

Code No: 157SW

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD**B. Tech IV Year I Semester Examinations, January/February - 2023****POWER SYSTEM OPERATION AND CONTROL****(Electrical and Electronics Engineering)****Time: 3 Hours****Max. Marks: 75****Note:** i) Question paper consists of Part A, Part B.

ii) Part A is compulsory, which carries 25 marks. In Part A, Answer all questions.

iii) In Part B, Answer any one question from each unit. Each question carries 10 marks and may have a, b as sub questions.

PART – A**(25 Marks)**

- 1.a) What is load flow analysis? [2]
- b) Give the significance of slack bus in load flow analysis. [3]
- c) Draw the incremental fuel rate curve and give its definition. [2]
- d) Define economic dispatch of load. [3]
- e) What are the features of an uncontrolled system? [2]
- f) Obtain the transfer function of a turbine model. [3]
- g) Define steady state stability and dynamic stability. [2]
- h) Explain equal area criterion on stability. [3]
- i) What is data acquisition? [2]
- j) What are the different operating states of a power system? [3]

PART – B**(50 Marks)**

- 2.a) Using generalized algorithm expressions for each case of analysis explain the load flow studies procedure, as per the G-S method for power system having PQ and PV buses, with reactive power generations constraints.
- b) Give the limitations of G-S method and its applications. [6+4]

OR

- 3.a) Explain briefly about fast decoupled load flow solution method for solving for the non linear load flow equations.
- b) Explain the representation of transformer with fixed tap changing during the load flow studies. [6+4]
- 4.a) A generator is supplying a load. An incremental change in load of 4MW requires a generation to be increased by 6MW. The incremental cost at the plant bus is Rs 30/MWh. What is the incremental cost at the receiving end?
- b) Derive the necessary conditions for optimal operation of thermal power plants with the transmission losses considered. [4+6]

OR

- 5.a) Derive the transmission loss formula with suitable assumptions.
- b) What is the basic criterion for economical division of load between units within a plant? [5+5]

- 6.a) Explain about static response of two area system with both uncontrolled and controlled cases.
b) Give the steady state analysis of a free governor operation. [6+4]

OR

7. With the help of block diagram, explain the load frequency control and economic dispatch control for a single area system. [10]

- 8.a) Find the maximum steady state power capability of a system consisting of a generator equivalent reactance of 0.4pu connected to an infinite bus through a series reactance of 1.0pu. The terminal voltage of the generator is held at 1.10pu and the voltage of the infinite bus is 1.0pu.

- b) Derive the swing equation. [4+6]

OR

- 9.a) A synchronous generator, capable of developing 500MW power per phase, operates at a power angle of 8° . By how much can the input shaft power be increased suddenly without loss of stability? Assume that P_{max} will remain constant.

- b) Explain the methods to improve transient state stability. [6+4]

- 10.a) Briefly discuss about various functions of energy control centre.

- b) Write a short note on SCADA functions and its importance. [5+5]

OR

11. Discuss the importance of load forecasting in power systems and explain various techniques of forecasting. [10]

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