

III B. Tech I Semester Regular/Supplementary Examinations, October/November - 2016
POWER SYSTEMS-II
 (Electrical and Electronics Engineering)

Time: 3 hours

Max. Marks: 70

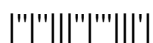
Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B**)
 2. Answering the question in **Part-A** is compulsory
 3. Answer any **THREE** Questions from **Part-B**

PART -A

- 1 a) Define Geometric mean distance in a transmission line? [3M]
- b) Classify the transmission lines based on the length? [3M]
- c) Define surge impedance? [4M]
- d) What is meant by power system transient? [4M]
- e) State proximity effect? [4M]
- f) What are the disadvantages of having more sag in the transmission lines? [4M]

PART -B

- 2 a) Derive the expression for the inductance of conductor due to external flux linkages in a single phase transmission line. [8M]
- b) Calculate the inductance of a single phase circuit comprising of two parallel conductors of 6mm in diameter spaced 1.1m apart. If the material of the conductor is copper and steel with relative permeability of 50? [8M]
- 3 a) Analyze a medium transmission line with nominal π method and draw the phasor diagram? [8M]
- b) A 3 phase 50Hz transmission line is 150KM long and delivers 25MW at 110KV, 0.8 power factor lagging. The resistance and reactance of the line per conductor per kilo meter are 0.33 ohm and 0.9 ohm respectively. The line charging admittance is 0.3×10^{-6} mho/km/ph. Compute the voltage regulation and transmission efficiency by applying the nominal π method? [8M]
- 4 a) Analyze the long transmission line by rigorous solution? [8M]
- b) Derive the A, B, C, D constants when two transmission lines are connected in cascade? [8M]
- 5 a) Derive the reflection and refraction coefficients of a line terminated with a resistance? [8M]
- b) Discuss the concept of travelling waves on a transmission line? [8M]
- 6 a) Discuss in detail about the shunt compensation? [8M]
- b) Explain about the various factors that affect the corona? [8M]
- 7 a) Derive the expression for sag of a transmission line between two supports of unequal heights? [8M]
- b) What is meant by stringing chart and explain its applications? [8M]



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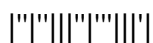
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PART -A

- 1 a) Explain the importance of a bundled conductor? [4M]
- b) Discuss why the capacitance is neglected in short transmission lines? [3M]
- c) Write the expression for the incident voltage wave of a long transmission line? [3M]
- d) What is meant by reflected voltage wave of a long transmission line? [4M]
- e) Write short notes on the radio interference due to corona? [4M]
- f) Discuss how the wind is affecting the weight of the conductor? [4M]

PART -B

- 2 a) Derive the expression for the capacitance of a transposed unsymmetrical 3 phase system? [8M]
- b) Derive the expression for the capacitance of a conductor in a double circuit hexagonal spaced three phase system? [8M]
- 3 a) Derive the A, B, C, D constants of a symmetrical medium transmission line. [8M]
- b) A three phase short transmission line has resistance and reactance per phase as 4.5 ohms and 6.7 ohms respectively. The sending end and receiving end voltages are 11kv and 100kv respectively, for some receiving end load at 0.8 power factor lagging calculate the output power, sending end power factor and the efficiency of the line? [8M]
- 4 a) Explain about the equivalent 'T' model of a long transmission line? [8M]
- b) A 3 phase 50Hz, 180km long transmission line has three conductors each of 0.6cm radius, spaced at the corners of an equilateral triangle of side 4m. the resistance of each conductor is 0.2 ohm/km and the line delivers 20MVA at 110kv at 0.85 lagging power factor, then find the A,B,C,D constants, sending end voltage and current, efficiency, regulation of the line? [8M]
- 5 a) Explain the transient behavior of a line when it is short circuited at the receiving end? [8M]
- b) A cable has a conductor of radius 0.77cm and the sheath of inner radius 2.5cm. find the inductance per meter length, the capacitance per meter length, surge impedance and the velocity of propagation if the permittivity of the insulation is 4? [8M]
- 6 a) What are the various methods that are used for power factor improvement? [8M]
- b) Explain about the importance of critical voltage and power loss due to corona? [8M]
- 7 a) Explain the importance of stringing chart and give its advantages. [8M]
- b) Explain how the string efficiency can be improved by using the guard ring? [8M]



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PART -A

- 1 a) What are the Differences between bundled and stranded conductors? [4M]
- b) What are the Differences between long and medium transmission lines? [4M]
- c) What is meant by surge impedance loading? [3M]
- d) What is meant by a travelling wave? [3M]
- e) What are the disadvantages of low power factor? [4M]
- f) Discuss how the ice formation is affecting the weight of the conductor? [4M]

PART -B

- 2 a) Derive the expression for the capacitance of a three phase line? [8M]
- b) Calculate the loop inductance of a single phase line with two parallel conductors spaced 3.7m apart. The diameter of each conductor is 1.5m? [8M]
- 3 a) Analyze a short transmission line with the help of phasor diagram? [8M]
- b) A 220kv 50Hz 3 phase transmission line is 56km long. The resistance per phase is 0.14 ohms/km, the inductance per phase is 1.32mH/km and the shunt capacitance is negligible. Use the short line model to find the voltage and power at the sending end, voltage regulation and efficiency when the line is supplying a 3 phase load of 400MVA, 220kv at 0.7 power factor lagging? [8M]
- 4 a) Evaluate the A, B, C, D constants of a long transmission line by equivalent 'T' network? [8M]
- b) List the factors that are considered for along transmission line with respect to short and medium lines. [8M]
- 5 a) What are the various types of power system transients? Explain. [8M]
- b) Explain the transient behavior of a line when it is connected to a cable? [8M]
- 6 a) Explain about the effect of charging current on the regulation of a transmission line? [8M]
- b) Discuss about the shunt capacitive compensation with phasor diagram? [8M]
- 7 a) Derive the expression for sag of a transmission line between two supports of equal heights? [8M]
- b) Explain how the string efficiency can be improved by grading of insulators? [8M]
