

Total Pages—5

B.Tech - 6th
Power System - II

(Set-R₁)

Full Marks : 70

Time : 3 hours

**Answer Q. No. 1, which is compulsory and
any five from the rest**

The figures in the right-hand margin indicate marks

1. Answer the following questions : 2 × 10
- (a) What is transposition ? Explain.
 - (b) What is the effect of earth on the capacitance of a transmission line ?
 - (c) What are bundle conductors ? Why are they used ?
 - (d) What are the various factors that influence corona loss ?
 - (e) State the condition for maximum power transfer on a short line.

(Turn Over)

(2)

- (f) What is the insulation materials used in cables ?
 - (g) Explain why load flow studies are performed ?
 - (h) Write the effects of regulating transformer.
 - (i) Write the conditions for optimum load dispatch including transmission losses.
 - (j) Write the advantages and disadvantages of FACTS devices.
2. (a) Find the inductance per km per conductor (line to neutral) of a 3-phase system which are placed at the corners of an equilateral triangle of side 1.49 m. the diameter of the conductor is 1.24 cm. 6
- (b) What are power circle diagrams ? What is their utility ? Explain. 4
- (a) A 3-phase 50 Hz, 15 km transmission line supplying a total load of 850 kW at 0.8 power factor lagging and 11 kV has the line

(3)

constants : $r = 0.45 \Omega/\text{km}$, $x = 0.6 \Omega/\text{km}$.
Calculate the line current, receiving end voltage, voltage regulation and efficiency of transmission.

6

(b) Explain skin effect and proximity effect.

4

4. (a) Find the critical disruptive voltage and corona loss for a 3-phase line which is operating at 220 kV, 50 Hz frequency. The line has conductor of 1.5 cm diameter arranged in a 3 meter delta connection. Assume air density factor of 1.05 and the dielectric strength of air to be 21.1 kV/cm.

5

(b) Explain the methods for improving string efficiency.

5

5. (a) An overhead transmission line has a span of 210 m. The conductor weights 600 kg/km. Calculate the maximum sag if the ultimate strength of the conductor is 5760 kg. Assume a factor of safety of 2.

5

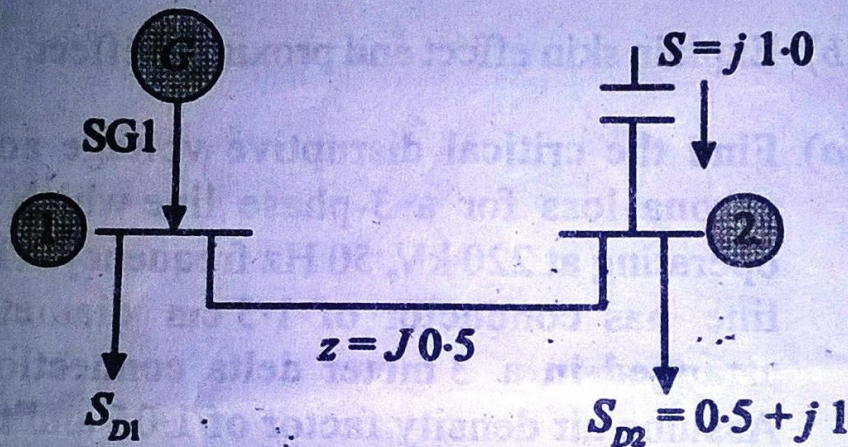
(b) Explain the constructional features of 3-core cable with a neat sketch.

5

(4)

6. (a) Obtain the voltage at 2 bus for the simple system shown in figure using the Gauss-Seidel method, if $V_1 = 1 \angle 0^\circ$ pu.

7



- (b) Explain the importance of swing bus.

3

7. (a) A constant load of 300 MW is supplied by two 200 MW generators 1 and 2, for which the respective incremental fuel costs are

$$\frac{dC_1}{dP_{G1}} = 0.10P_{G1} + 2.0$$

$$\frac{dC_2}{dP_{G2}} = 0.12P_{G2} + 15.0$$

(5)

With powers P_G in MW and costs in Rs/hr.
Determine the most economical division of
load between the generators.

6.

(b) Explain the algorithm for the solution of
economic hydrothermal scheduling problem. 4

8. With a neat sketch explain the following FACTS
devices :

5 + 5

(a) STATCOM

(b) UPFC.
