Reg. No.																

Question Paper Code	14156

B.E. / B.Tech. - DEGREE EXAMINATIONS, NOV / DEC 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.	If a power plant has a maximum demand of 200 MW and an average demand of 150 MW, what is its load factor? (a) 0.5 (b) 0.65 (c) 0.75 (d) 0.85	1	K2	CO1
2.	Load forecasting is crucial for: (a) Efficient operation of power systems (b) Planning future expansion (c) Reducing operational costs (d) All of the above	1	K1	CO1
3.	The main objective of load frequency control in a power system is (a) To bring the steady state error to zero after load change (b) To maintain the net tie-line flow (c) To maintain voltages on all buses (d) To economize the cost of generation	1	K1	CO2
4.	If speed increases, what happens to fly ball speed governor (a) Fly ball move inwards (b) Fly ball move outwards (c)Fly ball remains in same position (d) None of the mentioned	1	K1	CO2
5.	Stability of a transmission line can be increased by (a) Shunt capacitor (b) Series capacitor (c) Shunt reactor (d) Both (a) & (b)	1	K1	CO3
6.	FACTS devices generally used to compensate _____ of the transmission line. (a) Reactance (b) Resistance (c) Conductance (d) Admittance	1	K1	CO3
7.	The coordination equations in economic dispatch are derived using: (a) Laplace transform (b) Newton-Raphson method c) Lagrange multipliers (d) Gauss-Seidel method	1	K1	CO4
8.	Incremental fuel cost (IFC) is: (a) Total fuel cost divided by total power (b) Derivative of fuel cost function with respect to power (c) Fixed cost per unit generation (d) None of the above	1	K1	CO4
9.	Which of the following is not a part of a SCADA system? (a) Remote Terminal Unit (RTU) (b) Programmable Logic Controller (PLC) (c) Data acquisition system (d) Gas turbine	1	K1	CO5
10.	Energy Management System (EMS) is primarily used for: (a) Real-time relay coordination (b) Load forecasting and economic dispatch (c) Load shedding (d) Distribution automation	1	K1	CO5

PART - B (12 × 2 = 24 Marks)

Answer ALL Questions

		Marks	K – Level	CO
11.	List the reason for system load variations and the effect of variable load.	2	K1	CO1
12.	Outline the difference between load curve and load duration curve.	2	K2	CO1
13.	Define plant use factor.	2	K1	CO1
14.	Show with a neat sketch the dynamic response of change in frequency for a step load change.	2	K1	CO2
15.	List the use of static and dynamic response of ALFC loop.	2	K1	CO2
16.	Define AFRC.	2	K1	CO2
17.	Outline the role of stability compensation.	2	K2	CO3

18.	List the methods of Voltage control.	2	K1	CO3
19.	Show with a neat sketch the input - output characteristics of thermal power stations.	2	K1	CO4
20.	Define must run constraint.	2	K1	CO4
21.	Define state estimation.	2	K1	CO5
22.	List the functions of Energy Management Centre.	2	K1	CO5

PART - C (6 × 11 = 66 Marks)

Answer ALL Questions

23.	a)	A power system has to meet the following load demand. Load A-50 kw between 10 AM and 6 PM Load B- 30 Kw between 6 Pm and 10 PM Load-C -20Kw between 4 Pm and 10 AM (a) Plot the daily load curve and infer the (b) diversity factor (c) unit generated per day (d) Load factor.	11	K2	CO1
		OR			
	b)	Explain the Exponential curve fitting method of load forecasting.	11	K2	CO1
24.	a)	Two 750 KW alternator operate in parallel. The speed regulation of first alternator is100% to 103% from full to no load and that of the other 100% to 104%. Solve for the load sharing of 1000 KW between the two alternators and at what load will one machine cease to supply any portion of the load.	11	K3	CO2
		OR			
	b)	Develop and explain the dynamic analysis of ALFC of single area system.	11	K3	CO2
25.	a)	Explain the AVR loop, Derive the mathematical model for exciter and generator.	11	K2	CO3
		OR			
	b)	Explain the methods of voltage control and elaborate any one in detail.	11	K2	CO3
26.	a)	The fuel cost functions for three thermal plants in $/h are given by $F1=0.0045P_{g1}^2+5.2P_{g1}+580$ $F2=0.0056P_{g2}^2+4.5P_{g2}+640$ $F3=0.0079P_{g3}^2+5.8P_{g3}+820$ where P_{g1}, P_{g2}, P_{g3} are in MW. Estimate the optimal dispatch when the total load is 925 MW with the following generator limits.(Use equal incremental cost rule). $250MW \leq Pg1 \leq 450MW$, $200MW \leq Pg2 \leq 350MW$, $125MW \leq Pg3 \leq 250MW$.	11	K3	CO4
		OR			
	b)	A plant has two generators supplying the plant by and neither is to be operated below 20MW or above 135MW. Incremental costs with PG1 and PG2 in MW are $dF_1/dP_{G1}=0.14P_{G1}+21$ Rs/MWhr $dF_2/dP_{G2}=0.225P_{G2}+16.5$Rs/MWhr For economic dispatch, build the plant when the demand equals (i) 125 MW (ii) 250MW	11	K3	CO4
27.	a)	Explain EMS? What are its major functions in power system operation and control?	11	K2	CO5
		OR			
	b)	Explain SCADA system for power system, its hardware components and applications.	11	K2	CO5
28.	a) (i)	Derive the coordination equation for economic load dispatch including transmission losses.	6	K2	CO4
	(ii)	Explain the need for computer control of a power system.	5	K2	CO5
		OR			
	b) (i)	Explain briefly the constraints of economic dispatch.	6	K2	CO4
	(ii)	Outline various state transitions and control strategies using state transition diagram.	5	K2	CO5