7E7045

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7E7045

B. Tech. VII Sem. (Main / Back) Exam., Nov. – Dec. - 2018
Electrical & Electronics Engineering
7EX5A Power System Engineering
Common with EE, EX

Time: 3 Hours

Maximum Marks: 80
Min. Passing Marks: 26

Instructions to Candidates:

*Attempt any **five questions**, selecting **one question** from **each unit**. All questions carry equal marks. Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly.*

Units of quantities used/calculated must be stated clearly.

Use of following supporting material is permitted during examination. (Mentioned in form No. 205)

1. NIL

2. NIL

UNIT- I

Q.1 (a) Determine the transmission loss formula for a system having two generators. [8]

(b) Derive and discuss the condition for economic loading of a generating plant considering losses of transmission line. [8]

OR

Q.1 (a) Discuss all types of system constraints in detail. [8]

(b) For a power system having two generating stations, the B-Coefficients are:- [8]

$B_{11} = 0.001 MW^{-1}$, $B_{12} = -0.0005 MW^{-1}$, $B_{22} = 0.0024 MW^{-1}$

The incremental costs of two stations are-

$$\frac{dc_1}{dP_1} = 0.08\,P_1 + 16 \text{ Rs/MW-hr.}$$

$$\frac{dc_2}{dP_2} = 0.08\,P_2 + 12 \text{ Rs/MW-hr.}$$

Calculate economic outputs of the generating stations P_1 and P_2 for λ=20. Also calculate the transmission losses and load demand for this value of λ.

UNIT- II

Q.2 (a) Derive the formula of synchronizing power coefficients. [8]

(b) A 50 Hz, 4 pole, 100 MVA generator has an inertia constant of 8MJ/MVA. Calculate the rotor acceleration, if the mechanical input to the generator is suddenly increased to 80MW for an electrical load of 50MW. If the acceleration is maintained for 10 cycles, calculate change in rotor angle and rotor speed in rpm at the end of this period. [8]

OR

Q.2 (a) *Differentiate* between steady state and dynamic stability limits. [6]

(b) A 200 MVA, 4 pole, 50Hz generator has a moment of inertia(J) 4×10^3kg-m^2. Calculate the energy stored in the rotor at rated speed. Also calculate the inertia constant (H) and angular momentum of the rotor at rated speed. [10]

UNIT- III

Q.3 (a) Explain all the factors affecting steady state and transient stability limits. Also discuss various methods to improve steady state and transient stability limits separately. [8]

(b) Define critical clearing angle and critical clearing time. Derive formula for critical clearing angle. [8]

OR

Q.3 (a) Derive the formula of critical clearing time. [8]

(b) Explain the equal area criterion. Also illustrate the application of equal area criterion to study transient for sudden increase in input of generator. [8]

UNIT- IV

Q.4 (a) Describe in detail the working of DC-excitation system. [8]

(b) Write short notes on-

(i) Reserve capacity of power stations [2]

(ii) Cold reserve [2]

(iii) Hot reserve [2]

(iv) Spinning reserve [2]

OR

Q.4 (a) Write advantages and problems of inter-connected power stations. [8]

(b) Describe in detail the working of AC type rotating thyristor excitation syste

UNIT- V

Q.5 (a) Explain the phase angle control and phase shifting transformer with their applications. [8]

(b) Explain the use of series compensated transmission lines. Write the advantages and problems related to series compensation. [8]

OR

Q.5 (a) Discuss about the perfect location of series capacitor on transmission line. Which equipment is used for the protection of capacitor? [8]

(b) Write short notes on-

(i) Power system security [4]

(ii) Voltage stability [4]
