



R20 Regulation

Subject code: 3P6BC

**TKR COLLEGE OF ENGINEERING AND TECHNOLOGY**

(Autonomous, Accredited by NAAC with 'A+' Grade)

**B.Tech VI Semester Supplementary Examinations, February 2024**

**POWER SYSTEM OPERATION AND CONTROL**

(Electrical and Electronics Engineering)

**Maximum Marks: 70**

**Date: 20.02.2024 Duration: 3 hours**

- Note:**
1. This question paper contains two parts A and B.
  2. Part A is compulsory which carries 20 marks. Answer all questions in Part A.
  3. Part B consists of 5 Units. Answer any one full question from each unit which carries 10M.
  4. Each question carries 10 marks and may have a, b, c, d as sub questions.

**Part-A**

All the following questions carry equal marks		(10X2M=20 Marks)	CO	Bloom Tx
1	Define Incremental fuel costs.		CO1	L1
2	Write a short note on real power balance equation when losses are neglected.		CO1	L1
3	Write the advantages of operation of hydro thermal combinations.		CO2	L1
4	What are the parts of a turbine speed governing system?		CO2	L1
5	What is area control error? What are the control strategies?		CO3	L1
6	Why the proportional plus integral controller is incorporated in a single area load frequency controlled method?		CO3	L1
7	List the types of reactive power compensation.		CO4	L1
8	What is compensator?		CO4	L1
9	What are the functions of SCADA?		CO5	L1
10	What do you understand by network topology?		CO5	L1

**Part-B**

Answer All the following questions.		(5X10M=50Marks)		
11	The fuel inputs per hour of plants 1 and 2 are given as $F_1=0.2P_1^2+40P_1+120$ Rs/hr, $F_2=0.25P_2^2+30P_2+150$ Rs/hr. Determine the economic operating schedule and the corresponding cost of generation, if the maximum and minimum loading on each unit is 100 MW and 25 MW, the demand is 180 MW 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. [10]		CO1	L3
OR				
12	Derive and explain the general transmission loss formula. [10]		CO1	L2
13	Explain about optimal scheduling of hydrothermal system and find out the necessary equations and gradient vector to solve the system. [10]		CO2	L2
OR				
14	A. Explain about first order turbine model. [5]		CO2	L2

	B. Sketch the schematic diagram of speed governor system. [5]		L4
15	A. Explain about the combined operation of Load frequency control and Economic dispatch control. [5] B. Consider an isolated generator of 600 MVA, inertia constant $M=8$ pu on the machine base. The unit is supplying a load of 300 MVA. The load changes by 1.5% for a 1% change in frequency. Draw the block diagram for the equivalent generator load system. For an increase of 10 MVA in the load, determine the steady state frequency deviation and the response. [5]	CO3	L2
	OR		
16	Explain about load frequency control of single area isolated power system. [10]	CO3	L2
17	A. Explain how the reactive power is generated and also explain the significance of reactive power and voltage stability and regulation state necessary equation for it. [5] B. Briefly explain the reactive power compensation types and also explain in detail about static Var Compensator to maintain voltage stability. [5]	CO4	L2  L2
	OR		
18	Describe the necessity of connecting synchronous compensators and shunt capacitors in a power system. [10]	CO4	L1
19	A. Explain the various functions of energy control Centre. [5] B. What is EMS? What are its major functions in power system operation and control? [5]	CO5	L2
	OR		
20	Explain the architecture of SCADA and write its advantages and disadvantage. [10]	CO5	L2