Enrollment No: _____ Exam Seat No: _____

C.U. SHAH UNIVERSITY
Winter Examination-2022

Subject Name: Power System Analysis

Subject Code: 4TE06PSA1 Branch: B.Tech (Electrical)

Semester: 6 Date: 20/09/2022 Time: 11:00 To 02:00 Marks: 70

Instructions:

(1) Use of Programmable calculator & any other electronic instrument is prohibited.
(2) Instructions written on main answer book are strictly to be obeyed.
(3) Draw neat diagrams and figures (if necessary) at right places.
(4) Assume suitable data if needed.

Q-1 Attempt the following questions: (14)

a) If the effect of earth is taken into account, then the capacitance of line to ground
(a) Decreases
(b) Increases
(c) Remains unaltered
(d) Becomes infinite

b) Fault level means
(a) Voltage at fault point
(b) Fault current
(c) Fault power factor
(d) Fault MVA

c) Fault calculation using computer are usually done by
(a) YBUS method
(b) ZBUS method
(c) None of above
(d) Any of above

d) A short circuit current is identified by
(a) Heavy current flow
(b) Voltage rise
(c) Voltage drop
(d) None of above

e) Which of the following results in a symmetrical fault?
(a) Single phase to earth
(b) Phase to phase
(c) All the three phase to earth
(d) Two phase to earth

f) The maximum short circuit current occurs in the case of
(a) Three phase fault
(b) Double line to ground fault

(c) Line to line fault
(d) Single line to ground fault

g) The most common type of fault is
(a) Phase to ground
(b) Phase to phase
(c) Two phase to ground
(d) Three phase to ground

h) The slack bus has to be a
(a) P-Q bus
(b) P-V bus
(c) Q-V bus
(d) No constraint

i) The value of expression $1 + \alpha + \alpha^2$
(a) 0 (b) 1
(c) -1 (d) 2

j) The zero sequence impedance of a synchronous machine is independent of the pitch of the armature coils.
(a) True
(b) False

k) In power system, the maximum number of buses are
(a) Generator buses (b) Load buses
(c) Slack buses (d) P-V buses

l) Write importance of Power system analysis.

m) Write equation of positive, negative sequence components.

n) Classify transmission lines.

Attempt any four questions from Q-2 to Q-8

Q-2 **Attempt all questions** **(14)**

a) Give comparison between Gauss Seidal and Newton Raphson load flow study. **(7)**

b) Give basic assumptions taken in Fast decoupled load flow and explain its algorithm by using flow chart. **(7)**

Q-3 **Attempt all questions** **(14)**

a) Define per unit system. State its advantages. Derive the formulae of per unit impedance for the single phase case. **(7)**

b) Draw and explain equal area criterion for stability of power system. **(7)**

Q-4 **Attempt all questions** **(14)**

a) What are the factors, which affect steady state and transient stability of power system? Explain each in details. **(7)**

b) Write short note on Newton-Raphson Method. **(7)**

Q-5 **Attempt all questions** **(14)**

a) With usual notations prove that VP= AVS. **(7)**

	b)	Discuss the positive sequence network and negative sequence network of a synchronous generator.	**(7)**
Q-6		**Attempt all questions**	**(14)**
	a)	Derive Network Model for Four bus structure Power System having generator at each bus.	**(7)**
	b)	Draw the zero sequence component for the following configuration of 3 phase transformers. (i) Star ungrounded- star grounded (ii) Star grounded- Star grounded (iii) Star grounded – Delta (iv) Delta – Delta.	**(7)**
Q-7		**Attempt all questions**	**(14)**
	a)	Derive the r+1 iteration of Voltage of ith bus using a Gauss Siedel Method when system contains n buses in the power system and all the buses are of type PQ bus.	**(7)**
	b)	Write a note on swing equation.	**(7)**
Q-8		**Attempt all questions**	**(14)**
	a)	Derive the value of Current Ia_1 when a three phase transmission line is subjected to single line to ground fault.	**(7)**
	b)	Briefly explain the classification of bus for load flow study.	**(7)**