7E7045

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B. Tech. VII Sem. (Main/Back) Exam., Nov.-Dec.-2016
Elect. Electronics Engineering
7EE5A Power System Engineering

Time: 3 Hours

Maximum Marks: 80
Min. Passing Marks Main: 26
Min. Passing Marks Back: 24

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

     (b) Draw an discuss input output curve for thermal generating unit. [8]

OR

Q.1 (a) Determine the equation of incremental transmission loss penalty factor. [8]

     (b) Assume that the loss coefficients in 1/mw of a power system having two generating stations are: [8]

i	j	B ij
1	1	0.0015
1	2	-0.0005
2	2	0.0025

And the incremental costs of two stations are:

$$dC_1 / dP_1 = 0.01 P_1 + 2.0$$

$$dC_2 / dP_2 = 0.01 P_2 + 1.5$$

Calculate the economic output of the generating stations P1 and P2 for $\lambda = 2.6$. Also calculate the transmission losses and the load demand for this value of λ.

UNIT – II

Q.2 (a) What are power angle curves, how would you explain its function in steady state and transient conditions. [8]

(b) A 4- pole, 50 Hz turbo alternator is rated 45 MW 0.8 pf lag and has inertia of 25000 kg-m². It is connected through a transmission line to another set whose corresponding data is 2-pole, 60 MW, 50 Hz, 0.75pf lag, 3000 kg-m². Find inertia constant of each machine on its own rating and that of single equivalent set connected to an infinite bus and a base of 100 MVA. [8]

OR

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

(b) Find out the coherent condition and non-coherent condition in swing equation for a group. [8]

UNIT – III

Q.3 (a) Explain the equal area criteria, also illustrate by help of suitable diagram application of equal area criterion to study transient for the sudden increase in input of the generator. [8]

(b) What are the factors which affects power system stability and methods to improve stability? [8]

OR

Q.3 (a) Find out equation for critical cleaning angle if an auto reclose circuit breaker is used in a system having two transmission in parallel and a fault occurs at the mid point of one of the parallel lines. [8]

(b) For the system shown in figure, both the terminal voltage and infinite bus voltage are 1.0 pu and the generator is delivering 1.0 pu power. Calculate the critical clearing angle and the critical clearing angle and the critical clearing time when the system is subjected to a 3-phase fault at point p (middle of the line) as shown in figure. Let H = 5MJ/MVA [8]
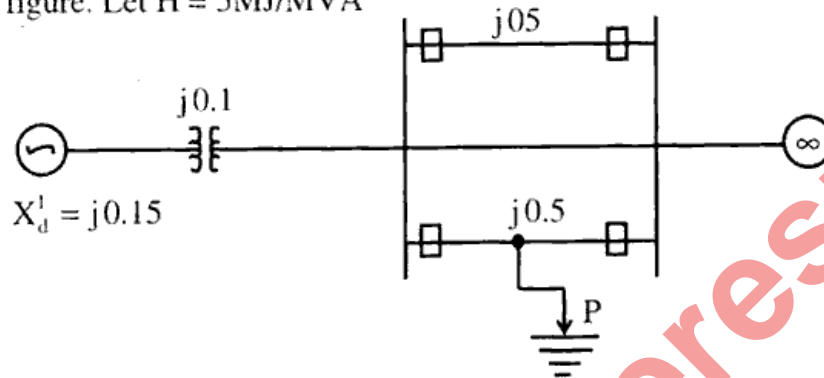
UNIT – IV

Q.4 (a) Explain use and working of excitation system in synchronous machines. [8]

(b) Describe briefly about brushless excitation system in electrical machine. [8]

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Q.4 (a) What are the spinning and maintenance reserve capacities? Explain how the reserve capacity of power station is decided. [8]

(b) Explain the rotating thyristor excitation scheme with its block diagram. [8]

UNIT – V

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

(b) What is the protection of series capacitors? Explain advantages and related with it. [8]

OR

Q.5 Write notes on following: [5+5+6=16]
(a) Power System security.
(b) Voltage instability.
(c) Series compensation.