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**Registration No :** | | | | | | | | | | |

**Total Number of Pages : 02** **M.Tech**
**EEPC201**

**2nd Semester Back Examination 2018-19**
**POWER SYSTEM TRANSIENT**
**BRANCH : ELECTRICAL POWER SYSTEM, POWER SYSTEM ENGG**
**Time : 3 Hours**
**Max Marks : 70**
**Q.CODE : F171**

**Answer Question No.1 which is compulsory and any FIVE from the rest.**
**The figures in the right hand margin indicate marks.**

**Q1** **Answer the following questions :** **(2 x 10)**

**a)** Determine the sources of power system transients.
**b)** Determine Transient recovery voltage.
**c)** What is meant by resistance switching?
**d)** What is ferro-resonance?
**e)** Determine the causes of over voltages.
**f)** Differentiate between Lightning and Switching over-voltages.
**g)** What are the characteristics of Lightning stroke?
**h)** Define standing waves and natural frequencies.
**i)** What do you mean by current chopping?
**j)** What do you mean by Basic Impulse Insulation levels (BIL)? Explain its significance.

**Q2** **a)** Develop the expression for the transient and steady state current and voltage for a series R-L DC circuit **(5)**

**b)** Consider a 345 kV, 25000 MVA, 3-phase air blast circuit breaker which is capable of interrupting approximately 40,000 A of current. Typical value of capacitor is 25000 pF. What is the critical resistance required? **(5)**

**Q3** **a)** Define reflection coefficient and refraction coefficient for the voltage and current component of the travelling waves, if $Z_c$ and $Z_t$ are surge impedance and impedance respectively. Also co-relate their relationship **(5)**

**b)** For a 13 kV circuit, the inductance L=1 mH and effective capacitance is 400 pF. Find the rate of rise of recovery voltage if the voltage swings twice the system peak in half a period **(5)**

**Q4** **a)** Derive the expression for the transient initiated by the removal of a short circuit **(5)**

**b)** Find the voltage across the circuit breaker contacts if an A.C current is chopped of at an value of $I_0$ at a time t=0.4 T, where T is the time period of fundamental wave. **(5)**

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**Q5** **a)** Explain in brief double frequency transients giving suitable example **(5)**

**b)** Consider a 750 V D.C system with 20 KA of fault current available. Let the system inductance be 800 μH. How will the breaker arc voltage vary with the arcing time when a fault occurs? **(5)**

**Q6** List and briefly discuss various tests prescribed for high voltage system equipments. **(10)**

**Q7** Discuss with neat sketch switching surges on integrated system. **(10)**

**Q8** **Write short answer on any TWO :** **(5 x 2)**

**a)** Protective devices for insulation co-ordination.

**b)** Voltage transients on closing and reclosing lines.

**c)** Switching surges on integrated system.