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Total Number of pages: 3

**M.TECH
EEPC201**

2ND Semester Back Examination -2015-16

POWER SYSTEM TRANSIENT

Q Code : W770x

Time: 3Hours

Max Marks: 70

Answer Question No.1 which is compulsory and any five from the rest.

The figures in the right hand margin indicate marks.

Q.1 Answer all the followings:

(2x10)

- (a) What are the causes of switching surges?
- (b) How does the arc help in interrupting a circuit?
- (c) How does ferroresonance condition arises in practice?
- (d) Why the transformers in a substation are connected to the transmission line through cable?
- (e) What do you mean kilometric fault?
- (f) Can you apply superposition principle in case of power system transient Analysis, Justify it ?
- (g) Write down the reflection and refraction coefficient of traveling waves in case of long transmission line.

- (h) Why we need resistance of earthing very low?
- (i) Why lightning is occur ?
- (j) What is the meaning of crest flashover and tail flashover?

Q .2 (a) What are the types of power system transients? (5)

(b) Describe the expression for the transient recovery voltage(TRV) described by Park. (5)

Q .3 (a) Derive the second order differential equation of traveling wave along long transmission line. (5)

(b) Derive the transmission coefficient in an integrated power system. (5)

Q .4 (a) What is called capacitance switching? Explain in detail with a restrike and multiple restrike (5)

(b) What would be the rise in the abnormal voltage in the transformer when 13.8kV system the current is chopped at 2.5A. Assume the stray capacitance of 4000pF and the typical magnetizing current of 1.5A. (5)

Q .5 (a) Derive the mathematical model of lightning. (5)

(b) A metal oxide arrester with a MCOV of 82kV protects a 138kV transformer. Its characteristics is $I=8.76 \times 10^{-37} \times V^{17}$. A surge rises linearly to 600kV in $1\mu s$ and declining to zero at $1/20^{\text{th}}$ of that rate, thereafter, approaches the transformer along an overhead line of surge impedance 480Ω . Estimate the peak surge voltage experienced by the transformer. (5)

Q .6 (a) Write down the different protection systems applied in case of long transmission line. (5)

(b) Explain the protective shadow of a transmission tower structure and classify the different types of tower. (5)

109 Q .7 (a) Explain the Insulation coordination procedures(IES) for high voltage systems. (5)

(b) Explain the principle of insulation co-ordinations based on lightning surges and switching surges. (5)

109 Q .8 Write short notes on :(any two) (5x2)

(a) Statistical methods of insulation coordination

(b) Application of arrestors for protection of lines and stations

(c) Cloud formation.

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