USN | | | | | | | | | | |

Seventh Semester B.E. Degree Examination, Dec.09-Jan.10
High Voltage Engineering

Time: 3 hrs.   Max. Marks:100

Note: *Answer any FIVE full questions.*

1 a. Briefly explain the need of generation of high voltage in the laboratory.   **(04 Marks)**
   b. What are electronegative gases? Derive the expression for criterion of breakdown in electronegative gases assuming current growth equation.   **(12 Marks)**
   c. In an experiment in a certain gas it was found that the steady state current is 5.5×10^{-8} Amp at 8 KV at a distance of 0.4cm between plane electrodes. Keeping the field constant and reducing the distance to 0.1cm results in a current of 5.5×10^{-9} Amp. Calculate the Townsend's primary ionization coefficient. Neglect secondary ionization effects.   **(04 Marks)**

2 a. What is corona discharge? Explain clearly the breakdown in non-uniform field.   **(06 Marks)**
   b. What is electroconvection? Explain liquid breakdown based on electroconvection.   **(06 Marks)**
   c. Explain Thermal breakdown in solid dielectrics. How this mechanism is more significant than the other mechanisms?   **(08 Marks)**

3 a. Define ripple voltage. Show that the ripple voltage in a rectifier circuit depends upon the load current and the circuit parameters.   **(06 Marks)**
   b. A ten stage Cockcrot – Walton circuit has all capacitors of 0.06 µF. The secondary voltage of the supply transformer is 100 KV at a frequency of 150Hz. If the load current is 1mA, determine: i) Voltage regulation; ii) The ripple; iii) The optimum number of stages for maximum output voltage.   **(06 Marks)**
   c. What is the principle of operation of a resonant transformer? What are its advantages over the cascade connected transformer?   **(08 Marks)**

4 a. Derive an expression of the output of a single stage impulse generator shown in Fig.4(a).   **(10 Marks)**
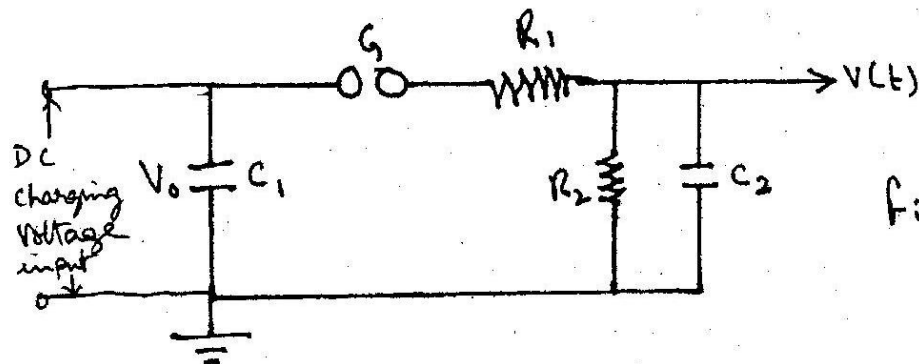

Fig.4(a).

   b. Define the standard lighting Impulse current wave.   **(04 Marks)**
   c. An impulse current generator is rated for 60 KW – s. The parameters of the circuit are C = 53 µF, L = 1.47 µH and the dynamic resistance = 0.0156 Ω. Determine the peak value of the current and the time – to – front and time – to – tail of the current wave form.   **(06 Marks)**

5   a. Explain the Chubb – Fortescue method for HVAC measurement. **(10 Marks)**
     b. Describe the generating voltmeter used for measuring high d.c. voltages. **(10 Marks)**

6   a. Explain how a sphere gap can be used to measure the peak value of voltages. What are the factors that influence such voltage measurements? **(12 Marks)**
     b. Explain Potential divider for very high impulse voltages and fast rising pulses. **(08 Marks)**

7   a. Explain the high voltage Schering bridge for tan δ and capacitance measurement. **(10 Marks)**
     b. What are different power frequency tests done on insulators? Mention the procedure for testing. **(10 Marks)**

8   Write short notes on any Four:
     i)   Paschen's law and its significance.
     ii)   Trigatron gap.
     iii)   Series resistance micro ammeter.
     iv)   Klydamograph.
     v)   Impulse testing of transformers. **(20 Marks)**

* * * * *