Reg No.:_

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APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

B.Tech S5 (S) Examination September 2020

Course Code: EE301 Course Name: POWER GENERATION, TRANSMISSION AND PROTECTION

Max. Marks: 100

Duration: 3 Hours

Marks

PART A

Answer all questions, each carries5 marks.

- 1 Explain the general arrangement and operation of a hydro electric power plant. (5)
- 2 The receiving end voltage of an unloaded long line may be more than the (5) sending end voltage. Explain this phenomenon with the help of a phasor diagram.
- 3 Explain Kelvin's law. What are its limitations? (5)
- 4 Describe the phenomenon of corona. Explain any three factors which affect (5) corona loss.
- 5 Explain the arc quenching theorems in a circuit breaker. (5)
- 6 Explain the fundamental requirements of protective relaying. (5)
- 7 Differentiate between surge diverter and surge absorber. What are the (5) characteristics of an ideal surge diverter.
- 8 Explain briefly various systems of primary distribution in the case of ac. (5)

PART B

Answer any two full questions, each carries 10 marks.

- 9 a) Define the term Diversity factor and prove that the load factor of a supply (5) system is improved by an increase in diversity of load.
 - b) Find the sending end voltage and voltage regulation of a 250 km, 3 phase, 50 (5) Hz transmission line delivering 25 MVA at 0.8 pf lag to a balanced load at 132 kV. The inductance of the line is 1.25mH/km/ph and the shunt capacitance is 0.0095 μF/km/ph. Use nominal π method.
- 10 a) From first principles, derive the equation for the loop inductance of a single (5) phase over head line.
 - b) A synchronous motor improves the power factor of a load of 250 kW from 0.75 (5)

to 0.9 lagging. Simultaneously the motor carries a load of 100 kW. Find (1) the leading KVAR taken by the motor (2) KVA rating of the motor and pf at which the motor operates.

- a) With the help of block diagrams explain the working of a solar power plant and (5) a wind power plant.
 - b) Derive the capacitance of a single phase transmission line, considering the (5) effect of earth.

PART C

Answer any two full questions, each carries 10 marks.

12 a) Explain the configuration of FC+ TCR.

(5)

b) A single core cable has a conductor radius 2 cm and inside sheath radius 4 cm. (5) It is provided with one inter heath so that limits of maximum and minimum electric stresses is the same in the two layers of dielectric. The system voltage is 66kV, 3 phase.

Find (a) the radius of inter sheath and its voltage (b) the ratio of maximum electric stress with and without inter sheath.

- 13 a) Explain the power transfer equations in ac transmission and dc transmission. (5)
 - b) A string of 5 suspension insulators is to be graded for obtaining uniform (5) voltage distribution across the string. If the pin to earth capacitance are all equal to C and the mutual capacitance of the top insulator is 10 C, find the mutual capacitance of each unit in terms of C.
- 14 a) Classify the types of HVDC links and explain the construction and working of (5) each type with the help of necessary diagrams.
 - b) Assuming that the shape of an over head line can be approximated by a (5) parabola, derive the expression for sag. How the effect of wind and ice loadings can be taken into account.

PART D

Answer any two full questions, each carries 10 marks.

- a) Compare the arc rupture in oil and air blast circuit breakers and summarize the (5) relative advantages and disadvantages of these types of switch gears.
 - b) With the help of a neat diagram explain the Buchholz's protection for (5) transformers.
- 16 a) Explain how an amplitude comparator can be converted to a phase comparator (5) and vice versa.

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	b)	What are the causes of over voltages arising on a power system?	(3)
	c)	Explain the term insulation co ordination.	(2)
17	a)	Draw a neat sketch of an induction disc relay and explain its construction and	(5)
		operation.	
	b)	A dc two wire distributor AB of 300m long is fed at both ends A and B. It	(5)
		supplies uniformly distributed load of 0.15A/m and concentrated loads of 50A,	

60A and 40A at distances of 75m, 175m and 225m respectively from the end A. The potentials of feeding points A and B are 206 V and 200 V respectively. The resistance of each wire is 0.00015 ohm/m. Find the currents fed at points A and B.
