Total No. of printed pages = 4

EI 181501

Roll No. of candidate | | | | | | | | | | |

17/7/22 2021

B.Tech. 5th Semester End-Term Examination

EE

POWER SYSTEM –II

(New Regulation & New Syllabus)

Full Marks – 70 Time – Three hours

The figures in the margin indicate full marks for the questions.

Answer question No. 1 and any *five* from the rest.

1. (a) Choose the correct answer: (10 × 1 = 10)

(i) The maximum possible short circuit current on a transmission line occurs

(a) when voltage wave is going through zero

(b) when voltage wave is going through 90 degree

(c) when the short circuit and system voltage is in same phase

(d) when the voltage is maximum

(ii) Which of the following is a sparse matrix:

(a) Jacobian matrix (b) Y bus matrix

(c) Both of these (d) None of these

(iii) On slack bus ———— and ———— are specified:

(a) Voltage Magnitude, Real power

(b) Voltage Magnitude, Phase angle

(c) Active, Reactive power

(d) Active power, phase angle

(iv) The quantity H in the swing equation is:

(a) Kelvin constant

(b) Motion of synchronous motor/3.55

(c) Inertia constant

(d) None of these

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(v) A balanced three phase system consists of

(a) zero sequence current only

(b) positive sequence current only

(c) positive, negative and zero sequence currents

(d) only negative sequence current

(vi) What happens if the neutral is not grounded in case of LG fault

(a) Only the zero sequence impedance would be zero

(b) The zero sequence impedance will be infinite

(c) Fault current will be zero

(d) Both (b) & (c)

(vii) What is the main drawback in NR method of Load flow

(a) Slow in convergence

(b) A large memory locations are needed to store the Jacobian matrix elements

(c) The number of iterations is more

(d) None of these

(viii) It is always economical and desirable to improve the power factor of an installation in a power system to

(a) Zero

(b) Unity

(c) Less than unity

(d) More than unity on the leading side

(ix) The load factor plays a key role in determining which among the following?

(a) Plant capacity.

(b) Overall cost per unit generated

(c) Overall demand

(d) Both (a) and (c)

(x) Neutral earthing is provided for

(a) Safety of equipment and personal against the lightning and voltage surges

(b) Reducing the voltage stress on line and equipment with respect to earth under various operating and fault conditions

(c) Controlling the earth fault current for protective relaying

(d) Both (a) and (c)

(b) Answer any 5 (five) parts $(5 \times 2 = 10)$

(i) Define oriented graph, tree, branch and link in respect to power system analysis

(ii) What are the advantages of per unit calculation

(iii) Write the transformation matrix for conversion of phase components to symmetrical components of a 3 phase quantity in power system

(iv) What do you mean by steady state stability

(v) Draw the zero sequence networks of (1) Delta to grounded star and (2) Star to grounded star transformers

(vi) What are the purposes of load flow analysis of a power system

(vii) Compare NR method of load flow analysis with GS method of load flow analysis

(viii) Write the swing equation and explain the various terms of it in respect to stability studies of power system

2. (a) Define load factor, diversity factor, utilization factor (3)

(b) Compare base load and peak load plant (2)

(c) Why is it necessary to improve the power factor of an installation of power system? Explain a method of power factor improvement for an installation (5)

3. (a) What is an unbalanced network? Derive the expression for the sequence currents when there is an LG fault. (5)

(b) What are the advantages of per unit system in power system analysis? (3)

(c) What are the different types of fault that may occur in a power system? Which fault is supposed to be most frequent? (2)

4. For the system shown in Fig Q4, the values are labeled in diagram. A solidly grounded fault occurs at bus G. Before the fault the motor is loaded to 15 MW at 10 kV, 0.8 leading pf. If pre-fault current is neglected, calculate the fault current in the system. (10)

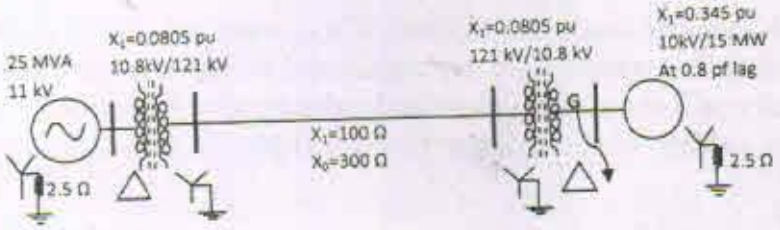

Fig Q4

5. (a) Explain the differences between grounding and earthing in a power system. (4)

(b) Explain the method of arc suspension (resonant) grounding and derive the value of L of the arc suppression coil. (6)

6. For the network shown in Fig Q6, find the bus incident matrix and basic loop incidence matrix. Using the bus-incidence matrix and primitive admittance matrix derive the bus admittance matrix. (10)

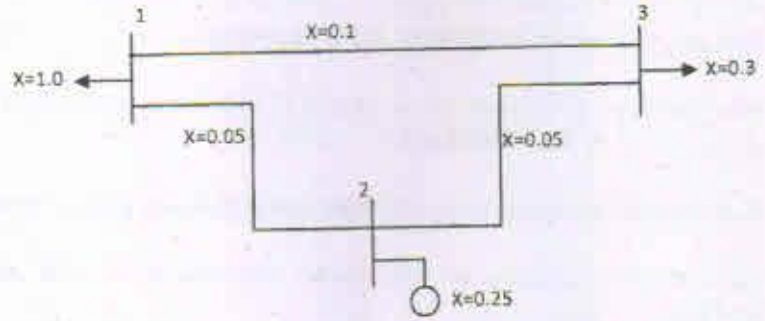

Fig Q6

7. (a) Mention the various methods of Y-bus formation of a network and briefly explain any of these. (4)

(b) Explain the algorithm for G-S method of load flow analysis. (6)

8. For the network shown in Fig Q8 obtain one iteration for N-R method of load flow. (10)

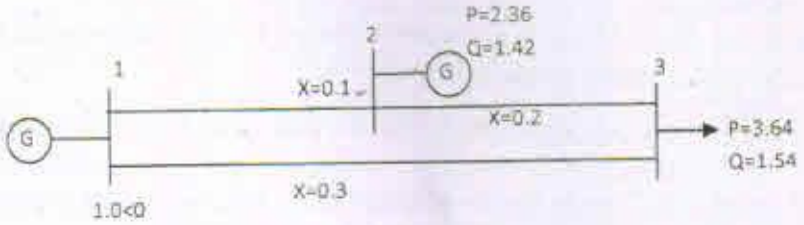

Fig Q8

9. (a) Explain the equal area criterion for transient stability study of a power system. (4)

(b) Find the steady state power limit of a system consisiting of a generator of equivalent reactance 0.50 pu connected to an infinite bus through a series reactance of 1.0 pu. The terminal voltage of the generator is held at 1.20 pu and the voltage of the infinite bus is 1.0 pu (6)