Reg No.:_____ Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

FIFTH SEMESTER B.TECH DEGREE EXAMINATION(R&S), DECEMBER 2019

Course Code: EE301

Course Name: POWER GENERATION, TRANSMISSION AND PROTECTION

Max. Marks: 100 Duration: 3 Hours

PART A

Answer all questions, each carries5 marks. Marks

1		What is Load curve. Explain the significance of Load curve.	(5)
2		Derive an expression for the capacitance of a single phase transmission line.	(5)
3		Each line of a 3-phase system is suspended by a string of three similar insulators. If the voltage across the line unit is 17.5kV. 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. Also calculate the string efficiency.	(5)
4		Explain TCR configuration	(5)
5		A circuit breaker interrupts the magnetising current of 100MVA transformer at 220kV.The magnetising current of the transformer is 5% of the full load current. Determine the maximum voltage which may appear across the gap of the breaker when the magnetising current is interrupted at 53% of its peak value. The stray capacitance is 2500μF.The inductance is 30H.	(5)
6		With the help of a block diagram explain the working of a microprocessor based over current relay.	(5)
7		With help of a neat diagram explain the working of a Buchholz relay.	(5)
8		Distinguish between radial and ring main distribution systems. Enlist their advantages and disadvantages.	(5)

PART B

Answer any twofull questions, each carries10 marks.

9	a)	With a neat figure explain the working of Hydro electric power plant.	(6)
	b)	A power station has a maximum demand of 15000kW.The annual load factor is 50% and capacity factor is 40%. Determine the reserve capacity of the plant.	(4)

10 a) Power Factor of a 3-φ load of 25kW at 415V, 50Hz is to be improved from 0.6 to 0.9. Calculate the value of the capacitance required in each branch , if the capacitor bank is in delta configuration. (6)

b) Explain Ferranti Effect. (4)

11 a) Derive an expression for the inductance of an isolated current carrying conductor. (5)

b) A 15km long 3 phase line has a resistance of 5.31ohms per phase and inductive reactance of 5.54ohms per phase. The sending end voltage is 11kV.The receiving end load is 1200kW at a power factor of 0.8 lagging. Find the receiving end voltage and line current.(Sending end and receiving end are star connected) (5)

PART C

Answer any twofull questions, each carries10 marks.

12 a) A two conductor cable 1km long is required to supply a constant current of 200A throughout the year. The cost of cable including installation is Rs. (20a+20)per metre where a is the area of cross section of the conductor in cm^2. The cost of energy is 5P per kWh and interest and depreciation charges amount to 10%. Calculate the most economical conductor size. Assume resistivity of conductor material is 1.73μΩcm. (5)

b) What is Corona? What are the factors affecting Corona? What are the methods to reduce Corona. (5)

13 a) The capacitances of a 3-phase belted cable are 12.6μF between the three cores bunched together and the lead sheath and 7.4μF between one core and the other two connected to sheath. Find the charging current drawn by the cable when connected to 66kV, 50Hz, star connected supply. (6)

b) What are the advantages of dc transmission over ac transmission. (4)

14 a) Explain the configuration of a TCSC (4)

b) A transmission line at a river crossing is supported by two towers 50m and 55mabove water level. The horizontal distance between towers is 300m. The tension in the conductor is 2000kg and weight of conductor is 0.85 kg/m. a) Find the minimum clearance between conductor and water b) Determine the position of minimum clearance. (6)

PART D

Answer any twofull questions, each carries 10 marks.

15 a) With the help of a neat diagram explain the working of Puffer type SF_6 circuit breaker. (4)

b) In a 220kV system, the reactance and capacitance up to the location of circuit breaker is 8Ω and 0.025μF respectively. A resistance of 600Ω is connected across the contacts of the circuit breaker. Determine the following. (6)

a)Natural frequency of oscillation

b)Damped frequency of oscillation

c) Critical value of resistance which will give no transient oscillation.

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

b) With the help of a neat diagram explain the working of percentage differential protection used in transformer. (5)

17 a) An 11kV, 100MVA alternator is provided with differential protection. The percentage of winding to be protected against phase to ground fault is 85%. The relay is set to operate when there is 20% out of balance current. Determine the value of the resistance to be placed in the neutral to ground connection. (5)

b) With the help of a neat diagram explain the working of a surge diverter. (5)

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