distribution automation.	3	K2	15M
OR					
6.		Explain the functioning of SCADA in distribution automation in detail.	3	K2	15M
UNIT-IV					
7.		Explain briefly about the optimum number of switches, capacitors are placed in radial distribution network.	1	K2	15M
OR					
8.	a)	Write briefly about the Remote Terminal Unit (RTU)	2	K2	7M
	b)	Write short note on i) Energy efficiency in electrical distribution, ii) types of sectionalizing switches	2	K1	8M
UNIT-V					
9.		Explain about maintenance of automated distribution system in detail	2	K2	15M
OR					
10.		Explain the AI techniques applied to distribution automation in detail	2	K2	15M

[M19PS1104]
SAGI RAMA KRISHNAM RAJU ENGINEERING COLLEGE(A)
I M. Tech I Semester (R19) Regular Examinations
HVDC TRANSMISSION
Electrical & Electronics Engineering
MODEL QUESTION PAPER

TIME: 3Hrs.

Max. Marks: 75 M

Answer **ONE Question** from **EACH UNIT**.

All questions carry equal marks.

			CO	KL	M
UNIT-I					
1.	a).	Briefly explain the power handling capabilities of HVDC lines.	1	K2	8M
	b).	Mention the advantages of HVDC technical economical reliability aspects.	1	K1	7M
OR					
2.	a).	Explain briefly about the static converter configuration.	2	K2	7M
	b).	Explain different types of HVDC links in detail.	1	K2	8M
UNIT-II					
3.	a).	Write the special features of converter transformers.	2	K1	7M
	b).	Draw the equivalent circuit of converter and explain it.	2	K2	8M
OR					
4.		With a neat sketch, explain the working of a 12pulse converter circuit.	2	K2	15 M
UNIT-III					
5.		Mention the reasons for generation of harmonics in HVDC transmission and explain them in detail.	3	K2	15 M
OR					
6.	a).	Explain briefly about the Individual phase control.	3	K2	8M
	b).	Explain briefly about the Constant extinction angle.	3	K2	7M
UNIT-IV					
7.	a).	Explain the significance of DC power modulation.	3	K2	7M
	b).	What are the advantages of Multi-terminal DC links?	6	K1	8M
OR					
8.	a).	Give the comparison between series and parallel MTDC systems.	6	K2	8M
	b).	Draw and explain the rectifier characteristics by voltage limiting control method.	3	K2	7M
UNIT-V					
9.	a).	Discuss about the over voltages due to disturbances on DC side.	5	K2	8M
	b).	What are the uses of circuit breakers in HVDC systems?	5	K2	7M
OR					
10.	a).	Explain briefly about surge arrester and their application?	5	K2	8M
	b).	Discuss about over current protection.	5	K2	7M

[M19 PS1105]
SAGI RAMA KRISHNAM RAJU ENGINEERING COLLEGE (A)
I M. Tech I Semester (R19) Regular Examinations
EHVAC TRANSMISSION
(ELECTRICAL & ELECTRONICS ENGINEERING)
MODEL QUESTION PAPER

TIME: 3 Hrs.

Max. Marks: 75 M

Answer **ONE Question** from **EACH UNIT**
 All questions carry equal marks

			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.	CO1	K4	7
	b).	Derive the expression for inductance of a Multi conductor line used in EHV AC transmission line	CO1	K4	8
OR					
2.	a).	Explain different mechanical considerations that are taken in to account for transmission line performance.	CO1	K4	7
	b).	Write down the procedure for diagonalization of Inductance matrix L $= \begin{bmatrix} L_s & L_m & L_m \\ L_m & L_s & L_m \\ L_m & L_m & L_s \end{bmatrix}$ of a transposed line.	CO1	K4	8
UNIT - II					
3.	a).	What are the effects of high electrostatic fields on biological organisms and human beings	CO2	K4	8
	b).	Starting from the fundamentals derive the expression for potential relations for multi conductor lines.	CO2	K4	7
OR					
4.	a).	Explain surface voltage gradient on conductors in a bundle.	CO2	K4	7
	b).	Derive the expression for voltage (charge voltage relation) of two conductor line.	CO2	K4	8
UNIT - III					
5.	a).	List out different corona loss formulae and explain each one	CO3	K4	7
	b).	Explain the generation and measurement of audio noise due to corona in EHV lines.	CO3	K4	8
OR					
6.	a).	Explain in detail the measurement of Audible Noise.	CO3	K4	8
	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 the sphere.	CO3	K4	7
UNIT - IV					
7.	a).	Explain cascade connection of components in shunt and series compensation.	CO4	K4	8
	b).	Explain the voltage control using synchronous condenser.	CO4	K4	7
OR					
8.	a).	Explain the sub synchronous resonance in a series capacitor.	CO4	K4	8
	b).	Compare series and shunt compensation for EHV AC transmission	CO4	K4	7
UNIT - V					
9.	a).	Explain in detail about the SVC schemes.	CO4	K4	8
	b).	Explain how the harmonics are injected in to network by TCR.	CO4	K4	7
OR					

10.	a).	Design a filter for suppressing harmonics injected in to the system.	CO4	K4	8
	b).	A 100MVA 230KV 50Hz transformer has $x_t = 12\%$ and is connected to a line 200km long which has an inductance of 1mH/km. The filter, connected to the l.v. 33kv side of the transformer, is required to suppress the 5 th harmonic generated by the TCR to 1% of I_n . Calculate the value of filter capacitor if the filter inductance used is 2mH.	CO4	K4	7

[M19 PS1106]
SAGI RAMA KRISHNAM RAJU ENGINEERING COLLEGE (A)
I M. Tech I Semester (R19) Regular Examinations
ARTIFICIAL INTELLIGENCE TECHNIQUES
(ELECTRICAL & ELECTRONICS ENGINEERING)
MODEL QUESTION PAPER

TIME: 3 Hrs.

Max. Marks: 75 M

Answer **ONE Question** from **EACH UNIT**
 All questions carry equal marks

			CO	KL	M
UNIT - I					
1.	a).	Explain the need of Artificial intelligent systems in electrical engineering	4	K1	6
	b).	Explain different operations on fuzzy sets	1	K1	8
OR					
2.	a).	Differentiate knowledge based learning from Statistical learning	4	K2	5
	b).	Discuss composition relation of Fuzzy sets with suitable example	1	K2	9
UNIT - II					
3.	a).	Discuss various membership functions in Fuzzy theory	1	K2	7
	b).	Explain in detail about various Fuzzy set relations.	1	K2	7
OR					
4.		Analyse how fuzzy logic is implemented for classification problem with suitable example	1	K3	14
UNIT - III					
5.		Explain the training and classification process using discrete perceptron classifier	2	K2	14
OR					
6.		Obtain output equations and weight update equations for a 3-layer feed forward neural network using Back propagation algorithm and also discuss about the limitations of Back propagation algorithm	2	K2	14
UNIT - IV					
7.	a).	What is the basic principle involved in the operation of Genetic Algorithm	3	K2	7
	b).	Discuss in detail about various methods involved in the reproduction operation	3	K3	7
OR					
8.	a).	With the help of flow chart explain the computational process of GA	3	K2	7
	b).	Write short notes on Single point cross over, Multi point cross over and uniform cross over.	3	K2	7
UNIT - V					
9.		Design Fuzzy PID controller for Load frequency problem	4	K4	14
OR					
10.	a).	Analyse how AI is applicable for speed control problem of DC motor	4	K4	10
	b).	List various emerging topics where AI techniques are useful	4	K1	4

[M19P1107]
SAGI RAMA KRISHNAM RAJU ENGINEERING COLLEGE (A)
I M. Tech I Semester (R19) Regular Examinations
OPTIMIZATION TECHNIQUES
Electrical & Electronic's Engineering Department
MODEL QUESTION PAPER

TIME: 3Hrs.

Max. Marks: 75 M

Answer **ONE Question** from **EACH UNIT**.

All questions carry equal marks.

			CO	KL	M
		UNIT-I			
1.	a)	State an optimization problem. Give any five Engineering applications of optimization.	1	K3	7M
	b)	Find minimum value of the function $f(X_1, X_2) = X_1^2 + X_2^2 - 10 X_1 - 10 X_2$ satisfying the constraints $X_1 + X_2 \leq 9$, $X_1 - X_2 \geq 6$ and $X_1, X_2 \geq 0$ using Lagrangian multipliers.	1	K3	8M
		OR			
2.		An advertising company has to plan their advertising strategy through the different media, namely TV, Radio and Newspaper. The purpose of advertising is to reach maximum number of potential customers. The cost of an advertisement in TV, Radio and Newspaper are Rs 3000/-, Rs2000/- and Rs2500/- respectively. The average expected potential customers reached per unit by 20000 of which 15000 are female customers. These figures with Radio are 60000 and 40000 and with Newspaper 25000 and 12000 respectively. The company has a maximum budget for advertising is Rs50000/- only. It is proposed to advertise through TV or Radio between 6 and 10 units and at least 5 advertisements should appear in Newspaper. Further it decides that atleast 100000 exposures should take place among female customers. Budget of advertising by Newspaper is limited to Rs25000/- only. Formulate into linear programming problem and solve it by using simplex method.	1	K3	15M
		UNIT-II			
3.		Minimize $Z = X_1 - X_2 + 2X_1^2 + 2 X_1 X_2 + X_2^2$ with the starting point (0,0) using the univariate method.	1	K3	15M
		OR			
4.		Solve the following Linear Programming Problem by Revised simplex method. Maximize $Z = 5X_1 + 3X_2$ Subject to $4X_1 + 5X_2 \geq 10$ $5X_1 + 2X_2 \leq 10$, $3X_1 + 8X_2 \leq 12$ And $X_1, X_2 \geq 0$	1	K3	15M
		UNIT-III			
5.		State Kuhn- Tucker conditions. Minimize $f(X_1, X_2) = (X_1 - 1)^2 + (X_2 - 5)^2$, Subject to $-X_1^2 + X_2 \leq 4$	1	K4	15M

		$-(X_1-2)^2 + X_2 \leq 3$ by Kuhn- Tucker conditions			
		OR			
6.		Solve the following problem by Powell's method (Use pattern search directions) Minimize $f(X_1, X_2) = 4X_1^2 + 3X_2^2 - 5X_1X_2 - 8X_1$ from starting point (0, 0).	1	K4	15M
		UNIT-IV			
7.		Minimize $f(X_1, X_2) = 6x_1^2 + 3x_2^2 + 4x_1x_2$ subject to $x_1 + x_2 - 5 = 0$ solve the problem by using the interior penalty function approach.	1	K3	15M
		OR			
8.		Minimize $f(X_1, X_2) = 1/3(x_1 + 1)^3 + x_2$ subject to $g_1(X_1, X_2) = 1 - x_1 \leq 0$, $g_2(X_1, X_2) = -x_2 \leq 0$. solve the problem by using an exterior penalty function approach.	1	K2	15M
		UNIT-V			
9.		Using Fibonacci method minimize $Z = 12x - 3x^4 - 2x^2$ Take the initial interval as [0,2] and $n=6$. Calculate the interval of uncertainty after 6 cycles.	1	K3	15M
		OR			
10.		Find the minimum function $f(x) = 0.65 - (0.75/(x^2 + 1)) - (0.65x)\tan^{-1}(1/x)$ using the quadratic interpolation method with an initial step size of 0.1. show calculations for two refits.	1	K3	15M

[M19PS1108]
SAGI RAMA KRISHNAM RAJU ENGINEERING COLLEGE (A)
I M. Tech I Semester (R19) Regular Examinations
ADVANCED DIGITAL SIGNAL PROCESSING
Electrical & Electronics' Engineering Department
MODEL QUESTION PAPER

TIME: 3Hrs.

Max. Marks: 75 M

Answer **ONE Question** from **EACH UNIT**.

All questions carry equal marks.

			CO	KL	M
UNIT-I					
1.	a)	What is multi rate signal processing? Explain any two applications of multi rate signal processing?	1	K2	8M
	b)	Derive the frequency domain transfer function of a decimator.	1	K3	7M
OR					
2.	a)	Write a brief notes on lattice structures. Mention the advantages of lattice structures	1	K1	8M
	b)	Draw and explain the lattice ladder structure for realization of pole zero system	1	K1	7M
UNIT-II					
3.	a)	Give a brief account of poly phase filter structures.	2	K1	7M
	b)	Discuss clearly the process of sampling rate conversion of band pass signals.	2	K2	8M
OR					
4.		Explain in detail Bilinear transformation method of IIR filter design	2	K2	15M
UNIT-III					
5.		Discuss about the computation of the discrete Fourier transform with an example	3	K2	15M
OR					
6.		Explain in detail about Tunable digital filters	3	K2	15M
UNIT-IV					
7.	a)	What are the quantization errors in FFT algorithm? Explain them.	4	K2	15M
	b)	Explain about the errors result that from the truncation and rounding with an example	4	K2	
OR					
8.		Discuss the procedure for the design of IIR filters and what are the constraints in the design of IIR filters using analog structures	4	K2	15M
UNIT-V					
9.	a)	What is the basic principle of parametric methods in power spectral estimation? Discuss various techniques in	5	K2	8M

		parametric method.			
	b)	Derive the mean and variance of the power spectral estimate of the Blackman Tuckey method.	5	K3	7M
		OR			
10.		Determine the mean and the auto correlation of the sequence $x(n)$ generated by the MA(2) process described by the difference equation. $X(n) = w(n) - 2w(n-1) + w(n-2)$ Where $w(n)$ is the white noise process with variance σ^2 w.	5	K3	15M

SAGI RAMA KRISHNAM RAJU ENGINEERING COLLEGE (A)
[M19RD1101]

I M. Tech I Semester (R19) Regular Examinations
RESEARCH METHODOLOGY AND IPR
Common to CST,CS,PSA,IT & CAD
MODEL QUESTION PAPER

TIME: 3Hrs.

Max. Marks: 75

Answer **ONE Question** from **EACH UNIT.**

All questions carry equal marks.

			CO	KL	M
		UNIT-I			
1.	a).	Write briefly about good Research criteria.	CO1	K2	8
	b).	What are the errors in selecting a research problem?	CO1	K2	7
		OR			
2.		Describe briefly the Research process with neat sketch.	CO1	K2	15
		UNIT-II			
3.	a).	Write briefly about Effective Literature studies approaches.	CO1	K2	8
	b).	Explain about Research ethics.	CO3	K2	7
		OR			
4.	a).	Write briefly about Effective technical writing.	CO2	K3	8
	b).	Explain about the Format of research proposal.	CO2	K3	7
		UNIT-III			
5.		Write about the various steps in acquisition of trademarks rights.	CO5	K2	15
		OR			
6.	a).	Write briefly about International cooperation on Intellectual Property.	CO5	K2	8
	b).	Explain the procedure for grants of patents.	CO5	K2	7
		UNIT-IV			
7.		Explain about patent information and databases.	CO5	K2	15
		OR			
8.	a).	Write briefly about scope of patent rights.	CO5	K2	8
	b).	Write briefly about Licensing and transfer of technology.	CO4	K2	7
		UNIT-V			
9.		Write briefly about Administration in patent system.	CO5	K2	15
		OR			
10.		Write briefly about New developments in IPR.	CO6	K2	15

CO-COURSE OUTCOME

KL-KNOWLEDGE LEVEL

M-MARKS

[M19 PS1201]
SAGI RAMA KRISHNAM RAJU ENGINEERING COLLEGE (A)
I M. Tech II Semester (R19) Regular Examinations
REAL TIME CONTROL OF POWER SYSTEMS
POWER SYSTEM & AUTOMATION
(ELECTRICAL & ELECTRONICS ENGINEERING)
MODEL QUESTION PAPER

TIME: 3 Hrs.

Max. Marks: 75 M

Answer **ONE Question** from **EACH UNIT**

All questions carry equal marks

			CO	KL	M
		UNIT-I			
1.	a).	Explain different types of state estimations in detail	CO4	K2	8M
	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 $z_1=9.01$ A, $z_2=3.02$ A, $z_3=6.98$ V and $z_4=5.01$ V. Assuming the ammeters are more accurate than the voltmeters, let us assign the measurement weights $w_1=100$, $w_2=100$, $w_3=50$ and $w_4=50$, respectively.	CO4	K3	7M
		OR			
2.	a).	In estimating the states explain about various criterions of state estimation?	CO4	K2	7M
	b).	Write procedure for detection, identification and elimination of bad data measurement by using a suitable test.	CO4	K1	8M
		UNIT-II			
3.	a).	Explain about network sensitivity factors by using linear power flow solution.	O4	K2	8M
	b).	What is a contingency? Explain basic process in analyzing contingency in power system	CO4	K2	7M

		OR			
4.	a).	Discuss the generator contingency analysis. Explain its effects on power systems	CO4	K2	8M
	b).	Explain about the Bounding and Concentric Relaxation	CO4	K2	7M
		UNIT-III			
5.	a).	Explain about the operating states of power system with its state diagram	CO1	K2	8M
	b).	What is energy control center? Explain its function in detail	CO1	K2	7M
		OR			
6.	a).	Explain about major elements of modern energy management system in detail	CO1	K2	7M
	b).	Discuss various functions of SCADA in power system network	CO1	K2	8M
		UNIT-IV			
7.	a).	What is Voltage collapse? Explain about the different types of voltage stabilities	CO2	K2	7M
	b).	Explain about voltage stability static indices	CO2	K2	8M
		OR			
8.	a).	What are P-V and V-Q curves? Discuss how these help in studying voltage stability of power system.	CO2	K1	8M
	b).	Discuss different methods of improving voltage stability of power system.	CO2	K1	7M
		UNIT-V			
9.	a).	What is PMU? Explain its functions and placement in power system network.	CO3	K2	8M
	b).	Explain about the estimation of phasor and frequency using	CO3	K2	7M

		PMU			
		OR			
10.	a).	By using Phasor measurement how to assess the voltage stability in power system.	CO3	K3	8M
	b).	Write procedure of detecting faults in power system network using PMU.	CO3	K1	7M

CO-COURSE OUTCOME

KL-KNOWLEDGE LEVEL

M-MARKS

[M19 PS1202]
SAGI RAMA KRISHNAM RAJU ENGINEERING COLLEGE (A)
I M. Tech II Semester (R19) Regular Examinations
ADVANCED POWER ELECTRONICS CONVERTERS
POWER SYSTEM & AUTOMATION
(ELECTRICAL & ELECTRONICS ENGINEERING)
MODEL QUESTION PAPER

TIME: 3 Hrs.

Max. Marks: 75 M

Answer **ONE Question** from **EACH UNIT**

All questions carry equal marks

S.No.		KL	CO	M
	UNIT-I			
1	Explain the operation of Single-phase Bidirectional controllers with Resistive Loads	K3	CO1	15
	OR			
2	Explain the Effects of source and load inductances on Single phase AC Voltage controller	K3	CO1	15
	UNIT-II			
3	Explain the Effects of source and load inductances on AC-DC converters.	K3	CO2	15
	OR			
4	Briefly explain the Extinction angle control and symmetrical angle control	K3	CO2	15
	UNIT-III			
5	Explain different modes of operation of PUSH PULL converter.	K3	CO3	15
	OR			
6	Explain the different mode of operation of single-switch fly-back converter	K3	CO3	15
	UNIT-IV			
7	Explain the Space Vector PWM technique.	K3	CO3	15
	OR			
8	Explain the Selective Harmonic Elimination (SHE) PWM.	K2	CO3	15
	UNIT-V			
9	Explain the operation of cascaded H Bridge multi-level inverter.	K3	CO4	15
	OR			
10	Explain the operation of Flying Capacitor multi-level inverter.	K3	CO4	15

CO: Course Outcome

KL: Knowledge Level

M: Marks

[M19 PS1203]
SAGI RAMA KRISHNAM RAJU ENGINEERING COLLEGE (A)
I M. Tech II Semester (R19) Regular Examinations
Power Quality Issues and Remedies
POWER SYSTEM & AUTOMATION
(ELECTRICAL & ELECTRONICS ENGINEERING)
MODEL QUESTION PAPER

TIME: 3 Hrs.

Max. Marks: 75 M

Answer **ONE Question** from **EACH UNIT**

All questions carry equal marks

			CO	KL	M
UNIT - I					
1.	a)	Classify the general power quality problems and explain	1	K2	8
	b)	Explain about the voltage sag performance estimation.	1	K2	7
OR					
2.	a)	Discuss about the transients in detail.	2	K2	8
	b)	What are the sources of sag and interruptions and explain	2	K2	7
UNIT - II					
3.	a)	Explain the type of disturbance caused by capacitor switching	2	K2	8
	b)	What is the source of very short duration transients and explain.	2	K2	7
OR					
4.	a)	Discuss about the long duration voltage variations in detail.	2	K2	7
	b)	Explain about the various methods of voltage regulation.	2	K2	8
UNIT - III					
5.	a)	What are the sources of harmonics and explain	3	K3	8
	b)	Differentiate the voltage and current harmonics.	3	K2	7
OR					
6.	a)	Discuss about the evaluation procedure for power quality assessment	3	K4	8

	b)	What are the devices used for controlling power quality problems and explain.	3	K2	7
		UNIT - IV			
7.	a)	Discuss about the distributed generation	4	K2	8
	b)	Explain about the interface to the utility system power quality issues.	4	K2	7
		OR			
8.	a)	What are the typical wiring and grounding problems and explain.	4	K2	8
	b)	Discuss about the solutions to wiring and grounding problems	4	K2	7
		UNIT - V			
9.	a)	Explain about the load compensation using DSTATCOM with schematic diagram.	5	K3	7
	b)	What are the applications of custom power devices in power systems	5	K3	8
		OR			
10.	a)	Explain the operation and control of Dynamic Voltage Restorer.	5	K3	7
	b)	Explain the operation and control of Unified power quality conditioner	5	K3	8

CO: Course Outcome

KL: Knowledge Level

M: Marks

[M19 PS1204]
SAGI RAMA KRISHNAM RAJU ENGINEERING COLLEGE (A)
I M. Tech II Semester (R19) Regular Examinations
DIGITAL PROTECTION OF POWER SYSTEMS
POWER SYSTEM & AUTOMATION
(ELECTRICAL & ELECTRONICS ENGINEERING)
MODEL QUESTION PAPER

TIME: 3 Hrs.

Max. Marks: 75 M

Answer **ONE Question** from **EACH UNIT**

All questions carry equal marks

			CO	KL	M
UNIT - I					
1.	a).	What are the advantages of Static Relays over conventional relay	1	2	7
	b).	Explain the operating principle of Static Over current relays. – Differential relays – distance relays.	1	2	8
OR					
2.	a).	Differentiate between differential relays and distance relays.	1	2	8
	b).	Analyse the concept of Amplitude and Phase Comparators	2	2	7
UNIT - II					
3.	a).	Discuss the concept of Pilot relaying and Carrier current protection schemes.	2	2	8
	b).	Explain the concept of 3-zone Protection of Transmission lines	2	2	7
OR					
4.	a).	Explain the concept Transformer protection. What are the wavelet applications in transformer protection	1	3	8
	b).	Discuss the Multi Input Comparator circuits.	2	2	7
UNIT - III					
5.	a).	What are the mathematical bases for protective relaying algorithms? Explain?	3	4	8
	b).	Differentiate between the Fourier Transforms and Discrete Fourier transforms.	2	2	7
OR					
6.	a).	What are the functions of Wavelet transforms in protection scheme.	2	2	7
	b).	Explain the digital protection by using Kalman filtering	2	3	8
UNIT - IV					
7.	a).	Explain the Fourier based algorithm for protection of transformers	2	3	7
	b).	Discuss the concept of finite duration impulse response filter based algorithms	2	2	8
OR					
8.	a).	Discuss the concept of least square curve fitting based algorithms	3	3	8
	b).	Explain the flux restrained current differential relay.	2	2	7
UNIT - V					
9.	a).	What is the composite voltage and current based schemes explain it.	4	3	8

	b).	Explain the fundamentals of travelling wave protection.	2	2	7
		OR			
10.	a).	Explain the principle of travelling wave distance relay	3	3	7
	b).	Explain briefly the concept of adaptive relaying fault location algorithms.	4	3	8

CO: Course Outcome

KL: Knowledge Level

M: Marks

[M19 PS1205]
SAGI RAMA KRISHNAM RAJU ENGINEERING COLLEGE (A)
I M. Tech II Semester (R19) Regular Examinations
POWER SYSTEM TRANSIENTS
POWER SYSTEM & AUTOMATION
(ELECTRICAL & ELECTRONICS ENGINEERING)
MODEL QUESTION PAPER

TIME: 3 Hrs.

Max. Marks: 75 M

Answer **ONE Question** from **EACH UNIT**

All questions carry equal marks

			CO	KL	M
UNIT - I					
1.	a).	Explain importance of the study of transients and discuss causes for transients.	1	K2	8
	b).	What are the different types of power system transients	1	K2	7
OR					
2.	a).	Explain various effect of transients on power systems	1	K2	8
	b).	Explain the concept of double frequency transients.	1	K2	7
UNIT - II				K2	
3.	a).	Explain about the different types of switching transients.	2		7
	b).	Describe briefly about the transient recovery voltage during different type of fault	3	K3	8
OR					
4.	a).	Explain the concept of Capacitance switching	2	K2	7
	b).	Explain the switching transient due to influence of capacitive current interruption.	2	K2	8
UNIT - III					
5.	a).	Explain the mechanism of lightning and draw the wave shape of the lightning curve.	2	K3	7
	b).	Derive the expression for Direct Lightning Stroke to Transmission Line Towers.	3	K3	8
OR			2		
6.	a).	What are the factors contributing to good line design.	3	K3	7
	b).	Derive the expression for Direct Lightning Stroke to Transmission Line		K3	8
UNIT - IV					
7.	a).	Explain briefly about the travelling wave velocity and the characteristic impedance	2	K2	8
	b).	With neat sketch explain Bewley's Lattice diagram.	2	K2	7
OR					
8.	a).	Derive the reflection and refraction coefficients of a travelling wave.	3	K2	7
	b).	Explain the transient response of systems with series and shunt lumped parameters.	2	K2	8
UNIT - V					
9.	a).	Explain the short line and kilometric fault.	2	K3	7
	b).	Differentiate between Line dropping and load rejection	3	K3	8
OR					

10.	a).	Explain about voltage transients on closing and reclosing lines	2	K2	7
	b).	What are the switching surges on integrated system Qualitative application of EMTP for transient computation?	4	K4	8

CO: Course Outcome

KL: Knowledge Level

M: Marks

[M19 PS1206]
SAGI RAMA KRISHNAM RAJU ENGINEERING COLLEGE (A)
I M. Tech II Semester (R19) Regular Examinations
SMART GRIDS TECHNOLOGIES
POWER SYSTEM & AUTOMATION
(ELECTRICAL & ELECTRONICS ENGINEERING)
MODEL QUESTION PAPER

TIME: 3 Hrs.

Max. Marks: 75 M

Answer **ONE Question** from **EACH UNIT**

All questions carry equal marks

			CO	KL	M
UNIT - I					
1.	a).	Explain the smart grid architectures.	1	K2	8
	b).	What is the communication technologies used in smart grid.	1	K2	7
OR					
2.	a).	Explain role of smart grids standards.	1	K2	8
	b).	Explain the function of national smart grid mission (NSGM) by Govt. of India.	1	K2	7
UNIT - II					
3.	a).	Explain the concept of Supervisory control and data acquisition (SCADA).	2	K2	8
	b).	Discuss about energy management system (EMS).	2	K2	7
OR					
4.	a).	Discuss about phasor measurement units (PMU),	2	K2	8
	b).	Discuss about Wide area measurement systems (WAMS)	2	K2	7
UNIT - III					
5.	a).	Define distribution automation and explain the automated meter reading (AMR)	2	K2	8
	b).	Explain briefly automated metering infrastructure (AMI),	2	K2	7
OR					
6.	a).	How to fault location isolation and service restoration (FLISR). Explain	2	K2	8
	b).	Explain the concept of Outage Management Systems (OMS).	2	K2	7
UNIT - IV					
7.	a).	Explain the concept of distributed energy resources (DERs).	3	K2	7
	b).	What are the various smart appliances and explain low voltage DC (LVDC) distribution in homes / buildings.	3	K2	8
OR					
8.	a).	Explain the concept of home energy management system (HEMS Microgrid)	3	K2	7
	b).	Differentiate between Building to Grid B2G, Vehicle to Grid V2G,.	3	K2	8
UNIT - V					
9.	a).	Discuss the Demand Response from consumer side.	4	K2	7
	b).	Discuss the concept of Tariff Design	4	K2	8
OR					
10.	a).	Differentiate between the Time of the day pricing (TOD) and Time of use pricing (TOU),	4	K2	8
	b).	Explain the Consumer privacy and data protection in smart grid system.	4	K2	7

CO: Course Outcome

KL: Knowledge Level

M: Marks

[M19 PS1207]
SAGI RAMA KRISHNAM RAJU ENGINEERING COLLEGE (A)
I M. Tech II Semester (R19) Regular Examinations
RENEWABLE ENERGY SYSTEMS
POWER SYSTEM & AUTOMATION
(ELECTRICAL & ELECTRONICS ENGINEERING)
MODEL QUESTION PAPER

TIME: 3 Hrs.

Max. Marks: 75 M

Answer **ONE Question** from **EACH UNIT**

All questions carry equal marks

			CO	KL	M
UNIT - I					
1.	a).	What are the Effects of Conventional Energy methods?	1	K2	8
	b).	Discuss the Impact of energy on economy Potentials.	1	K2	7
OR					
2.	a).	What are the Environmental aspects of conventional power plants.	1	K2	7
	b).	What is meant by Renewable energy sources? Explain in brief this energy sources scenario in Indian context.	2	K2	8
UNIT - II					
3.	a).	Explain the principle of conversion of solar energy into heat.	1	K2	7
	b).	What are the main components of a flat-plate solar collector, explain the function of each.	2	K2	8
OR					
4.	a).	Enumerate the different types of concentrating type collectors.	2	K2	8
	b).	What is the principle of solar photovoltaic power generation? What are the main elements of a PV system?	3	K2	7
UNIT - III					
5.	a).	Describe with a neat sketch the working of a wind energy system with main components.	1	K2	7
	b).	What are the different types of wind energy systems?	2	K2	8
OR					
6.	a).	What are the Safety and Environmental Aspects of wind energy?	1	K2	7
	b).	Describe the main applications of wind energy, giving neat sketches.	2	K2	8
UNIT - IV					
7.	a).	What is meant by anaerobic digestion? What are the factors, which affect biodigestion? Explain briefly.	3	K2	8
	b).	Define a geothermal source. What are the classifications of geothermal source	3	K2	7
OR					
8.	a).	Write a short note on wave energy conversion machines. What are the advantages and limitations of wave energy conversion?	4	K2	8
	b).	What is a fuel cell? Describe the principle of working of a fuel cell with reference to H ₂ – O ₂ cell.	4	K2	7
UNIT - V					
9.	a).	Explain the concept of Distributed Generation in power system.	3	K2	8
	b).	Describe the Islanding distribution in power system.	4	K2	7
OR					

10.	a).	What is the Impact of Embedded Generation on the power System Power Quality Disturbances?	4	K2	8
	b).	Discuss the Economics of distributed Generation.	3	K2	7

CO: Course Outcome

KL: Knowledge Level

M: Marks

[M19 PS1208]
SAGI RAMA KRISHNAM RAJU ENGINEERING COLLEGE (A)
I M. Tech II Semester (R19) Regular Examinations
ADVANCED CONTROL THEORY
POWER SYSTEM & AUTOMATION
(ELECTRICAL & ELECTRONICS ENGINEERING)
MODEL QUESTION PAPER

TIME: 3 Hrs.

Max. Marks: 75 M

Answer **ONE Question** from **EACH UNIT**

All questions carry equal marks

			CO	KL	M
UNIT - I					
1.	a).	Convert the following system matrix to Jordan canonical form and calculate the state transition matrix e^{At} . $\begin{bmatrix} 4 & 1 & -2 \\ 1 & 0 & 2 \\ 1 & -1 & 3 \end{bmatrix}$	CO-1	K2	(8M)
	b).	Calculate state transition matrix using Laplace transform technique for given matrix $\begin{bmatrix} 2 & 1 & 1 \\ 1 & 7 & 1 \\ -3 & 4 & -5 \end{bmatrix}$			(7M)
OR					
2.	a).	For the given state space equations calculate determine whether the system is controllable $\begin{bmatrix} \dot{x}_1 \\ \dot{x}_2 \\ \dot{x}_3 \end{bmatrix} = \begin{bmatrix} -1 & 1 & 20 \\ 0 & -1 & 5 \\ 0 & 3 & -4 \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \\ x_3 \end{bmatrix} + \begin{bmatrix} 2 \\ 1 \\ 1 \end{bmatrix} u$	CO-2	K2	(8M)
	b).	For the given state space equations calculate determine whether the system is observable $\begin{bmatrix} \dot{x}_1 \\ \dot{x}_2 \\ \dot{x}_3 \end{bmatrix} = \begin{bmatrix} 0 & 1 & 0 \\ 0 & 0 & 1 \\ -4 & -3 & -2 \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \\ x_3 \end{bmatrix} + \begin{bmatrix} 0 \\ 0 \\ 1 \end{bmatrix} u$ $[y] = [0 \quad 5 \quad 1] \begin{bmatrix} x_1 \\ x_2 \\ x_3 \end{bmatrix}$			(7M)
UNIT - II					
3.	a).	A single input system is described by the following state equations	CO-2	K4	(8M)

		$\begin{bmatrix} \dot{x}_1 \\ \dot{x}_2 \\ \dot{x}_3 \end{bmatrix} = \begin{bmatrix} -1 & 0 & 0 \\ 2 & -2 & 0 \\ -1 & 0 & -3 \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \\ x_3 \end{bmatrix} + \begin{bmatrix} 10 \\ 0 \\ 0 \end{bmatrix} u$ <p>Design a state feedback controller which will give closed loop poles at $-1 \pm j2, 6$</p>			
	b).	<p>Determine full order observer model for the given state space equations</p> $\begin{bmatrix} \dot{x}_1 \\ \dot{x}_2 \\ \dot{x}_3 \end{bmatrix} = \begin{bmatrix} 0 & 1 & 0 \\ 0 & 0 & 1 \\ -4 & -3 & -2 \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \\ x_3 \end{bmatrix} + \begin{bmatrix} 0 \\ 0 \\ 1 \end{bmatrix} u$ $[y] = [0 \quad 5 \quad 1] \begin{bmatrix} x_1 \\ x_2 \\ x_3 \end{bmatrix}$			(7M)
OR					
4.	a).	<p>A multiple input system is described by the following state equations</p> $\begin{bmatrix} \dot{x}_1 \\ \dot{x}_2 \\ \dot{x}_3 \end{bmatrix} = \begin{bmatrix} -1 & 0 & 0 \\ 1 & -2 & 0 \\ 2 & 1 & -3 \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \\ x_3 \end{bmatrix} + \begin{bmatrix} 10 \\ 1 \\ 0 \end{bmatrix} u$ <p>Design a state feedback controller which will give closed loop poles at $-1 \pm j2, 6$</p>	CO-2	K4	(8M)
	b).	<p>Determine full order observer for the given state space equations</p> $\begin{bmatrix} \dot{x}_1 \\ \dot{x}_2 \\ \dot{x}_3 \end{bmatrix} = \begin{bmatrix} 0 & 1 & 0 \\ 0 & 0 & 1 \\ -4 & -3 & -2 \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \\ x_3 \end{bmatrix} + \begin{bmatrix} 0 \\ 0 \\ 1 \end{bmatrix} u$ $[y] = [0 \quad 5 \quad 1] \begin{bmatrix} x_1 \\ x_2 \\ x_3 \end{bmatrix}$			(7M)
UNIT - III					
5.	a).	<p>Explain in detail about physical Nonlinearities: Saturation, Friction, Backlash, Dead-Zone, Relay, On-Off</p>	CO-3	K4	(7M)
	b).	<p>Explain in detail about Nonlinear System, Construction of Phase Trajectories, Describing Functions Method,</p>			
OR					
6.	a).	<p>Explain in detail about Describing Function Method. Lyapunov's</p>			(8M)

		Stability Analysis, Stability Criterion,			
	b).	Explain in detail about Direct Method of Lyapunov and the Linear Systems, Method of Construction of Lyapunov Functions for Nonlinear Systems.			
		UNIT - IV			
7.	a).	Explain in detail about Parameter Optimization: Servomechanism, Optimal Control Problem:	CO-3	K4	(7M)
	b).	Explain in detail about Transfer Function and State Variable Approach, State Regulator Problem			
		OR			
8.	a).	Explain in detail about Infinite Time Regulator Problem, Output Regulator and the Tracking Problem,			(8M)
	b).	Explain in detail about Parameter Optimization Regulators			
		UNIT - V			
9.	a).	a) Find the impulse response functions for the following difference equations a. $y(k+1) - 0.5 y(k) = u(k)$. b. $y(k+2) - 0.1 y(k+1) + 0.8 y(k) = u(k)$.	CO-4	K4	(7M)
	b).) Find the inverse z- transforms for the following functions a. $F(z) = \frac{z}{z^2 + 0.3z + 0.02}$ b. $F(z) = \frac{z - 0.1}{z^2 + 0.04z + 0.25}$			(8M)
		OR			
10.	a).	For the following systems with unity feedback a) $G(z) = \frac{0.4(z + 0.2)}{(z - 1)(z - 0.1)}$ b) $G(z) = \frac{0.5(z + 0.2)}{(z - 0.1)(z - 0.8)}$ Find a) the position error constant b) the velocity error constant c) the steady state error for unit step input d) the steady state error for unit ramp input	CO-4	K4	(7M)
	b).	a) Find the steady state error for the analog system $G(s) = \frac{K}{s + a} \quad a > 0$ a. For proportional analog control with a unit step input b. For proportional digital control with a sampled unit step input.			(8M)

[M19 PS2101]
SAGI RAMA KRISHNAM RAJU ENGINEERING COLLEGE (A)
I M. Tech III Semester (R19) Regular Examinations
POWER SYSTEM AUTOMATION
(ELECTRICAL & ELECTRONICS ENGINEERING)
MODEL QUESTION PAPER

TIME: 3 Hrs.

Max. Marks: 75 M

Answer **ONE Question** from **EACH UNIT**

All questions carry equal marks

			CO	KL	M
UNIT - I					
1.		Explain the architecture of the Supervisory Control and Data Acquisition (SCADA) Systems,	CO2	K2	15
OR					
2.	a).	Explain the concept of Evolution of Automation systems	CO1	K2	7
	b).	What is the SCADA application functions in Generation, Transmission and Distribution?	CO2	K2	8
UNIT - II					
3.	a).	Write the advantages of SCADA in Power Systems	CO2	K2	7
	b).	Describe the Types of data & signals in the Power system	CO4	K2	8
OR					
4.	a).	Explain the concept of Power system 'Field'?	CO1	K2	7
	b).	What is the Classification of SCADA systems?	CO2	K2	8
UNIT - III					
5.	a).	Write short note on function of RTU	CO3	K3	8
	b).	List out the types of communication technologies used in RTU.	CO3	K3	7
OR					
6.	a).	Evolute the components of RTU.	CO3	K3	7
	b).	List out the functionalities in advanced RTU.	CO3	K3	8
UNIT - IV					
7.	a).	Describe the function of Intelligent Electronic Devices (IEDs)	CO3	K3	7
	b).	Explain the IED functional block diagram briefly.	CO3	K3	8
OR					
8.	a).	Explain the software architecture of IED	CO3		8
	b).	Write short notes on Data Concentrators and Merging Units	CO5	K5	7
UNIT - V					
9.	a).	Discuss the briefly Master station hardware configurations	CO5	K5	8
	b).	What is the function of Server systems in the master station	CO5	K5	7
OR					
10.	a).	Discuss the concept Global Positioning Systems	CO5	K5	7
	b).	Describe the function of Human Machine Interface (HMI)	CO5	K5	8

CO: Course Outcome

KL: Knowledge Level

M: Mark

[M19 PS2102]
SAGI RAMA KRISHNAM RAJU ENGINEERING COLLEGE (A)
I M. Tech III Semester (R19) Regular Examinations
RESTRUCTURED POWER SYSTEMS
(ELECTRICAL & ELECTRONICS ENGINEERING)
MODEL QUESTION PAPER

TIME: 3 Hrs.

Max. Marks: 75 M

Answer **ONE Question** from **EACH UNIT**

All questions carry equal marks

			CO	KL	M
UNIT - I					
1.	a).	Define Deregulation. Explain Need and conditions for deregulation	CO1	K2	8
	b).	Discuss the Benefits from a Competitive Electricity Market.	CO1	K2	7
OR					
2.	a).	What are the different Entities in Deregulated Electricity Markets?	CO1	K2	8
	b).	List out the Effects of Deregulation.	CO2	K3	7
UNIT - II					
3.	a).	Explain the Market Structure and Operation.	CO2	K3	7
	b).	Describe the Review of Concepts marginal cost of generation	CO2	K3	8
OR					
4.		What are the Different types of structure model?	CO3	K4	15
UNIT - III					
5.	a).	What is the Role of Independent System Operator (ISO)?	CO2	K3	8
	b).	Explain in details of Market Participation Issues.	CO2	K3	7
OR					
6.	a).	What are the Operational Planning Activities of a Genco?	CO4	K2	7
	b).	Discuss the concept of Unit Commitment in Deregulated Environment.	CO4	K2	8
UNIT - IV					
7.	a).	Explain the concepts of Power exchange (PX) and Market clearing price (MCP).	CO3	K4	8
	b).	What are the Congestion management methods explain?	CO3	K4	7
OR					
8.	a).	Write short notes on contract path method and MW-mile method	CO3	K4	8
	b).	List out the effects of LMP on Congestion.	CO3	K4	7
UNIT - V					
9.	a).	Explain the concept of System Security in Deregulation,	CO4	K2	7
	b).	What are the Classifications Ancillary Services?	CO4	K2	8
OR					
10.	a).	Discuss the Ancillary Services Management in Various Countries.	CO4	K2	7
	b).	Explain the Reactive Power as an Ancillary Service?	CO4	K2	8

CO: Course Outcome

KL: Knowledge Level

M: Marks

[M19 PS2103]
SAGI RAMA KRISHNAM RAJU ENGINEERING COLLEGE (A)
I M. Tech III Semester (R19) Regular Examinations
FLEXIBLE AC TRANSMISSION SYSTEMS
(ELECTRICAL & ELECTRONICS ENGINEERING)
MODEL QUESTION PAPER

TIME: 3 Hrs.

Max. Marks: 75 M

Answer **ONE Question** from **EACH UNIT**

All questions carry equal marks

			CO	PO	KL	M
		UNIT - I				
1.		What are the main advantages of FACTS controllers? Also list and explain different types of FACTS controllers.	CO1	PO3	K2	15
		OR				
2.	a).	What are the factors affecting the loading capability of power system	CO1	PO3	K2	8
	b).	Explain the benefits from FACTS technologies	CO1	PO3	K2	7
		UNIT - II				
3.		What is a STATCOM? What are its applications? Explain its operation.	CO2	PO3	K2	15
		OR				
4.	a).	Draw and Explain the V-I characteristics of TCR and TSC.	CO2	PO3	K2	8
	b).	Explain the voltage control of system using SVC.	CO2	PO3	K2	7
		UNIT - III				
5.	a).	Describe the operation of SSSC	CO2	PO3	K2	7
	b).	Explain the operation of GCSC.	CO2	PO3	K2	8
		OR				
6.		List different series FACTS converters. With neat circuit diagrams, discuss the operation of thyristor switched series capacitor (TSSC), and thyristor-controlled series capacitor (TCSC).	CO2	PO3	K2	15
		UNIT - IV				
7.		What is UPFC? What are its applications? Explain its operation.	CO3	PO3	K2	15
		OR				
8.		What is IPFC? What are its applications? Explain its operation.	CO3	PO3	K2	15
		UNIT - V				
9.	a).	Describe the operation of TCPAR	CO4	PO3	K2	7
	b).	Explain the operation of TCVR	CO4	PO3	K2	8
		OR				
10.	a).	Explain the modelling of FACTS devices	CO4	PO3	K2	7
	b).	Explain the application of optimization in FACTS technology.	CO4	PO3	K2	8