Q.P. Code: 16EE218 **R16**

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SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY:: PUTTUR

(AUTONOMOUS)

B.Tech III Year I Semester Supplementary Examinations August-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	Find the expression for Inductance of a single phase two-wire Transmission line system.	**6M**
	b	A Three phase line 3km long delivers 3000KW at pf 0.8 lagging to the load . The resistance and reactance per km of each conductor are 0.4 Ω and 0.3Ω respectively. If the voltage at the supply end is maintained at 11KV. Calculate receiving end voltage, line current and transmission efficiency.	**6M**

OR

2	a	Derive an expression for the capacitance per phase for a 3-phase overhead transmission line	**6M**
	b	Determine the inductance/phase/km of a double circuit 3-phase line. The radius of each conductor is 20mm and the conductors are placed on the circumference of an imaginary circle at a distance of 7m forming a regular hexagonal figure.	**6M**

UNIT-II

3	a	Explain Ferranti effect and also draw its phasor diagram.	**4M**
	b	A 3-phase, 50Hz, 15km transmission line supplying a total load of 850kW at 0.8 p.f lagging and 11kV has the following line constants: r=0.45ohms/km, x=0.6ohms/km. Calculate the line current, receiving end voltage, voltage regulation and efficiency of transmission.	**8M**

OR

4	a	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*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 (i) medium line nominal - T method (ii) medium line nominal - π method.	**8M**
	b	Draw the Equivalent circuit &phasor diagram of medium transmission line nominal π method.	**4M**

UNIT-III

5	a	What are the factors affecting corona? And derive the expressions for critical disruptive and visual critical voltage	**6M**
	b	Determine the corona characteristics of a 3-phase line 160km long, conductor diameter 1.036cm, 2.44m delta spacing, air temperature 26.67oC, altitude 2440m, corresponding to an approximate barometric pressure of 73.15cm of Mercury, operating voltage 110kv at 50Hz. Assume data if required.(irregularity factor etc.)	**6M**

OR

6	a	What do you understand by grading of insulators? Explain.	**4M**
	b	An overhead line erected across a span of 250 meters on level supports. The conductor has a diameter 1.4cm and has a dead weight of 1.9kg/m. The line is subjected to wind pressure of 37.8 kg/m2 of projected area. The radial thickness of ice is 1.3cm. Calculate (i) the sag in an inclined direction (ii) the sag in vertical direction. Assume maximum working stress 1050kg per sq. cm. One cubic meter of	**8M**

ice weight 913.5kg.

UNIT-IV

7	a	Derive the expression for transient current wave, show that transient current is sum of incident current, and reflected current.	6M
	b	Write short notes on Beweley's lattice diagram	6M

OR

8	a	What is meant by power system transients? Develop the differential equation for a transient in the transmission system. How voltage and current expressions are established from the above differential equations?	8M
	b	Define surge impedance and surge impedance loading:	6M

UNIT-V

9	a	What are the limitations of belted cable? How these are can be overcome in pressurized cables?	6M
	b	Show that the ratio of maximum potential gradient to the minimum potential gradient is R/r. Where r and R are the conductor radius and sheath radius.	6M

OR

10	a	Derive a relation between the conductor radius and inside sheath radius of a single core cable so that the electric stress of the conductor surface may be minimum.	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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