C.U.SHAH UNIVERSITY
Summer Examination-2017

Subject Name: High Voltage Engineering

Subject Code: 4TE06HVE1   **Branch:** B.Tech (EE,EEE)

Semester: 6   **Date: 17/04/2017**   **Time: 02:30 To 05:30**   **Marks: 70**

Instructions:
   (1) Use of Programmable calculator & any other electronic instrument is prohibited.
   (2) Instructions written on main answer book are strictly to be obeyed.
   (3) Draw neat diagrams and figures (if necessary) at right places.
   (4) Assume suitable data if needed.

Q-1   **Attempt the following questions:**   **(14)**
   a) A Tesla coil is a   **(1)**
         (a) cascaded transformer
         (b) coreless transformer
         (c) high frequency resonant transformer
         (d) low impedance transformer.
   b) Which of the following gas has been used as insulating medium in electrical   **(1)**
         appliances?
         (a) Nitrogen
         (b) Carbon dioxide
         (c) Sulphur hexafluoride
         (d) Freon..
   c) Which of the following method or technique can be used for the measurement of   **(1)**
         high dc voltages?
         (a) Generating voltmeter
         (b) Electrostatic voltmeter
         (c) Peak voltmeter
         (d) all of the above..
   d) Impulse voltages are characterized by   **(1)**
         (a) polarity
         (b) peak value
         (c) time of half the peak value
         (d) all of the above
   e) Panchen's law is associated with   **(1)**
         (a) ionization
         (b) breakdown voltage
         (c) thermal radiations
         (d) none of the above.
   f) In sphere gaps, the sphere are made of   **(1)**

(a) aluminum
(b) brass
(c) bronze
(d) any of the above.

g) A generating voltmeter is used to measure   **(1)**
(a) Impulse voltage
(b) AC voltage
(c) dc voltage
(d) All

h) A series capacitance voltmeter can measure   **(1)**
(a) DC voltage
(b) Ac voltage generation
(c) Both a and b
(d) None

i) Cockcroft Walton circuit is used for   **(1)**
(a) Dc voltage generation
(b) RMS value voltage
(c) Ac voltage
(d) All

j) Electro-mechanical breakdown of solid insulating materials occurs due to   **(1)**
(a) magnetic bum
(b) vibrations
(c) mechanical stresses produced by the electrical field
(d) electrical   stresses produced by the voltage fluctuations.

k) Surge voltage originate in power systems due to   **(1)**
(a) lightning
(b) switching operations
(c) faults
(d) any of the above.

l) The essential condition for the Panchen's law to be valid is that   **(1)**
(a) voltage must be dc
(b) voltage must be ac
(c) temperature must be constant
(d) humidity must be low.

m) Impulse testing of transformers is done using   **(1)**
(a) Full wave standard impulse
(b) Chopped wave standard impulse
(c) Half wave standard impulse
(d)Only (a) and (b)

n) The spark over voltage   **(1)**
(a) Increases with humidity
(b) decreases with the partial pressure of water vapour in air
(c) Humidity effect decreases with the size of spheres
(d) Humidity is minimum for uniform field gaps

Attempt any four questions from Q-2 to Q-8
Q-2   **Attempt all questions**   **(14)**

a)	What is vacuum? Discuss the various mechanism of vacuum breakdown.	**(7)**
b)	Define the Townsend first & second ionization co-efficient. Also derive the equation for second ionization co-efficient I = I0eαd / (1-γ (eαd - 1)).	**(7)**

Q-3 **Attempt all questions** **(14)**
a)	Explain Conduction and breakdown in commercial liquids.	**(7)**
b)	Write Short note on epoxy resins.	**(7)**

Q-4 **Attempt all questions** **(14)**
a)	What are "Treeing" & "Tracking"? Explain clearly the two processes in Solid dielectrics.	**(7)**
b)	Write the different methods of generating D. C. Voltage. Explain deltatron Circuit.	**(7)**

Q-5 **Attempt all questions** **(14)**
a)	Describe with a neat sketch, the working of a Van de Graff generator. What are the factors that limit the maximum voltage obtained?	**(7)**
b)	A 12 stage impulse generator has 0.126 μF capacitors. The wave front and the wave tail resistances connected are 800 ohms and 5000 ohms respectively. if the load capacitor is 1000 pF, find the front and tail times of the impulse wave produced.	**(7)**

Q-6 **Attempt all questions** **(14)**
a)	A Cockcroft-Walton type voltage multiplier has eight stages with capacitances , all equal to 0.05μF.the supply transformer secondary voltage is 125 kV at a frequency of 150 Hz. If the load current to be supplied is 5 mA, Find (a) Percentage ripple, (b) the regulation, and (c) the optimum number of stages for minimum regulation or voltage drop.	**(7)**
b)	Give the Marx circuit arrangement for multistage impulse generators. How is the basic arrangement modified to accommodate the wave time control resistances?	**(7)**

Q-7 **Attempt all questions** **(14)**
a)	Explain how a sphere gap can be used to measure the peak value of voltage.	**(7)**
b)	Explain the principle and constructions of an electrostatic voltmeter for high voltages. What are its merits and demerits for high voltage ac measurements?	**(7)**

Q-8 **Attempt all questions** **(14)**
a)	Write short note on testing of cable.	**(7)**
b)	Explain measurement of dielectric constant and loss factor.	**(7)**