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**SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY:: PUTTUR**  
(AUTONOMOUS)

**B.Tech III Year I Semester Supplementary Examinations Feb-2021**

**ELECTRICAL POWER TRANSMISSION SYSTEMS**

(Electrical and Electronics Engineering)

Time: 3 hours

Max. Marks: 60

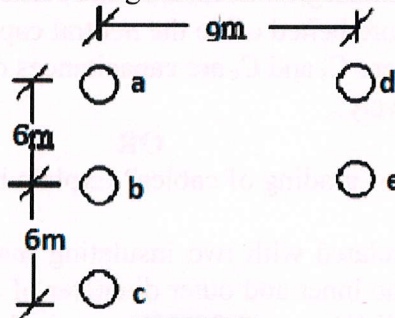
(Answer all Five Units 5 x 12 = 60 Marks)

**UNIT-I**

- 1 a Derive the expression for capacitance of a single phase two-wire line system. 6M  
 b Calculate the Inductance and capacitance of a 100km long 3- phase, 50Hz overhead transmission line consisting of 3 conductors, each of diameter 2 cm and spaced 2.5 m at the corners of an equilateral triangle. 6M

OR

- 2 a Clearly explain what you understand by GMR and GMD of a transmission line. 6M  
 b Determine the inductance of a single phase transmission line consisting of three conductors of 2.5mm radii in the GO conductors and two conductors of 5mm radii in the RETURN conductors. The configuration of the line is as shown in figure bellow. 6M



**UNIT-II**

- 3 a Derive the expression for A, B, C, D parameters for long transmission lines. 6M  
 b An overhead 3-phase transmission line delivers 5000kW at 22kV at 0.8 p.f lagging. The resistance and reactance of each conductor is 4ohms & 6ohms respectively. Determine: i) Sending end voltage. (ii) Regulation. (iii) Efficiency. 6M

OR

- 4 a Define surge impedance loading. Determine the surge impedance loading for a 400KV Transmission line. 4M  
 b A 50Hz, 3-phase transmission line is 280 km long. It has a total series impedance of  $(35 + j140)$  ohms and shunt admittance of  $930 \times 10^{-6}$  siemen. It delivers 40,000 KW at 220KV with 90% p.f lagging. Find the Generalized circuit Constants, Sending end voltage and current, by using medium line nominal - T method. 8M

**UNIT-III**

- 5 a Explain various types of insulators with neat diagrams and compare them. 6M  
 b An overhead transmission line at a river crossing is supported from two towers at heights of 40m and 90 m above water level. The horizontal distance between the towers being 400m. If the allowable tension is 2000kg, find the clearance between the conductor and water at a point mid-way between the towers. Weight of conductor is 1kg/m. 6M

**OR**

- 6 a Explain about the improvement of string efficiency by grading of units and guard ring. **5M**
- b Each conductor of a three phase over head line is suspended from a cross arm of a steel tower by a string of 4 suspension insulators. The voltage across the second unit is 14.2kv and across the third 20kv. Find the voltage between the conductors and the string efficiency. **7M**

**UNIT-IV**

- 7 a How can the analysis of a wave travelling on a line terminated by an inductance be carried out? **6M**
- b A surge of a 200kv travelling on a line of natural impedance 500ohms arrives at a junction with two lines of impedances 700ohms and 300ohms respectively. Find the surge voltages and currents transmitted into each branch line. Also find the reflected surge voltage and current. **6M**

**OR**

- 8 a Discuss the phenomenon of reflection and refraction in travelling waves. Derive the expressions for reflection and refraction coefficients when a travelling wave is terminated through an Open circuited line, short circuited line and reactance. **8M**
- b Explain about propagation of surges. **4M**

**UNIT-V**

- 9 a Distinguish between Underground cables and overhead lines. **6M**
- b Show that in a three core belted cable the neutral capacitance to earth conductor  $C_n$  is equal to  $C_s+3C_c$  where  $C_s$  and  $C_c$  are capacitances of each conductor to sheath and to each other respectively. **6M**

**OR**

- 10 a What is the necessity of grading of cables? Explain briefly the various grading methods of cables? **6M**
- b A cable has been insulated with two insulating materials having permittivity of 6 and 4 respectively. The inner and outer diameter of a cable is 3cms and 7cms. If the dielectric stress is 50kV/cm and 30kV/cm, calculate the radial thickness of each insulating layer and the safe working voltage of the cable. **6M**

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