

IV B.Tech I Semester Regular Examinations, November 2005
HIGH VOLTAGE ENGINEERING
(Electrical & Electronic Engineering)

Time: 3 hours

Max Marks: 80

Answer any FIVE Questions
All Questions carry equal marks

1. (a) What is electron attachment? Why are electron attaching gases are useful for practical use as insulants compared to non- attaching gases.
(b) Define and Explain
 - i. Negative ion formulation
 - ii. Electron affinity [8+8]
2. Explain the different schemes for cascade connection of Transformers for producing very high a.c. voltage [16]
3. Give different circuits that produce impulse waves explaining clearly their relative merits and demerits. [16]
4. (a) Explain and compare the performance of half wave rectifier and voltage double circuits for generation of high d.c. voltages.
(b) A 10 stage cock roft – Walton circuit has all capacitors of $0.1 \mu F$. The secondary voltage of supply transforme is 11 kv at a frequency of 50 Hz if the load current is 2 mA find
 - i. the voltage regulation
 - ii. ripple voltage. [8+8]
5. (a) Give the Marx circuit arrangement for multi stage impulse generators.
(b) An impulse current generator is rated for 50kW sec. The parameters of the circuit are $C = 51 \mu F$ and $L = 2 \mu H$. Find the time to front, time to tail of the current wave form. [8+8]
6. Explain with a neat diagram the Principle of operation of an electrostatic voltmeter. Discuss its advantages and limitations for high voltages measurements. [16]
7. (a) Give the schematic arrangement of an impulse potential divider with an oscilloscope connected for measuring impulse voltages. Explain the arrangement used to minimize errors.
(b) Calculate the correction factors for atmospheric conditions, if the laboratory temperature is $37^{\circ}C$, the atmospheric pressure is 750 mm Hg, and the wet bulb temperature is $27^{\circ}C$ [8+8]
8. (a) What are the significances of power factor tests and partial discharge tests on bushings ? How they are conducted in the laboratory ?

- (b) The dielectric constant and dissipation factor of a Perspex sheet were measured at 10 MHz using the susceptibility variation technique. The observations obtained were as follows:
- i. With specimen clamped into the circuit, geometrical capacitance $C_a = 7.8 \text{ pF}$
 - ii. Calibration capacitance for specimen spacing $C_s = 6.2 \text{ pF}$
 - iii. Calibration capacitance C of micrometer electrode to obtain resonance $= 21.6 \text{ pF}$
 - iv. Capacitance of detuning micrometers for half power points $C_1 = 3.6 \text{ pF}$ and $C_2 = 3.71 \text{ pF}$
 - v. Total capacitance including the detuning capacitors $= C_e = 13.0 \text{ pF}$ Find the relative permittivity and loss factor. [8+8]
