Name: Enrolment No:	UPES

UNIVERSITY OF PETROLEUM AND ENERGY STUDIES
End Semester Examination, December 2018

Course: Power Transmission & Distribution (PSEG 308) **Semester: V**
Programme: B Tech Electrical & PSE **Time: 03 hrs.**
No. of pages : 02 **Max. Marks: 100**

SECTION A

S. No.	Answer all Questions	Marks	CO
Q 1	Explain the causes of insulator failure?	**04**	**CO1**
Q 2	A 132 kV transmission line has the following data: Wt.of conductor = 680 kg/km Length of span = 260 m Ultimate strength = 3100 kg Safety factor=2 Calculate the height above ground at which the conductor should be supported. Ground clearance requires is 10 mt.	**04**	**CO2**
Q 3	Discuss the various types of line supports.	**04**	**CO1**
Q 4	Explain the methods of reducing corona loss.	**04**	**CO2**
Q 5	Each line of a 3 phase system is suspended by a string of 3 similar insulators. If the voltage across the line unit is 17.5 kV calculate the line to neutral voltage. Assume that the shunt capacitance between each insulator and earth is $1/8^{th}$ of the capacitance of the insulator itself.	**04**	**CO2**
	SECTION B		
Q 6	In a 33 kV overhead line, there are three units in the string of insulators. If the capacitance between each insulator pin and earth is 11% of self-capacitance of each insulators, find (a) distribution of voltage over 3 insulators (b) string efficiency	**10**	**CO3**
Q 7	Derive the sending end voltage and regulation of medium transmission line with phasor diagram and equivalent circuit by using Nominal- T method	**10**	**CO4**
	(OR)		
Q 7	Derive the sending end voltage and regulation of medium transmission line with phasor diagram and equivalent circuit by using Nominal- π method.	**10**	**CO4**
Q 8	Explain the methods of improving String Efficiency and uniform voltage distribution across insulators.	**10**	**CO4**
Q 9	A conductor with 2.5 cm dia is passed centrally through a porcelain bushing $e_r = 4$ having internal and external diameters of 3 cm and 9 cm respectively. The voltage between the conductor and an earthed clamp surrounding the porcelain is 20 kV rms. Determine whether corona will be present in the air space round the conductor.	**10**	**CO3**

	SECTION-C		
Q 10	Derive the expressions for voltage distribution across each insulator and string efficiency of a three disc insulator system.	**20**	**CO5**
Q 11	A 33 kV, 50 Hz, 3 phase underground cable, 4 km long uses three single core cables. Each of the conductor has a diameter of 2.5 cm and the radial thickness of insulators is 0.5 cm. determine (a) Capacitance of the cable/phase (b) Charging current/phase (c) Total charging kVAR. The relative permittivity of insulation is 3.	**20**	**CO5**
	(OR)		
Q 11	A single core cable for use on 11 kV, 50 Hz system has conductor area of 0.645 cm^2 and internal diameter of sheath is 2.18 cm. the permittivity of the dielectric used in the cable is 3.5. find (a) Maximum electrostatic stress in the cable. (b) Minimum electrostatic stress in the cable (c) Capacitance of the cable per km length (d) Charging current	**20**	**CO5**

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SECTION A

S. No.	Answer all Questions	Marks	CO
Q 1	Explain the advantages of suspension type insulators?	**04**	**CO2**
Q 2	An overhead line has a span of 260 mt, the weight of the line conductor is 0.68 kg per metre run. Calculate the maximum sag in the line. The maximum allowable tension in the line is 1550 kg.	**04**	**CO2**
Q 3	Explain the reasons for unequal distribution of voltage over a string of suspension insulators	**04**	**CO1**
Q 4	Discuss the various type of underground cables.	**04**	**CO1**
Q 5	Describe Proximity effect and Skin effect in Power systems.	**04**	**CO2**
	SECTION B		
Q 6	A 3-phase transmission line is being supported by three disc insulators. The potentials across top unit (i.e., near to the tower) and the middle unit are 8 kV and 11 kV respectively. Calculate (a) the ratio of capacitance between pin and earth to the self-capacitance of each unit (b) line voltage (c) string efficiency	**10**	**CO4**
Q 7	The self capacitance of each unit in a string of three suspension insulators is C. the shunt capacitance of the connecting metal work of each insulator to earth is 0.15 C. while for the line is 0.1C. calculate (a) The voltage across each insulator as a percentage of the line voltage to earth (b) String Efficiency	**10**	**CO3**
Q 8	Derive the expression for insulation resistance of a single core cable.	**10**	**CO3**
	(OR)		
Q 8	Explain the measurements of core-core capacitance (C_C) and core-earth capacitance (C_e) for belted cables.	**10**	**CO3**
Q 9	The insulation resistance of a single core cable is 495 Mega ohms per km. if the core diameter is 2.5 cm and the resistivity of insulation is $4.5*10^{14}$ ohm-cm, find the insulation thickness.	**10**	**CO4**

SECTION-C			
Q 10	Derive the expression for critical disruptive voltage and visual critical voltage in the analysis of corona effects.	**20**	**CO5**
Q 11	A 3-phase, 50 Hz transmission line has the following parameters per km: R= 0.2 ohm, L=1.3 mH and C=0.01 micro Farads. The voltage at the receiving end is 132 kV. Determine the sending end voltage and efficiency using Nominal-π method.	**20**	**CO5**
	(OR)		
Q 11	A 3-phase, 50 Hz, 120 km transmission line has the following parameters per km: R= 0.2 ohm, L=1.3 mH and C=0.01 micro Farads. The voltage at the receiving end is 132 kV. Determine the sending end voltage and efficiency using Nominal-T method.	**20**	**CO5**