

(Following Paper ID and Roll No. to be filled in your Answer Book)

PAPER ID : 121403 Roll No.

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B.Tech.

(SEM. IV) THEORY EXAMINATION 2013-14

ELEMENTS OF POWER SYSTEM

Time : 3 Hours

Total Marks : 100

Note: (i) Attempt all questions.

(ii) All questions carry equal marks.

1. Attempt any **four** parts of the following **(5×4=20)**
 - (a) Explain different types of Conductor in power system.
 - (b) What is the Kelvin's Economy-law & derive to condition for most economical cross-sectional area of conductor ?
 - (c) What are the corona losses ?
 - (d) How can we make $V_s = V_r$ on a transmission line ?
 - (e) Distinguish between AC & DC resistances of a conductor, why the two differ from each other ?
 - (f) Why the operation of Grid is a cheaper option ?
2. Attempt any **two** parts of the following **(10×2=20)**
 - (a) Derive the Inductance of 3 ϕ symmetrical transmission line (transposed-line).
 - (b) A 1- ϕ line has two parallel conductors, each of 1.2 cm diameter & 2.5 meters apart. Calculate the loop-Inductance per km length of the line if the material of conductor is steel with $M_r = 200$.

(c) How we can obtain A,B,C & D parameters of a model of a long-transmission line ?

3. Attempt any **two** parts of the following: **(10×2=20)**

(a) An overhead stranded galvanised steel conductor has a 183 span. The conductor has 37 strands each of 2.59 cm diameter. The weight of conductor is 7.15 N/m & the breaking strength is 67700 N. The factor of safety should be 2.5. Calculate the sag under ice & wind condition if radial thickness of ice is 0.96 cm & the wind load is 382 N/m² of projected area (coated with ice). The weight of ice is 8920 N/m³.

(b) What is the need of Capacitance Grading of the underground cables used in Power systems ?

(c) Explain the phenomenon of corona & various factors affecting it.

4. Attempt any **two** parts of the following **(10×2=20)**

(a) Define string efficiency and what are the different methods to improve string efficiency ? What is the need to improve this ?

(b) A transmission line has a capacitance of 0.1 μf/Phase. Determine the inductance of Peterson's coil to neutralize the effect of capacitance of

(i) 76% of the line

(ii) 95% of length of line

(iii) Complete length of line

If supply frequency is 50 Hz.

(c) Explain the expression of Dielectric loss & its power factor.

5. Attempt any **two** parts :- (10×2=20)

- (a) Compare EHV & HVDC system in detail.
- (b) What are the different methods of Neutral Grounding ?
Compare each of them and find which is best.
- (c) What are the kinds of D.C links used in HVDC ?