VASAVI COLLEGE OF ENGINEERING (AUTONOMOUS), HYDERABAD
Accredited by NAAC with A++ Grade
M.E. (E.E.E.) II-Semester Main Examinations, September-2022
Distribution System Planning and Automation
(Power Systems & Power Electronics)

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.	Define i) Contribution factor ii)Load diversity	2	1	1	1,2
2.	A feeder has a system peak of 3000 kVA per phase and a copper loss of 0.5% at the system peak . Determine copper loss of feeder in kilowatt.	2	3	1	1,2
3.	Draw the loop-type sub transmission system?	2	2	2	1,2
4.	A radial feeder of 1 km long is supplying a lumped sum load of 500 kVA with a lagging power factor of 0.9 connected at the end of the feeder. Calculate the percentage voltage drop(K=0.01%VD/kVA-km.	2	3	2	1,2
5.	Define primary distribution system?	2	1	3	1,2
6.	Analyze the design and operation aspects affected by the primary-feeder voltage level?	2	4	3	1,2
7.	Draw the voltage phasor diagrams for a feeder circuit of lagging power factor with and without shunt capacitors?	2	2	4	1,2
8.	Assume that a 2.4kV single-phase circuit feeds a load of 360kW at a lagging power factor and the load current is 200A. Determine the power factor and reactive load?	2	3	4	1,2
9.	Explain the use of remote terminal unit in distribution automation?	2	2	5	1,2
10.	Discuss the advantages and disadvantages of power line carrier communication?	2	2	5	1,2
	Part-B (5 × 8 = 40 Marks)				
11. a)	Explain the factors affecting Load forecast?	4	2	1	1,2
b)	Draw the flow chart for substation site selection procedure?	4	2	1	1,2
12. a)	A square shaped distribution service area is served by four 3 phase 4 wire 2.4/4.16 kV grounded- wye primary feeder. It is supplying a uniformly distributed lagging load of power factor 0.9 and having load density of 1000 kVA/km2.Calculate the following if the feeders are limited by voltage drop of 5%(Assume K= 0.007% VD/kVA-km) (i) Maximum load per feeder (ii) substation size (iii) substation spacing	4	3	2	1,2

			M	L	CO	PO
b)	Draw typical breaker-and-a-half scheme and write their advantages and disadvantages?		4	1	2	1,2
13. a)	Assume that a three-phase 34.5kV radial express feeder is used in rural distribution and that the receiving-end voltages at full load and no-load are 34.5 and 36.9kV respectively. Determine the percent voltage regulation of the feeder?		4	3	3	1,2
b)	Assume that a radial express feeder is used on rural distribution and is connected to a lumped-sum load at the receiving end. The feeder impedance is 01+j0.1 p.u, the sending-end voltage is 1.0 pu, Pr is 1.0 pu constant power load and the power factor at the receiving end is 0.8 lagging. Use the given data and the exact equations for K, Pr and tan☐ and determine the following i) Compute V_r and δ ii) I_r and I_s currents.		4	3	3	1,2
14. a)	Assume that a substation has a bank of three 2000 kVA transformers that supplies a peak load of 7800 kVA at lagging power factor of 0.89.All three transformers have a thermal capability of 120% of the nameplate rating. It has already been planned to install 1000 kVAr of shunt capacitors on the feeder to improve the voltage regulation. Determine the following i) whether or not to install additional capacitors on the feeder to decrease the load to the thermal capability of the transformer? ii) The rating of the additional capacitors?		4	3	4	1,2
b)	Explain the voltage control methods in distribution systems?		4	2	4	1,2
15. a)	Discuss the consumer information services in distribution automation?		4	1	5	1,2
b)	Explain the radio communication used in distribution automation?		4	2	5	1,2
16. a)	Assume that the annual peak load of a primary feeder is 2000 kW, at which the power loss (total copper loss) is 80 kW per three phase. Assuming an annual loss factor of 0.15, determine (i) The average annual power loss and (ii) The total annual energy loss due to the copper losses of the feeder circuits		4	3	1	1,2
b)	Write the voltage drop formula and explain the factors affecting it?		4	2	2	1,2
17.	Answer any *two* of the following:					
a)	Explain the distribution feeder exit with radial type development?		4	2	3	1,2
b)	A 3 phase express feeder has an impedance of 6+j20 Ω . at the load end line to line voltage is 13.8 kV and a total 3 phase power is 1200 kW at a lagging power factot of 0.8. Determine the power factor of the sending end.		4	3	4	1,2
c)	Describe the equipment of distribution automation system?		4	1	5	1,2

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

i)	Blooms Taxonomy Level – 1	21%
ii)	Blooms Taxonomy Level – 2	37%
iii)	Blooms Taxonomy Level – 3 & 4	42%

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