

Code No: **R31023/R10****III B.Tech I Semester Supplementary Examinations, November - 2015****POWER SYSTEMS- II****(Electrical and Electronics Engineering)****Time: 3 hours****Max. Marks: 75****Answer any FIVE Questions****All Questions carry equal marks***********

- 1 a) Find the expression for the flux linkages due to [8]
i) a single current carrying conductor, ii) current carrying conductors in parallel.
- b) Calculate the capacitance per phase of a three-phase three-wire transposed system when [7]
the conductors are arranged at the corners of a triangle with sides measuring 1.0m, 1.5m, and 2.0m. Diameter of each conductor is 1.2 cm.
- 2 a) Show how regulation and transmission efficiency are determined for medium lines [8]
using end condenser method and illustrate your answer with suitable vector diagram
- b) A single-phase, 11 kV line with a length of 15 km is to transmit 500 kVA. The inductive [7]
reactance of the line is 0.6Ω per km and the resistance is 0.25Ω per km. Calculate the efficiency and regulation for a p.f of 0.75 lead.
- 3 a) Explain the surge impedance loading of transmission line [7]
- b) The three phase transmission lines have the generalized constants: [8]
 $A_1 = D_1 = 0.98 \angle 2^\circ$, $B_1 = 28 \angle 69^\circ \text{ ohm}$, $C_1 = 0.0002 \angle 88^\circ \text{ mho}$
 $A_2 = D_2 = 0.95 \angle 3^\circ$, $B_2 = 40 \angle 85^\circ \text{ ohm}$, $C_2 = 0.0004 \angle 90^\circ \text{ mho}$
They are connected in series and delivers a load current of 200 A at 0.95 p.f. at 110kV.
Determine the sending end voltage and current.
- 4 a) Draw equivalent circuit for finding the transmitted voltage and current surges on a line. [9]
Derive expressions for the transmitted voltage and currents.
- b) A 200 kV, 3 μs , rectangular surge travels on a line of surge impedance of 400 ohms. [6]
The line is terminated in a capacitance of 3000 pf. Find an expression for voltage across the capacitance.
- 5 a) What is Ferranti effect? Prove with mathematical expression the actual phenomenon [8]
that occurs in Ferranti effect.
- b) A 3-phase, 220 kV, 50 Hz, over line consists of 2.5cm diameter conductors spaced 3 [7]
meters apart in equilateral triangle formation. Determine the corona loss per km of the line at 20°C and atmospheric pressure 75 cm of mercury. Take irregularity factor as 0.8.

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- 6 a) Explain the use of grading rings and arcing horns on suspension insulators. [7]
b) A string of four suspension insulators is to be graded to obtain uniform distribution of voltage across the string. If the capacitance to ground of each unit is 10% of the capacitance of the top unit, determine the capacitance of the remaining three units. [8]
- 7 a) Derive the expression for sag and tension when the supports are at unequal heights. [8]
b) Determine the sag of an overhead line for the following data: span length 160 meter, conductor diameter 0.95 cm, weight per unit length of the conductor 0.65 kg/meter. Ultimate stress = 4250 kg/cm^2 , wind pressure = 40 kg/cm^2 of projected area and Factor of safety = 5. [7]
- 8 a) Why voltage control is required in power systems? Mention the different methods of voltage control employed in power system. [8]
b) A synchronous motor improves the p.f. of a load of 180 kW from 0.8 lagging to 0.9 lagging. Simultaneously the motor carries a load of 60 kW. Find i) the leading kVAR supplied by the motor, ii) the p.f. at which motor operates. [7]

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