1. The number of iterations required to reach convergence in the Gauss-Seidel method of load flow analysis:

A. dependent on the size of the system, and decreases with the increase in the size of the system
B. dependent on the size of the system, and increases with the increase in the size of the system
C. dependent on the size of the system, and increases with the decrease in the size of the system
D. independent of the size of the system

Answer ||| B

Solution |||

The number of iterations to reach convergence in the Gauss-seidel method of load flow analysis are dependent on the size of the system and increases with the increase in the size of the system.

2. Which of the following is an inverse transducer?

A. Piezo electric crystals
B. Resistance potentiometer
C. Capacitive transducer
D. L.V.D T

Answer ||| A

Solution |||

The inverse transducer converts the electrical quantity into the non-electrical quantity. Examples of inverse transducer are Piezoelectric Transducer, current carrying conductor placed in a magnetic field.

3.If a capacitance is charged by a square wave current source, then the voltage across the capacitor will be

A. square wave
B. Step function
C. Triangular wave
D. Zero

Answer ||| C

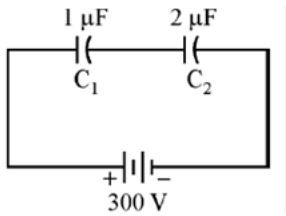
Solution |||

$$I_c = C\frac{dv}{dt}$$

$$V = \frac{1}{c}\int Idt$$

∴ Integration of squire wave is Triangular wave.

4.In the following figure, the voltage across C_1 will be



A. 100 V
B. 200 V
C. 150 V
D. 300 V

Answer ||| B

Solution |||

$$V_{c_1} = V_s \times \frac{c_2}{c_1 + c_2} = 300 \times \frac{2\mu F}{(2+1)\,\mu F} = \frac{300 \times 2}{3} = 200V$$

$$\therefore \; V_{c_1} = 200V$$

$$V_{c_2} = 100V.$$

5.A 100/5 A bar primary current transformer supplies an overcurrent relay set at 25% pick up and it has a burden of 5 VA. The secondary voltage is

A. 1 V
B. 1.25 V
C. 2.5 V
D. 4 V

Answer ||| D

Solution ||| Secondary side current = $5\times\frac{25}{100}$

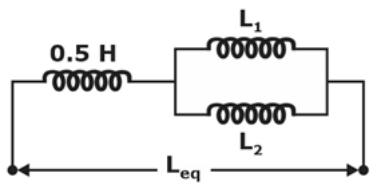
$$I_2 = \frac{5}{4}\ A$$

$$V_2 I_2 = 5$$

Secondary voltage $(V_2) = \frac{5}{\frac{5}{4}}$

$$V_2 = 5\times\frac{4}{5} = 4\ V$$

6.In the given circuit, inductances L_1 and L_2, if $L_1 = 2L_2$ and L_{eq} is 0.7 H, are



A. 0.4 H and 0.8 H respectively
B. 0.6 H and 0.3 H respectively
C. 0.8 H and 0.4 H respectively
D. 1.0 H and 0.5 H respectively

Answer ||| B

Solution |||

L_{eq}= 0.5+(L_1L_2)/(L_1+L_2)

Since, $L_1 = 2L_2$

L_{eq}= 0.5+($2L_2L_2$)/($2L_2$+L_2)

L_{eq}= 0.5+$2L_2/3$ = 0.7

$2L_2/3$=0.2

L_2=0.3 and L_1=0.6

7.What is the TUF of the center-tap full-wave rectifier?

A. 28.6 %
B. 57.3%
C. 69.3%
D. 81.2%

Answer ||| C

Solution |||

$$TUF = \frac{(TUF)_p + (TUF)_5}{2}$$ primary

Also $$TUF = \frac{P_{DC}}{P_{AC}}$$

$$(TUF)_p = \frac{I_{DC^2} R_L}{V_{RMS} I_{RMS}} = \frac{(2im) R_L}{\frac{i_m^2 R_L}{2}} = 81.2\%$$

$$(TUF)_s = \frac{P_{DC}}{Pacs_1 + Pacs_2} = 57.3\%$$

$$TUF = \frac{81.2 + 57.3}{2} = 69.3\%$$

8.A 2-transistor class B power amplifier is commonly called……amplifier.

A. dual
B. push-pull
C. symmetrical
D. differential

Answer ||| B

Solution ||| It is called a **push-pull** amplifier.

9.The meaning of uploading in PLC is _____.

A. Transferring program from programming device.
B. Transferring program from output device to PLC
C. Transferring user program from PLC to programming device.
D. Transferring program from memory to PLC's.

Answer ||| C

Solution |||

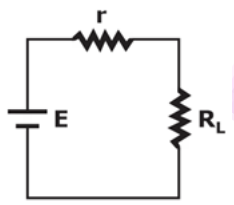
• Most of the PLC use the term 'upload' to mean transfer from the PLC, and 'download' to mean transfer to the PLC.

10.The maximum power dissipation in a resistance from a battery of electromotive force 'E' and internal resistance 'r' will be

A. $\frac{E^2}{8r}$
B. $\frac{E^2}{4r}$
C. $\frac{E^2}{2r}$
D. $\frac{E^2}{r}$

Answer ||| B

Solution |||



⇒ Maximum Power will transfer if $R_L = \pi$

$$\therefore P_{max} = I^2R_L = \left(\frac{E}{2RL}\right)^2 \times RL = \frac{E^2}{4R_L} = \frac{E^2}{4r}$$

11.A permanent magnet moving coil ammeter has a coil resistance of 99 ohm and Full Scale Deflection (FSD) current of 0.1mA. Shunt resistance is 1 ohm. Current through the meter at 0.5 F.S.D is:

A. 0.007mA
B. 0.05mA
C. 0.023mA
D. None of these

Answer ||| B

Solution ||| Deflection produced in ammeter is directly proportional to the amount of current flowing through it.
Hence, [1 FSD /0.5 FSD] = [0.1 mA/x]
x = 0.05 mA

12.The illumination level in houses is in range

A. 10-20 lumen/m^2
B. 30-50 lumen/m^2
C. 40-75 lumen/m^2
D. 100-140 lumen/m^2

Answer ||| D

Solution |||

The illumination level in houses is in the range of 100-140 lumen/m^2.

13.A 100 mA meter has accuracy of ± 2%. What will be the accuracy while reading 50 mA ?

A. ± 1%
B. ± 2%
C. ± 4%
D. ± 20%

Answer ||| C

Solution ||| The error while measuring 100 mA = $\frac{100\times2}{100}$ = 2mA

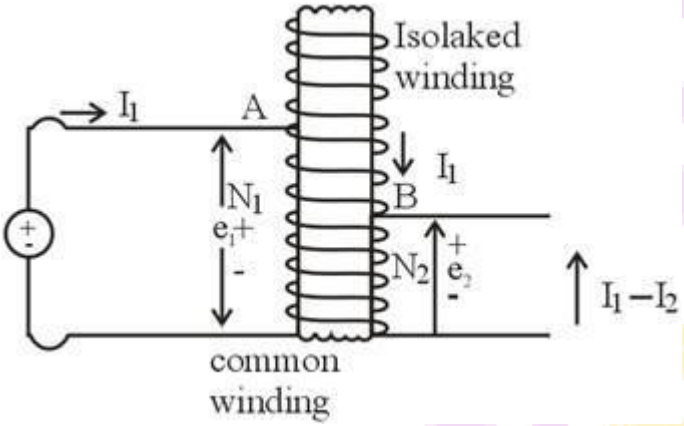
Accuracy while measuring 50 mA = $\frac{2}{50}\times 100$ = 2× 2 = ±4%

14.Consider the following statement regarding the auto transformer
A) Volume of core requirement in auto transformer is less than two winding transformer.
B) In auto transformer the volume of copper requirement and insulation requirement is reduced.

A. A is false but B is true.
B. A is right but B is not the correct explanation of A
C. A is true and B is false
D. A is right and B is also right and B is the correct explanation of A.

Answer ||| B

Solution ||| Volume of core requirement is less in auto transformer than in two winding transformer because for given core area the requirement of copper and insulation is reduced.
(Volume of copper requirement)$_{2\ winding}$= $N_1I_1+N_2I_2$= 2NI (equal AT)



(volume of copper requirement)$_{auto}$= $I_1(N_1-N_2)+ (I_2-I_1)N_2= 2I_1(N_1-N_2)$
= 2IN (value of $\mathbf{N_{effective}}$ is reduced so requirement of insulation also reduced).

15.Which one of the following heating method is most inefficient method of electrical heating?

A. Infrared Heating
B. Resistance Heating
C. Dielectric Heating
D. Induction Heating

Answer ||| A

Solution |||

Infrared Heating is the most inefficient method of electric heating. It is also the simplest form of electric heating. Here the electromagnetic radiation coming out from an incandescent light bulb is focused to the surface to be heated. It is mostly used for drying out the wed painted surface of an object.

16.A 3-Φ transmission line has a reactance of 12Ω/phase. The voltage at each end is maintained at 132 kV (L-L). The limits of angular oscillations for transient stability, When the above line develops a sudden jerk at 2/5th of the steady state limit.

A. 12.34° – 167.66° (electrical)
B. 23.6° – 156.4° (electrical)
C. 46.1° – 133.9° (electrical)
D. 51.4° – 128.6° (electrical)

Answer ||| B

Solution |||

$V_S = V_R = V_L = 132kV$

X = 12 Ω/phase

P_{max}/Phase = $\frac{V_S V_L}{X} = \frac{132 * 132}{12} = 1452\ M/W$

$P_0 = \frac{2}{5} P_{max}$

$P_0 = 580.8$ MW

Operating load angle corresponding to this load $\delta_0 = \sin^{-1} \frac{P_0}{P_{max}}$

$= \sin^{-1}\left(\frac{580.8}{1452}\right)$

$\delta_0 = 23.6$ (electrical)

So, limit → 180° – 23.6° = 156.4°

= 23.6° to 156.4°

17.Fleming Right Hand Rule is used to determine:-

A. Direction of Induced EMF in Motoring Action.
B. Direction of Induced EMF in Generation Action.
C. Both (A) & (B)

D. Fleming Right hand Rule is not associated with Voltage/Current.

Answer ||| B

Solution ||| This rule is used to determine the direction of Induced EMF for generating action.

18.For defining the standard meter, wavelength of which material is considered?

A. Neon
B. Krypton
C. Helium
D. Xenon

Answer ||| B

Solution ||| The meter was redefined in terms of a certain number of wavelengths of a certain emission line of krypton-86.

19.A 3 Phase, 11 kV, 5 MVA alternator has synchronous reactance of 10 Ω per phase. Its excitation is such that the generated emf is 14 kV. If the alternator is connected to infinite but the maximum output of the alternator at a given excitation is

A. 15400 kW
B. 8000 kW
C. 6200 kW
D. 5135 kW

Answer ||| A

Solution ||| Maximum output power –

$$P_{max} = \frac{E_f v_t}{X_s}$$

$$P_{max} = \frac{14 \times 1000 \times 11 \times 1000}{10}$$

$$P_{max} = 15400\ kW$$

20.At 1.5 GHz a general transmission line of 50Ω has following parameters:

R = 2Ω/m, G = 0.06 S/m, L = 8 nH/m and C = 110 pF/m. What will be the value of the propagation constant (γ) in m^{-1} ?

A. $\gamma = 8.84\angle 13.23^\circ$
B. $\gamma = 7.84\angle 13.23^\circ$
C. $\gamma = 6.84\angle 13.23^\circ$
D. $\gamma = 5.84\angle 13.23^\circ$

Answer ||| A

Solution |||

f = 1.5 GHz

R = 2 Ω/m

G = 0.06 S/m

L = 8nH/m

C = 110 pF/m

$$\gamma = \sqrt{(R + j\omega L)(G + j\omega C)}$$

$$= \sqrt{(2 + j2\pi \times 1.5 \times 10^9 \times 8 \times 10^{-9})(0.06 + j2\pi \times 1.5 \times 10^9 \times 110 \times 10^{-12})}$$

$$= \sqrt{(2 + j75.4)(0.06 + j1.036)}$$

$$= \sqrt{(75.426\angle 88.48)(1.038\angle 86.68)}$$

$\gamma = 8.84\angle 13.23^\circ$ = 8.613 + j2.025

γ = (α + jβ) = 8.613 + j2.025 m^{-1}

21.Phantom loading in an energy meter is used because

A. the arrangement gives accurate result.
B. the onside calibration is possible
C. power consumed in calibration work is minimized

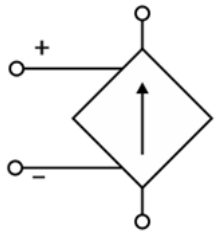
D. None of these

Answer ||| C

Solution |||

The phantom loading in an energy meter is used to reduce the power consumption in its calibration work.

22.The symbol shown here is:



A. Voltage controlled current source
B. Current controlled current source
C. Current controlled voltage source
D. Voltage controlled voltage source

Answer ||| A

Solution |||

Direction symbol shows the source as current whereas the polarity across the source shows the controlling parameter as voltage.

23.What is the approximate impedance of a CRO?

A. 0
B. 1 Mega Ohm
C. 10 Ohm
D. 10 Tera Ohm

Answer ||| B

Solution ||| Approximate impedance of CRO is 1 mega ohm.

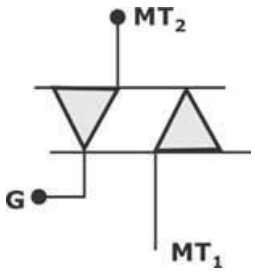
24.Triac can conduct with

A. positive voltage at gate only.
B. Negative voltage at gate only.
C. Either positive or negative voltage at gate.
D. Conduct without gate signal.

Answer ||| C

Solution |||

<u>Triac</u>



1.3 terminal bidirectional switch.

2.Can conduct with either positive or negative voltage at gate.

3.It is equivalent to two thyristors connected back-to-back with their gate terminals tied up.

25.If the value of α is 0.9, then the value of β is _____

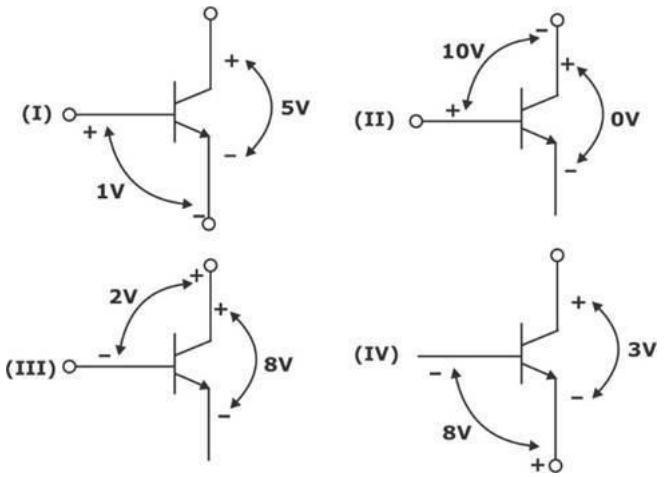
A. 0.1
B. 900
C. 90
D. 9

Answer ||| D

Solution |||

$$\beta = \frac{\alpha}{1-\alpha} = \frac{0.9}{1-0.9} = 9$$

26.Consider the circuits shown below, identify the region of operation, then which of the following is correct?



A. I in saturation region
B. II in active region
C. III in saturation region
D. IV in cut off region

Answer ||| D

Solution |||

(I) $V_{BE} = 1V$, $V_{CE} = 5V$

$V_{CE} > V_{BE} \rightarrow$ Active region

(II) $V_{CE} = 0V$; $V_{BC} > 0V$ or 10V

Hence, $V_{BE} > 0$ or 10V

$\rightarrow$ saturation region

(III) $V_{BE} = ?$, $V_{CE} = 8V$, $V_{BC} = -2V \rightarrow V_{CB} = 2V$

Hence, $V_{BE} > 0$ Active region

(IV) $V_{BE} = -8V$, $V_{CE} = 3V$

Cut off region

27.Step down chopper is used for

A. Rectification
B. Inverting
C. Voltage regulator

D. None

Answer ||| A

Solution |||

Mode of operation is shown below

Quadrant of operation	Voltage & current	Mode of operation	Application
1	V = +ve I = +ve	Forward motoring (Rectification)	Step-down chopper
2	V = +ve I = –ve	Forward regeneration (inverting)	Step-up chopper
3	V = –ve I = –ve	Reverse motoring (Rectification)	Step-down chopper
4	V = –ve I = +ve	Reverse regeneration (inverting)	Step-up chopper

28.Cheapest system of wiring is

A. casing and capping
B. cleat wiring
C. batten wiring
D. conduit wiring

Answer ||| B

Solution |||

Cleat wiring is the cheapest wiring system. In Cleat wiring, when one circuit or cables are passing through another circuit or cable, then insulators are used on lower cables for safety purposes.

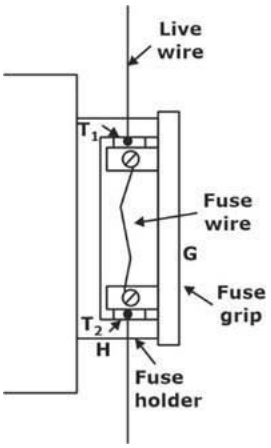
29.Laws of Illumination states that:

A. $E= I\ r^4$
B. $E= I\ r$
C. $E= I\ r^2$
D. $E= I\ /\ r^2$

Answer ||| D

Solution ||| Laws of Illumination states that Inverse Square Law Intensity is inversely proportional to the square of the distance from the source. $E = I / r2$

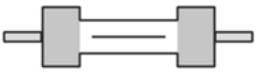
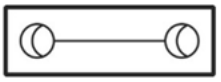
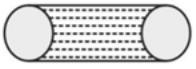
30.Which type of fuse is shown in the given diagram?



A. Link type cartridge
B. HRC
C. Rewireable fuse
D. D-type cartridge fuse

Answer ||| C

Solution |||

Link type Cartridge	
HRC	
Rewireable fuse	
D-type cartridge fuse	

31.A PAL logic device generally consists:

A. Fixed OR and fixed AND array
B. Fixed OR and programmable AND array
C. Programmable AND and programmable OR array
D. Fixed AND and programmable OR array

Answer ||| B

Solution |||

Fixed OR and programmable AND array

32.Which of the following type of motor are not the commutator motor?

A. AC series motor
B. Reluctance motor
C. universal motor
D. Repulsion motor

Answer ||| B

Solution ||| The following motors are considered to be the commutator motors:
1) AC series motor
2) Universal motor
3) Repulsion motor

33.For a forward biased pn-junction diode, the diffusion capacitance varies as

A. Linearly with current
B. Square of current
C. Inversely with current
D. Does not vary with current

Answer ||| A

Solution ||| For a forward biased pn-junction diode diffusion capacitance varies linearly with current.
1) When the junction is forward biased, a capacitance comes into play, that is known as diffusion capacitance denoted as CD. It is much greater than the transition capacitance.
2) The density of the charge carriers is high near the junction and reduces or decays as the distance increases.
3) Thus, in this case charge is stored on both side of the junction and varies with the applied potential. So as per definition change in charge with respect to applied voltage results in capacitance which here is called as diffusion capacitance.
4) The diffusion capacitance is directly proportional to the diode current.

34.The voltage phasor of a circuit is $10 \angle 15°$ V and the current phasor is $2\angle -45°$ A . The active and reactive powers in the circuit are

A. 20 $\sqrt{2}$ W and 10 $\sqrt{2}$ VAR

B. 10 W and 10 $\sqrt{3}$ VAR

C. 5 W and 5 $\sqrt{3}$ VAR

D. 10 $\sqrt{3}$ W and -10 VAR

Answer ||| C

Solution |||

Active power, P = VIcosθ

Reactive power, Q = VIsinθ

Where θ is the phase angle difference between voltage and current phasor
Given V=10∠15°
I=2∠-45°

$$\theta = 15^\circ - (-45^\circ)$$
$$\theta = 60^\circ$$
$$P = VI\cos\theta$$
$$P = \frac{10}{\sqrt{2}} \times \frac{2}{\sqrt{2}} \times \cos 60^\circ$$
$$P = 5\,\text{Watt}$$
$$Q = VI\sin\theta$$
$$Q = \frac{10}{\sqrt{2}} \times \frac{2}{\sqrt{2}} \times \sin 60^\circ$$
$$Q = 5\sqrt{3}\,\text{VAR}$$

35.In a synchronous motor, the torque angle is the angle between

A. magnetizing current and back e.m.f.
B. the rotating stator flux and rotor poles
C. the supply voltage and the back e.m.f.
D. None of these

Answer ||| B

Solution |||

The torque angle or load angle is the rotating stator flux and rotor poles.

36.Inverter circuits are used in which of the following applications?

A. UPS
B. Both A and C
C. As active filters
D. None of the above

Answer ||| B

Solution |||

Inverter circuits are used in

(1) Ups (constant voltage and constant frequency type).

(2) Speed control of AC motors (Variable voltage and variable frequency type).

(3) Reactive power compensation.

(4) Stability Enhancement in power systems.

(5) As active filters.

(6) In solar power converters and in the power converters of wind turbines.

37.Minimum time period that a microcontroller can measure depends upon

A. Clock frequency
B. size of counter/timer
C. Both A and B
D. None of these

Answer ||| A

Solution |||

Minimum time period that a microcontroller can measure depends upon Clock frequency.

38.The commutator in a DC machine acts as

A. a mechanical inverter
B. a mechanical rectifier

C. current controller
D. either (A) or (B)

Answer ||| D

Solution ||| Commutator in dc machine act both as inverter and rectifier. Commutator acts as mechanical Inverter in case of DC motor and as mechanical rectifier in case of DC generator.

39.Match List-I (Diode) with List-II (Application) and select the correct answer using the codes given below the lists:

List-I

A- Varactor diode

B- Tunnel diode

C- Photodiode

D- Zener diode

List-II

1- To charge auxiliary storage batteries

2- Reference voltage

3- High frequency tuning circuits

4- High frequency switching circuit

Codes:

A. a-2 b-1 c-4 d-3
B. a-3 b-1 c-4 d-2
C. a-3 b-4 c-1 d-2
D. a-2 b-4 c-1 d-3

Answer ||| C

Solution |||

(i) Zener diode is used for reference voltage.

(ii) Tunnel diode is a high frequency switching circuit.

(iii) Varactor diode is used for high frequency tuning purposes.

40.A voltmeter has resistance of 2000 Ω, when it is connected across a DC circuit its power consumption is 2 mW. Suppose this voltmeter is replaced by a voltmeter of 4000 Ω resistance, the power consumption will be:

A. 2 mW
B. 4 mW
C. 3 mW
D. 1 mW

Answer ||| D

Solution |||

Resistance of the voltmeter, $R_V = 2000\ \Omega$

It consumes 2 mW of power

Resistance of new voltmeter, $R_V' = 4000\ \Omega$

In voltmeter, voltage remains the same.

$$P = I^2R$$
$$2 \times 10^{-3} = I^2 \times 2000$$
$$I^2 = 10^{-6}$$
$$I = 10^{-3}\ A = 1\ mA$$
$$V = IR = 10^{-3} \times 2000 = 2\ V$$
$$R_V' = 4000\,\Omega$$
$$P' = \frac{V^2}{R} = \frac{(2)^2}{4000} = \frac{4}{4000} = 10^{-3} = 1\ mW$$

41.The losses in electric drive systems is/are

A. Electrical Transmission Losses
B. Mechanical Transmission Losses
C. Load Losses
D. All of the above

Answer ||| D

Solution |||

LOSSES IN AN ELECTRICAL DRIVE SYSTEM

Energy conservation in an electrical drive is achieved by the reduction of losses in its various parts. Typical losses include the following:

· Electrical transmission losses: These losses depend on the drive power factor and harmonics in the line current.

· Conversion losses in the power modulator (or converter): The semiconductor converter usually has low conversion losses.

· Electric motor losses to convert electric power into mechanical power: These are determined by choice of the motor (quality of its design and selection of right rating) and quality of supply (voltage variations, unbalance, frequency variations and harmonics).

· Mechanical losses:- It is part of the transmission system such as bearings, gears, clutches, and belts.

· Losses in the load: A load in a machine required to perform a specified task such as fan, pump, and train.

42.Which of the following statement is/are correct about transformer?

1) Core type transformer require more amount of copper as compared to shell type transformer

2) Size of distribution transformer is smaller as compared to similar power transformer

3) Auto transformer has lower p.u impedance as compared to two winding transformer

4) Shell type transformer is suitable for low voltage and low power applications.

A. 1, 2 and 3
B. 1, 2 and 4
C. 1, 3 and 4
D. 1, 2, 3 and 4

Answer ||| C

Solution |||

Core type transformer:

- Require more amount of copper.

- Suitable for low flux density application.

- It requires less amount of insulation. So, it is suitable for high voltage and high power applications.

Shell type transformer:

- Suitable for low voltage and low power applications.

Auto transformer has higher efficiency, lower p.u. impedance and lower voltage regulation as compared to 2-winding transformer.

Size of distribution transformer is larger as compared to similar power transformer as iron to copper ratio of distribution transformer is higher.

43.Which of the following set of IE rules related to additional provisions for use of energy at high and extra high voltage –

A. IE Rule – 50
B. IE Rule – 61
C. IE Rule – 64A
D. IE Rule – 44A

Answer ||| C

Solution ||| IE Rule 50 is about supply and use of energy.
IE Rule 61 is about connection with earth.
IE Rule 64 A is about additional provisions for use of energy at high and extra high voltage.
IE Rule 44 A is about intimation of accident.

44.A salient-pole synchronous motor is operating 1/4 full load. If its field current is suddenly switched off, it would?

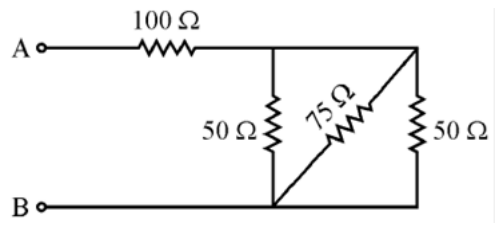
A. run at sub-synchronous speed
B. stop running
C. continue to run at synchronous speed
D. run at super-synchronous speed

Answer ||| A

Solution ||| If field current is switched off, the rotor will fall out of synchronism and eventually stop. However if the field coil on rotor is immediately shorted taking out of DC supply, the motor will behave like an induction motor.

To maintain synchronous speed at the situation you described, the synchronous motor need to be coupled to another induction motor of rated synchronous speed.

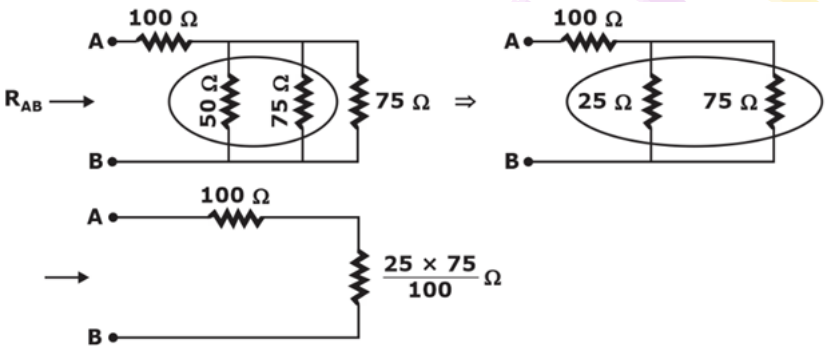
45.In the following figure, the equivalent resistance at terminals A and B will be



A. 275 Ω
B. 180 Ω
C. 118.75 Ω
D. None of these

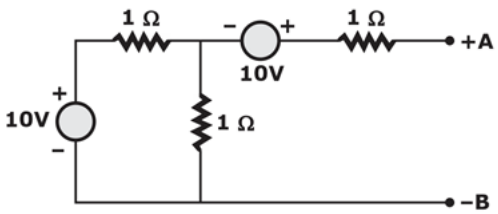
Answer ||| C

Solution |||



$$R_{AB} = 100 + \frac{75}{4} = 118.75\Omega$$

46.In the given circuit, Thevenin voltage across the terminal AB is

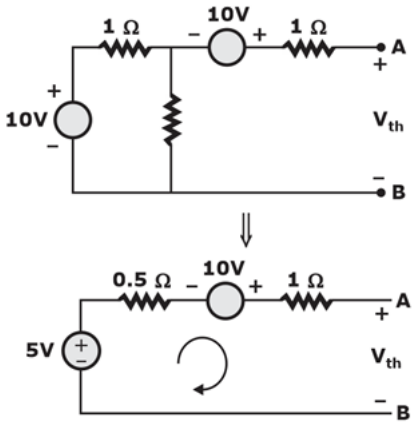


A. -15 V
B. 15 V
C. 5 V

D. 0 V

Answer ||| B

Solution |||



Apply KVL

$$-5-10+V_{th}=0$$
$$V_{th}=15\,V$$

47.Express the Boolean function $F=A+\bar{B}C$ as a sum of minterms?

A. $ABC+\bar{A}\,\bar{B}C$

B. $A\bar{B}C+\bar{A}\,BC+A\bar{B}\bar{C}$

C. $ABC+AB\bar{C}+A\bar{B}C+A\bar{B}\bar{C}+\bar{A}\,\bar{B}C$

D. $AB\bar{C}+A\bar{B}C+\bar{A}\bar{B}\bar{C}$

Answer ||| C

Solution |||

$$F=A+\bar{B}\,C$$

$$=A(\bar{B}+B)\;(\bar{C}+C)+(\bar{A}+A)\bar{B}C$$

$$ABC+AB\bar{C}+A\bar{B}C+A\bar{B}\bar{C}+\bar{A}\,\bar{B}C$$

48.For a transistor, turn-off time is

A. Sum of storage time and fall time
B. Maximum value of storate time
C. Maximum vslue of fall time
D. Sum of rise time and fall time

Answer ||| A

Solution ||| Turn-off time=storage time + fall time
(for change (time taken Carriers to for current Reach in their to reduce Original condition) to zero)

49.In a 3 – phase induction motor the maximum torque

A. is proportional to rotor resistance r_2.
B. does not depend on r_2.
C. is proportional to $\sqrt{r_2}$.
D. is proportional to r_2^2 .

Answer ||| B

Solution |||

. The maximum torque in a 3-ϕ induction motor

$$\Psi_{max} = \frac{3}{W_S} \cdot \frac{V^2}{2X_2}$$

Does not depends upon the rotor resistance.

50.The minimum number of NAND gates required to implement the below function is?

$$F = A(A + B)(A + B + C)$$

A. 1
B. 0
C. 2

D. 3

Answer ||| B

Solution ||| The given function can be simplified as below:

$$F = A\big(A + B(B + C)\big)$$

$$F = A(A + B + BC)$$

$$F = A + AB + ABC$$

$$\Rightarrow F = A(1 + B + BC)$$

$$\Rightarrow F = A$$

So, no gate is required to implement this function.

51.Consider the following statements:

A semiconductor to be used in opto-electronic devices should have

1- direct energy band gap.

2- indirect energy band gap.

3- any value of forbidden energy band gap.

4- right value of band gap corresponding to light wavelength.

Which of these statements is/are correct?

A. 1 only
B. 1 and 4
C. 2 and 3
D. 2 and 4

Answer ||| B

Solution |||

When an electron in the direct band gap material jumps from higher energy stat into lower energy state, it releases energy in the form of light.

In indirect band gap material, this energy is released in the form of heat.

52.The surge impedance of 400 km long overhead transmission line is 300 Ω . For a 200 km length of the same transmission line surge impedance will be

A. 150 Ω

B. 600 Ω

C. 300 Ω

D. 75 Ω

Answer ||| C

Solution |||

$$Surge\ Impedance\,(Z_o) = \sqrt{\frac{L}{C}}$$

Z_o is not function of length.

$\therefore Z_o$ will remain same.

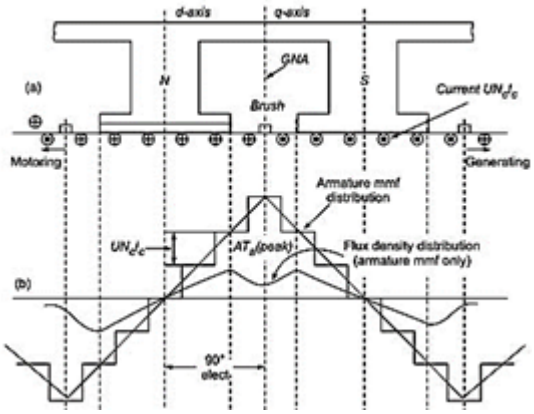
53.The wave form of the armature m.m.f. in DC machine is _____.

A. square
B. rectangular
C. triangular
D. sinusoidal

Answer ||| C

Solution |||

The armature mmf of a distributed armature winding of a dc machine is triangular in shape as shown in Fig. In a D.C. machine, the armature M.M.F. wave has its maximum value at fixed points between the main poles, and its chief effect is to increase the flux density on one side of the pole and reduce it on the other



At GNA (Geometrical neutral axis) MMF Attends it's maximum value MMF and at MNA (Magnetic neutral axis) MMF Attends zero value, it is alternating in nature.

At MNA axis the armature conductors are situated in parallel with the field flux thus induced EMF is zero at that time and at GNA axis the armature conductors are situated at 90 ° with the field fluxes, between MNA and GNA the armature MMF slowly rise as the angle between an armature conductor and field flux increases the MMF induced on that conductor increases thus it creates a triangular form of armature MMF.

54.The output of logic gate is 1 when all its inputs are 0. In such case the gate is either:

A. AND gate or EX-OR gate
B. OR gate or EX-NOR gate
C. AND gate or OR gate
D. NOR gate or EX-NOR gate

Answer ||| D

Solution ||| If the output of logic gate is 1 when all inputs are at logic 0, then in such gate, logic gate is either NOR gate or EX-NOR gate. Consider the truth table as shown:

Input	Output	Input	Output
A B	Y	A B	Y
0 0	1	0 0	1
0 1	0	0 1	0
1 0	0	1 0	0
1 1	0	1 1	1

55.Which power plant will have high capital initial cost?

A. Diesel power plant
B. Gas power plant
C. Steam power plant
D. Nuclear power plant

Answer ||| D

Solution |||

Power Plant	Capital Cost (Rs)
Diesel power plant	3000-7000 per kW
Gas power plant	5000-15000 per kW
Steam power plant	4000-5000 per kW
Nuclear power plant	20000-55000 per kW

56.When PLC program is executed, multiple repetitive processes occurred. This process of repetition is called

A. PLC scan cycle
B. PLC counter
C. PLC rung
D. RTO

Answer ||| A

Solution ||| When PLC program is executed, multiple repetitive processes that occurred are called PLC scan cycle

57.The Fermi level in N-type semiconductor is given by

A. $E_F = E_C - kT\ln\left(\frac{N_C}{N_D}\right)$

B. $E_F = E_C - 0.5kT\ln\left(\frac{N_C}{N_D}\right)$

C. $E_F = E_C + kT\ln\left(\frac{N_C}{N_D}\right)$

D. $E_F = E_C - 0.5kT\ln\left(\frac{N_D}{N_C}\right)$

Answer ||| A

Solution |||

In an N-type semiconductor, we have:

$$n \cong N_D = N_C e^{\frac{E_C - E_F}{kT}}$$

$$\Rightarrow \frac{E_c - E_F}{kT} = \ln\left(\frac{N_D}{N_C}\right)$$

$$\Rightarrow E_F = E_C - kT\ln\left(\frac{N_C}{N_D}\right)$$

58.In a 132 kV system, Phase to Ground capacitance is 0.01 μF and inductance is 4H. Calculate the critical resistance to be connected in order to eliminate restriking if a magnetizing current of 5 A is interrupted by the circuit

A. 20 kΩ
B. 10 kΩ
C. 100 kΩ
D. 200 kΩ

Answer ||| B

Solution ||| Critical resistance

$$R = \frac{1}{2}\sqrt{\frac{L}{C}} = \frac{1}{2}\sqrt{\frac{4}{0.01 \times 10^{-6}}}$$

= 10 kΩ

59.The sign magnitude representation of –26 using 8 bits is?

A. 00011010
B. 10101001
C. 10011010
D. 00101101

Answer ||| C

Solution ||| $+26$ is represented by: 11010

In 8-bit sign magnitude form, we have: 00011010

-26 Is therefore given by:

$\Rightarrow (10011010)$

60.The purpose of skewing of rotor slots in induction motor is_____.

A. to increase the magnetic hum of the motor
B. to increase the distribution factor
C. to reduce the locking tendency of rotor
D. to increase the breadth factor

Answer ||| C

Solution ||| In Squirrel cage rotor, slots in lamination or rotor core is not made parallel to the rotor shaft. A slight angle is maintained due to some advantages. This is called the rotor Skew.
Skew helps to make the motor run quietly by reducing the magnetic hum. It reduce rotor locking tendency. Rotor locking tendency occurs when rotor teeth remain directly under stator teeth thus they might be magnetically attracted.

61.Which plant can never have 100 percent load factor?

A. Peak load plant
B. Base load plant
C. Nuclear power plant
D. Hydro-electric plant

Answer ||| A

Solution |||

Average load: It is the average of load occurring at various instant of time on a power station.

Average load = $\frac{\text{kwh supplied in a day}}{24}$

Maximum demand: It is the greatest load on a power station during short interval of time.

Load factor: It is the ratio of average load to maximum demand.

Load factor = $\frac{\text{Average load}}{\text{Maximum demand}}$

Average load is always less than maximum demand in peak load period, hence peak load plant can never have percent load factor.

62.The expression for the transconductance for JEET is given by:

A. $g_m = \frac{2I_{DSS}}{|V_P|}\left[1 - \frac{V_{GS}}{V_P}\right]$

B. $g_m = \frac{I_{DSS}}{|V_P|}\left[1 - \frac{V_{GS}}{V_P}\right]$

C. $g_m = \frac{2I_{DSS}}{|V_{GS}|}\left[1 - \frac{V_{GS}}{V_P}\right]$

D. $g_m = \frac{2I_{OSS}}{V_{GS}}\left[1 - \frac{V_{GS}}{V_P}\right]^2$

Answer ||| A

Solution |||

Transconductance is given as: $g_m = \left.\frac{\Delta I_o}{\Delta V_{GS}}\right|_{Q\text{-point}} = \left.\frac{dI_o}{dV_{GS}}\right|_{Q\text{-point}}$

Drain current, $I_D = I_{DSS}\left(1 - \frac{V_{GS}}{V_P}\right)^2$

$$g_m = \frac{2I_{DSS}}{|V_P|}\left[1 - \frac{V_{GS}}{V_P}\right]$$

Here, $|V_P|$ denotes magnitude only to ensure a positive value of g_m.

63.What is/are the functions of SCADA?

A. To monitor and gather data in real-time
B. Information Storage and Reports
C. To control manufacturing process virtually
D. All of the above

Answer ||| D

Solution |||

Functions of SCADA Systems:

We can tell the SCADA system is a collection of hardware and software components that allows the manufacturing units to perform specific functions. Some of the important functions include

* To monitor and gather data in real-time

* To interact with field devices and control stations via Human Machine Interface (HMI)

* To record systems events into a log file

* To control manufacturing process virtually

* Information Storage and Reports

64.What can be done in order to prevent Creeping in Energy meters?

A. Two diametrically opposite holes are drilled in the disc
B. Creeping can't be prevented
C. Friction is over compensated
D. Disc is made to run where there is no current

Answer ||| A

Solution |||

If the friction is overcompensated by placing the shading loop near the potential coil, then disc start rotating with only potential coil excited without connecting the load is called creeping.

To reduce this effect holes or slot are made on the opposite side of the spindle in the disc and a torque is produced due to side limbs of the shunt magnet opposed to each other so that creeping stops.

65.In a power network, 380 kV is recorded at a 400 kV bus. A 60 MVAR, 400 kV bus. A 60 MVAR, 400 kV shunt reactor is connected to the bus. What is the reactive power absorbed by the shunt reactor?

A. 57 MVAR
B. 54.15 MVAR

C. 66.48 MVAR
D. 63.16 MVAR

Answer ||| B

Solution ||| Reactive power absorbed by shunt reactor -

$$Q_{absorbed} = \frac{V^2}{X_{rated}}$$

$$Q_{absorbed} = \frac{(380)^2}{\frac{(400)^2}{60}}$$

$$Q_{absorbed} = \frac{380 \times 380 \times 60}{400 \times 400}$$

$$Q_{absorbed} = 54.15\ MVAR$$

66.The deflecting torque of an Ammeter is directly proportional to the current passing through it and the instrument has full scale deflection of 90 degree for a current of 10 A. What deflection will occur for a current of 5 A. When the instrument has gravity control?

A. 30 degree
B. 45 degree
C. 60 degree
D. 90 degree

Answer ||| A

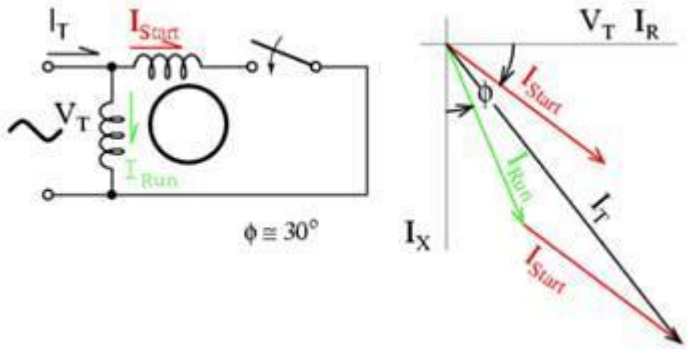
Solution ||| For gravity control
$T_d = I\sin\theta$
$I_1\sin\theta_1 = I^2\sin\theta_2$
$10\sin 90 = 5\ \sin\theta_2$
$\boxed{\theta_2 = 30^\circ}$

67.At starting, the current through the starting winding (I_s) of single phase induction motor

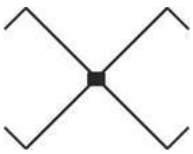
A. legs 'V' by 90^0
B. leads 'V' by 90^0
C. is nearly in phase with 'V'
D. leads 'V' by 75^0

Answer ||| C

Solution ||| In addition to the main winding or running winding, the stator of single phase induction motor carries another winding called auxiliary winding or starting winding. A centrifugal switch is connected in series with auxiliary winding . The purpose of this switch is to disconnect the auxiliary winding from the main circuit when the motor attains a speed up to 75 to 80% of the synchronous speed. We know that the running winding is inductive in nature. Our aim is to create the phase difference between the two winding and this is possible if the starting winding carries high resistance so current is nearly in phase with voltage.
Let us say I_{run} is the current flowing through the main or running winding,
I_{start} is the current flowing in starting winding, and V_T is the supply voltage.



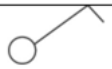
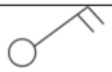
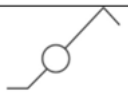
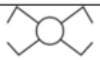
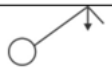
68.The given symbol belongs to which of the following ‘switch’ and switch outles’?



A. Two -way bell push
B. Two-way switch
C. Intermediate switch
D. Two-pole one way switch

Answer ||| C

Solution |||

Name of switch	Symbol
Switch	
1-pole switch	
2-pole switch	
2-way switch	
Intermediate switch	
Pull-cord switch	
Multi switch	

69.If a 110 V heater is used on 220 V supply, the heat produced by it will be nearly

A. one half
B. twice
C. one-fourth
D. four times

Answer ||| D

Solution |||

Heat is Proportional to power loss.

$$\text{Power loss} = \frac{V^2}{R}$$

$$\therefore \frac{P_1}{P_2} = \left(\frac{V_1}{V_2}\right)^2$$

$V_1 = 110V$

$V_2 = 220V$

$$\Rightarrow P_2 = P_1\left(\frac{V_2}{V_1}\right)^2 = 4P_1$$

∴ Heat will produce four times with 220V.

70.A stepper motor is

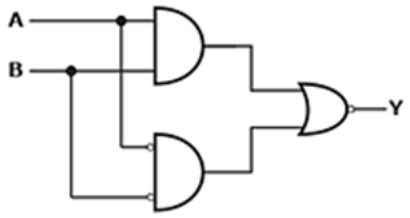
A. a dc motor.
B. a single-phase ac motor.
C. a multi-phase motor.
D. a two phase motor.

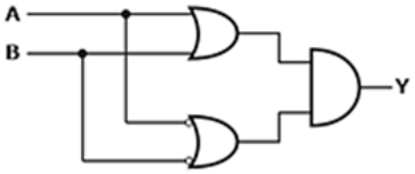
Answer ||| D

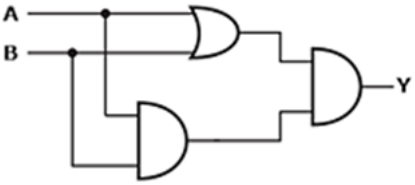
Solution ||| A stepper motor is a two phase motor. It is a brushers DC electric motor that divides a full rotation into a number of equal steps.

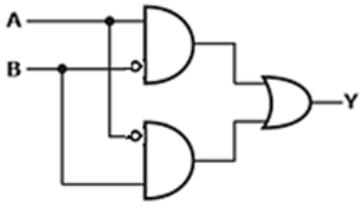
Stepper motor works on 1-phase-ON or 2-phase –ON modes of operation

71.Which of the following logical circuit is not equivalent to an XOR gate?

A.


B.


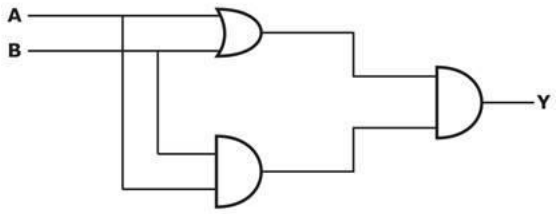
C.


D.


Answer ||| C

Solution |||

For option (C)



Y = (A + B).AB

= ABA + ABB

= AB = AND gate

And remain option simplifies to XOR gates.

72.When the conducting angle of thyristor increases then its average rating of on state current

A. Do not change
B. Increases
C. Decreases
D. Cannot say

Answer ||| B

Solution |||

When conduction angle of increases form factor decreases as

$$I_{avg} = \frac{I_{rms}(\text{rating})}{FF}$$

If form factor decreases, then $I_{T(avg)}$ increases

Hence option B is correct.

73.The reserve generating capacity which is not in operation but can be made available for service

A. Cold reserve
B. Hot reserve
C. spinning reserve

D. None of these

Answer ||| A

Solution |||

Cold reserve: It is that reserve generating capacity which isn't in operation but can be made available for service.

Hot reserve: It is that reserve generating capacity which in in operation but not is service.

Which is connected to the bus and is ready to take the load.

Spinning reserve: It is that reserve generating capacity which is connected to the bus and is ready to take the load.

74.Leakage factor in magnetic circuit is defined as:

A. total flux + useful flux
B. total flux × useful flux
C. useful flux / total flux
D. total flux / useful flux

Answer ||| D

Solution |||

The total magnetic flux in an electric rotating machine or transformer divided by the useful flux that passes through the armature or secondary winding.

75.The overall power factor of an On-load transformer_____,.

A. depends on the power factor of the load.
B. is always lagging
C. is always unity
D. is always leading

Answer ||| A

Solution |||

Whenever we calculate over all power factor of a transformer, we consider the impedance of the electrically loaded transformer which consists of impedance of that transformer and impedance of its load. As power factor of load depends upon its nature of impedance, obviously overall power factor of an on-load transformers depends on the power factor of the load.