Roll No. ☐☐☐☐☐☐☐☐☐☐☐☐ **Total No. of Pages : 02**

Total No. of Questions : 09

B.Tech.(Electronics & Electrical) (2011 Onwards O.E.)/
(Electrical & Electronics) (2013 OE) (Sem.–6)

ELEMENTS OF POWER SYSTEMS

Subject Code : BTEEE-OPC
Paper ID : [A2326]

Time : 3 Hrs. **Max. Marks : 60**

INSTRUCTION TO CANDIDATES :

1. **SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.**
2. **SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.**
3. **SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.**

SECTION-A

1. Write briefly :

a. What is proximity effect?

b. Classify the cables according to voltage level along with voltage range.

c. What is sag-template?

d. How to choose the voltage for transmission of power?

e. What are feeders, distributors and service mains?

f. Why is transposition done in transmission lines?

g. What is surge impedance? Also give its range for underground cables.

h. What is the effect of capacitance on performance of transmission lines?

i. What are the two functions performed by grading ring?

j. A short transmission line has an impedance of 58 Ω. Calculates its ABCD constants.

SECTION-B

2. Explain with neat sketches, the construction features of pin type and suspension type insulators. List the advantages of the later type over the former for high voltage transmission lines.

3. Determine the inductance per phase per km of a double circuit 3-phase transmission line. The radius of each conductor is 20 mm and the conductors are placed on the circumference of an imaginary circle of radius 7 m forming a regular hexagonal figure.

4. Draw the labeled diagram of 3-core cable. Also derive the expression for calculating the capacitance of 3-core underground cables.

5. What is the requirement of reactive power compensation? Briefly explain methods of reactive compensation.

6. A 3-phase voltage of 11 kV is applied to a line having R = 10 Ω and X = 12 Ω per conductor. At the end of line is balanced load of P kW at a leading power factor is connected. At what value of P is the voltage regulation zero when the power factor of the load is 0.85?

SECTION-C

7. Deduce an approximate expression of sag, tension and length of conductor in overhead lines when supports are at equal level.

8. A 50 Hz transmission line 300 km long has a total series impedance of 40 + j 125 Ω and a total shunt admittance of 10^{-3} mho. The receiving end load is 50 MW at 220 kV with 0.8 lagging power factor. Find the sending end voltage, current and power factor using :

   a. Short line approximation and

   b. nominal π-method. Compare the results and comment.

9. a. Explain how to find economic size of conductors,

   b. List the steps to draw receiving end circle diagram.