

M.Tech. (Electrical Power System) Regular-Semester 2012- Sem II
EP203-A - Elective-II : Computer Applications in Power Systems

Time : Three Hours

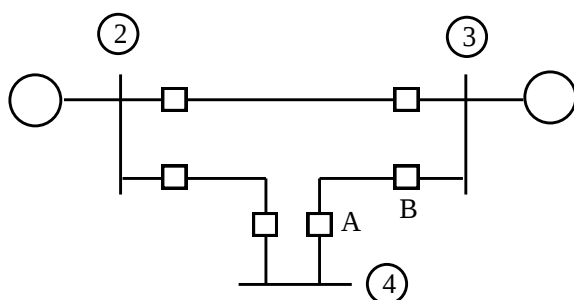


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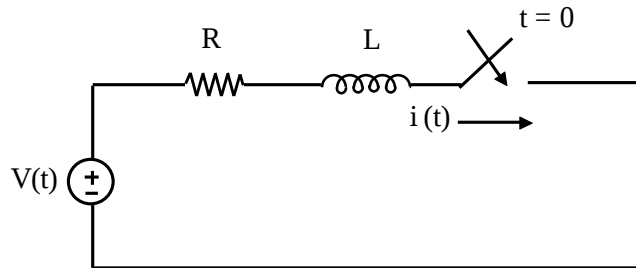
Max. Marks : 70

- Notes :
1. All questions carry equal marks.
 2. Answer **five** questions.
 3. Due credit will be given to neatness and adequate dimensions.
 4. Assume suitable data wherever necessary.
 5. Illustrate your answers wherever necessary with the help of neat sketches.

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|----|--|--------------------------|
| 1. | Develop the expressions for formation of three phases ZBUS for the element which is added between two existing buses in a partial network. | 14 |
| 2. | Derive the expressions for Bus admittance and impedance matrices by singular transformation. | 14 |
| 3. | Describe the procedure of modification of Zbus by adding mutually coupled branch from existing buses (p) and (k). | 14 |
| 4. | a) Write a detail note on tap-changing and regulating transformer. | 7 |
| | b) Explain the primitive network three phase representation of a component in impedance form. | 7 |
| 5. | a) What is the importance of swing Equation in determining the stability of the system. | 7 |
| | b) Using the relations between interconnected and primitive network variables prove the following. | 7 |
| | a) $A_b k^t = U$ | b) $B_\ell = A_\ell k^t$ |
| 6. | Explain algorithm for load flow solution using Gauss Siedel method. | 14 |
| 7. | Using symmetrical components, calculate the following for a three – phase fault at bus 4. | 14 |
| | i) Total fault current. | |
| | ii) Short circuit currents in all the lines of the network. | |
| | iii) Bus voltages during the fault. | |



- 8 a) In the circuit of figure. let $R = 0.125 \, \Omega$, $L = 10 \, \text{mH}$, and the source voltage be given by $v(t) = 151 \sin(377t + \alpha)$. Determine the current response after closing the switch for the following cases.
- a) No dc offset.
- b) For maximum dc offset.



- b) A three- phase, 60-Hz synchronous machine is driven at constant synchronous speed by a prime mover. The armature windings are initially open – circuited and field voltage is adjusted so that the armature terminal voltage is at the rated value (i.e., 1.0 per unit). The machine has the following per unit reactances and time constants.

$$X_d'' = 0.15 \text{ pu} \quad T_d'' = 0.035 \text{ sec}$$

$$X_d' = 0.40 \text{ pu} \quad T_d' = 1.0 \text{ sec}$$

$$X_d = 1.20 \text{ pu}$$

Determine the steady state, transient and subtransient short circuit currents.
