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Fourth Semester B.E. Degree Examination

Transmission and Distribution

TIME: 03Hours

Max. Marks: 100

- Note: 01. Answer any **FIVE** full questions, choosing at least **ONE** question from each **MODULE**.
02. Assume any missing data.

Module -1			*Bloom's Taxonomy Level	Marks
Q.01	a	Show that increase in transmission voltage causes: (i) Reduction in copper losses (ii) Reduced weight of conductor material.	L2	06
	b	Obtain an expression for sag of a line conductor suspended between two equal supports. Assume parabolic configuration.	L3	06
	c	A 3 phase overhead transmission line is being supported by 3 discs of suspension insulators. The potentials of first & second insulators are 8 & 11kV respectively. Calculate (i) The line voltage. (ii) The ratio of capacitance between pin & earth to self capacitance of each unit. (iii) The string efficiency.	L3	08
OR				
Q.02	a	Explain typical line diagram of Transmission & Distribution scheme indicating voltage levels used at different stages.	L1	06
	b	Explain the different methods to equalize the potential across the string of suspension insulator.	L1	06
	c	An overhead transmission line has a span of 200m, between the supports. The supports are at the same level. The area of cross section of conductor is 1.9cm^2 while the ultimate strength is 5000kg/cm^2 . The specific gravity of the conductor material is 8.9gm/cm^3 . If the conductor is subjected to the wind pressure of 1.5kg/m length, calculate the sag if factor of safety is 5. Also calculate the vertical sag.	L3	08
Module-2				
Q.03	a	With neat diagram, develop an expression for inductance of a 3 phase overhead line with unsymmetrical spacing.	L2	06
	b	Explain the process of transposition of transmission lines and its advantages.	L1	06
	c	A 3-phase 50Hz line consists of three conductors each of diameter 21mm. the spacing between the conductors is as follows. A – B=2.5m, B – C= 4.5m, C – A = 3.5m Find the capacitance and capacitive reactance per phase per km of the line. The line is transposed at regular intervals.	L3	08
OR				
Q.04	a	Derive an expression for capacitance of a 3 phase single circuit line with equilateral spacing.	L3	08
	b	What is the effect of earth on the capacitance of single phase transmission line?	L1	04

	c	Calculate inductance of each conductor in a 3-phase, 3 wire system. Conductors are arranged in a horizontal plane with spacing $d_{31}=4m$, $d_{12}=d_{23}=2m$. the conductors are transposed and have a diameter of 2.5cm.	L3	08
Module-3				
Q. 05	a	Write a short note on classification of transmission lines.	L1	05
	b	Derive an expression for A, B, C, D constants of a long transmission line by rigorous method of analysis.	L3	07
	c	A 3- ϕ , 50 Hz transmission line 100km long delivers 20MW at 0.9 p.f. lagging & at 110kV. The resistance & reactance of the line per phase per km are 0.2Ω & 0.4Ω respectively while capacitive admittance is 2.5×10^{-6} mho/km/phase. Calculate (i) Sending end voltage & current, (ii) Transmission efficiency, use nominal T method.	L3	08
OR				
Q. 06	a	Derive an expression for voltage regulation and transmission efficiency of a single phase short transmission line with the help of vector diagram.	L3	06
	b	Explain Ferranti effect with suitable example.	L1	06
	c	A balanced 3 phase load of 30MW is supplied at 132kV, 50Hz and 0.8 pf lagging by means of a transmission line. The series impedance of a single conductor is $(20 + j52)\Omega$ and total phase to neutral admittance is 315×10^{-6} mho. Using nominal T method find: (i) A, B, C, D constants of line (ii) Sending end voltage (iii) Regulation of the line	L3	08

Module-4				
Q. 07	a	Draw the cross sectional view of single core cable and explain its construction.	L2	06
	b	Derive an expression for insulation resistance of a cable.	L1	06
	c	A 3-phase, 50Hz, 132kV transmission line consists of conductors of 1.17cm dia & spaced equilaterally at a distance of 3 m. The conductors have smooth surface with $m_o = 0.96$. The barometric pressure is 72 cm of Hg & the temperature is 20°C. Determine corona loss per km per phase under fair & foul weather conditions.	L3	08
OR				
Q. 08	a	What is corona? Briefly explain the phenomenon of corona.	L1	06
	b	Explain various methods employed to reduce the effect of corona.	L1	06
	c	A single core lead covered cable has a conductor diameter of 3cm with insulation diameter of 8.5cm. The cable is insulated with two dielectrics 5 & 3 respectively. The maximum stresses in the two dielectrics are 38kV/cm & 26kV/cm respectively then calculate radial thickness of insulating layers & working voltage of the cable.	L3	08
Module-5				
Q. 09	a	Explain Radial and parallel distribution schemes.	L1	06
	b	With the help of neat graph explain bathtub curve.	L1	06
	c	A single phase distributor one km long has resistance and reactance per conductor of 0.1Ω & 0.15Ω respectively. At the far end voltage $V_B = 200$ V & the current is 100 A at a p.f. of 0.8 lagging. At the midpoint of the distributor, a current of 100A is tapped at a p.f. of 0.6 lagging. Calculate : (i) voltage at mid point (ii) sending end voltage (iii) phase angle between sending end voltage & receiving end voltage.	L3	08
OR				
Q. 10	a	What is power quality? Explain various power quality problems.	L1	06
	b	Explain the effect of disconnecting the neutral in a 3-phase, 4-wire system with the help of suitable example.	L1	08
	c	A single phase AC distributor AB 300m long is fed from end A and is loaded as: (i) 100A at 0.707 pf lag; 200m from point A. (ii) 200A at 0.8 pf lag; 300m from point A. The load resistance and reactance of the distributor is 0.2Ω and 0.1Ω per km. calculate the total voltage drop in the distributor. The load pfs are referred to the voltage at far end.	L3	06

*Bloom's Taxonomy Level: Indicate as L1, L2, L3, L4, etc. It is also desirable to indicate the COs and POs to be attained by every bit of questions.