



P.E.S. College of Engineering, Mandya - 571 401

(An Autonomous Institution affiliated to VTU, Belagavi)

Eighth Semester, B.E. - Electrical and Electronics Engineering

Semester End Examination; July / August - 2022

Power System Operation and Control

Time: 3 hrs

Max. Marks: 100

Course Outcomes

The Students will be able to:

CO1: Understand about computer control centers to control power systems, timeline power flow, frequency deviation.

CO2: Design and develop different system models to Load-Frequency control, Single area control and two area control methods.

CO3: Understand the different methods of controlling voltage, Different methods inject reactive power and working of tap changing transformer in voltage control.

CO4: Understand the need of unit commitment and different constraints in unit commitment.

CO5: Study about power system security, different methods to get the solution of network problems

Note: I) PART - A is compulsory. **Two** marks for each question.

II) PART - B: Answer any **Two** sub questions (from a, b, c) for Maximum of **18 marks** from each unit.

Q. No.	Questions	Marks	BLs	COs	POs
I : PART - A		10			
I a.	Mention the objectives of automatic generation control	2	L1	CO1	PO1
b.	Mention the basic control loops of a generator.	2	L1	CO2	PO1,2
c.	What are the sources of reactive power?	2	L1	CO3	PO1
d.	Distinguish between the problem of economic dispatch and unit commitment.	2	L1	CO4	PO1
e.	List out the security level of power system.	2	L1	CO5	PO1
II : PART - B		90			
UNIT - I		18			
1 a.	Write a note on area control error.	9	L2	CO1	PO1,2
b.	With a block diagram, describe typical digital computer control and monitoring for power system.	9	L2	CO1	PO1,2
c.	Explain the parallel operation of generators.	9	L2	CO1	PO1,2
UNIT - II		18			
2 a.	Derive the mathematical model of speed governing system.	9	L2	CO2	PO1
b.	Derive the ALFC mathematical model of turbine and generator load model.	9	L3	CO2	PO1
c.	With block diagram, explain load frequency of two area system.	9	L2	CO2	PO1
UNIT - III		18			
3 a.	Consider a single phase 220 kV line of length 200 km. The resistance per km is 0.3 Ω and the reactance per km is 0.32 Ω . Compute the sending end voltage with accurate and approximate formulae if the	9	L3	CO3	PO1,2

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|--|---|----|-----|-----|
| b. Explain voltage control method using tap changing transformer. | 9 | L2 | CO3 | PO1 |
| c. Derive the relationship between the voltage at the receiving end and the reactive power in terms of the short circuit strength. | 9 | L2 | CO3 | PO1 |

UNIT - IV**18**

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|--|---|----|-----|-------|
| 4 a. Interpret the algorithm used for priority list method of unit commitment. | 9 | L2 | CO4 | PO1,2 |
| b. Enumerate the need and importance of unit commitment. | 9 | L2 | CO4 | PO1 |
| c. Explain spinning reserve constraint in unit commitment. | 9 | L2 | CO4 | PO1 |

UNIT - V**18**

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|---|---|----|-----|-----|
| 5 a. Explain the factors affecting the power system security. | 9 | L2 | CO5 | PO1 |
| b. Explain AC power flow security analysis with flowchart. | 9 | L2 | CO5 | PO1 |
| c. Explain 1P1Q method for contingency ranking. | 9 | L2 | CO5 | PO1 |

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