

# C.U.SHAH UNIVERSITY

## Summer Examination-2018

**Subject Name: High Voltage Engineering**

**Subject Code: 4TE06HVE1**

**Branch: B.Tech (Electrical)**

**Semester: 6**

**Date: 27/04/2018**

**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.
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- Q-1 Attempt the following questions: (14)**
- a) Transformer oil is a (1)
- (a) Silicon oil
  - (b) Mineral oil
  - (c) Natural oil
  - (d) Askeral oil.
- b) The breakdown strength of mineral oil is about (1)
- (a) 20 KV/mm
  - (b) 50 KV/mm
  - (c) 3 to 5 KV/mm
  - (d) 4 to 6 KV/mm.
- c) In a impulse current generator the capacitors are connected in (1)
- (a) Series
  - (b) Parallel
  - (c) Charging in parallel and discharging in series
  - (d) Charging in series and discharging in parallel.
- d) The value of charging voltage used in a medium size impulse generator is (1)
- (a) 10 to 50 KV
  - (b) 50 to 100 KV
  - (c) 500 KV
  - (d) Any of above.
- e) Tigerton gap is used with (1)
- (a) Cascade transformer units
  - (b) Impulse current generator
  - (c) Impulse voltage generator.
  - (d) DC voltage double units.
- f) Sphere gap are used to measure (1)
- (a) DC Voltages
  - (b) AC Peak voltages
  - (c) DC and AC voltages
  - (d) DC, AC and impulse voltages.



- g) A Series capacitance voltmeter can measure (1)  
 (a) DC Voltages  
 (b) AC voltages (rms value)  
 (c) AC voltages (Peak values)  
 (d) Impulse voltages.
- h) Draw three stage voltage multiplier circuits. (1)
- i) Define tracking for solid breakdown. (1)
- j) Write different application of high voltage engineering. (1)
- k) Write equation of wave front and wave tail time of impulse wave. (1)
- l) What do you meant by treeing? (1)
- m) Draw circuit of high ohmic series resistance with micro ammeter for measurement high dc voltages. (1)
- n) What do you meant by partial discharge? (1)

**Attempt any four questions from Q-2 to Q-8**

- Q-2 Attempt all questions (14)**  
 (a) Explain the various theories that explain breakdown in commercial liquid dielectrics. (07)  
 (b) Write short note on (i) Intrinsic breakdown (ii) Thermal breakdown. (07)
- Q-3 Attempt all questions (14)**  
 (a) Define vacuum and explain various phenomena of vacuum breakdown. (07)  
 (b) What is Paschen's law? How do you account for minimum voltage for breakdown under a given 'p \* d' condition? (07)
- Q-4 Attempt all questions (14)**  
 (a) Define the Townsend first & second ionization co-efficient. Also derive the equation for second ionization co-efficient  $I = I_0 e^{\alpha d} / (1 - \gamma (e^{\alpha d} - 1))$ . (07)  
 (b) An Impulse generator has eight stages with each condenser rated for 0.16  $\mu$ f and 125KV. The load capacitor available is 1000pf. Find the series resistance and the damping resistance needed to produce 1.2/50  $\mu$ s impulse wave. What is the maximum output voltage of generator, if the charging voltage is 120KV? (07)
- 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? (07)  
 (b) Write short note on (i) Cascade transformer (ii) Resonant transformer. (07)
- Q-6 Attempt all questions (14)**  
 (a) Describe generating voltmeter used for measuring high d.c voltages. Write its advantages and limitation. (07)  
 (b) Write short note on capacitance voltage transformer. (07)
- Q-7 Attempt all questions (14)**  
 (a) Explain tripping and control of impulse generator with using three electrode gap and trigatron gap method. (07)  
 (b) Define front and tail times of an impulse wave. What are the tolerances allowed (07)



as per the specifications? Draw different circuit for producing impulse wave shape.

**Q-8**

**Attempt all questions**

**(14)**

**(a)** Explain with neat and clean diagram testing of transformer.

**(07)**

**(b)** Draw and explain high voltage Schering bridge.

**(07)**

