Code No: R2031021 **R20** SET -1

III B. Tech I Semester Supplementary Examinations, JULY - 2023

POWER SYSTEMS-II

(Electrical and Electronics Engineering)

Time: 3 hours Max. Marks: 70

Answer any **FIVE** Questions **ONE** Question from **Each unit**
All Questions Carry Equal Marks
*****

UNIT-I

1. a) Explain the effect of electric and magnetic fields on a single conductor system with field line diagram? [7M]
   b) Derive and analyze the expression for capacitance of a three phase system with symmetrical spacing? [7M]

(OR)

2. a) Derive the expression for the inductance per loop per meter length of the single phase system? [7M]
   b) A single phase over head line 28km long consists of two parallel wires each of 0.62 cm diameter, 1.9m apart. If the line voltage is 55kV at 50 Hz, find the charging current when the line is open circuited? [7M]

UNIT-II

3. a) Draw the equivalent circuit and analyze the short transmission line with different power factors? [7M]
   b) Elaborate the equivalent 'T' network of a long transmission line with relevant equations? [7M]

(OR)

4. a) Justify the existence of Ferranti effect on the lightly loaded transmission line? [7M]
   b) A 3 phase 50Hz, 12km transmission line supplying a total load of 888kW at 0.76 power factor lagging and 11kV has r= 0.57 ohms/km, X= 0.9 ohms/km. Determine the line current, receiving end voltage, voltage regulation and efficiency of the transmission? [7M]

UNIT-III

5. a) Derive and describe the propagation of surges through the transmission line network? [7M]
   b) A 200kV, 1.9 micro seconds rectangular surge travels on a line of surge impedance 418 ohms. The line is terminated through a capacitance of 1885pF. Calculate the voltage across the capacitance? [7M]

(OR)

6. a) Obtain the voltage and current magnitude wave of an open ended line? [7M]
   b) Prove the attenuation of current waves when travelled over the transmission lines? [7M]

UNIT-IV

7. a) Derive and analyze the disruptive critical voltage by using air density factor? [7M]
   b) Discuss in detail about the radio interference due to corona by suggesting the remedial measures? [7M]

(OR)

8. a) Derive the visual critical voltage expression for different surfaced conductors? [7M]
   b) A two conductor single phase line of 50Hz has its conductors placed horizontally with a spacing of 4.1cm. A telephone line is supported on the same mast 1.5m below the power line, again with horizontal spacing of 0.6m. Find the voltage induced due to electromagnetic induction in the telephone circuit when the current in the power line is 167A? [7M]

UNIT-V

9. a) High light the standard factors and specifications of mechanical design of transmission lines? [7M]
   b) An over head line has a span of 108m. The diameter of the conductor is 1.18cm. The conductor is coated with ice of 0.88cm thick. The wind pressure is 279 N/m^2 of projected area. The weight of the conductor is 7.4N/m. Given that ice weighs 8232 N/m^3 and the permissible tension is $2.7*10^4$ N. Determine the sag at the midpoint? [7M]

(OR)

10. a) Analyze the vertical sag by considering wind effect with phasor diagram? [7M]
    b) Draw neat diagram and explain the Pin type insulator with applications? [7M]