R17 Regulation *Subject code:* 1P7BB

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY

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

B.Tech IV Year I Semester Regular Examinations, February 2021

POWER SYSTEM OPERATION AND CONTROL

(Electrical and Electronics Engineering)

Maximum Marks: 70 **Date: 23.02.2021 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.
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)

1 Draw the incremental cost curve of a thermal power plant
2 Differentiate between load frequency controller and economic dispatch controller
3 What is the spring reserver?
4 Explain the significance of Unit Commitment
5 Why should the system frequency maintained constant?
6 What are the effects of generator loading in AVR loop?
7 Distinguish between load compensation and system compensation
8 Brief about the advantages of series compensation.
9 List any four functions of Load Dispatch Centre.
10 Briefly explain the functions of EMS

Part-B

Answer All the following questions. (10M X 5=50Marks)

11 a) Derive the coordination equation with losses (4M)

b)Explain the procedure for solving ED with losses using λ iteration method (6M)

OR

12 A power plant has 3 units with the following characteristics:

$F_1 = 800+21.5P_1+0.05P_1^2$
$F_2 = 500+27P_2+0.1P_2^2$
$F_3 = 900+16P_3+0.07P_3^2$

Pmax = 120 Mw and Pmin = 39 MW.

i) Find the optimum scheduling and total cost per hour for a total load of 200 Mw.

ii)If all the generators are scheduled equally, find the total cost and also find the savings obtained because of optimal scheduling. (10M)

13 a) What is Unit Commitment problem and discuss its constraints? (4M)

b) Draw the flowchart for DP in Unit commitment method. (6M)

OR

14 What are the important methods of hydro-thermal coordination? Explain them in brief. (10M)

15 What are the components of speed governor system? Derive its transfer function with an aid of block diagram. (10M)

OR

16 (i)Evaluate steady state frequency in HZ and system parameters for an isolated control area having the following data. Total rated area capacity, pr=300Mw, load demand=100 Mw, f=50hz,inertia constant H=5S,regulation R=2.5 Hz pu MW, turbine time constant=0.5sec,governor time constant=0.2 sec, load change=60Mw.the load varies by 0.8% for a 1% in frequency. (6M)

(ii) Discuss the integration of economic dispatch control with load frequency control (4M)

17 a) A 415kv line is fed through an 132/415 KV transformer from a constant 132KV supply. At the load end of the line, the voltage is reduced by another transformer of ratio 415/132 KV. The total impedance of line is 40+ j80 ohms both transformers are equipped with tap changing; the product of the two off nominal setting is unity. if the load on the system is 200 MW at 0.8 p.f lagging. Calculate the settings of the tap changers required to maintain the voltage at 132KV. (5M)

b) Point out the relations between voltage, power and reactive power at a node for applications in power system control (5M)

OR

18 Draw the block diagram of Automatic voltage regulator and derive its transfer function. Explain its static and dynamic analysis. (10M)

19 Explain the functions of SCADA with neat block diagram. (10M)

OR

20 What is load forecasting? Explain the methods of Load forecasting. Also state its classification and importance. (10M)