

Code: EEPC1T5B

PVP 12

I M.Tech-I Semester-Regular Examinations-April 2013

**EHVAC TRANSMISSION
(POWER SYSTEM CONTROL & AUTOMATION)**

Duration: 3 hours

Marks: 5x14=70

Answer any FIVE questions. All questions carry equal marks

1. (a) What is meant by double circuit line? Explain the necessity of double circuit lines for EHV transmission systems. 5 M
- (b) What is meant by bundled conductors? Why the bundled conductors are essential for EHV transmission systems? 5 M
- (c) What are the mechanical design aspects of transmission towers? 4 M
2. (a) Derive an expression for resistance of a circular conductor. What are the effects of resistance of conductors in transmission systems? 7 M

- (b) A 400-kV line uses a 2-conductor bundle with *diameter* 0.0318 m for each conductor. The phase current is 1000A (500A per conductor). The area of each conductor is 515.7 mm^2 , $\rho_a = 2.7 \times 10^{-8} \text{ ohm-m}$ at 20°C , $\alpha = 0.0045 \text{ ohm}/^\circ\text{C}$ at 20° . Take the ambient temperature $t_a = 40^\circ\text{C}$, atmospheric pressure $p = 1$, wind velocity $v_m = 1 \text{ m/s}$, $e = 0.5$ and neglect solar irradiation. Calculate the final temperature of conductor due to only I^2R heating. 7 M
3. (a) Derive an expression for the capacitance of multi conductor line. 7 M
- (b) Explain the procedure of inductance transformation of a three phase line to sequence quantities. 7 M
4. (a) Derive an expression for electric field of a sphere gap. 7 M
- (b) A point charge $Q = 1 \text{ } \mu\text{C}$ is kept on the surface of a conducting sphere of radius $r = 1 \text{ cm}$, which can be considered as a point charge located at the centre of the sphere. Calculate the field strength and potential at a distance of 0.5 cm from the surface of the sphere. Also find the capacitance of the sphere, $\epsilon_r = 1$. 7 M
5. (a) Derive an expression for the surface voltage gradient of single conductor line. 7 M
- (b) Obtain the Mangoldt formula for a three phase ac line. 7 M

6. List and explain the corona loss formulae based on
(a) Voltage
(b) voltage gradients. 14 M
7. (a) What are the problems of series capacitor compensation in long lines? What are the remedies taken to counteract them? 7 M
- (b) Why the SSR is existed in the steady state and transient conditions in series-capacitor compensated lines? 7 M
8. (a) List out advantages and applications of SVC used in EHV systems. 7 M
- (b) Explain the arrangement of TCR and filter for suppression of harmonics in EHV lines. 7 M