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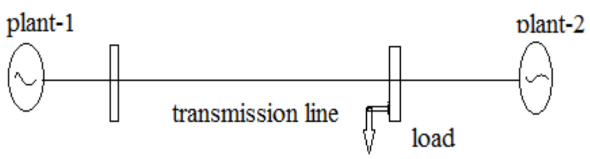
QUESTION BANK (DESCRIPTIVE)

Subject with Code : PSOC(**16EE228**) **Course & Branch**: B.Tech - EEE

Year & Sem: IV-B.Tech & I-Sem **Regulation:** R16

UNIT –I

ECONOMIC OPERATION

1		Briefly explain about the exact coordination equation and derive the penalty factor.	12M
2		The fuel inputs per hour of plants 1 and 2 are given as F1=0.2P12+40P1+120 Rs/hr, F2=0.25P22+ 30P2+150 Rs/hr. Determine the economic operating schedule and the corresponding cost of generation if the max and min loading on each unit is 100MW and 25MW the demand is 180MW, and transmission losses are neglected. If the load is equally shared by both units, determine the saving obtained by loading the units as per equal incremental production cost.	12M
3	a	Explain with diagram the physical interpretation of co-ordination equation.	6M
	b	Derive the condition for economic scheduling of generation in a plant by neglecting the transmission losses.	6M
4		A system consists of two power plants connected by transmission line the total load located at plant-2 is as shown in figure. Data of evaluating loss coefficients consist of information that a power transfer of 100 MW from station-1 to station-2 results in a total loss of 8 MW. find the required generation at each station and power received by the load when λ of the system in Rs. 100/Mwh. The IFCs of the two plants are given by $\frac{dC_1}{dP_{G1}} = 0.12\ P_{G1} + 65$ Rs/MWh. $\frac{dC_2}{dP_{G2}} = 0.25\ P_{G2} + 75$ Rs/MWh 	12M
5		For a simple two unit system the loss coefficients are B11=0.001, B12=-0.0005, B22=0.0024 and the incremental fuel costs of two units are	12M

$\frac{dc1}{dp1} = 0.08P_1 + 16\,Rs/Mwh$, $\frac{dc2}{dp2} = 0.08P_2 + 12\,Rs/Mwh$

find the generation P1 and P2 for ʎ= 50 ,also compute the transmission losses and total load.

6 The fuel cost curve of two generators are given as C1=0.06P12+35P1+625 Rs/hr, C2=0.05P22+ 30P2+175 Rs/hr. If the total load supplied is 550MW, find the optimal dispatch with and without considering the generator limits: 35MW< P1<175MW, and also comment about the incremental cost of both cases. 35MW< P1<175MW 12M

7 a Explain the various factors to be considered in allotting generation to different power stations for optimal equation. 6M

b A system consists of two generations with the following characteristics F1= (0.03P12+7P1+70)10^6, F2= (0.05P22+ 5P2+100)10^6 . Where F and P are fuel input in k-cal/hr and unit output in MW respectively. The daily load cycle is given as follows. 6M

TIME	LOAD
12 MIDNIGHT TO 6 A.M	50MW
6 A.M TO 6 P.M	150MW
6 P.M TO 12 MIDNIGHT	50MW

8 Develop the loss coefficients formula for a two plant system and power loss equation. State the assumptions made. 12M

9 Draw the flow chart for optimum operation of a power system with n plants when losses are considered. 12M

10 (i) Define the incremental fuel cost 12M

(ii) Write the exact co-ordination equation

(iii) Define the state variables

(iv) Define and draw the production cost

(v) What are the assumptions for deriving the loss coefficients?

(vi) Draw input-output characteristics curve

UNIT –II

HYDRO-THERMAL SCHEDULING

1		Derive the co-ordination equation for the optimal scheduling of Hydro – Thermal interconnected power systems.	12M
2		Explain about hydro – thermal co-ordination with necessary equations.	12M
3		Explain the problem of scheduling Hydro-thermal power plants. What are the constraints in the problem?	12M
4		Classify hydro power plants with necessary diagrams.	12M
5		Derive the mathematical formulation of hydro-thermal scheduling.	12M
6		Briefly explain about short term problem in hydrothermal scheduling.	12M
7		Derive the general mathematical formulation of long term hydro thermal scheduling.	12M
8		Derive solution for short term hydro-thermal scheduling using kirchmayer's method.	12M
9	a	What is inter connected grid system?	6M
	b	List necessity of two different plants on same load.	6M
10	a	Explain in detail about long term co-ordination.	8M
	b	Explain about conventional plants in detail	4M

UNIT –III

MODELING OF TURBINE AND GOVERNER

1		Explain the first order and second order of turbine models and represent it in a block.	12M
2	a	Explain the functions of various blocks of speed governing system.	6M
	b	Explain the turbine model and hence discuss transfer functions of reheat and non – reheat turbine.	6M
3	a	Derive the Transfer Function of steam turbine by making suitable assumptions.	6M
	b	A 100 MVA synchronous generator operates on full load at a frequency of 50 Hz. The load is scheduled to 50 MW. Due to time lag in the governor system, the steam valve begins to close after 0.4 seconds. Determine the change in frequency that occurs in this time. M = 5 KW-S/KVA of generator capacity.	6M
4		Two generating stations A and B have full load capacities of 500MW and 210MW respectively. The inter connector connecting the two stations has an induction motor /synchronous generator (plant C) of full load capacity 50MW near station. A percentage changes of speed of A, B and C are 5, 4 and 2.5 respectively. The loads on bus bars A and B are 250MW and 100MW respectively. Determine the load taken by the set C and indicate the direction of power flow	12M
5		Two synchronous generators operate in parallel and supply a total load of 400MW, the capacities of machines are 200MW and 500MW and both have generator drooping Characteristics of 4% from no load to full load. Calculate the load taken by the each machine. Assuming free governor action also finds system frequency at this load.	12M
6		What is the need of reheat type steam turbine for the modern large power system? Explain with neat sketch .	12M
7		Derive the mathematical modeling of speed governor system	12M
8		Two turbo alternators rated for 110MW and 210MW, have governor drop characteristics of 5% from no load to full load. They are connected in parallel to share a load of 250MW. Determine the load shared by each machine assuming free governor action.	12M
9	a	Explain about block diagram representation of turbine model.	7M
	b	List the parts of speed governor system.	5M

10		Derive and explain the mathematical modeling of speed governing system.	12M

UNIT –IV

LOAD FREQUENCY CONTROL

1		Draw the block diagram representation of a single area system and deduce the expression for the static and dynamic response of the system under uncontrolled case?	12M
2	a	Explain the concept of control area in a load control problem.	6M
	b	Derive the expression for the frequency deviation, when a step load disturbance occurs in a single control area frequency control.	6M
3		A single area consists of two generators with the following parameters: Generator 1 =1200 MVA; R=6% (on machine base) Generator2 =1000 MVA; R=4% (on machine base) The units are sharing 1800 MW at normal frequency 50Hz Unit supplies 1000MW and unit 2 supplies 800MW.The load now increased by 200MW.	6M
4		Explain the effect of integral gain on the performance of load frequency control in two area load frequency control.	12M
5		Give typical block diagram for a two-area system inter connected by tie line and explain each block.	12M
6		Two control areas connected by a tie-line have the following characteristics Two control areas connected by a tie-line have the following characteristics	12M

Area1	Area 2
R=0.01 pu	R=0.02pu
D=0.8pu	D=1pu
Base MVA=2000	Base MVA=500

A load change of 100 MW (0.2 pu) occurs in area 2. Find the new steady state frequency and what is the change in the tie flow? Assume both areas were at nominal frequency (60Hz) to begin.

7		Explain the proportional plus integral control for load frequency control of single area system	12M
8	a	Discuss in detail the importance of load frequency control.	6M

	b	Show the dynamic response of ALFC for first order and third order approximations.	6M
9	a	Explain the multi control area systems.	5M
	b	A 2000 MW control area 1 is inter connected with 10000MW area 2. The 2000MW area has the system parameters as R_1=2.4Hz/pu and $B_1=8.33*10^{-3}$ pu MW/Hs. Area 2 has the same parameters, but in terms of 10000MW base. A 20MW load takes place in area 1. Find the static frequency drop and tie line power change.	7M
10		Explain the principle of tie-line bias control.	12M

UNIT –V

REACTIVE POWER CONTROL AND POWER SYSTEM RESTRUCTURING

1	a	Describe the effects of connecting the series capacitors in transmission system	6M
	b	A short transmission line has an impedance of (2+j3) ohms interconnects two power stations, A and B both operating at 11 KV, equal in magnitude and phase. To transfer 25 MW at 0.8 p.f. lagging from A to B determine the voltage boost required at plant A.	6M
2		Explain clearly what do mean by compensation of a line and discuss briefly different methods of compensation.	12M
3		Explain the operations of synchronous condenser and mention its applications in power systems and derive the expression for capacity of synchronous condenser.	12M
4		Explain the objectives of reactive power compensation.	12M
5		Explain the synchronous condenser role in power system	12M
6		What are the advantages and disadvantages of different types of compensating for transmission systems?	12M
7		Explain the advantages and disadvantages of synchronous phase modifiers	12M
8	a	Distinguish shunt and series compensations	6M
	b	What is the role of reactive power in the power system? Discuss in detail about the generation and absorption of reactive power in power system components	6M
9	a	Explain the limitations of series compensation.	12M
	b	List out different reactive power sinks in power system and briefly explain.	
10		(i)What are the sources of reactive power? How it is controlled? (ii) What are the effects capacitors in series compensation circuit? (iii) Mention the purpose of series compensation (iv) Write about static VAR compensator (v) Define the voltage regulation.	12M