

005501

Jan. 2022
B.Tech(EL) 5th Semester
POWER SYSTEMS-I
(APPARATUS AND MODELLING) (ELPC-501)

Time : 90 Minutes]

[Max Marks : 25

Instructions:

1. *It is compulsory to answer all the questions (1 mark each) of Part-A in short.*
2. *Answer any three questions from Part-B in detail.*

PART-A

1. (a) Define safety factor of insulators. 1
- (b) What is arcing ground phenomenon? 1
- (c) Define corona effect. 1
- (d) What is a surge diverter? What is the basic principle of operation of surge diverter? 1
- (e) Why is regenerator used in gas turbine power plant? 1
- (f) What is the significance of p.u system? 1
- (g) Define string efficiency. 1

- (h) What is skin effect? 1
- (i) Draw the basic architecture of microgrid. 1
- (j) Why cannot diesel power stations be employed to generate bulk power? 1

PART B

- 2. Derive an expression for the fault current for double line to ground fault by symmetrical component method. 5
- 3. (a) Define insulation coordination with the help of a neat sketch, explain the process of drawing the V-T curve where V represents the crest flashover voltage and T is the time to flashover. 2
- (b) Derive an expression for the capacitance of a 1-phase overhead transmission line. 3
- 4. Find the following for a single circuit transmission line delivering a load of 50 MVA at 110 kV & p.f. 0.8 lagging.
 - (i) Sending end Voltage
 - (ii) Sending end current
 - (iii) Sending end power
 - (iv) Efficiency of transmission
 Given $A=D=0.98\angle 30^\circ$, $B=110\angle 75^\circ$ ohm, $C=0.0005\angle 80^\circ$ Siemens. 5

- 5. (a) Find the inductance for a 3-phase transmission line using 1.24 cm diameter conductors when they are placed at the corners of the equilateral triangle of each side 2 m. 3
- (b) Discuss the phenomenon of Current chopping in circuit breaker 2
- 6. (a) Describe Merz price circulating current scheme for the protection of transformer. 2
- (b) In a three phase overhead system, each line is suspended by a string of 3 insulators. The voltage across the top unit (i.e. near the tower) and middle unit are 10 kV and 11 kV respectively. Calculate (i) the ratio of shunt capacitance to self capacitance of each insulator, (ii) the string efficiency and (iii) line voltage. 3