Model Question Paper-1 with effect from 2019-20 (CBCS Scheme)

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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 x 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)Ω and total phase to neutral admittance is 315x10^{-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^{o}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 0.1 Ω & 0.15 Ω 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 0.1 Ω 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.