Reg No.:_____ Name:_____

**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

**PART A**

***Answer all questions, each carries5 marks.*** Marks

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|---|---|---|---|
| 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 sending end voltage. Explain this phenomenon with the help of a phasor diagram. | (5) |
| 3 | | Explain Kelvin's law. What are its limitations? | (5) |
| 4 | | Describe the phenomenon of corona. Explain any three factors which affect corona loss. | (5) |
| 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 characteristics of an ideal surge diverter. | (5) |
| 8 | | Explain briefly various systems of primary distribution in the case of ac. | (5) |

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**PART B**

***Answer any two full questions, each carries 10 marks.***

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| 9 | a) | Define the term Diversity factor and prove that the load factor of a supply system is improved by an increase in diversity of load. | (5) |
| | b) | Find the sending end voltage and voltage regulation of a 250 km, 3 phase, 50 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. | (5) |
| 10 | a) | From first principles, derive the equation for the loop inductance of a single phase over head line. | (5) |
| | 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.

11 a) With the help of block diagrams explain the working of a solar power plant and a wind power plant. (5)

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

## 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. 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. (5)

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 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. (5)

14 a) Classify the types of HVDC links and explain the construction and working of each type with the help of necessary diagrams. (5)

b) Assuming that the shape of an over head line can be approximated by a parabola, derive the expression for sag. How the effect of wind and ice loadings can be taken into account. (5)

## PART D

***Answer any two full questions, each carries 10 marks.***

15 a) Compare the arc rupture in oil and air blast circuit breakers and summarize the relative advantages and disadvantages of these types of switch gears. (5)

b) With the help of a neat diagram explain the Buchholz's protection for transformers. (5)

16 a) Explain how an amplitude comparator can be converted to a phase comparator and vice versa. (5)

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 operation. (5)

b) A dc two wire distributor AB of 300m long is fed at both ends A and B. It 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. (5)

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