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Reg No.:_____ Name:_____

**APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY**
FIFTH SEMESTER B.TECH DEGREE EXAMINATION, DECEMBER 2017

**Course Code: EE301**

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

Max. Marks: 100 Duration: 3 Hours

**PART A**

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

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|---|---|---|---|
| 1 | | Write using figures and equations how the power factor is improved using capacitors in power system. | (5) |
| 2 | a) | A 3 phase 80km long Transmission line has its conductors of 1cm diameter spaced at the corners of the equilateral triangle of 100cm side. Find the inductance per phase of the system. | (3) |
| | b) | Define Ferranti effect. | (2) |
| 3 | | Derive the equation for Sag in transmission lines, when the support is at equal and unequal heights. | (5) |
| 4 | | Explain different types of DC links. | (5) |
| 5 | | Define the terms Restriking voltage, Recovery voltage, Zones of protection, properties of $SF_6$ gas | (5) |
| 6 | | Draw the block diagram of microprocessor based over current relay. | (5) |
| 7 | | Explain Insulation Coordination. | (5) |
| 8 | | Explain Buchholz Relay and write its importance in Transformer protection. | (5) |

**PART B**

***Answer any twofull questions, each carries10 marks.***

| | | | |
|---|---|---|---|
| 9 | a) | Explain Hydro Electric power plants using a neat sketch. | (6) |
| | b) | Explain the term Load factor, Load curve and write its features. | (4) |
| 10 | a) | What do you mean by Voltage Regulation and Efficiency of power transmission. | (3) |
| | b) | Derive the ABCD Constants for medium length lines using nominal $\pi$ method draw its phasor diagram. | (7) |
| 11 | a) | Derive the L-L Capacitance of a two wire line. | (4) |
| | b) | A 3phase, 50 Hz, 132 kV OH Line has conductors placed in a horizontal plane 4m apart. Conductor diameter is 2 cm. If the line length is 100km calculate the charging currents per phase assuming complete transposition. | (6) |

**PART C**

***Answer any twofull questions, each carries10 marks.***

| | | | |
|---|---|---|---|
| 12 | a) | Find the optimum transmission voltage in power system for transmission and write its empirical formulae. | (4) |
| | b) | Explain corona and derive the equation for disruptive critical voltage and visual critical voltage. | (6) |
| 13 | a) | Explain with figures the configuration of **TCSC.** | (4) |
| | b) | Explain Intersheath grading of cables using figures. | (6) |
| 14 | a) | Explain different types of insulators used for transmission and distribution. | (3) |
| | b) | State the methods of improving string efficiency. | (3) |

c) Each line of a 3-phase system is suspended by a string of 3 similar insulators. If the voltage across the line unit is 17.5 kV, calculate 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 find the string efficiency. (4)

## PART D

***Answer any twofull questions, each carries 10 marks.***

15 a) Explain the Operation the Vacuum CB using a neat sketch and write its advantages. (6)

b) Explain any two types of Amplitude Comparators. (4)

16 a) Explain Carrier – Current protection Scheme for long transmission lines. (4)

b) Explain the characteristics features of Surge Diverters and explain any two types of Surge Diverters. (6)

17 a) Drive the Essential Qualities of Protective relays. (3)

b) Explain using phasor diagram the directional feature of relays. (3)

c) A 2 wire dc ring distributor is 300m long and is fed at 240V at point A. At point B, 150m from A, a load of 120A is taken and at C, 100m in the opposite direction from A, a load of 80A is taken. If the resistance per 100m of single conductor is 0.03Ω find: (4)

i)Current in each section of distributor ii) Voltage at points B and C.

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