



JK LAKSHMIPAT UNIVERSITY, JAIPUR

INSTITUTE OF ENGINEERING AND TECHNOLOGY

End Term Examination (Regular/ Backlog), April-May 2015

B. Tech in EE Engineering, Semester IV

Roll No.....

EE402: TRANSMISSION & DISTRIBUTION OF
ELECTRICAL POWER

Time: 3 hours

Max. Marks: 100

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. An overhead line conductor has an inductance per unit length of L Henry. If the entire medium around the conductor is filled with a dielectric material of permittivity (ϵ), then the inductance will be
(A) L/ϵ (B) $L/(0.5\epsilon)$ (C) L (D) unchanged.
- ii. The fact that a conductor carries more current on the surface as compared to core, is known as
(A) skin effect (B) corona (C) permeability (D) unsymmetrical fault.
- iii. Which of following properties has got higher value for aluminium as compared to copper?
(A) Melting point (B) Specific gravity
(C) Electrical resistivity (D) Thermal conductivity.
- iv. Which conductors connect the consumer's terminals to distribution?
(A) Service mains (B) Distributors
(C) Feeders (D) None of the above
- v. The corona is affected by which of the following?
(A) Size of the conductor (B) Shape of the conductor
(C) Surface condition of conductor (D) All of the above
- vi. For a 50 Hz 300 km long transmission line $V_S = 145 \angle 4.9^\circ$ kV, $I_S = 0.164 \angle -36.9^\circ$ kA. What is the sending end power?
(A) 82.9 MW (B) 43.8 MW
(C) 75.4 MW (D) 53.2 MW
- vii. In overhead transmission lines the effect of capacitance can be neglected when the length of transmission line is
(A) 80 km (B) 120 km (C) 145 km (D) 250 km
- viii. DC transmission has which following disadvantages?
(A) Low voltage DC generation is difficult
(B) Step up and step down of DC voltages are difficult
(C) High transmission losses
(D) None
- ix. The safety factor of insulators is defined as ratio of
(A) Flash over voltage to puncture voltage (B) Current to voltage



- (C) Puncture voltage to flash over voltage (D) Current to power
- x. Voltage across the string of a string insulator assembly is 132 kV, no. of insulators is 8 and voltage across insulator near to conductor is 20 kV. Then string efficiency is
(A) 82.5 % (B) 85.2 % (C) 88.23 % (D) 98.23 %
- Q.2 Short answer type questions (4 questions @ 2.5 marks) 10
- i. What is meant by transposition of line conductors?
ii. Why cables are not used for long distance transmission?
iii. Define proximity effect and critical disruptive voltage.
iv. Why is voltage regulation better in case of dc transmission?
- Q.3A What is meant by serving of a cable? Also mention two significance of neutral grounding. 05
- Q.3B Show various parts of 3 core cable using suitable neat and clean diagram. 05
- Q.4A Compare overhead lines and underground cables on any points. 05
- Q.4B What are the various properties of insulators? Also briefly explain about suspension type insulators. 05
- Q.5A Explain the effect of high voltage on volume of copper and on efficiency 05
- Q.5B State Kelvin's law. What are the main causes for failure of insulators? 05
- Q.6A A 50Hz transmission line 300 km long total series impedance of $40+j25$ Ohm and total shunt admittance of 10^{-3} mho. The 220 KV with 0.8 lagging power factor. Find the sending end voltage, current, power and power factor using nominal π Method. 05
- Q.6B A certain 3 phase equilateral transmission line has a total corona loss of 53 KW at 106 KV and a loss of 98 KW at 110.9 KV. What is the disruptive critical voltage? What is the corona loss at 113 KV? 05
- OR
- Q.6B Calculate the most economical diameter of a single core cable to be used on 132kV, 3 phase system. Find also the overall diameter of the insulation; if the peak permissible stress does not exceed 60kV/cm. also derive the formula used here. 05
- Q.7A Explain various methods of grounding. 05
- Q.7B Derive the expression for insulation resistance and electric stress in a single core cable. 05
- OR
- Q.7B Derive the expressions for sending end voltage in end condenser method. 05
- Q.8 What is an equivalent circuit of long line? Derive expression for parameters of this circuit in terms of line parameters. 10
- Q.9A Drive an expression for inductance of a 3-phase transmission line with equilateral spacing? 10
- Q.9B A 3 phase overhead transmission line is being supported by three disc insulators. The potential across top unit (i.e. near the tower) and the middle unit are 8kV and 11kV respectively. Calculate, 10
- The ratio of capacitance between pin and earth to the self-capacitance of each unit
 - Line Voltage



- String Efficiency

OR

Q.9B An overhead line has a span of 336 m. The line is supported, at water crossing 10
from two towers whose heights are 33.6 m and 29 m above water level. The
weight of conductor is 8.33 N/m and tension in the conductor is not to exceed
 3.34×10^4 N. Find (i) Clearance between the lowest point on the conductor and
water (ii) horizontal distance of this point from the lower support