Reg. No.															

Question Paper Code	13592

B.E. / B.Tech. - DEGREE EXAMINATIONS, APRIL / MAY 2025

Sixth Semester

Electrical and Electronics Engineering

20EEPC602 - POWER SYSTEM OPERATION AND CONTROL

Regulations - 2020

Duration: 3 Hours Max. Marks: 100

PART - A (MCQ) (10 × 1 = 10 Marks)

Answer ALL Questions

		Marks	K – Level	CO
1.	Daily load curve divided into how many parts (a) 1 (b) 2 (c) 3 (d) 4	1	K1	CO1
2.	Load forecasting method are (a) Extrapolation (b) Correlation (c) Combination of both a and b (d) All of the above	1	K1	CO1
3.	Turbine speed governing system consists of (a) Fly ball speed governor (b) Hydraulic amplifier and Linkage mechanism (c) Speed changer (d) All of the above	1	K1	CO2
4.	In which of the following frequency control method tie lines may be overloaded? (a) Flat frequency control (b) Flat tie line control (c) Parallel frequency (d) All of the above	1	K1	CO2
5.	Which of the following methods is/are used for reactive or voltage compensation (a) Shunt capacitor (b) Series capacitor (c) Generation excitation control (d) All of the above	1	K1	CO3
6.	The time scale of transient voltage stability due to static VAR compensator is (a)1 sec (b) 1.5 sec (c) 0.5 sec (d) 2 sec	1	K1	CO3
7.	What does the Economic Dispatch problem primarily aim to minimize in power system operation? (a) Transmission losses (b) Fuel cost (c) Power generation (d) Load demand	1	K1	CO4
8.	In short-term hydrothermal scheduling, hydro plants are generally preferred to: (a) Maximize water storage (b) Minimize thermal generation cost (c) Increase fuel consumption (d) Increase transmission losses	1	K1	CO4
9.	The most applicable state estimation algorithm is (a) Load flow (b) Optimum load flow (c) Weighted least square (d) None of above	1	K1	CO5
10.	Which of the following is *NOT* a primary function of a SCADA system? (a) Data acquisition (b) Supervisory control (c) Energy management (d) Real-time system modeling	1	K1	CO5

PART - B (12 × 2 = 24 Marks)

Answer ALL Questions

11.	List out the requirement of good power system.	2	K1	CO1
12.	Differentiate load curve and load duration curve.	2	K2	CO1
13.	Mention different types of load forecasting.	2	K1	CO1
14.	What is meant by single area power system?	2	K1	CO2
15.	Define area control error.	2	K1	CO2
16.	Illustrate the advantages of state variable model.	2	K2	CO2
17.	Outline the role of synchronous generators in generating and absorption of reactive power	2	K2	CO3
18.	Write down the TCSC base reactance value.	2	K1	CO3
19.	Show the condition for the optimal power dispatch in lossless system.	2	K2	CO4
20.	Define incremental transmission loss.	2	K1	CO4
21.	What are the advantages of computer control?	2	K1	CO5
22.	Mention four types of SCADA system and its application area.	2	K1	CO5

PART - C (6 × 11 = 66 Marks)

Answer ALL Questions

23.	a) i)	Explain plant level and system level control of power system	6	*K2*	*CO1*
	ii)	List out the current power scenario in India.	5	*K2*	*CO1*
		OR			
	b)	A generating station has the following daily loads : 0-6hrs=4500KW; 6-8hrs=3500 KW; 8-12hrs=7500 KW; 12-14hrs=2000 KW; 14-18hrs=8000 KW; 8-20hrs=2500 KW; 20-24hrs=5000 KW; Sketch load duration curve and formulate load factor and plant capacity factor, if the capacity of plant is 12 MW.	*11*	*K2*	*CO1*
24.	a)	What are the components of speed governor system of an alternator? Derive the mathematical model of speed governor system with aid of block diagram	*11*	*K3*	*CO2*
		OR			
	b)	Draw the transfer function block diagram for a single area system provided with static analysis of uncontrolled case and controlled case.	*11*	*K3*	*CO2*
25.	a)	Develop the block diagram of AVR and obtain its transfer function and explain the static and dynamic response.	*11*	*K3*	*CO3*
		OR			
	b)	Explain the methods of voltage control and elaborate any one in detail.	*11*	*K3*	*CO3*
26.	a)	Analyze the coordination equation for economic dispatch including losses and give the steps for economic dispatch calculation, neglecting losses.	*11*	*K3*	*CO4*
		OR			
	b)	The fuel inputs per hour of plants 1 and 2 are given as $F1= 0.2P_1^2+40P_1+120$Rs/hr $F2=0.25P_2^2+30P_2+150$Rs/hr Construct the economic operating schedule and the corresponding cost of generation. The maximum and the minimum loading on each unit are 100MW and 25MW. Assume the transmission losses are ignored and the total demand is 180MW. Also determine the saving obtained if the load is equally shared by both the units.	*11*	*K3*	*CO4*
27.	a)	Evaluate the different types of system hardware used for controlling power system operations. Discuss their effectiveness and suggest improvements or alternatives for enhancing system reliability and performance.	*11*	*K3*	*CO5*
		OR			
	b)	Evaluate how SCADA systems are used to perform substation control functions. Assess the advantages, challenges, and overall impact on power system operation efficiency.	*11*	*K3*	*CO5*
28.	a) i)	Compose the priority list method of solving unit commitment problem. State merits and limitations of this method.	*6*	*K3*	*CO4*
	ii)	Explain the security monitoring using state estimation with necessary diagrams.	*5*	*K2*	*CO5*
		OR			
	b) i)	Given a power system with multiple generating units, apply your understanding to define unit commitment and briefly explain the typical constraints that must be considered when planning the commitment of these units.	*6*	*K3*	*CO4*
	ii)	Explain the need of computer control of power system.	5	*K2*	*CO5*