

C.U.SHAH UNIVERSITY

Summer Examination-2019

Subject Name: High Voltage Engineering

Subject Code: 4TE06HVE1

Branch: B.Tech (Electrical)

Semester: 6

Date: 30/04/2019

Time: 10:30 To 01:30

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) A generating voltmeter is used to measure (1)**
- (a) Impulse voltage
 - (b) AC voltage
 - (c) DC voltage
 - (d) All.
- b) In Van de Graff generators, the shape of high voltage electrode is nearly spherical (1)**
to avoid
- a. High surface field gradients
 - b. Corona
 - c. Local discharges
 - d. All of above.
- c) In sphere gaps, the sphere are made of (1)**
- (a) Aluminum
 - (b) Brass
 - (c) Bronze
 - (d) Any of the above.
- d) 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.
- e) Treeing phenomenon is observed in (1)**
- a. Capacitors
 - b. Cables
 - c. Insulators
 - d. Only (a) and (b).
- f) Which is having higher breakdown strength? (1)**
- a. Solid dielectrics
 - b. Liquid dielectrics



- c. Gases dielectrics
d. Equal in all.
- g) Intrinsic breakdown occurs in time of the order of (1)
a. 10^{-5} s
b. 105 s
c. 10^{-8} s
d. 108 s.
- h) Define thermal breakdown. (1)
- i) List out different testing methods on Insulator. (1)
- j) What do you meant by Instrinsic breakdown? (1)
- k) .Write properties of liquid di-electrical. (1)
- l) Define treeing in solid breakdown. (1)
- m) Write different application of high voltage. (1)
- n) Define tracking. (1)

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

- Q-2 Attempt all questions (14)**
- (a) Why a Cockcroft – Walton circuit preferred for voltage multiplier circuits? Explain its working with a schematic diagram. (07)
- (b) What is vacuum? Discuss the various mechanism of vacuum breakdown. (07)
- Q-3 Attempt all questions (14)**
- (a) A 12 stage impulse generator has $0.126 \mu\text{F}$ 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. (07)
- (b) Write short note on following : (07)
(i) Suspended particle theory (ii) Bubble theory (iii) Stress oil volume theory.
- Q-4 Attempt all questions (14)**
- (a) Define the Townsend first and second ionization co-efficient. Also derive the equation for second ionization co-efficient $I = I_0 e^{ad} / (1 - \gamma (ead - 1))$. (07)
- (b) Write a note on epoxy resins. (07)
- Q-5 Attempt all questions (14)**
- (a) Explain in brief Van de Graff generator for generation of high voltage dc. (07)
- (b) Give the marx circuit arrangement for multistage impulse generators. How is the basic arrangement modified to accommodate the wave time control resistances? (07)
- Q-6 Attempt all questions (14)**
- (a) Write different methods of measurement of dc voltage and explain following. (07)
(i) High resistance with micro ammeter (ii) Resistance potential divider.
- (b) Explain with neat diagram the principle of operation of a Generating voltmeter. Discuss its advantages and limitations generating voltmeter. (07)
- Q-7 Attempt all questions (14)**
- (a) Discuss tripping and control of impulse generator with using three electrode gap. (07)
- (b) Write a note on cascade transformer. (07)



Q-8

Attempt all questions

(14)

- (a) Explain different method of testing of high voltage transformers. What is the procedure adopted for locating the failure? **(07)**
- (b) Explain measurement of dielectric constant and loss factor. **(07)**

