Reg No.:_____ Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

FIFTH SEMESTER B.TECH DEGREE EXAMINATION, APRIL 2018

Course Code: EE301

Course Name: POWER GENERATION, TRANSMISSION AND PROTECTION (EE)

Max. Marks: 100 Duration: 3 Hours

PART A

Answer all questions, each carries 5 marks

		Marks
1	Explain the significance of load factor and diversity factor.	(5)
2	Derive an expression for capacitance of a single-phase transmission line.	(5)
3	Compare the volume of conductor required for a two-wire dc system with a single phase two wire ac system.	(5)
4	Explain the different methods of grading of underground cables.	(5)
5	Derive an expression for rate of rise of restriking voltage in circuit breakers.	(5)
6	With the help of a block diagram, explain the working of a microprocessor based relay.	(5)
7	With the help of a diagram, explain the percentage differential protection used in transformers.	(5)
8	Explain the different causes of over voltages in power system.	(5)

PART B

Answer any two full questions, each carries 10 marks

9	a)	With the help of a block diagram, explain the working of a thermal power plant.	(5)
	b)	A power station is to supply four regions of loads whose peak values are 10,000 kW, 5000 kW, 8000 kW and 7000 kW. The diversity factor of the load at the station is 1.5 and the average annual load factor is 60%. Calculate the maximum demand on the station and annual energy supplied from the station.	(5)
10	a)	With the help of a block diagram, explain the working of a wind energy conversion system.	(5)
	b)	A three phase, 50 Hz, 3300 V, star connected induction motor develops 250HP, the power factor being 0.707 lagging and the efficiency 0.86. Three capacitors in delta are connected across the supply terminals and power factor is raised to 0.9 lagging. Calculate: i) The kVAR rating of the capacitor bank and ii) The capacitance of each unit.	(5)
11	a)	Derive an expression for inductance of a three-phase transmission line with unsymmetrical spacing.	(5)
	b)	A three phase, 66 kV, 50 Hz line has a resistance of 9.6Ω, inductance of 0.097H and capacitance of 0.765 μF per phase respectively. It delivers 24 MVA at 66 kV at 0.8 power factor lagging. Find the voltage regulation and transmission efficiency. Use nominal T method.	(5)

PART C

Answer any two full questions, each carries 10 marks

12 a) An overhead line has a span of 122m, the diameter of the conductor is 1.15 cm. Calculate the sag at mid span when the conductors have an ice coating of 0.96 cm thick and the wind pressure is 382 N/m^2 of projected area. The weight of conductor is 5.83 N/m, ice weighs 8920 N/m^3 and the permissible tension is 3.56 x 10^4 N. (5)

b) A string has five suspension discs. The capacitance between each unit and earth is one-fifth of the mutual capacitance: (5)

i) Find the voltages across different discs as percent of total string voltage

ii) Find the string efficiency.

13 a) Differentiate between disruptive critical voltage and visual critical voltage. (3)

b) What are the factors affecting corona? (3)

c) Explain the working of any two FACTS devices. (4)

14 a) What are the advantages of dc transmission over ac transmission? (2)

b) Explain the different types of dc links. (2)

c) A 2.2 km long, 11 kV, 3 phase, 3 – core, belted cable gave the following results in a test for capacitance: (6)

Capacitance between two conductors joined to sheath and the third conductor is 1.5μF and capacitance between all the three conductors joined and sheath is1.8 μF. Find:

i) Effective capacitance of each core to neutral and

ii) Capacitance between any two cores

PART D

Answer any two full questions, each carries 10 marks

15 a) With the help of a diagram, explain the working of a vacuum circuit breaker. (4)

b) With the help of a block diagram, explain the working of a static over current relay. (6)

16 a) With the help of a diagram, explain the working of a watt hour meter type electromagnetic relay. (5)

b) With the help of a neat diagram, explain the working of a Buchholz Relay (5)

17 a) With the help of a diagram, explain the working of a surge diverter. (4)

b) A single-phase a. c. distributor AB is fed from end A and has a total impedance of (0.2 + j3) Ω. At the far end, the voltage V_B = 240V and the current is 100 A at a power factor of 0.8 lagging. At the midpoint M, a current of 100 A is tapped at a power factor of 0.6 lagging with reference to the voltage V_M at the midpoint. Calculate the supply voltage V_A and phase angle between V_A and V_B. (6)

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