*R20 Regulation* *Subject code:* 3P5BC

# TKR COLLEGE OF ENGINEERING AND TECHNOLOGY

(Autonomous, Accredited by NAAC with 'A' Grade)

## B.Tech V Semester Regular Examinations, January 2023

## POWER SYSTEMS-II

**(Electrical and Electronics Engineering)**

*Maximum Marks: 70* Date:18.01.2023 Duration: 3 hours

Note: 1.This question paper contains two parts A and B.
2. Part A is compulsory which carries 20 marks. Answer all questions in Part A.
3. Part B consists of 5 Units. Answer any one full question from each unit which carries 10M.
4. Each question carries 10 marks and may have a, b, c, d as sub questions.

Part-A

All the following questions carry equal marks (10x2M=20 Marks)

1 List out the advantages of bundled conductors.
2 Write the advantages of double circuit lines.
3 Define regulation and discuss it's significance
4 What is the effect of line length on transmission parameters B and C
5 Differentiate lumped and distributed parameters
6 Define propagation constant and write an expression for it.
7 Define the proximity effect.
8 What is a travelling wave.
9 Discuss the need for stringing chart
10 What is the effect of ice on sag calculations

Part-B

Answer All the following questions. (5X10M=50Marks)

11 Determine the expression for inductance of a 3-phase circuit line with symmetrical spacing. [10]

OR

12 A. Explain the reason why the geometric mean radius of a stranded conductor is less than that of a solid conductor of the same overall diameter.
B. The conductors in a Single – phase transmission line are 6m above the ground. Each conductor is 15 mm diameter and spacing between them is 2.5 m. Calculate i) the capacitance per Km of the line neglecting the effect of Ground. ii) the capacitance per Km of the line taking in to the effect of ground. [5+5]

13 A. Explain the effect of power factor on regulation and efficiency.
B.A three-phase line delivers 3600 kW at a power factor 0.8 lagging to a load. If the sending end voltage is 33 kV, determine i) receiving end voltage ii) line current iii) transmission efficiency. The resistance and reactance of each conductor is 5.31Ω and 5.54Ω respectively. [5+5]

OR

14 A. Draw the vector diagrams of nominal-π of medium transmission line. Derive the expression for voltage regulation.
B. A 3- phase has a series impedance of 300∠750 ohms per phase and shunt admittance of 25×10-4∠900 siemens per phase. The voltage at the receiving end is 220kV but there is no load at receiving end. A load of 100 MW at UPF is connected at the midpoint of the line. Using nominal-π method, find sending end voltage. [5+5]

15 Explain the interpretation of the long line equations. [10]

OR

16 A. Explain the equivalent π method of solution for the performance of long transmission lines? Draw a phasor diagram with the receiving end voltage as reference.

B. Find the network constants of a long transmission line 3 phase, 50 Hz and 150 km long whose resistance per km is 0.2 Ω and inductance per km is 1.5 mH and capacitance per km is 0.008 μF. Neglect the conductance of the line. [5+5]

17 A. Discuss why receiving end voltage of an unloaded long line may be more than the sending end voltage
B. Explain the concepts of incident, reflected and refracted waves in the transmission lines. [5+5]

OR

18 A. Discuss how the line voltage and the line spacing will effects the corona in the lines?
B. Derive the reflection coefficient of a transmission line terminated with resistance. [5+5]

19 A. Derive the expression for the Sag in different levels.
B. Each conductor of a three-phase transmission line is suspended from a cross arm of a steel tower by a string of four suspension insulators. The voltage across the second unit is 15 kV and across the third is 20 kV. Find the voltage between the conductors and the string efficiency. [5+5]

OR

20 A. Explain how the atmospheric conditions will affect the critical disruptive voltage?
B. Discuss about the four types of insulators. [5+5]