Register No : _____

THE KAVERY ENGINEERING COLLEGE

(An Autonomous Institution)

UG/PG DEGREE END SEMESTER THEORY EXAMINATIONS, APRIL/MAY 2026

Sixth Semester

Electrical and Electronics Engineering

EE3602 – POWER SYSTEM OPERATION AND CONTROL

Regulations - 2021

Duration : 3 Hrs *Maximum : 100 Marks*

*PART – A (ANSWER ALL QUESTIONS) (Marks 10*2=20)*

Q.No	*Questions*	*BLT*	*CO*	*Marks*
1.	List down any two functions of load dispatching Centre.	L1	1	2
2.	Define "Load Factor".	L1	1	2
3.	Classify the methods of frequency regulation.	L2	2	2
4.	Express the state variable equation for real power and frequency.	L2	2	2
5.	What are the sources of reactive power?	L1	3	2
6.	Mention any two types of static VAR system.	L2	3	2
7.	Define Incremental Cost Curve.	L1	4	2
8.	Three generators are need to operated economically. State the condition for economic operation.	L2	4	2
9.	Mention any two function of energy control center.	L1	5	2
10.	Mention the operating states of power system.	L2	5	2

*PART – B (ANSWER ALL QUESTIONS) (Marks 5*16 = 80)*

Q.No			*Questions*	*BLT*	*CO*	*Marks*
11.	a	i	What is the need of power system control? Mention the parameters need to be considered for control. Analyse the impact of these parameters on the control of power system.	L2	1	8
		ii	Consider an inductive load whose impedance is given by R+jX i) By how many percentages will the real power drop if the voltage is reduced by 1% ii) How would a 1% drop in frequency will affect the real power load. Assume the power factor of the load as 0.8.	L3	1	8
			Or			
	b	i	Describe the importance of load forecasting. Also discuss about its types.	L2	1	8
		ii	Following data are available from Load Duration curve. Maximum Demand on the system is 40 MW. The load supplied by the two generating units is 28 MW and 20 MW. Unit no 1 is the base unit and works for all the time. Unit No 2 is peak load unit and works only for 40% of time. The energy produced annually by unit 1 is 2×10^8 units and that by unit 2 is 15×10^6. Find the (a) load factor (b) Plant capacity factor (c) plant use factor of both the units (d) determine the load factor of the total plant.	L3	1	8

12.	a	i	Illustrate in detail about the step load change of demand in one area and derive the expression about change in frequency and tie line power.	L3	2	8
		ii	Identify the primary ALFC loop parameters for a control area having the following data. Total rated area capacity Pr = 2000MW. Normal operating load Pd=1000MW. Inertia constant H=5.0 Regulation R=2.40 Hz/pu MW (all area generators) We shall assume that the load frequency dependency as linear meaning that the old load would increase 1% for 1% frequency increase	L3	2	8
			Or			
	b	i	Develop block diagram representation for two area LFC system with controlled mode and explain each unit.	L3	2	8
		ii	Consider the two area system connected by a tie line with the following characteristics. Where R is the speed regulation and D represents change in load due to change in frequency. A step change of load is 100 MW occurs in area-1. What is the new steady state frequency and change in tie line power flow? Assume both areas were at nominal frequency (50 Hz) to begin.	L3	2	8
13.	a	i	Discuss in detail about the generation and absorption of reactive power in power system components.	L3	3	8
		ii	Describe in detail about various DC and AC excitation system available for constant voltage control	L3	3	8
			Or			
	b		Draw the block diagram representation of automatic voltage regulator. Derive the transfer function of the same. Also obtain the static performance of the model.	L3	3	16
14.	a	i	Derive an expression for an optimum fuel cost when the losses are neglected.	L3	4	6
		ii	IFC in Rs/MW-hr for 2 units in a generating plant is given by $\frac{dF_1}{dP_1}$= 0.1P_1 + 20 and $\frac{dF_2}{dP_2}$ = 0.12 P_2 + 16. The minimum and maximum load on each unit is 20 and 125 MW. Use λ -iteration method and hence device the economic scheduling between the units for a total load of 100 MW.	L3	4	10
			Or			
	b		Represent the Unit Commitment problem mathematically. Mention the various constraints need to be considered. Develop a detailed note on any one of the solution methods for the UC problem	L3	4	16

	R(p.u)	D(p.u)	Base MVA
Area 1:	0.01	0.8	500
Area 2:	0.02	1.0	500

15.	a	i	Define PMU. What is its function? With the neat sketch, explain hardware architecture of PMU.	L2	5	8
		ii	With the neat diagram, explain the purpose and the function of energy control Centre.	L2	5	8
			Or			
	b	i	Develop a short note about the various operating states of the power system.	L2	5	8
		ii	Define state estimation of the system. Discuss about the weighted least square estimation method.	L2	5	8