

JK LAKSHMIPAT UNIVERSITY, JAIPUR

INSTITUTE OF ENGINEERING AND TECHNOLOGY

End Term Examination (Regular/Backlog), November 2016

B. Tech/ M. Tech (as applicable) in EE.....Engineering, Semester ...VII...

Roll No.....

COURSE CODE: EE702

Time: 3 hours

Max. Marks: 100

COURSE TITLE: HIGH VOLTAGE ENGINEERING

Instructions to students:

1. Do not write anything other than your roll number on question paper.
2. Assume suitable data wherever required and mention it clearly.
3. Writing appropriate units, nomenclature, and drawing neat sketches/schematics/ flow chart wherever, required are an integral part of the answer.

Q.1A	Objective type multiple choice questions (10 questions @ 1 mark)	10
i.	Most important tests conducted on insulators and circuit breakers are- (a) Voltage withstand tests (b) Short circuit tests (c) High current tests (d) Temperature rise tests	
ii.	Impulse testing of transformer indicates (a) Winding to ground insulation strength (b) Winding to winding insulation test (c) Dielectric strength, quantity of insulation and processing (d) Induced voltages in other windings during transients	
iii.	The breakdown of gas or air with increase in pressure under uniform field has relation with pressure. (a) Almost linear (b) Square (c) Non-linear (d) Reciprocal	
iv.	Which of the following gas is a electronegative gas? (a) Air (b) O_2 (c) SF_6 (d) both O_2 and SF_6	
v.	For 1 cm gap in air at 760 mm pressure and 20°C temperature, the breakdown voltage is (a) 100 V (b) 4.4 K V (c) 40 V (d) 325 V	
vi.	The mechanism of breakdown in vacuum is due to (a) Particle exchange	

	(b) Field emission (c) Clump formation (d) All of above	
vii.	Synthetic liquid dielectrics are mainly used in (a) capacitors and cable insulation as impregnants (b) In transformer insulation (c) In circuit breaker (d) all the three above a, b and c	
viii.	Peak to peak ripple is defined as (a) the difference between average dc voltage and peak value (b) the difference between maximum and minimum dc voltage (c) the difference between maximum ac and average dc voltages (d) the difference between ac (rms) and average dc voltages	
ix.	The value of Townsends second ionization coefficient has (a) High value for low E/p ratio (b) Low value for low E/p ratio (c) No relation with E/p ratio (d) No application if the gas pressure is low	
x.	The requirement of gases for insulation purpose is (a) High dielectric strength and thermal stability (b) High dielectric strength only (c) High thermal stability (d) High thermal stability and low temperature condensation.	

Q.2	Short answer type questions (4 questions @ 2.5 marks)	10
i.	What do you mean by penning effect?	
ii.	What is time-lag ? explain statistical time lag and formative time lag.	
iii.	What do you mean by intrinsic strength of solid dielectrics?	
iv.	Explain the mechanism of lightning stroke.	
Q.3A	What are the different power frequency tests done on insulators? Mention the procedure for testing.	05
Q.3B	Why both electrical and thermal properties important for liquids for use in an apparatus like a transformer?	05
Q.4A	What is 'thermal breakdown' in solid dielectrics, and how is it practically more important than other mechanisms?	05
Q.4B	Explain the phenomenon of corona discharge.	05
Q.5A	Give temperature classification for solid insulating materials. Why is this classification not done for liquids and gases?	05
Q.5B	Discuss how vacuum breakdown is different from normal breakdown of a gas.	05
Q.6A	Explain the phenomenon of 'treeing and tracking' in solid insulating materials under electrical stress. How does it lead to breakdown?	05
Q.6B	What are the common liquid insulants used in an electrical apparatus? Briefly give their physical properties.	05

OR		
Q.6B	What is composite dielectrics and what are it's properties?	05
Q.7A	Explain the partial discharge tests on high-voltage cables. How is a fault in the insulation located in this test?	05
Q.7B	What are commercial liquid dielectrics , and how they differ from pure liquid dielectrics?	05
OR		
Q.7B	What is significance of impulse test ? briefly explain the impulse testing of insulators.	05
Q.8A	What is paschen' law? How do you account for the minimum voltage for breakdown under a given ' $P \times d$ ' condition?	10
Q.9A	Explain different mechanism by which breakdown occurs in solid dielectrics in practice.	10
Q.9B	Define townsend's first and second ionization coefficents. How is the condition for breakdown obtained in a townsend discharge?	10
OR		
Q.9B	Explain the terms (a) Withstand voltage (b) Flashover voltage (c) 50% flashover voltage (d) Wet and dry power frequency tests as refereed to high voltage testing	10