

G 1297

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Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, MAY 2016

Seventh Semester

Branch : Electrical and Electronics Engineering

EE 010 701—ELECTRICAL POWER TRANSMISSION (EE)

(New Scheme—2010 Admission onwards/Improvement/Supplementary)

Time : Three Hours

Maximum : 100 Marks

Part A

Answer all questions.

Each question carries 3 marks.

1. Explain Skin effect and Proximity effect.
2. What is Ferranti effect ?
3. What are vibration dampers ? Where are these fixed ?
4. What are the disadvantages of solid or effective earthing ?
5. What are the advantages of HVDC transmission ?

(5 × 3 = 15 marks)

Part B

Answer all questions.

Each question carries 5 marks.

6. Derive an expression for the capacitance of a single phase overhead line.
7. Derive the ABCD constants of the nominal π representation of medium transmission lines.
8. What are the methods of testing insulators ?
9. Define Visual critical voltage and Disruptive critical voltage as related to corona.
10. What are the objectives of FACTS ?

(5 × 5 = 25 marks)

Part C

Answer all questions.

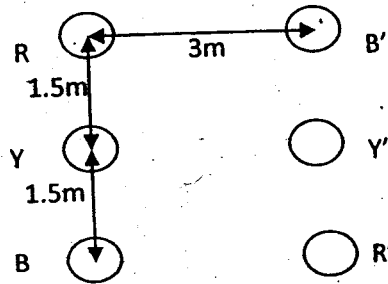
Each question carries 12 marks.

11. (a) Derive an expression for the inductance of a 3- ϕ transposed line with unsymmetrical spacing.
(6 marks)
- (b) A single phase line has two conductors spaced 1m apart. The radius of each conductor is 0.5 cm. Calculate the loop inductance /km of the line.
(6 marks)

Or

Turn over

12. A symmetrical double circuit 3- ϕ line is to have conductors arranged as shown. Calculate the inductive reactance /phase/km. The line is completely transposed and radius of each conductor is 1.25 cms.



(12 marks)

13. A 50 Hz, 3- ϕ line 80 km long has a total series impedance of $(40 + j 125)\Omega$ and shunt admittance of 10^{-3} S. The load is 50 MW at 220 kV with 0.8 pf lag. Find the sending end voltage, current, power factor and efficiency using nominal T configuration.

(12 marks)

Or

14. (a) A 33 kV 3- ϕ , transmission line has parameters $A = D = 1 \angle 0^\circ$, $B = 11.18 \angle 63.43^\circ$. The line is to deliver 7.5 MVA at 0.85 pf lag at the load end. The receiving end voltage is 32 kV. How much active and reactive power is to be dispatched from the sending end.

(8 marks)

(b) What is a tuned power line?

(4 marks)

15. (a) What is string efficiency? What are the methods to improve it?

(6 marks)

(b) A 3-core 3- ϕ metal sheathed cable has :

- (i) capacitance of $1\mu\text{F}$ between shorted conductors and sheath and
- (ii) Capacitance between two conductors shorted with sheath and the third conductor as $0.6\mu\text{F}$. Find the capacitance/phase and the charging current if the voltage is 66 kV, 50 Hz.

(6 marks)

Or

- 16 (a) Describe any *one* method of locating faults in underground cables. (5 marks)
- (b) An overhead line with stranded conductors is supported on two poles 200 m apart having a difference in level of 10 m. The conductor diameter is 2 cms and weighs 2.3 kg/m. Calculate the sag at the lower support, if wind pressure is 57.5 kg /m² of projected area and factor of safety is 4. The maximum tensile strength of copper is 4220 kg/cm². (7 marks)
- 17 (a) Explain the single bus bar with sectionalisation and double bus bar schemes in substations. (6 marks)
- (b) A 132 kV, 3- ϕ 50 Hz overhead line, 50 km long has a capacitance to earth of 0.0157 μ F/km. Determine the inductance and kVA rating of the arc suppression coil suitable for it. (6 marks)

Or

- 18 (a) A 3- ϕ , 220 kV 50 Hz line consists of 1.2 cms radius conductors spaced 2m apart at the corners of an equilateral triangle. Calculate the disruptive critical voltage between lines. Irregularity factor is 0.96, temperature 20°C, Pressure 72.2 cms of Hg, Dielectric strength of air 21.1 kV(rms)/cm. (7 marks)
- (b) What are the disadvantages of working with ungrounded neutral ? (5 marks)
- 19 (a) What is an UPFC ? What are its advantages ? (6 marks)
- (b) Discuss about the different kinds of DC links in HVDC transmission. (6 marks)

Or

20 Write short notes on :

- (i) Static VAR Compensator.
- (ii) Thyristor Controlled Reactor and
- (iii) Thyristor Switched Capacitor.

(3 \times 4 = 12 marks)

[5 \times 12 = 60 marks]