ACE
Engineering Academy

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ESE- 2018 (Prelims) - Offline Test Series Test- 7

ELECTRICAL ENGINEERING

SUBJECT: ELECTRICAL AND ELECTRONIC MEASUREMENTS + POWER SYSTEMS SOLUTIONS

01. Ans: (b)

02. Ans: (b)

Sol: $R_{se} = R_m\left[\frac{V}{V_{in}} - 1\right]$

$= 200\left[\frac{500}{50\mu A \times 200} - 1\right]$

$= 20000 \times 500 - 200 = 9.99\ M\Omega$

03. And: (d) **04. Ans: (d)**

05. Ans: (a)

06. Ans: (a)

Sol: $M = -8\cos(\theta + 60^0)$mH

$\frac{dM}{d\theta} = 8\sin(\theta + 60^0)$mH

$T_d = I^2\frac{dM}{d\theta}$

$= [25 \times 10^{-3}]^2 \times [8\sin 90^0] \times 10^{-3}$

$= 5000 \times 10^{-9} \Rightarrow 5\ \mu$N-m

07. Ans: (d)

08. Ans: (b)

09. Ans: (d)

Sol: Energy Consumed = Power × time

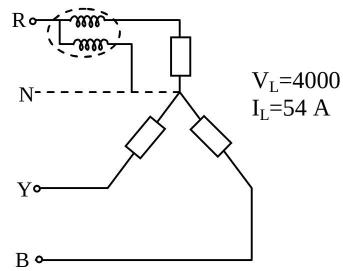
$= \frac{450}{1000} \times \frac{100}{3600} = \frac{1}{80}$ kWh

Meter Constant (k) $= \frac{rev}{kWh} = \frac{10}{(1/80)} = 800$

10. Ans: (b)

11. Ans: (b)

Sol: **Case (i)**: Potential coil is connected across R



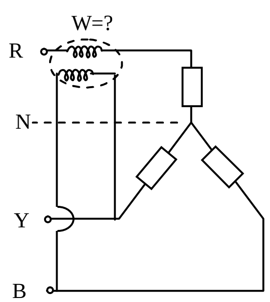
Wattmeter reading = 10 kW

$= V_{ph}I_{ph}\cos\phi$

$10 \text{ kW} = \frac{V_L}{\sqrt{3}} I_L \cos\phi$

$\cos\phi = 0.8$

Case (ii): The potential coil reconnected across B-Y phases



$\cos\phi = 0.8; \sin\phi = 0.6$

wattmeter reads, $V_LI_L\sin\phi$

$= 400 \times 54 \times 0.6$

$= 12.96$ kW

≈ 13 kW

12. Ans: (b)

13. Ans: (b)

Sol: For balanced bridge, product of impedance in opposite arms must be equal

Let $Z_2 = a + jb$

Then in balance state

$R_1z_2 = R_3[R_4 + j\omega L_4]$

$R_1[a + jb] = R_3R_4 + j\omega R_3L_4$

$R_1a + jR_1b = R_3R_4 + j\omega R_3L_4$

Equating Real Parts

$a = \frac{R_3R_4}{R_1}$ → 'a' must be resistor as no frequency term is involved.

Equating imaginary parts

$b = \frac{\omega R_3L_4}{R_1} =$ where $b\rightarrow$ inductive reactance

So, 'Z_2' should be R and L

14. Ans: (a)

15. Ans: (c)

Sol: No actual part of the coil is allowed to reach the extreme positions near the pole tips where, there is fringing field. Owing to fringing the flux density near the pole tips is smaller than that at the centre and also the field is not radial. Thus the angular span is restricted to 90°.

16. Ans: (c)

17. Ans: (a)

Sol: $\frac{I_1}{I_2} = \frac{250}{5}$

$\frac{I_1}{2.7} = \frac{250}{5}$

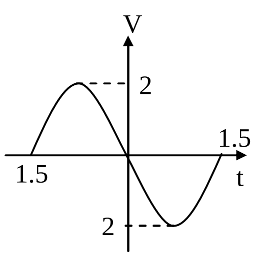
$I_1 = 135$ A

18. Ans: (a)

Sol: Wagner's earth device removes all the earth capacitances from the bridge network.

19. Ans: (a)

Sol:



$$\frac{\text{time}}{\text{disvision}} = 10\mu s$$

$$\frac{\text{volt}}{\text{division}} = 200 \text{ mV}$$

Here the wave repeats for every 3 divisions.

Time period T = 10 μs × 3 = 30 μs.

Frequency $1/T = \frac{1}{30\times10^{-6}} = 33.33\text{kHz}$ and

Number of division for peak to peak is 4.

$\therefore$ Peak to peak voltage = $4\times\frac{\text{voltage}}{\text{division}}$ = 4 × 200 = 800 mV

20. Ans: (a)

Sol: For n-bit Flash type A/D converter requires 1 CLK cycle for total conversion. It uses 2^n-1 comparators, so hard ware implementation is complex.

21. Ans: (a)

22. Ans: (b)

Sol: Vibrating reed frequency-meter indicates the supply frequency by means of individual reeds, when, rated voltage is applied across the terminals of the meter, the particular reed whose, natural frequency of vibration coincides with the supply frequency, vibrate with full amplitude.

23. Ans: (b)

Sol: In an energy meter the pressure coil current should lag voltage across pressure coil by 90° for accurate readings. Hence pressure coil circuit is designed in such a way that it is highly inductive and has low resistance.

24. Ans: (b) **25. Ans: (c)**

26. Ans: (c)

Sol: Total load, P_{load} = 200 MW

$$P_{G1} + P_{G2} = 200 \text{ MW} \quad .....(1)$$

Cost curves $C_1 = P_{G1} + 0.01\ P_{G1}^2$

$$C_2 = 5P_{G2} + 0.02\,P_{G2}^2$$

Most economical load scheduling, $\frac{dC_1}{dP_{G1}} = \frac{dC_2}{dP_{G2}}$

$1+0.02\ P_{G1} = 5 + 0.04\ P_{G2}$

$0.02\ P_{G1} - 0.04\ P_{G2} = 4$

$2\ P_{G1} - 4P_{G2} = 400$

$P_{G1} - 2P_{G2} = 200$ …….(2)

Equation (1) – equation (2) give $3P_{G2} = 0$

$P_{G2} = 0$

But minimum loading on each generator given as 30 MW

So, P_{G2} must be set to 30 MW

P_{G2} = 30 MW

Then $P_{G1} = 200 - P_{G2}$

$\therefore P_{G1}$ = 170 MW

27. Ans: (b)

Sol: $C = \frac{\varepsilon A}{d}, C\alpha\frac{1}{d}\ \frac{C_1}{C_2} = \frac{d_2}{d_1}$;

$$C_2 = \frac{C_1 \times d_1}{d_2} = (370\text{pF}) \times \frac{3.5\text{mm}}{(3.5-0.6)\text{mm}}$$

= 447 pF

28. Ans: (b)

Sol: Acceleration (a) $= \frac{Kx}{m}$

$K = 3\times10^3$ N/m

$m = 0.05\times10^3$ grams

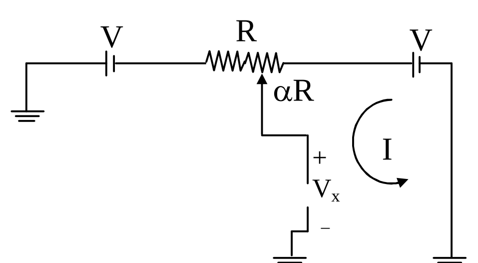
$x = \pm$ 1mm

$$a = \frac{3\times10^3 \times 1\times10^{-3}}{0.05\times10^3} = 60 \text{ m/s}^2$$

29. Ans: (d)

30. Ans: (a)

Sol:



$I = \frac{2V}{R}$

Apply KVL in loop

$-V+I\alpha R+V_x = 0$

$$-v+\frac{2v}{R}\times\alpha R+v_x = 0$$

V-2Vα = Vxs

$V_x = [1-2\alpha]\ V$

31. Ans: (a)

Sol: $$(Z_{pu})_{new} = (Z_{pu})_{old}\times\left(\frac{kV_{old}}{kV_{new}}\right)^2\times\left(\frac{MVA_{new}}{MVA_{old}}\right)$$

$$= x\,(2)^2\times\left(\frac{1}{2}\right)$$

$$= 2x$$

32. Ans: (c)

Sol: Given data:

f = 50 Hz, V_{ph} = 100 kV

$I_{c/km}$ = 0.314 A/km

$\because I_{c/km} = \omega CV_{ph}$ (C is capacitance per unit distance)

$0.314 = 2\times3.14\times50\times C\times100\times10^3$

$\Rightarrow C = 0.01\ \mu F/km$

33. Ans: (b)

Sol: Tuned line, $|V_s| = |V_R|$ and $|I_s| = |I_R|$

$\because$ Length of the line for tuning,

$$\ell = \frac{1}{2}(n\lambda)$$

$$= \frac{1}{2}\lambda,\ \lambda,\ \frac{3}{2}\lambda.......$$

But, $v = f\lambda$ { Where, $v=3\times10^5$ Km/sec & f = 50Hz}

$$\Rightarrow \lambda = \frac{3\times10^5}{50} = 6000km$$

Hence, $\ell = \frac{1}{2}\lambda = \frac{1}{2}\times6000 = 3000km$

34. Ans: (d)

Sol: $\therefore$ dc output voltage is given as,

$$V_d = \frac{V_0}{2}[\cos\alpha+\cos(\alpha+\gamma)]$$

Where, α = 60° and γ = 30°

Also, $V_0 = \frac{3\sqrt{2}}{\pi}V_L = \frac{3\sqrt{2}}{22/7}\times220$

= 296.98 kV

$$V_d = \frac{296.98}{2}[\cos60^\circ+\cos(60^\circ+30^\circ)]$$

= 74.25 kV

35. Ans: (c)

Sol: The dc spreads over a very large cross sectional area in both depth and width, therefore earth resistance is much less as compared to ac.

Also, the earth resistance in case of dc is equal to the sum of electrode resistances, which is almost constant and independent of the length of the line.

36. Ans: (a)

Sol: Given data, $\varepsilon_r = 0.02$, $\varepsilon_x = 0.3$, $\cos\phi = 0.8$

Then,

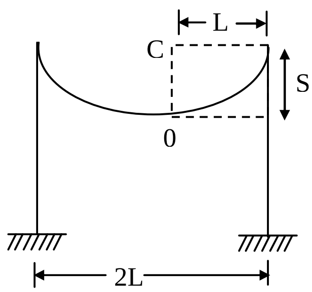
$\% \text{VR} = (\varepsilon_r \cos\phi + \varepsilon_r \sin\phi) \times 100$

$= (0.02\times0.8+0.3\times0.6)\times100$

$= 19.6\%$

37. Ans: (b)

Sol: If, x is the distance from centre '0' (fig(i)) then, sag of the conductor is given as,



Fig(i)

$$S = \frac{Wx^2}{2T}$$

if, $x = L \Rightarrow S = \dfrac{WL^2}{2T}$

38. Ans: (c)

Sol: $\because V_s = AV_r + BI_r$

At, no load, $I_r = 0$

$$\Rightarrow V_{rn\ell} = \frac{V_s}{A} = \frac{240\times10^3}{0.9}$$

Also, $V_r = 220\times10^3 V$(full load)

Then,

$$\%VR = \frac{V_{rn\ell} - V_{rf\ell}}{V_{rf\ell}}\times100$$

$$\%VR = \frac{\left(\dfrac{240}{0.9}\right) - 220}{220}\times100$$

$= 21.21\%$

39. Ans: (a)

Sol: Distribution feeders are designed on the basis of voltage drop to maintain voltage stability

40. Ans: (d)

Sol: Shunt capacitors are used to improve voltage profile.

Shunt reactors are used to avoid over-voltages

Series capacitors are used to increase P_{max} $\left(P_{max} = \frac{|V_1||V_2|}{X\downarrow}\right)$, so as to improve the angular stability of the system.

41. Ans: (d)

Sol: Given data: Load: 10 MVA, 0.8 pf (lag)

let, rating of the delta connected capacitor bank be Q_{shcap}- In order to improve the power factor to unity. The capacitor bank must supply the reactive power required by the load locally,

Hence, $Q_{shap} = S \sin(\cos^{-1}0.8)$

$= 10 \times 0.6 = 6$ MVAR

42. Ans: (b)

Sol: Given data, n = 6

Then, string efficiency,

$$\eta = \frac{\text{System voltage}}{\text{n} \times \text{Voltage across the bottom most insulator disc}} \times 100$$

$$\Rightarrow \eta = \frac{V}{6 \times 0.3V} \times 100$$

$= 55.55\%$

43. Ans: (c)

Sol: **KAPLAN Turbine:** It is a propeller-type axial flow water turbine. It is an evolution of francis turbine, which allowed power production at low head (10-70 meters) with output ranging from 5 to 200 MW.

FRANCIS Turbine: It is an inward-flow reaction water turbine which combines radial and axial flow. It is a medium head turbine (40 to 600m)

Pelton Wheel: It is an impulse water turbine. It is a high head turbine having tangential flow.

44. Ans: (c)

Sol: LG fault:

$$I_{a_1} = \frac{1}{3}(I_a + \alpha I_b + \alpha^2 I_c)$$

$$I_{a_2} = \frac{1}{3}\left(I_a + \alpha^2 I_b + \alpha I_c\right)$$

$$I_{a_0} = \frac{1}{3}\left(I_a + I_b + I_c\right)$$

As, $V_a = 0$, $I_b = 0$ & $I_c = 0$

$$I_{a_1} = I_{a_2} = I_{a_0} = \frac{I_a}{3}$$

LL fault:

$$I_{a_1} = \frac{1}{3}\left(I_a + \alpha I_b + \alpha^2 I_c\right)$$

$$I_{a_2} = \frac{1}{3}\left(I_a + \alpha^2 I_b + \alpha I_c\right)$$

$$I_{a_0} = \frac{1}{3}\left(I_a + I_b + I_c\right)$$

As , $I_a = 0$, $I_b + I_c = 0$, $V_b = V_c$

$$\Rightarrow I_{a_1} = \frac{1}{3}\left(\alpha - \alpha^2\right) I_b$$

$$I_{a_2} = \frac{1}{3}\left(\alpha^2 - \alpha\right) I_b$$

$$I_{a_0} = 0$$

$$\Rightarrow I_{a_1} = -I_{a_2}$$

LLG fault:

$$V_{a_0} = \frac{1}{3}\left(V_a + V_b + V_c\right)$$

$$V_{a_1} = \frac{1}{3}\left(V_a + \alpha V_b + \alpha^2 V_c\right)$$

$$V_{a_2} = \frac{1}{3}\left(V_a + \alpha^2 V_b + \alpha V_c\right)$$

As, $I_a = 0$, $V_b = V_c = 0$

$$\Rightarrow V_{a_0} = V_{a_1} = V_{a_2} = \frac{1}{3} V_a$$

LLL fault:

$$I_{a_1} = \frac{1}{3}\left(I_a + \alpha I_b + \alpha^2 I_c\right),$$

$$V_{a_1} = \frac{1}{3}\left(V_a + \alpha V_b + \alpha^2 V_c\right)$$

$$I_{a_2} = \frac{1}{3}\left(I_a + \alpha^2 I_b + \alpha I_c\right),$$

$$V_{a_2} = \frac{1}{3}\left(V_a + \alpha^2 V_b + \alpha V_c\right)$$

$$I_{a_0} = \frac{1}{3}\left(I_a + I_b + I_c\right),\ V_{a_0} = \frac{1}{3}\left(V_a + V_b + V_c\right)$$

As, $V_a = V_b = V_c$, $|I_a| = |I_b| = |I_c|$, $I_b = \alpha^2 I_a$, $I_c = \alpha I_a$

$$I_{a_2} = 0, I_{a_0} = 0, V_{a_1} = V_{a_2} = V_{a_0} = 0$$

45. Ans: (a)

Sol: Relays at source ends are non-directional also relays feeding a radial load are non-directional.

46. Ans: (b)

Sol: **Generator reactor:** Modern generators have high reactance upto 2 pu to limit dead short circuit current at the generator terminal. But in general reactors are provided to limit the short circuit current.

Feeder reactor:

The per unit value of reactance of a feeder on its own rating may be small but when compared to rating of the whole system, its value is quite large.

Hence, a small reactor is effective in limiting short circuit current.

Busbar reactor:

For large size power plants ring or star connections are used for connecting busbars through the reactors.

47. Ans: (d)

Sol: Short-circuit capacity of a bus:

→ It is defined as the product of prefault voltage and post fault current.

→ Since strength of a bus is directly related to short-circuit capacity, the higher the short-circuit capacity, the more voltage stable it is in case of fault on any other bus.

→ Higher the short-circuit capacity, lower will be the equivalent impedance. An infinite bus is almost unaffected by the fault on other bus, hence it has infinite short-circuit capacity and zero equivalent impedance.

$$\uparrow \text{short-circuit capacity} = \frac{(\text{MVA})_{\text{base}}}{Z_{eq}\downarrow}$$

48. Ans: (a)

Sol: Reactance voltage drop = $\varepsilon_r \cos\phi + \varepsilon_x \sin\phi$

But $\varepsilon_r = 0$ (reactive feeder)

$\Delta V = 5 \times 0.6 = 3\%$

49. Ans: (d)

Sol: Since the transformer is connected to an infinite bus, the per unit impedance of the circuit would be,

$Z_{eq} = 0.1$ pu

Then, $\text{SCMVA} = \frac{(\text{MVA})_b}{Z_{eq}} = \frac{0.4}{0.1} = 4$ MVA

50. Ans: (c)

Sol: A good insulator should have

1. Low relative permittivity
2. High dielectric strength
3. High insulation resistivity
4. High thermal conductivity

51. Ans: (d)

Sol: Combined cycle gas power plant uses both the gas and steam turbine to produce up to 50% more electricity from the same fuel.

The steam turbine follows the Rankine cycle.

The gas turbine follows the Brayton cycle.

52. Ans: (b)

Sol: CANDU (Canadian Deuterium Uranium) heavy water reactors use natural uranium as fuel (0.7% U-235).

53. Ans: (d)

Sol: Combined cycle gas power plant uses both the gas and steam turbine to produce up to 50% more electricity from the same fuel.

The steam turbine follows the Rankine cycle.

The gas turbine follows the Brayton cycle.

54. Ans: (d)

Sol: Complex power

$$S = V_P^T \times I_P^* = V_a \times I_a^* + V_b \times I_b^* + V_c \times I_c^*$$

$$= [A \times V_S]^T \times [A \times I_S]^*$$

$$= V_S^T \times A^T \times A^* \times I_S^* \qquad [A^T \times A^*] = 3 \times U$$

$$= V_S^T \times (3 \times U) \times I_S^* = 3 \times V_S^T \times I_S^*$$

55. Ans: (c)

Sol: $L_{int} = \dfrac{\mu}{8\pi} = \dfrac{\mu_0 \mu_r}{8\pi}$

$$L_{int} = \frac{1}{2} \times \mu_r \times 10^{-7}\, H/m$$

$$L_{int} \propto \mu_r$$

$$\frac{(L_{int})_2}{(L_{int})_1} = \frac{(\mu_r)_2}{(\mu_r)_1}$$

$$(L_{int})_2 = \frac{8}{1} \times 0.05 = 0.4$$

56. Ans: (c)

Sol: charging reactance $X_C \propto \dfrac{1}{\text{length of the line}}$

For 50km $\rightarrow$ 500Ω

100km $\rightarrow$ 250Ω

57. Ans: (d)

Sol: Static VAR controllers are used to provide dynamic voltage regulation by using thyristor controlled inductors and thyristor switched capacitors.

58. Ans: (d)

Sol: The stability of arc in vacuum depends on

1. Contact material: eg: Thermal conductivity of contact material
2. Pressure of metal vapour
3. Circuit parameters such as voltage, current, inductor, capacitor.

59. Ans: (d)

Sol: Given Y_{Bus} is

$$Y_{Bus} = j\begin{bmatrix} -50 & 10 & 15 \\ 10 & -30 & 10 \\ 15 & 10 & -25 \end{bmatrix}$$

If the sum of the elements of any row of Y_{Bus} is not equal to zero, then the corresponding bus contains a shunt element.

1^{st} row $\rightarrow$ –j50+j10+j15= –j25

2^{nd} row $\rightarrow$ j10–j30+j10=–j10

3^{rd} row$\rightarrow$ j15+j10–j25=0

Hence only 2-buses have shunt elements

$y_{11} = -j25 \Rightarrow z_{11} = \dfrac{j}{25}$ $\rightarrow$ inductive reactance

$y_{22} = -j10 \Rightarrow z_{22} = \dfrac{j}{10}$ $\rightarrow$ inductive reactance

$\therefore$ Number of buses with shunt capacitances = 0

Number of buses with shunt inductances =2.

60. Ans: (c)

Sol: $Y_{Bus} = 100 \times 100$

Zero admittances = 0.95 ×10,000

= 9500 (mutual)

Non-zero admittances = 0.05×10,000

= 500 [100 $\rightarrow$ self admitances

400 $\rightarrow$ Non-zero mutual admittances]

The number of off diagonal non-zero admittances = total non-zero admittances – self (or) diagonal admittances

= 500 – 100 = 400

The number of transmission lines

$$\frac{400}{2} = 200.$$

61. Ans: (d)

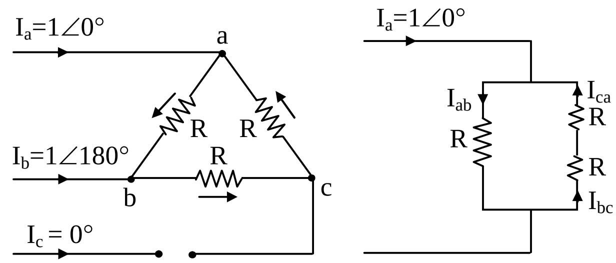
Sol: Inertia constant (H)

$$= \frac{\text{K.E.stored}}{\text{Rating of the machine}} \text{ MJ / MVA}$$

$$H = \frac{800}{100} = 8 \text{ MJ/MVA}$$

62. Ans: (d)

Sol:



$$I_{ab} = 1\angle 0^o \times \frac{2R}{3R} = \frac{2}{3}\angle 0^o \text{ p.u.}$$

$$I_{bc} = I_{ca} = \frac{1}{3}\angle 180^o \text{ p.u.}$$

Zero sequence current in loop,

$$I_{ab0} = \frac{1}{3}\left(I_{ab} + I_{bc} + I_{ca}\right)$$

$$= \frac{1}{3}\left(\frac{2}{3}\angle 0^o - \frac{1}{3} - \frac{1}{3}\right)$$

$$= 0$$

63. Ans: (c)

Sol: For the given two generators system

$P_1 = 50\ (50 - f)$

$P_2 = 100(51 - f)$

Total load, $P_{load} = 800$ MW

Assuming that P_1 and P_2 are in MW

So, $P_1 + P_2 = 800$

$50(50 - f) + 100(51 - f) = 800$

$50 - f + 2\ (51 - f) = 16$

$50 + 102 - 3f = 16$

$3f = 152 - 16$

$f = 45.33$ Hz

64. Ans: (d)

Sol:

1. Positive sequence currents, flowing through the phases, produce an mmf rotating in the same direction as the rotor, and at the same speed as the rotor. Hence the stator mmf is stationary with respect to the rotor. If the stator mmf axis coincides with the direct-axis; we have X_d, X'_d and X''_d (X'_d & X''_d arising due to the presence of closed field winding and damper winding along the direct-axis and the constant flux linkage theorem). Similarly, if the quadrature axis coincides with the stator mmf, we have X_q, X'_q and X''_q.
2. The presence of damper windings pushes the flux produced by the stator mmf into very high reluctance paths initially, leading to lower fluxes, lower inductances and lower reactances, which are called subtransient reactance.
3. X_d is certainly greater than X_q. But the flux path which leads to X''_d has higher reluctance than the flux path which leads to X''_q. Hence $X''_q > X''_d$.
4. With negative sequence currents through the phases, stator mmf rotates at double the synchronous speed with respect to rotor, and hence repeatedly experiences high reluctance paths as well as low reluctance paths. Hence there is only one value for the negative sequence reactance.

Zero sequence currents, flowing through the phases, produce zero resultant stator mmf and hence ideally, zero-sequence reactance should be zero. Practically there is a small zero sequence reactance, but it is single valued.

5. As can be seen from the explanation for statement 4: zero-sequence reactance is less than the negative sequence reactance.

65. Ans: (c)

Sol: Generator buses = 10

Load buses = 90

5 load buses are converted into generator buses total generator buses = 15

Load buses = 85

Generator equations = (15 - 1) × 1 = 14

Load bus equations = 85 × 2 = 170

Total number of equations = 184.

66. Ans: (b)

Sol: Steady state stability $P_{max} = \frac{EV}{X}$

By using Bundle conductors or Double circuit lines, the reactance is reduced than single circuit line. Hence steady state stability limit increases.

67. Ans: (a)

Sol: Corona induces a third harmonic voltage between line and earth, which leads to flow of third harmonic current due to line to earth capacitance. This third harmonic current leads to interference with the neighboring communication lines.

68. Ans: (a)

Sol: Due to the hollow cylindrical cup structure of the induction cup relay, it is more sensitive than induction disc realy.

Hence, it is used in high speed relaying.

69. Ans: (c)

Sol: By changing the off-nominal tapping voltage can be controlled by using a tap-changing transformer.

Tap-changing transformers do not inject reactive power into the system, rather by controlling the voltage reactive power is controlled.

70. Ans: (a)

Sol: LPS system has poor voltage regulation because LPS system has low level of short circuit MVA.

$\therefore$ Both are true and Statement(II) is correct explanation of Statement(I).

71. Ans: (a)

Sol: The rectifier voltage is given by

$$V_{d_1} = n\left(\frac{3\sqrt{2}\ V_{Lr}}{\pi}\cos\alpha - \frac{3X_r}{\pi}I_d\right) \ldots\ldots (1)$$

The inverter voltage is given by

$$V_{d_2} = n\left(\frac{3\sqrt{2}\ V_{Li}}{\pi}\cos\gamma - \frac{3X_i}{\pi}I_d\right) \ldots\ \ldots\ldots(2)$$

where n = number of bridges

V_{Lr} V_{Li} = line to line AC voltages at the rectifier and inverter respectively.

X_{cr}, X_{ci} = commutation reactance at the rectifier and inverter, respectively.

In HVDC systems, DC voltage should be as high as possible because rectifier control angle is low (equation (1)). From equation (1) and (2), control of DC voltage is exercised by the rectifier and inverter control angles α and γ respectively.

72. Ans: (a) **73. Ans: (a)**

74. Ans: (b)

75. Ans: (d)

Sol: Measurement of voltage magnitude by a CRO is not fast compared to other techniques of measurement of same voltage by AVM or DVM.

As such, statement (I) is false but statement (II) is true.