



PRACTICE QUESTIONS

for SSC-JE : CBT-2

Generation Transmission and Distribution

Electrical Engineering



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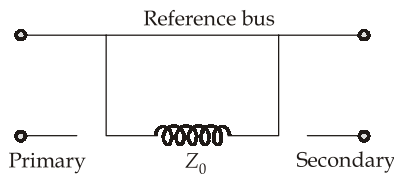
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Generation Transmission and Distribution

- Q.1** Use of bundled conductor increases,
- GMR
 - GMD
 - Potential gradient
 - Radius of conductor
- Q.2** ACSR conductor have
- all conductors made of aluminium
 - outer conductors made of aluminium
 - inner conductor made of aluminium
 - core made of aluminium
- Q.3** In a transmission line sag depends upon
- conductor material
 - tension in conductor
 - weight per unit length of conductor
 - all the above
- Q.4** The good effect of corona on overhead lines is to
- increase the line carrying capacity due to conducting ionised air envelop around the conductor.
 - increase the power factor due to corona loss.
 - reduce the radio interference from the conductor.
 - reduce the steepness of surge fronts.
- Q.5** The skin effect in a transmission line is affected by
- the resistivity of the transmission line
 - the current magnitude in the transmission line
 - the length of the transmission line
 - the voltage applied across the transmission line
- Q.6** The transmission efficiency increases with
- decrease in pf and increase in voltage level
 - decrease in pf and decrease in voltage level
 - increase in pf and increase in voltage level
 - increase in pf and decrease in voltage level
- Q.7** For equilateral spacing of conductors of an untransposed 3-phase line, we have
- balanced receiving end voltage and no communication interference.
 - unbalanced receiving end voltage and no communication interference.
 - balanced receiving end voltage and communication interference.
 - unbalanced receiving end voltage and communication interference.
- Q.8** The reactive power transfer over a line mainly depends on
- power angle δ
 - $|V_s| - |V_R|$
 - V_s
 - V_R
- Q.9** STATCOM (Static synchronous Compensator) has ability to maintain
- full capacitive output current at low system voltage.
 - full capacitive output current at high system voltage.
 - half capacitive output current at high system voltage.
 - half capacitive output current at low system voltage.

- Q.10** In a short transmission line, voltage regulation is zero when the power factor angle of the load at the receiving end side is equal to
(a) $\tan^{-1}(X/R)$ (b) $\tan^{-1}(R/X)$
(c) $\tan^{-1}(X/Z)$ (d) $\tan^{-1}(R/Z)$
- Q.11** A power system needs injection of VARs at
(a) off-peak load
(b) peak load
(c) both peak and off-peak load
(d) full load
- Q.12** By using guard ring in a transmission line, its string efficiency
(a) increase (b) decrease
(c) remain constant (d) none
- Q.13** For 66 KV lines the no. of insulator discs used are
(a) 3 (b) 6
(c) 9 (d) 12
- Q.14** On what basis is the insulation level of a 400 kV, EHV overhead transmission line decided?
(a) Lightning overvoltage
(b) Corona inception voltage
(c) Switching overvoltage
(d) Radio and TV interference
- Q.15** The value of diversity factor is
(a) less than one (b) more than one
(c) equal to one (d) none
- Q.16** For variable heads of near about but less than 30 meters, which type of turbines is used in hydro power stations?
(a) Pelton (b) Kaplan
(c) Francis (d) None of these
- Q.17** On which one of the following cycle does a modern steam power plant work?
(a) Carnot cycle
(b) Rankine cycle
(c) Otto cycle
(d) Bell-Coleman cycle
- Q.18** In a nuclear reactor, chain reaction is controlled by
(a) Iron rods (b) Cadmium rods
(c) Graphite rods (d) Brass rods
- Q.19** If capacity factor = load factor, then
(a) utilization factor is zero
(b) utilization factor is non-zero
(c) utilization factor is equal to one
(d) none of the above
- Q.20** The advantage of hydro-electric power station over thermal power station is
(a) the initial cost of hydro-electric power station is low.
(b) the operating cost of hydro-electric power station is low.
(c) hydro-electric power station can supply the power throughout the year.
(d) hydro-electric power station can be constructed at the place where the energy is required.
- Q.21** When all the three phases are short circuited it gives rise to
(a) asymmetrical fault current
(b) symmetrical fault current
(c) zero fault current
(d) both (a) and (b)
- Q.22** The most common type of unsymmetrical fault is
(a) single line to ground
(b) double line to ground
(c) line to line
(d) three phase
- Q.23** For a fault at generator terminals the fault current is maximum for
(a) 3- ϕ fault (b) line-line fault
(c) S-L-G fault (d) D-L-G fault
- Q.24** A three-phase transformer having zero-sequence impedance of Z_0 has the zero-sequence network as shown in the figure below. The connections of its windings are



- (a) star-star
 (b) delta-delta
 (c) star-delta
 (d) delta-star with neutral grounded

Q.25 A fault occurring at the terminals of an unloaded synchronous generator operating at its rated voltage has resulted in the following values of currents and voltages:

$$I_{a_0} = j2.37 \text{ p.u.}$$

$$I_{a_1} = -j3.05 \text{ p.u.}$$

$$I_{a_2} = j0.68 \text{ p.u.}$$

$$V_{a_0} = V_{a_1} = V_{a_2} = 0.237 \text{ p.u.}$$

Which one of the following fault has occurred?

- (a) L-L fault (b) L-G fault
 (c) L-L-G fault (d) L-L-L fault

Q.26 How many relays are used to detect inter phase fault of a three-line system?

- (a) One (b) Two
 (c) Three (d) Six

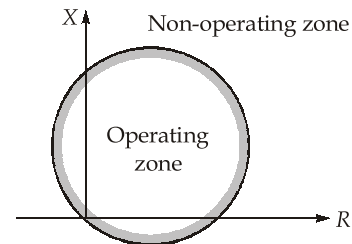
Q.27 What is the preferred type of CB to be installed in extra high voltage ac system?

- (a) Bulk oil type CB
 (b) Air Blast CB
 (c) Vacuum CB
 (d) Sulphur hexafluoride (SF_6) CB

Q.28 The location of the lightning arresters is

- (a) near the transformer
 (b) away from the transformer
 (c) near the circuit breaker
 (d) away from the circuit breaker

Q.29 The operating characteristic of a distance relay in the R-X plane is shown in the figure below. It represents operating characteristic of a



- (a) reactance relay
 (b) directional impedance relay
 (c) impedance relay
 (d) mho relay

Q.30 Z_{pu}^{old} is the per unit impedance on the power base S_B^{old} and voltage base V_B^{old} . What would be the per unit impedance on the new power base S_B^{new} and voltage base V_B^{new} ?

(a) $Z_{pu}^{new} = Z_{pu}^{old} \frac{S_B^{old}}{S_B^{new}} \left(\frac{V_B^{new}}{V_B^{old}} \right)^2$

(b) $Z_{pu}^{new} = Z_{pu}^{old} \frac{S_B^{new}}{S_B^{old}} \left(\frac{V_B^{old}}{V_B^{new}} \right)^2$

(c) $Z_{pu}^{new} = Z_{pu}^{old} \frac{S_B^{new}}{S_B^{old}} \left(\frac{V_B^{old}}{V_B^{new}} \right)$

(d) $Z_{pu}^{new} = Z_{pu}^{old} \frac{S_B^{old}}{S_B^{new}} \left(\frac{V_B^{new}}{V_B^{old}} \right)$

■■■■

Answer Keys

1. (a)	2. (b)	3. (d)	4. (d)	5. (a)	6. (c)	7. (c)
8. (b)	9. (a)	10. (b)	11. (c)	12. (a)	13. (b)	14. (c)
15. (b)	16. (b)	17. (b)	18. (b)	19. (c)	20. (b)	21. (b)
22. (a)	23. (c)	24. (b)	25. (c)	26. (c)	27. (d)	28. (a)
29. (d)	30. (b)					

Detailed Solutions

1. (a)

With the use of bundle conductors self GMD or GMR is increased which reduces the inductance of line.

2. (b)

ACSR is Aluminium conductor steel reinforced. In this the outer conductors made of aluminium.

3. (d)

$$\text{Sag} = \frac{Wl^2}{8T}$$

where,

$W \rightarrow$ weight of conductor per unit length

$l \rightarrow$ span length

$T \rightarrow$ tension in conductor (depends on the conductor material)

4. (d)

Corona, is helpful in one respect, namely, it reduces the effect of surges and acts as a relief valve for them. This is so because the surges are partially dissipated as corona.

5. (a)

$$\therefore \text{Skin depth}(\delta) = \frac{1}{\sqrt{\pi f \mu_0 \mu_r \sigma}} \propto \frac{1}{\text{(skin effect)}}$$

$$\therefore \sigma = \frac{1}{\rho}$$

Therefore skin effect is affected by resistivity of conductor.

6. (c)

The losses occurring in a transmission line is

$$\text{loss} \propto \frac{1}{(V \cos \phi)^2}$$

As pf is improved and voltage is increased, losses reduces and hence, efficiency of transmission increases.

7. (c)

As the line is not transposed therefore, there will be communication interference.

8. (b)

Reactive power,

$$Q \propto \Delta V$$

or,

$$Q \propto [|V_s| - |V_R|]$$

9. (a)

STATCOM has ability to maintain full capacitive output current at low system voltage. It is more effective than SVC in improving transient stability.

10. (b)

$$\text{Percent regulation} = \frac{|I|R \cos \phi_R - |I|X \sin \phi_R}{|V_R|} \times 100$$

For zero voltage regulation

$$(|I|R \cos \phi_R - |I|X \sin \phi_R) = 0$$

⇒

$$\tan \phi_R = \frac{R}{X}$$

⇒

$$\phi_R = \tan^{-1} \left(\frac{R}{X} \right)$$

11. (c)

A power system requires a considerable amount of reactive power whether it is at peak load or at off-peak load.

12. (a)

Guard Ring serves two purposes:

1. Equalisation of voltage drop across the units.
2. Protects the insulator string from flashover whenever over-voltage appears between the tower structure and the power conductor.

Due to these its string efficiency increases.

13. (b)

In suspension Insulators, each insulator is designed for 11 kV. Hence for 66 kV we need 6 insulators.

14. (c)

At transmission line voltages upto 230 kV, the insulation level is dictated by the requirement of protection against lightning. In EHV, switching surges cause higher over voltages than lightning and are therefore mainly responsible for insulation level decision.

15. (b)

Diversity factor is the ratio of sum of the individual maximum demands of all the consumers supplied by it to the maximum demand of the power stations. It is always greater than unity.

16. (b)

For medium head (16 - 70 m) we use Kaplan turbine.

17. (b)

The steam power station operates on the Rankine cycle, modified to include superheating, feed-water heating and steam reheating.

18. (b)

Control rods made up of boron, Cadmium are used to control the nuclear chain reaction in a nuclear power plant.

19. (c)

Since plant capacity factor = Load factor

$$\therefore \frac{\text{Average load}}{\text{Plant capacity}} = \frac{\text{Average load}}{\text{Maximum demand}}$$

$$\text{or, Plant capacity} = \text{Maximum demand}$$

$$\text{Now, PUF} = \frac{\text{Maximum demand}}{\text{Plant capacity}} = 1$$

20. (b)

Hydro-electric power stations don't require fuel like thermal power stations, operating cost of hydro-electric power station is low.

21. (b)

When all the three phases are short circuited, then it is called as symmetrical fault and symmetrical fault current flow from fault point to ground.

22. (a)

Single line to ground fault is most common fault.

23. (c)

Single line to ground fault is most severe fault at the generator terminals.

24. (b)

A delta-connected circuit provides no path for zero sequence currents flowing in the line. The zero sequence currents being single phase circulate within the winding. Hence viewed from its terminals its zero sequence impedance is infinite.

25. (c)

For L-L-G fault ($I_{af} = 0$)

$$\Rightarrow I_{af}^{(0)} + I_{af}^{(1)} + I_{af}^{(2)} = 0$$

$$\Rightarrow j2.37 + (-j3.05) + j0.08 = 0$$

$$\Rightarrow V_{ag}^{(0)} = V_{ag}^{(1)} = V_{ag}^{(2)}$$

26. (c)

We require three over-current relays as phase-fault relays.

27. (d)

 SF_6 is used upto 132 kV

Bulk oil upto 33 kV

Vacuum CB used upto 66 kV

28. (a)

Lighting arresters are placed at both of the sides of a transformer for the protection of transformer from lightning surges and high voltage spikes.

29. (d)

Impedance relay is a voltage restrained directional relay.

$$T = K_3 VI \cos(\theta - \tau) - K_2 V^2$$

$$\text{For relay to operate } Z < \frac{K_3}{K_2} \cos(\theta - \tau)$$

So the relay operates when the impedance seen by the relay falls within this circle.

30. (b)

$$Z_{\text{base}} = \frac{V_B^2}{S_B}$$

$$Z_{\text{actual}} = Z_{\text{pu}}^{\text{old}} \times Z_{\text{base}}^{\text{old}}$$

$$Z_{\text{pu}}^{\text{new}} = \frac{Z_{\text{actual}}}{Z_{\text{base}}^{\text{new}}} = Z_{\text{pu}}^{\text{old}} \times Z_{\text{base}}^{\text{old}} \times \frac{S_B^{\text{new}}}{(V_B^{\text{new}})^2}$$

$$Z_{\text{pu}}^{\text{new}} = Z_{\text{pu}}^{\text{old}} \times \frac{S_B^{\text{new}}}{S_B^{\text{old}}} \left(\frac{V_B^{\text{old}}}{V_B^{\text{new}}} \right)^2$$





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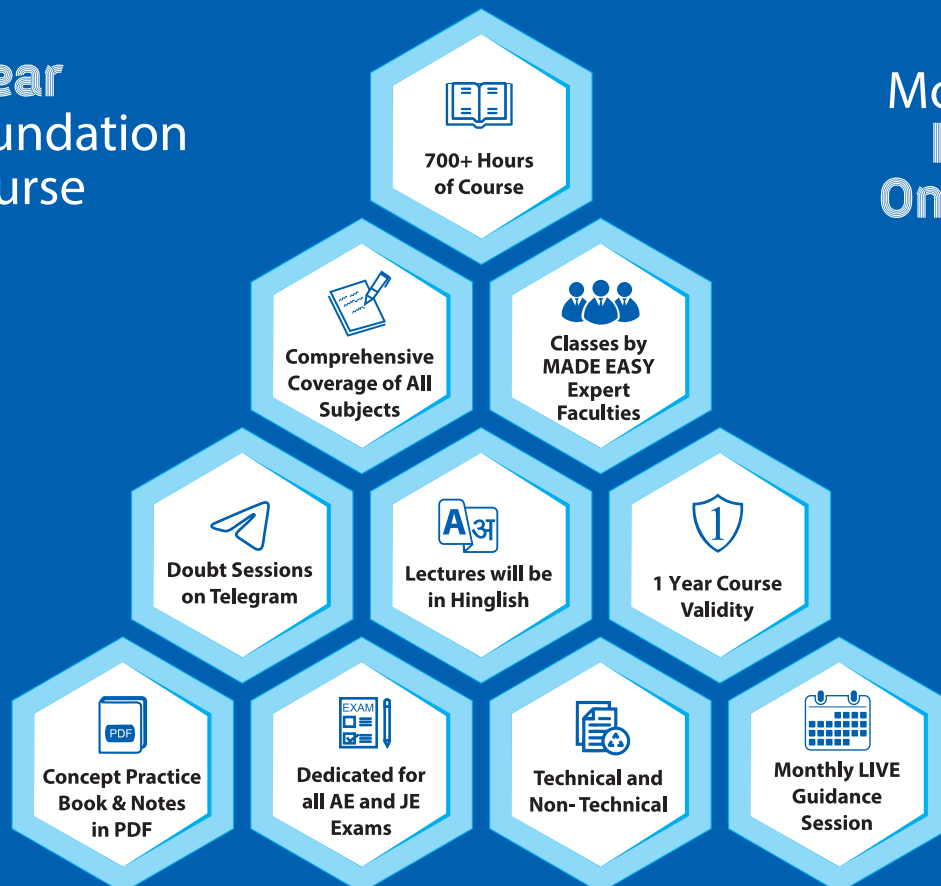
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