

Enrollment No: \_\_\_\_\_

Exam Seat No: \_\_\_\_\_

# C. U. SHAH UNIVERSITY

## Winter Examination-2022

**Subject Name : High Voltage Engineering**

**Subject Code : 4TE06HVE1**

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

**Semester: 6**

**Date: 19/09/2022**

**Time: 11:00 To 02:00**

**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)** In large impulse generators, the spark gaps are generally      01
1. Sphere gaps
  2. Hemispherical gaps
  3. Square gaps
  4. Either (1) or (2)
- b)** For producing large values of impulse currents, a number of capacitors      01  
are charged in
1. Parallel and discharged in series
  2. Parallel and discharged in parallel
  3. Series and discharged in series
  4. Series and discharged in parallel
- c)** In a multistage impulse generator, for producing very high voltages, a      01  
bank of capacitors is
1. Charged in parallel and then discharged in series
  2. Charged in series and then discharged in parallel
  3. Charged in parallel and then discharged in parallel only
  4. Charged in series and then discharged in series only
- d)** In a series RLC circuit, the wave front and wave tail times are controlled      01  
by changing the value
1. R only
  2. R and L simultaneously
  3. R and C simultaneously
  4. L and C simultaneously
- e)** The disadvantages of resonant transformers are      01
1. Pure sine wave output
  2. No high power arcing
  3. No repeated flashovers
  4. Additional variable chokes
- f)** The commonly used materials for HV insulation is      01
1. Paper-oil insulation



2. Polyester resin
  3. Ceramic
  4. PVC
- g)** Resins and varnishes are commonly used in 01
1. Generators and motors
  2. Cables
  3. Transformers
  4. Circuit breakers
- h)** The most commonly used insulating materials for low and medium voltage cables is 01
1. Polyethylene
  2. Porcelain
  3. PVC
  4. Vulcanized rubber
- i)** Treeing phenomenon is observed in 01
1. Capacitors
  2. Cables
  3. Insulators
  4. Only (1) and (2)
- j)** According to the Bubble theory, once a bubble is formed, it will elongate in the direction of electric field under the influence of electrostatic forces. During elongation the volume of bubbles 01
1. Increases
  2. Decreases
  3. Remains constant
  4. None of these
- k)** According to the Paschen's Law, the breakdown voltage of a uniform field gap is 01
1. Directly proportional to the gas pressure and inversely proportional to the electrode gap
  2. Inversely proportional to the gas pressure and directly proportional to the electrode gap
  3. Directly proportional to the both electrode gap and gas pressure
  4. Inversely proportional to the both electrode gap and gas pressure
- l)** The voltage which produces the loss of dielectric strength of insulation is known as 01
1. Withstand voltage
  2. Disruptive discharge voltage
  3. Flashover voltage
  4. Impulse voltage
- m)** Series capacitance voltmeters were used with cascade transformers for measuring rms values up to 01
1. 100 kV
  2. 500 kV
  3. 800 kV
  4. 1000 kV
- n)** In routine tests, the cable is tested by applying an ac voltage of 01
1. 2 times the rated value
  2. 2.5 times the rated value
  3. 3 times the rated value



4. 3.5 times the rated value

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

- Q-2                    Attempt all questions                    (14)**
- A**                    Define the Townsend's first & second ionization coefficient. Explain the Townsend's criterion for a spark.                    **07**
- B**                    What are "Treeing" & "Tracking"? Explain clearly the two processes in solid dielectrics.                    **07**
- Q-3                    Attempt all questions                    (14)**
- A**                    Explain clearly suspended particle mechanism of liquid breakdown.                    **07**
- B**                    What is corona discharge? Explain clearly anode & cathode corona.                    **07**
- Q-4                    Attempt all questions                    (14)**
- A**                    Explain & compare the performance of half wave rectifier & voltage double circuits for generation of high d.c voltages.                    **07**
- B**                    Explain with neat sketches Cockroft Walton multiplier circuit .Explain clearly its operation when the circuit is (1) Loaded & (2) Unloaded.                    **07**
- Q-5                    Attempt all questions                    (14)**
- A**                    What is cascaded transformer? Explain why cascading is done? Describe with neat diagram a three stage cascaded transformer.                    **07**
- B**                    Explain the series parallel resonant circuit.                    **07**
- Q-6                    Attempt all questions                    (14)**
- A**                    Define the term : (1) Front time (2) Tail time (3) Impulse voltages (4) chopped wave (5) Thermal breakdown (6) Ripple factor (7) Impulse wave                    **07**
- B**                    Describe the construction of various components used in the development of the impulse generator.                    **07**
- Q-7                    Attempt all questions                    (14)**
- A**                    What are the requirement of a sphere gap for measurement of high voltages? Discuss the disadvantages of sphere gap for measurements.                    **07**
- B**                    Explain with neat diagram principle of operation of an electrostatic voltmeter. Discuss its advantages & limitations for high voltage measurement.                    **07**
- Q-8                    Attempt all questions                    (14)**
- A**                    Describe the arrangement of insulators for performing various tests.                    **07**
- B**                    Explain briefly various tests to be carried out on a bushing.                    **07**

