B.Tech Degree VII Semester Special Supplementary Examination June 2012

EE 703 POWER SYSTEM II

(*2006 Scheme*)

Time : 3 Hours Maximum Marks : 100

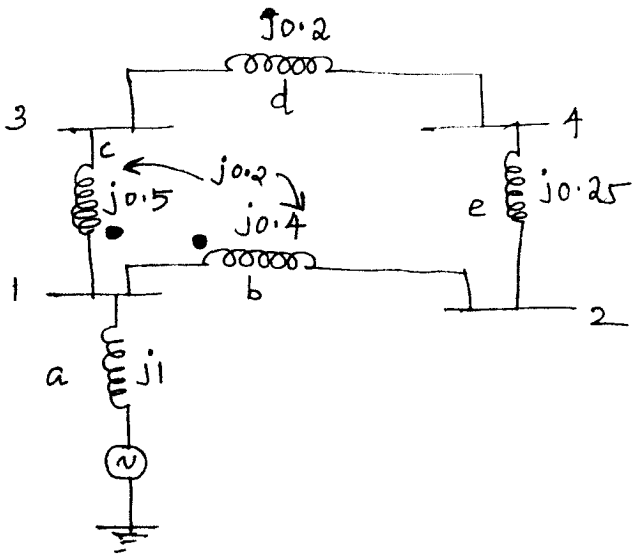
PART A

(Answer *ALL* questions)

(8 × 5 = 40)

I. (a) What do you mean by per unit quantity? What are the advantages of per unit system?

(b) Figure shows a system with one source and four lines. The reactance of source and lines are as shown. Lines *c* and *b* are mutually coupled through a reactance of j 0.2 p.u. Formulate bus admittance matrix.



(c) What do you mean by load dispatching? What are the different system constraints to be noted for economic load dispatch?

(d) Briefly explain the principle of automatic voltage regulation.

(e) What do you mean by positive, negative and zero sequence networks?

(f) Distinguish between symmetrical and unsymmetrical faults. List the steps in symmetrical fault calculations.

(g) Distinguish between steady state and transient stability. Transient stability limit is lower than steady statistability limit. Why?

(h) Explain the concept of equal area criterion. How can it be used to study transient stability?

(P.T.O)

PART B

$(4 \times 15 = 60)$

II. With flow chart, explains fast decoupled method for load flow analysis. (15)

OR

III. With flow chart, explain Gauss-Seidel method for load flow analysis. (15)

IV. With transfer function model, explain the principle of IEEE type I excitation system. (15)

OR

V. A 100 MVA, 50Hz alternator is operating at rated speed. The inertia constant of the machine is 5 KW sec/KVA. The load suddenly increases by 50 MW. Due to delay in governor action, there is a delay of 0.6 sec in opening of steam valve. Find frequency deviation. (15)

VI. (a) Show that positive and negative sequence currents are equal in magnitude but out of phase by 180° in a line to line fault. Draw diagram showing interconnection of sequence networks for this type of fault. (10)

(b) In what respects are the fault calculations, for a fault on the alternator terminals different from the fault calculations for a fault in a power system network. (5)

OR

VII. A 33 KV bus bar has a 3 phase fault level of 1000 MVA. The negative and zero sequence source reactances are 2/3 and 1/3 of positive sequence reactance. The zero sequence source resistance is 60Ω. A 30 MVA, 33/132 KV solidly grounded Δ/Y transformer having reactance of 1 p.u. is fed from 33 KV bus. Find fault current and fault MVA at 132 KV bus for following faults. (i) 3 phase (ii) single line to ground (iii) line to line (iv) double line to ground. (15)

VIII. (a) A 4 pole, 50 Hz turbo alternator is rated 45MW, 0.8 pf lag and has an inertia of 25000 Kg-m^2. It is connected through a transmission line to another set whose corresponding data is 2 pole, 60MW, 50 Hz, 0.75 pf lag, 9000 Kg-m^2. Find the inertia constant of each machine on its own rating and that of single equivalent set connected to an infinite bus on a base of 100 MVA. (10)

(b) What are the advantages of HVDC transmission? (5)

OR

IX. (a) Starting from first principle, derive swing equation of a synchronous machine. Define inertia constant. (8)

(b) Explain critical clearing angle. Derive an expression for critical clearing angle. (7)

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