VASAVI COLLEGE OF ENGINEERING (AUTONOMOUS), HYDERABAD
Accredited by NAAC with A++ Grade
B.E. (E.E.E.) VI-Semester Advance Supplementary Examinations, August-2022
Power Systems-II

Time: **3 hours**

Max. Marks: **60**

Note: Answer all questions from Part-A and any FIVE from Part-B

Part-A (10 × 2 = 20 Marks)

Q. No.	Stem of the question	M	L	CO	PO
1.	What are the means to reduce loss due to corona effect?	2	1	1	1
2.	Interpret the equivalent-π representation of a long transmission line and write the network equations.	2	2	1	1
3.	List the advantages of per unit system.	2	1	2	1
4.	Explain the classification of buses for load flow studies.	2	2	2	1
5.	Write about generator transient and sub transient reactance.	2	1	3	1
6.	What is Zbus? Identify is its use in fault studies?	2	3	3	1
7.	Explain the use of sequence components in fault studies?	2	2	4	1
8.	Construct the interconnection of sequence networks for a single line to ground fault.	2	3	4	1
9.	What is the expression for refracted voltage for a wave travelling from a line of impedance Z1 to cable of impedance Z2.	2	2	5	1
10.	State the use of Bewley's lattice diagram.	2	1	5	1

Part-B (5 × 8 = 40 Marks)

Q. No.		Stem of the question	M	L	CO	PO
11.	a)	Derive the A, B, C, D constants of medium transmission line in nominal-T configuration.	3	1	1	1
	b)	Determine the efficiency and regulation of a 3-phase, 50 Hz, 150 kms long transmission line having three conductors spaced 3.5 metres delta formation when the receiving end delivers 25 MVA at 120 kV and p.f. 0.9 lagging. The resistance of the conductor is 0.25 ohm per km and the effective dia is 0.75 cm. Neglect leakance and use (i) nominal-T, (ii) nominal-π methods.	5	3	1	1,2
12.	a)	Derive the necessary equations for Newton Raphson method of Load flow studies using rectangular coordinates.	5	2	2	1
	b)	Form the Y_{BUS} for the following system. The values of line admittances are given.	3	3	2	1,2

Element Number	Bus code	Self Impedance
1	1-2 (1)	0.6
2	1-3	0.5
3	3-4	0.5
4	1-2 (2)	0.4
5	2-4	0.2

Q. No.		Stem of the question	M	L	CO	PO
13.	a)	How can a system consisting of loaded generator or motor be analyzed for a symmetrical fault?	4	3	3	1

			M	L	CO	PO
	b)	A 60-Hz alternating voltage having rms value of 100 V is applied to a series RL circuit by closing a switch. The resistance is 15 Ω and the inductance is 0.12 H. (a) Find the value of the dc component of current upon closing the switch if the instantaneous value of the voltage is 50 V at that time. (b) What is the instantaneous value of the voltage which will produce the maximum dc component of current upon closing the switch?	4	3	3	1,2
14.	a)	Analyze a double line fault with necessary formulations.	4	2	4	1
	b)	A 50 Hz, 13.2 kV, 15 MVA alternator has $X'' = X_2 = 20\%$ and $X0 = 8\%$ and its neutral is grounded through a reactor of 0.5 ohm. Determine the initial symmetrical r.m.s. current in the ground and in line c, when a double line-to-ground fault occurs on phase b and c and the generator voltage is 12 kV before the fault takes place.	4	3	4	1,2
15.	a)	Illustrate the variation of voltage and current waves in a short-circuited line with necessary expressions for coefficients.	4	2	5	1
	b)	A dc source of 120 V with negligible resistance is connected through a switch S to a lossless transmission line having $Zc = 30 \Omega$. The line is terminated in a resistance of 90 Ω. If the switch closes at $t = 0$, plot V_R versus time until $t = 5T$, where T is the time for a voltage wave to travel the length of the line	4	3	5	1,2
16.	a)	What is corona? Determine the critical disruptive voltage and corona loss for a 3-phase line operating at 110 kV which has conductor of 1.25 cm dia arranged in a 3.05 metre delta. Assume air density factor of 1.07 and the dielectric strength of air to be 21 kV/cm.	4	3	1	1
	b)	Illustrate the modelling of a phase shifting transformer for load flow studies.	4	2	2	1
17.		Answer any *two* of the following:				
	a)	Explain short circuit capacity of a bus.	4	1	3	1
	b)	Three 6.6 kV, 12 MVA, 3-phase alternators are connected to a common set of busbars. The positive, negative and zero sequence impedances of each alternator are 15%, 12% and 4.5% respectively. If an earth fault occurs on one busbar, determine the fault current if all the alternator neutrals are solidly grounded.	4	3	4	1,2
	c)	A surge of 100 kV travelling in a line of natural impedance 600 ohms arrives at a junction with two lines of impedances 800 ohms and 200 ohms respectively. Find the surge voltages and currents transmitted into each branch line.	4	3	5	1,2

M : Marks;   L: Bloom's Taxonomy Level;   CO; Course Outcome;   PO: Programme Outcome

i)	Blooms Taxonomy Level – 1	20%
ii)	Blooms Taxonomy Level – 2	31%
iii)	Blooms Taxonomy Level – 3 & 4	49%

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