Student Exam No:-_____

GANPAT UNIVERSITY
B.TECH SEM-V (ELECTRICAL)
REGULAR EXAMINATION NOV-DEC-2015
2EE502:- HIGH VOLTAGE ENGINEERING

Time: 3 Hours **Total Marks:-70**

Instructions: - 1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Answer to two sections must be written in separate answer books.

SECTION-I

Que.-1 (A) Discuss Marx circuit arrangements for multistage impulse generators. How is the basic arrangement modified to accommodate the wave time control resistances? [06]

(B) What is a cascaded transformer? Describe with neat diagram a three stage cascaded transformer. [06]

OR

Que.-1 (A) An 8-stage impulse generator has 0.12 μF capacitors rated for 167 kV. What is its maximum discharge energy? If it has to produce a 1/50 μs waveform across a load capacitor of 15,000 pF, find the values of the wave front and wave tail resistances. [06]

(B) Explain the different methods of producing switching impulses in test laboratories. [06]

Que.-2 (A) Give the brief view about any one measuring circuit of DC resistivity measurement for non-destructive testing. [05]

(B) Eight stage Cockcroft-Walton circuit has all capacitors of 0.06 μF. The secondary voltage of the supply transformer is 100 kV at a frequency of 150 Hz. If the load current is 1 mA, determine (i) voltage regulation (ii) the ripple (iii) the optimum number of stages for maximum output voltage (iv) the maximum output voltage. [06]

OR

Que.-2 (A) A Schering bridge was used to measure the capacitance and loss angle for an H.V. bushing. At balance, the readings are: Standard capacitance =90pF, R_3 = 2180 Ohm, C_3 = 0.00125 micro F and R_4 = 730 Ohm. Find Cx and tan delta with proper diagram. [04]

(B) What do you mean by Tesla coil? Discuss its application for high frequency high voltage generation. [05]

(C) Define: (a) Creepage Distance (b) Fifty percent flashover voltage. [02]

Que.-3 **Attempt any three:** [12]

(A) Enlist various test require to perform for C.B. testing and discuss any one of them.

(B) Write down Short note on "Grounding of impulse testing laboratories"

(C) Define standard lightning impulse wave by graph and discuss specifications and tolerances allowed as per the standards for lightning impulse voltage.

(D) Classify the HV laboratories based on important points of consideration.

SECTION-II

Que.-4 (A) What is composite dielectric? What are the characteristics of composite materials? [06]

(B) Explain intrinsic breakdown mechanism for solid dielectric breakdown. [06]

OR

Que.-4 (A) Develop the thermal chart showing the effects of AC and DC high voltages on solid dielectrics breakdown. [06]

(B) A solid specimen of dielectric has a dielectric constant of 4.5, and $\tan\delta = 0.001$ at a frequency of 50 Hz. If it is subjected to an alternating field of 55kV/cm, calculate the heat generated in the specimen due to the dielectric loss. [06]

Que.-5 (A) Why is it require to measure the peak value of high voltage? Draw the vertical sphere gap configuration for peak value measurement. [03]

(B) If the indicating meter used in a generating voltmeter designed to measure DC voltage for a range from 20 to 200 kV reads a minimum current of 1 μA and maximum current of 25 μA. What should the capacitance of the generating voltmeter if, synchronously driving motor operates at 1500 RPM? [06]

(C) Draw the Rogowski Coil used for high current measurement. [02]

OR

Que.-5 (A) Discuss an Electro Static Voltmeter with suitable sketches. [05]

(B) Enlist the various DC high voltage measurement methods. Explain resistance potential divider used for DC HV measurement. [06]

Que.-6 **Attempt any three:** [12]

(A) Write a short note on Liquid purification system.

(B) Describe the suspended particle theory for liquid dielectrics.

(C) Explain Streamer theory for gaseous dielectric.

(D) Explain Paschen's Law by using suitable curve.

END OF PAPER