Total No. of Questions: 6 *Total No. of Printed Pages:3*

Enrollment No.....

Faculty of Engineering

End Sem (Odd) Examination Dec-2022

EE3CO12 / EX3CO12 Power System -II

Programme: B.Tech. Branch/Specialisation: EE/EX

Duration: 3 Hrs. **Maximum Marks: 60**

Note: All questions are compulsory. Internal choices, if any, are indicated.Answers of Q.1 (MCQs) should be written in full instead of only a, b, c or d.

Q.1 i. Phase shifting transformer are used for- **1**

(a) Reactive power flow control (b) Real power flow control

(c) Voltage control (d) Frequency control

ii. Z bus is a- **1**

(a) Sparse matrix (b) Dense matrix

(c) Unity matrix (d) None of these

iii. Slack bus is needed in power studies because- **1**

(a) Losses are not known

(b) Real power load is not known

(c) Voltage at PV bus is not known

(d) Power angle at slack bus is not known

iv. In a two plant system, the load is connected to plant no. 2. The loss co-efficient are- **1**

(a) B_{11}, B_{12}, B_{22} are nonzero

(b) B_{11} is nonzero but B_{12} and B_{22} are zero

(c) B_{11} and B_{12} are nonzero but B_{22} is zero

(d) B_{11} and B_{22} are nonzero but B_{12} is zero

v. Time constant of turbine system, when compared to a generator-load system is generally- **1**

(a) Less (b) More (c) Same (d) None of these

vi. In a two-area case, area control error is- **1**

(a) Change in frequency

(b) Change in tie-line power

(c) Linear combination of both (a) and (b)

(d) None of these

P.T.O.

vii. The main function of pilot exciter in larger alternator is- **1**
(a) Driving DC auxiliaries
(b) Battery charging
(c) Exciting field winding of the main alternator
(d) Exciting field winding of the main exciter

viii. Alternators are usually designed to generate which type of AC voltage- **1**
(a) With fixed frequency (b) With variable frequency
(c) Fixed current (d) Fixed power factor

ix. Method to improve the steady state stability of the synchronous generator for a better performance- **1**
(a) Increasing the excitation (b) Increasing reactance
(c) Decreasing moment of inertia (d) Increasing moment of inertia

x. If there are two machines having moment of inertia M1 and M2, where M1<M2; The possible number of equivalent moment of inertia will be- **1**
(a) 1 (b) 2 (c) 3 (d) 4

Q.2 i. Write features of phase shifting transformer. **3**
ii. Suggest and explain the formation of Y bus matrix using the singular transformation method. **7**
OR iii. Classify the advantages and problems in interconnected and deregulated power systems. (Four each) **7**

Q.3 i. Compare any three load flow solution methods. **3**
ii. Outline FDLF method for load flow study. Also write two advantages and two disadvantages. **7**
OR iii. Formulate the exact coordination equation method for the solution of economic dispatch problem. **7**

Q.4 i. Classify the area control error in single-area and two-area power systems? **3**
ii. Two generators rated 200 MW and 400 MW are operating in parallel. The drop characteristics are 4 percent and 5 percent respectively. Assuming that the generators are operating at 50 Hz at no load. Evaluate the load shared by two generators for a total load of 500 MW. Evaluate the system frequency? Assume free governor action. **7**

OR iii. Generate and explain the proportional plus integral control for load frequency control for a single area system. Also draw the block diagram. **7**

Q.5 i. Classify voltage control according to production & absorption of reactive power in power network. **3**
ii. Derive for the transfer function of AVR system. Also, draw the block diagram. Explain the same. **7**
OR iii. Explain and appraise in detail the static excitation system for alternator with block diagram. **7**

Q.6 Attempt any two:
i. Differentiate between steady state, dynamic and transient stability. **5**
ii. Explain equal area criteria for transient stability analysis. **5**
iii. A synchronous generator of reactance 1.2 pu is connected to an infinite bus bar ($|V|$=1.0 pu) through transformers and a line of total reactance of 0.60 pu. The generator no load voltage is 1.2 pu and its inertia constant is H= 4 MW-s/MVA. The system frequency is 50 Hz. Neglect damping and resistive losses. **5**
Evaluate the frequency of natural oscillations if the generator is loaded to 50% of its maximum power limit.

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Marking Scheme

EE3CO12 / EX3CO12 Power System -II

Q.1	i.	(b) Real power flow control	1 Mark	**1**
	ii.	(b) Dense matrix	1 Mark	**1**
	iii.	(a) Losses are not known	1 Mark	**1**
	iv.	(b) B_{11} is nonzero but B_{12} and B_{22} are zero	1 Mark	**1**
	v.	(a) Less	1 Mark	**1**
	vi.	(c) Linear combination of both (a) and (b)	1 Mark	**1**
	vii.	(d) Exciting field winding of the main exciter	1 Mark	**1**
	viii.	(a) With fixed frequency	1 Mark	**1**
	ix.	(a) Increasing the excitation	1 Mark	**1**
	x.	(c) 3	1 Mark	**1**
Q.2	i.	Three features	1 Mark each (1 Mark*3)	**3**
	ii.	Diagram	2 Marks	**7**
		Incidence matrix	2 Marks	
		Final answer	3 Marks	
OR	iii.	Advantages	3.5 Marks	**7**
		Problems	3.5 Marks	
Q.3	i.	Comparison any three	1 Mark each (1 Mark*3)	**3**
	ii.	Derivation of FDLF method	4 Marks	**7**
		Advantages and disadvantages (Two each)	3 Marks (1.5 Marks*2)	
OR	iii.	ITL derivation	2 Marks	**7**
		Final derivation of exact coordination equation	5 Marks	
Q.4	i.	Classification of the area control error	3 Marks	**3**
	ii.	Calculation of load shared by two generators (G_1 & G_2)	5 Marks	**7**
		Evaluate the system frequency	2 Marks	
OR	iii.	Block diagram	3 Marks	**7**
		Explanation with equation	4 Marks	
Q.5	i.	Classification	1 Mark each (1 Mark*3)	**3**
	ii.	Block diagram	2 Marks	**7**
		Derivation (Equation)	5 Marks	
OR	iii.	Block diagram	2 Marks	**7**
		Explanation with Equation	5 Marks	
Q.6		Attempt any two:		
	i.	Difference	5 Marks	**5**
	ii.	Diagram	2 Marks	**5**
		Formulation	3 Marks	
	iii.	Calculation of M	2 Marks	**5**
		Calculation of frequency	3 Marks	

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