Reg No.:_____ Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

FIFTH SEMESTER B.TECH DEGREE EXAMINATION(S), MAY 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 are the limiting factors in tapping the wind and solar potential?	(5)
2		Explain the principle and causes of proximity effect and Ferranti effect using appropriate figures	(5)
3		What are the critical voltages in the formation of Corona? What is the effect of Corona?	(5)
4		With a neat cross sectional view show the constructional features of an EHT Cable.	(5)
5		What are the essential qualities required by any insulating medium used for arc quenching? What are the usual insulating media used?	(5)
6		Explain the significant features of a Microprocessor based relay.	(5)
7		What makes the differential protection very significant in the protection schemes of electrical machines and transformers?	(5)
8		Calculate the voltage drop and Power loss for a radial load of 120A, 0.8 pf lag supplied by a 6.6kV Three Phase system with a branch impedance of 2 +j2 ohms.	(5)

PART B

Answer any two full questions, each carries10 marks.

9	a)	With a neat sketch explain the principle of working of a High Head Hydro-electric Power Station.	(5)
	b)	An 80 km long transmission line has a series impedance of (0.15+j0.75) ohm per km and a shunt admittance of j5.1 x 10^{-6} ohm per km. Find the A, B, C, D parameters by Nominal Pi method.	(5)
10	a)	Derive the inductance of a single phase transmission line with three conductors arranged vertically in Side A and two conductors in Side B. The distance between adjacent conductors in each Side is 6m and that between the	(5)

sides are 8m. Each conductor is of radius 0.3cm.

b) A generating station has the following maximum loads: 16000kW, 12000kW, 10000kW, 7000kW and 800kW. The annual load factor is 50%. Calculate the diversity factor and annual energy consumption if the maximum demand on the station is noted as 24000kW. (5)

11 a) A 3-phase 500-HP 50Hz, 11kV star connected induction motor has a full load efficiency of 85% and a lagging p.f. of 0.8. It is connected to a feeder and it is desired to correct the p.f. to 0.95 lagging. Determine : (5)

(i) The Capacitor bank rating in kVAR and

(ii) The capacitance of each unit if the units are connected in Star.

b) Derive the Capacitance of a single phase overhead transmission line considering the effect of earth. (5)

PART C

Answer any two full questions, each carries10 marks.

12 a) Following results are obtained by making experiments on three phase, three core metal sheathed cable: (5)

(a) Capacitance between all the three bunched conductors and sheath is 1.2 micro Farad.

(b) Capacitance between any one conductor and sheath and the other two being insulated is 0.8 micro Farad.

Calculate the capacitance (C) between any two conductors when the third conductor is connected to the sheath.

b) A transmission line conductor at a river crossing is supported from two towers at a height of 45m and 75m above the water level. The span length is 300m. Weight of the conductor is 0.85kg/m. Determine the clearance between the conductor and water at a point midway between towers if the tension in the conductor is 2050kg. (5)

13 a) What is the expansion of FACTS? What are the devices used as FACTS devices? Why are they significant in the present scenario? (5)

b) A three phase overhead transmission line is supported by three disc suspension insulators. The potentials across the first and second insulator are 9kV and 12kV respectively. Find out: (5)

(i) The line voltage and

(ii) The string efficiency

14 a) What are the advantages and disadvantages of HVDC transmission systems? (4)

b) Derive Kelvin's law for conductors (4)

c) What are the advantages of bundling of conductors? (2)

PART D

Answer any two full questions, each carries 10 marks.

15 a) In a short circuit test on a 132kV three phase system, the breaker gave the following result: power factor of the fault =0.6, recovery voltage 0.97of full line value; the breaking current is symmetrical and the restriking transient had a natural frequency of 16kHz. Determine the rate of rise of restriking voltage. Assume that the fault is grounded. (6)

b) Derive the equations for voltage drop and current loss in a two wire ring main distributor supplied by (i) DC and (ii) AC Voltages. (4)

16 a) With a neat sketch explain the principle of operation of an Air Blast Circuit Breaker (5)

b) What are the primary causes of over voltages? How are the equipments protected from over voltages? (5)

17 a) Explain the principle of operation of a static over current relay. (5)

b) What are the three main protection aspects included in the protection of alternators? Why are they significant? (5)

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