MEGA MOCK CHALLENGE

BYJU'S EXAM PREP

JSSC JE

Electrical Engineering

Paper-2 Mega Mock Test

(June 20th - June 21th 2022)

Questions & Solutions

1. The Fermi level in an n-type semi-conductor at zero degree kelvin lies

A. Below the donor level

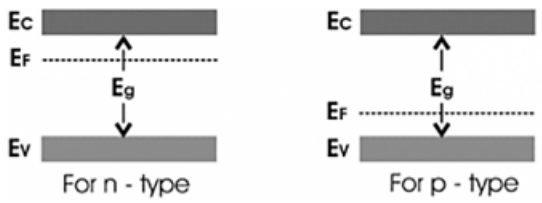
B. Half-way between the conduction band and the donor level

C. Half-way between the conduction band and the valence level

D. Close to the valence band

Ans. B

Sol.



Since in N-type donar type impurity added to intrinsic semiconductor so that initially ND state in conduction Band will be filled.

EF must be closer to the conduction band when most of the energy state in the conduction band are filled by the donar electrons & very few hole exist in Valance band.

2. When donor atoms are added to semi-conductor, it

A. Increases the energy band gap of the semiconductor

B. Decreases the energy band gap of he semiconductor

C. Introduces a new narrow band gap near the conductor band

D. Introduces a new discrete energy level below the conduction band

Ans. D

Sol. When donor atoms are added to semi-conductor, it introduces a new discrete energy level below the conduction band.

3. In a 3-wire d.c. system, the current in positive outer is 200 A and in the negative outer is 100 A. The current in the neutral wire is?

A. 100 A

B. 200 A

C. 300 A

D. 0 A

Ans. A

Sol. Current in neutral wire

$I_n = I_1 - I_2$

$I_n = 200 - 100$

$= 100$ A

4. The state of charge of a nickel-iron cell is determined by.....

A. the specific gravity of electrolyte (KOH)

B. e.m.f. of the cell

C. colour of plates

D. none of the above

Ans. B

Sol. The specific gravity of the electrolyte (KOH) remains unchanged during charge or discharge. Therefore, the state of charge is determined by **e.m.f. of the cell.**

5. A zener diode is always .....connected.

A. reverse
B. forward
C. either reverse of forward
D. none of the above

Ans. A

Sol. Because it uses reverse characteristic to act as a voltage regulator.

6. An equipment has a per unit impedance of 0.9 p.u. to a base of 20 MVA, 33 kV. The p.u. impedance to the base of 50 MVA and 11 kV will be

A. 4.7
B. 20.25
C. 0.9
D. 16.27

Ans. B

Sol. Per unit impedance referred to new base

$$= 0.9 \times \left(\frac{33}{11}\right)^2 \times \left(\frac{50 \times 10^3}{20 \times 10^3}\right) = 20.25$$

7. The currents in a 3-phase unbalanced system are:

$$\overrightarrow{I_R} = (12 + j6)A;$$
$$\overrightarrow{I_Y} = (12 - j12)A;$$
$$\overrightarrow{I_B} = (-15 + j10)A;$$

The phase sequence is RYB. The zero phase sequence component of current in the Y-phase is

A. 3+j1.33A
B. 9+j4A
C. 4+j9A
D. 1.33+j2A

Ans. A

Sol.

$$I_0 = \frac{1}{3}\left(\vec{I_R} + \vec{I_Y} + \vec{I_B}\right)$$
$$I_0 = \frac{1}{3}(12 + j6 + 12 - j12 - 15 + j10)$$
$$I_0 = 3 + j1.33$$

8. A symmetrical fault occurs on a power system. The percentage reactance of the system on 5000 base kVA is 25%. If the full-load current corresponding to base kVA is 20A, then short-circuit current is

A. 160 A
B. 20 A
C. 60 A
D. 80 A

Ans. D

Sol. Short Circuit Current Isc = I x (100/%Reactance)

= 20 x (100/25) = 80 A

9. A 230/2300 V transformer takes no-load current of 6.5 A and absorbs 187 W. If the resistance of the primary is 0.06 Ω, what is the magnetising current?

A. 5.4 A
B. 2.7 A
C. 3.8 A
D. 6.4 A

Ans. D

Sol. Given:

No Load current I_o = 6.5 A

at no load it take only iron loss

P_o = 187 W

Active component of current,

$$I_w = \frac{P_o}{V} = \frac{187}{230} = 0.81\ A$$

Magnetizing current,

$$I_m = \sqrt{I_o^2 - I_w^2} = \sqrt{(6.5)^2 - (0.81)^2} = 6.4\,A$$

10. A Y-connected three-phase alternator is delivering power to a three-phase line. The line – to-line voltage is 460 V. The line currents are 7.73 A and the total wattage is 5.12 kW. The load power factor is

A. 72%
B. 83.1%
C. 70.7%
D. 92%

Ans. B

Sol.

$$P = \sqrt{3} V_L I_L \cos\phi, p.f.,$$

$$\cos\phi = \frac{P}{\sqrt{3} V_L I_L} = \frac{5.12 \times 10^3}{\sqrt{3} \times 460 \times 7.73} = 0.831 or 83.1\%$$

11. A 3-phase, 16-pole alternator has a star connected winding with 144 slots and 10 conductors per slot. The flux per pole is 30 mWb sinusoidally distributed and the speed is 375 r.p.m. The frequency of generated e.m.f. is

A. 25 Hz
B. 50 Hz
C. 100 Hz
D. 200 Hz

Ans. B

Sol.

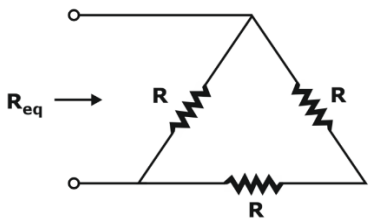
$$Frequency, f = \frac{NP}{120} = \frac{375 \times 16}{120} = 50\,Hz$$

12. The d.c. armature resistance of a delta connected alternator measured across its two terminals is 1Ω. The per phase d.c. resistance is …….. .

A. 3Ω
B. 1.5Ω
C. 0.33Ω
D. none of the above

Ans. B

Sol.



$$R_{eq} = R \parallel 2R$$

$$R_{eq} = \frac{2}{3}R$$

$$1 = \frac{2}{3}R$$

$$R = 1.5\ \Omega$$

13. In the armature winding of an alternator, the coil span falls short of full-pitch by $60°$ (electrical). The pitch factor is .....

A. 0.866 B. 0.5

C. 0.25 D. none of the above

Ans. A

Sol.

$$Pitch\ factor, K_p = \cos(\alpha/2) = \cos(60°/2) = 0.866$$

where α = electrical angle by which coil span falls short of full-pitch.

14. Turbo-alternators have rotors of .....

A. small diameter and long axial length

B. large diameter and long axial length

C. large diameter and small axial length

D. small diameter and axial length

Ans. A

Sol. The turbo-alternators run at high speeds. The high speed of rotation produces strong centrifugal forces which impose an upper limit on the diameter of the rotor. In case of a rotor turning at 3600 r.p.m., the elastic limit of the steel requires the manufacturer to limit the diameter to a maximum of 1.2 m. We can double the diameter when the speed is 1800 r.p.m. but because of the transportation problems, we seldom go beyond 1.8 m.

15. A 230 V, 50 Hz single-phase energy meter has a load current of 10 A at p.f. of 0.8 lagging. The energy consumed by the load in 2 minutes is 0.06 kWh. If the disc makes 72 revolutions for 2 minutes, what is the meter constant?

A. 600 rev/kWh B. 900 rev/kWh

C. 1200 rev/kWh D. none of the above

Ans. C

Sol. Meter constant can be expressed as:

$$k = \frac{\text{Number of revolutions}}{\text{Power consumed in that period}}$$

$$k = \frac{72}{0.06}$$

$$k = 1200 \text{ rev/kWh}$$

16. Emitter follower is a negative feedback amplifier using:

A. voltage series feedback
B. current series feedback
C. current shunt feedback
D. voltage shunt feedback

Ans. A

Sol. Emitter follower is depicted as a voltage series negative feedback amplifier and a current series negative feedback amplifier as well. Difference between the two circuits shown is only that the one, which is a current series feedback amplifier uses another load resistor coupled to the emitter resistor using one capacitor that is the load resistor and emitter resistor are in parallel only for ac and for dc load resistor is absent. In the one, which is shown as voltage series negative feedback amplifier doesn't have any load coupled to emitter resistor and output is taken across emitter resistor only.

17. In BJT Common Base Configuration, in saturation region:

A. Emitter Base Junction is forward-biased, Collector Base Junction is reverse-biased
B. Emitter Base Junction and Collector Base Junction are forward-biased
C. Emitter Base Junction reverse-biased, Collector Base Junction forward-biased
D. Emitter Base Junction and Collector Base Junction are reverse-biased

Ans. B

Sol. In BJT CB Configuration, Emitter Base Junction and Collector Base Junction are forward biased theen it is turned on into saturation region.

In active and breakdown region, Emitter Base Junction is forward-biased, Collector Base Junction is reverse-biased.

18. The output voltage of an operational amplifier is?

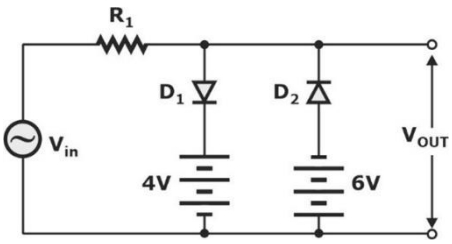
A. 90 degree out of phase from the input.
B. 180 degree out of phase from the input.
C. 45 degree out of phase from the input.
D. -90 degree out of phase from the input.

Ans. B

Sol. When an AC signal is applied to the transistor amplifier it causes the base voltage VB to fluctuate in value at the AC signal. The positive half of the applied signal will cause an increase in the value of VB this turn will increase the base current IB and cause a corresponding increase in emitter current IE and collector current IC. As a result, the collector emitter voltage will be reduced because of the increase voltage drop across RL. The negative alternation of an AC signal will cause a decrease in IB this action then causes

a corresponding decrease in IE through RL. The output signal of a common- emitter amplifier is therefore 180 degrees out of phase with the input signal.

19. In diode clipping circuit shown, which among the following conditions are correct?



A. In positive half cycle, diode D1 conducts and limits waveform to +4.7 V

B. In positive half cycle, diode D2 also conducts till voltage reaches +6.7 V

C. Positive voltages above +4.7 V are not clipped

D. Negative voltages below +6.7 V are clipped

Ans. A

Sol. In case of diode clipping circuits, when voltage of positive half cycle reaches +4.7 V, diode D1 conducts and limits waveform at +4.7 V while diode D2 does not conduct till voltage reaches –6.7 V. So, positive voltages above +4.7 V and negative voltages below –6.7 V are clipped.

20. What is a ripple referred in a rectifier

A. The dc component contained in the pulsating output of a rectifier

B. The ac component contained in the pulsating output of a rectifier

C. Both a & b

D. None of these

Ans. B

Sol. The ac component contained in the pulsating output of a rectifier is referred as ripple

21. An industrial consumer has a daily load pattern of 2000 kW, 0.8 lag for 12 hours and 1000 kW UPF for 12 hours. The load factor is

A. 0.5 B. 0.75

C. 0.6 D. 2.0

Ans. B

Sol.

$$\text{Load factor} = \frac{\text{Actual number of units generated}}{\text{maximum load} \times \text{Total no. of hours}}$$

$$\text{Load factor} = \frac{(2000 \times 12) + (1000 \times 12)}{2000 \times 24} = 0.75$$

22. As per recommendation of ISI, the maximum number of points of lights, fans and socket outlets that can be connected in one sun-circuit is

A. 8 B. 10

C. 15 D. 20

Ans. B

Sol. The distribution and division of circuits provides comfort and facilitates rapid location of fault As per recommendation of ISI, the maximum number of points that can be connected in one sun-circuit is 10.

23. Which insulation is most widely used for covering wires/cables used in internal wiring ?

A. Paper
B. Wood
C. Glass
D. PVC

Ans. D

Sol. The electrical characteristics of PVC such as electrical insulating properties or dielectric constant are excellent. To express electrical insulating properties, volume resistivity or dielectric strength is widely used as an index. The volume resistivity is expressed in terms of electrical resistance calculated per unit volume of the test piece.

Materials	Value (Ω-cm)	
PE	$10^{16}\sim10^{20}$	
PP	$10^{16}\sim10^{20}$	
PS	$10^{17}\sim10^{19}$	
Tetrafluoroethylene	$10^{15}\sim10^{19}$	
PVC	$10^{14}\sim10^{16}$	(rigid)
Methacrylate	$10^{14}\sim10^{15}$	(rigid)
PU	$10^{13}\sim10^{15}$	(flexible)
Nylon	$10^{13}\sim10^{14}$	(flexible)
Polyester	$10^{12}\sim10^{14}$	(flexible)
Neoprene	$10^{11}\sim10^{13}$	(flexible)
Epoxy resin	$10^{8}\sim10^{14}$	(flexible)

Source: "Plastics almanac" by Kogyo Chosakai Publishing Co. Ltd., p.422, 1976

Hence, Option (D) is correct answer.

24. 15 minutes rated motors are suitable for _____.

A. Light duty cranes
B. Medium duty cranes
C. Heavy duty cranes
D. All options are correct

Ans. A

Sol. **Operation of the motor** at the declared load(s) including starting, electric braking, no load and rest and de-energised periods to which the motor is subjected, including their durations and sequence in time.

1. If no designation is indicated following the rated output, then the motor should be considered suitable for maximum continuous rating, i.e. **S1 duty**.

2. For the **duty type S2**, the duration of duty should be indicated in minutes after S2. For example, "**S2 60 minutes**".

3. For the **duty type S3 and S6**, indication of the cyclic duration factor (CDF) in percentage should follow S3 or S6. For example, "**S3 15 %**" or "**S6 60%**".

S3: Intermittent periodic duty – The motor works with a sequence of identical duty cycles comprising of period of running at a constant load and rest and de-energized

period. Thermal equilibrium is never reached due to these periods.

Benefits of Light Duty Cranes

- Light weight frame
- Low friction operation
- Easy assembly and installation
- Telescopic bridge beams
- Crane support steelwork
- Spark resistance
- Low headroom applications

15 minutes rated motors are suitable for light crane application.

25. NEMA standards rate motors according to_____.

A. frame number
B. horsepower
C. voltage
D. weight

Ans. A

Sol. The National Electrical Manufacturers Association (NEMA) represents nearly 350 electrical equipment and medical imaging manufacturers at the forefront of electrical safety, reliability, and resilience, as well as efficiency and energy security. NEMA standard rates motor according to frame numbers.

26. What is the maximum span upto which the wooden poles can be used?

A. 20 m
B. 50 m
C. 60 m
D. 100 m

Ans. C

Sol. **Wooden poles:**

- These are made of seasoned wood (sal or chir) and are suitable for lines of the moderate X-sectional area and of relatively shorter spans, say up to 60 meters
- Such supports are cheap, easily available, provide insulating properties and, therefore, are widely used for distribution purposes in rural areas as an economic proposition
- They have a comparatively smaller life (20-25 years) and cannot be used for voltages higher than 20 kV
- They have less mechanical strength and require periodical inspection

Steel Poles:

- They are used for system voltages up to 33 kV in low and high-voltage distribution systems
- When compared to wooden poles steel poles have advantages like lightweight, long life, and greater strength
- These are used for a longer span, i.e., from 50 to 80 m
- These are costlier than wooden and RCC poles
- All steel supports should be well-galvanized and have a life of at least 30 years

Concrete poles (RCC Poles):

- Reinforced concrete poles have become very popular as line supports in recent years.

- They have greater mechanical strength, longer life, and permit longer spans than steel poles.
- Moreover, they give a good outlook, require little maintenance, and have good insulating properties.
- The maximum permissible span for RCC poles is 80 - 100 meters.
- The main difficulty with the use of these types of electric poles is the high cost of transport owing to their heavyweight

27. If the capacitor of a single phase motor is short circuited, the motor will _____.

A. start
B. not start
C. start with jerks
D. start and then stop

Ans. B

Sol. If capacitor of single phase induction motor is short circuited then

$X_c = 0$

So there will be no phase difference between main and auxiliary winding currents and motor starting torque will be zero. That's why motor will not run.

28. If a 10 – μF capacitor is connected to a voltage source with v(t) = 50 sin 2000t V, then the current through the capacitor is _____ A

A. 10^5 cos 2000 t
B. 5×10^{-4} cos 2000 t
C. cos 2000t
D. 500 cos 2000t

Ans. C

Sol. Given:

v(t) = 50sin2000t, C = 10 μF

$$i(t) = C\frac{dv(t)}{dt}$$

$$i(t) = 10 \times 10^{-6} \times \frac{d}{dt}(50\sin 2000t)$$

$$i(t) = 10 \times 10^{-6} \times 50 \times 2000 \times \cos 2000t$$

$$i(t) = \cos 2000t \ A$$

29. In a domestic cake baking oven, the temperature is controlled by

A. series parallel operation
B. auto transformer
C. thermostat
D. voltage variation

Ans. A

Sol. In a domestic cake baking oven, the temperature is controlled by series parallel operation. In this method, heating elements can be connected in series for low temperatures and connected in parallel for high temperatures by means of series parallel switch

30. A synchronous motor can run at_____.

A. a leading power factor
B. unity power factor
C. lagging or leading or unity power factor
D. zero power factor

Ans. C

Sol. A synchronous motor can run at lagging, leading and unity power factor based on excitation given to the motor.

At normal excitation machine runs at unity Power factor.

At over excited condition machine runs at leading power factor.

At under excitation machine runs at lagging power factor.

31. For a full pitch winding, the generated voltages in both coil slides are _____

A. exactly in phase

B. in quadrature

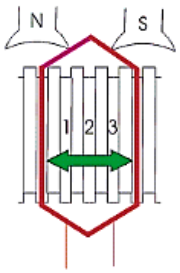
C. exactly 180° out of phase

D. approximately 180° out of phase

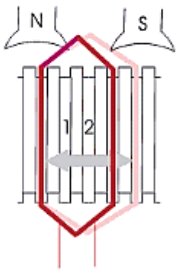
Ans. C

Sol. If the coil span is equal to the pole pitch, then the **armature winding** is said to be full - pitched.

In this situation, two opposite sides of the coil lie under two **opposite poles**. Hence emf induced in one side of the coil will be in 180° phase shift with emf induced in the other side of the coil. Thus, the total terminal voltage of the coil will be nothing but the direct arithmetic sum of these two emfs.

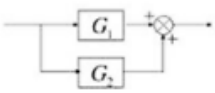


Multi turn Full Pitched Coil



Multi turn Short Pitched Coil

32. Two blocks $G_1(s)$ and $G_2(s)$ are connected as shown in below figure. The resultant transfer function is _____.



A. $G_1(s) + G_2(s)$

B. $G_1(s)/G_2$

C. $G_1(s)G_2(s)$

D. $1 + G_1(s)G_2(s)$

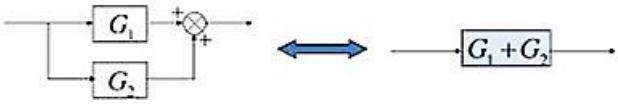
Ans. A

Sol. Two block Cascaded then resultant output = $G_1(s) + G_2(s)$

Reduction techniques

1. Combining blocks in cascade

2. Combining blocks in parallel



33. The basic shift register operation is _____.

A. serial in serial out
B. serial in parallel out
C. parallel in serial out
D. All options are correct

Ans. B

Sol. Shift Registers are used for data storage. Serial-in, serial-out shift registers delay data by one clock time for each stage.

34. The D.C. motor having the high starting Torque is _____.

A. Series motor
B. Shunt motor
C. Differential compound motor
D. None of these

Ans. A

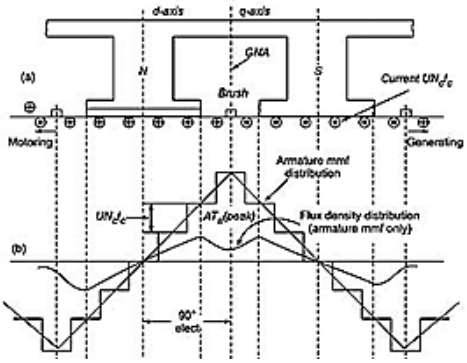
Sol. In case of series motor the flux produced is directly proportional to the armature current. Hence torque is directly proportional to the square of armature current. So as current during starting is 1.5 times the rated so starting torque is higher for series motor.

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

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

Ans. C

Sol. 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.

36. Which of the following is a correct statement about a series motor?

A. Its field winding consists of thicker wire and less turns

B. It can run easily without load

C. It has an almost constant speed

D. It has poor torque

Ans. A

Sol. DC series motors winding are in series with armature resistance (that's why they are called series motor) due to which they experience more intense(heavy) currents generated by motor's armature. So to counter these intense currents, the windings are made thick and so their number of turns are less as compared to thin windings of the shunt motors.

37. In a DC motor, where does iron loss occur?

A. the brushes

B. the armature

C. the field

D. None of these

Ans. B

Sol. As iron core of the armature is rotating in magnetic field, some losses occurs in the core which is called core losses. Normally, machines are operated with constant speed, so these losses are almost constant.

38. The open loop control system is one in which control action_____.

A. The output is dependent on control input

B. The output is independent on control input

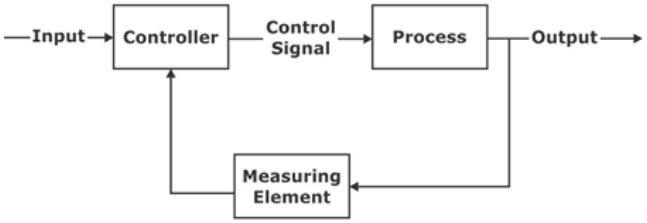
C. Only system parameters have effect on the control output

D. None of these

Ans. B

Sol. One type of control system in which the output has no influence or effect on the control action of the input signal is called an Open-loop system.

Open Loop System



Closed Loop System

39. A parallel plate capacitor have stored energy U is connected against another identical capacitor. What will be the energy of the attached capacitor?

A. $\frac{U}{4}$ B. $\frac{3U}{2}$

C. $\frac{U}{2}$ D. U

Ans. A

Sol. Let V is the initial potential then initially energy stored in capacitor is $U=\frac{1}{2}CV^2$

After connecting another identical capacitor in series potential will be same $\frac{V}{2}$ on each capacitor. Then the stored energy in each capacitor will be

$$U'=\frac{1}{2}C\left(\frac{V}{2}\right)^2$$

$$U'=\frac{\left(\frac{1}{2}CV^2\right)}{4}$$

$$U'=\frac{U}{4}$$

40. An example of semi-conductor is :

A. aluminum B. silicon

C. plastic D. copper

Ans. B

Sol. 'Silicon' is an example of semi-conductor. It is most abundant electro positive element found in the curst of earth. Its symbol is Si and atomic number is 14. It has very large affinity towards oxygen. Silicon is brittle in nature.

41. The output waveform of a 555 Timer is:

A. Sinusoidal B. Triangular

C. Rectangular D. Elliptical

Ans. C

Sol. A 555 timer produces a rectangular output. It operates in two modes: mono-stable and astable.

When operating in the mono-stable mode, a trigger is applied to it and the output switches

from low to high and after a time delay returns back to the low state, and remains low until another trigger arrives, thereby producing a rectangular output.

In astable mode, it does not require any trigger. It has no stable state and hence does not remain indefinitely in either state. It oscillates between the low and high state and produces a rectangular output.

42. The ideal operational amplifier does not have:

A. Infinite input resistance

B. Infinite output resistance

C. Infinite voltage gain

D. Infinite bandwidth

Ans. B

Sol. An ideal amplifier should not draw any current from the source, and should deliver maximum current to the load. High impedance means that a circuit draws or provides little power, whereas low impedance means that the circuit draws or provides more power. Due to this reason, an ideal op-amp should have infinite input impedance and zero output impedance. Zero output impedance indicates that the op-amp can drive any load.

43. Assertion (A): It is possible to design a current source using operational amplifier

Reason (R): Operational amplifier is a current controlled voltage source

A. Both A and R are individually true and R is the correct explanation of A

B. Both A and R are individually true but R is not the correct explanation of A

C. A is true but R is false

D. A is false but R is true

Ans. C

Sol. The generic term "op-amp" refers to a voltage-controlled voltage source (VCVS). The input impedance is very high and the output impedance is very low.

44. A Zener diode is used for _____

A. Voltage regulation

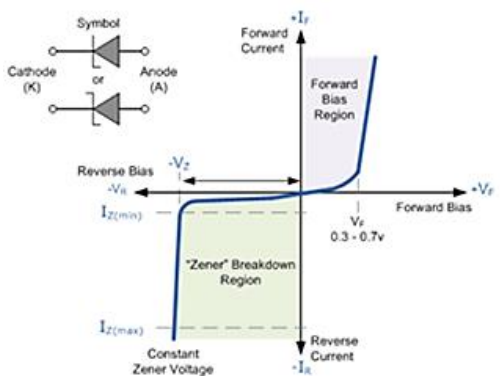
B. Rectification

C. Noise suppression

D. Blocking AC

Ans. A

Sol.



Zener Diode or "Breakdown Diode", are basically the same as the standard PN junction diode but they are specially designed to have a low and specified **Reverse Breakdown Voltage** which takes advantage of any reverse voltage applied to it, hence it behaves like a voltage regulator.

45. When a number of two-port networks are cascaded then,

A. z-parameters are added up

B. y-parameters are added up

C. h-parameters are multiplied

D. ABCD-parameters are multiplied

Ans. D

Sol.

Cascade Connection

For network X,

$V_{1X} = A_X V_{2X} - B_X I_{2X}$

$I_{IX} = C_X V_{2X} - D_X I_{2X}$

and for network Y,

$V_{1Y} = A_Y V_{2Y} - B_Y I_{2Y}$

$I_{1Y} = C_Y V_{2Y} - D_Y I_{2Y}$

$$\begin{bmatrix} A & B \\ C & D \end{bmatrix} = \begin{bmatrix} A_X & B_X \\ C_X & D_X \end{bmatrix} \begin{bmatrix} A_Y & B_Y \\ D_Y & D_Y \end{bmatrix}$$

46. Which of the following rectifier has highest transformer utilizing factor

A. Half wave rectifier

B. Centre tapped full wave rectifier

C. Bridge rectifier (full wave)

D. None of the above

Ans. C

Sol. Bridge rectifier has highest TUF(transformer utilizing factor) more than 80% so it is best among class.

47. The current required for full scale deflection of a voltmeter is 10 mA. Find the sensitivity (in ohms/V) of the voltmeter.

A. 100 B. 10

C. 0.01 D. 0.001

Ans. A

Sol. Sensitivity of the voltmeter is given by

$$S = \frac{1}{I_{fl}}$$

Where I_f = full load current

$$S = \frac{1}{10 \times 10^{-3}} = 100\Omega / V$$

48. The underground system can not be operated above

A. 440V
B. 11KV
C. 33kV
D. 66kV

Ans. D

Sol. Underground system can be operated in 11kV and 33kV but it cannot be used above 66kV as they do not have much higher capacity voltage insulation feasibility.

49. A rectifier for welding has voltage/current characteristics as_____.

A. Drooping
B. Rising
C. Static
D. Variabl

Ans. A

Sol. Drooping V-I characteristic is used on constant current type welding machine. When arc is struck in arc welding machine electoral is essentially in short circuit which would immediately require a sudden of current otherwise machine is designed to Prevent this. A constant current machine is designed to minimized these sudden surges.

50. Arc can be produced by?

A. AC current only
B. DC current only
C. Either AC or DC current
D. all options are correct

Ans. C

Sol. Arc is used in Arc welding for combining of two metals.

Are welders can use either DC (or) AC current, & consumable (or) non-consumable electrodes.

Welding is the process of joining of metal to metal by using electricity to create enough heat to melt metal, and the melted metals when cools result in binding of the metal.

51. Lumen/watt is the unit of _____

A. Light flux
B. Luminous intensity
C. Brightness
D. Luminous efficiency

Ans. D

Sol. Luminous efficiency is the ratio of the total luminous flux radiated by any source to the total radiant flux from the source commonly expressed in lumens per watt.

52. Which of the following is not an indoor lighting?

A. Residence light
B. Office light
C. Industry light
D. flood light

Ans. D

Sol. Food light is a broad beaned high intensity artificial light. They are more after used illuminate the outdoor playing.

53. Which one of the given fuse is bigger _____?

A. DC
B. AC
C. DC or AC
D. AC and DC are same

Ans. A

Sol. Always DC resistance is less than A.C resistance i.e. $R_{AC} = 1.6\ R_{DC}$

i.e. I_{DC} is more than I_{AC}

∴ so, DC fuse rating more than that of AC fuse rating.

54. Which of the following statement as CORRECT?

A. Superposition theorem is applicable to only those circuits that only have active elements.

B. Superposition theorem is applicable to only those circuits that only have passive dements.

C. Superposition theorem is applicable to only those circuits that only have hear bilateral elements.

D. Superposition theorem is applicable to only those circuits that only have non-linear bilateral elements.

Ans. C

Sol. We can use super position theorem in a circuit consistory of many sources to find current or voltage across any element. But under the condition that all element must be linear & bilateral.

55. The direction of rotation of an hysteresis motor is determined by

A. interchanging the supply leads

B. position of shaded pole with respect to main pole

C. retentivity of the rotor material

D. none of these

Ans. B

Sol. The effect of shading pole to cause field flux to shift across the pole face from unshaded to shaded portion. Hence the direction of rotation can easily be determined from the position of shaded pole w.r.t. main pole.

56. Which & the following is NOT a feature of MI type instruments?

A. Can be used in both AC and DC circuit.

B. Moving element is a small soft Iron piece.

C. Uniformly divided scale.

D. Low cost of instrument in comparison to moving coil instruments.

Ans. C

Sol.

1. **MI (Less cost)**

- Based on principle of change in self inductance
- works for both AC and DC
- Robust construction
- frequency error present
- Spring or Gravity control is used.
- Hysteresis error is more in MI
- To Avoid hysteresis error in MI:
- 1)We make iron parts short so that it can demagnetize itself

- 2) We use high permeability material i.e., in place or iron/steel we use MU-Metal (77% nickel +16% iron+5% cu+ 2% chromium) or perm alloy (80% Ni & 20% iron).
- For MI type instruments, I^2 dl = Kθ i.e. follow square law => Non-uniform scale.

57. A factory runs in 4 shifts of 6 hours each, in which it consumes 36kW, 86kW, 50kW and 20kW per hour in each shift respectively. Calculate the energy (in kWh) consumed by the factory per day.

A. 216 B. 557

C. 1152 D. 1920

Ans. C

Sol. Since each of the 4-shift duration are equal.

Hence Energy consumption per day,

E = (36+ 86+ 50+ 20) × 6 = 192 × 6 = 1152 KWh

58. The voltage at the two ends of a transmission line are 132 KV and its reactance is 40 ohm. The Capacity of the line is

A. 435.6 MW B. 217.8 MW

C. 251.5 MW D. 500 MW

Ans. A

Sol. Power transfer capacity is

$$P = \frac{V^2}{Z}$$

$$P = \frac{(132)^2}{40} = 435.6 \text{ Mw}$$

59. The synchronous speed for a 3 phase 6-pole induction motor is 1200 rpm. If the number of poles is now reduced to 4 with the frequency remaining constant, the rotor speed with a slip of 5% will be _____.

A. 1690 rpm B. 1750 rpm

C. 1500 rpm D. 1710 rpm

Ans. D

Sol. Given : N_{s1} =1200, P_1 = 6,

P_2 = 4, s = 0.05,

Frequency f = N_s × P/120

= 120 × 6/120 = 60 Hz

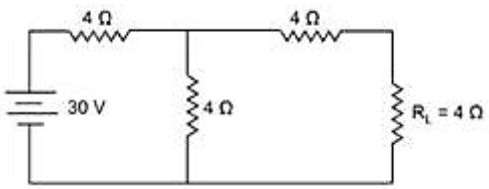
rotor frequency f = s.f = 0.05 × 60 = 3.0 H_z

Now, N_{s2} = 120 × 60 /4 = 1800

and Ns – N = 120 f / P_2

Therefore, N=N_s — 120 f / P_2 = 1800 — 120 × 0.05 × 60/4 = 1800 — 90 = 1710

60. What will be the value of Norton's current (in A) through load resistance R_L for the given electrical circuit?

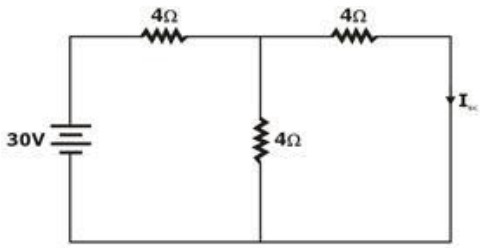


A. 6.2 B. 5.2

C. 4.2 D. 2.5

Ans. D

Sol. To find the Norton's current, short circuit the load resistance, and hence the circuit reduces to



$$R_{eq} = 6\,\Omega$$

$$I_{total} = \frac{V}{R_{eq}} = \frac{30}{6} = 5\,\text{A}$$

Using current division rule,

$$I_{SC} = I_N = \frac{5\times 4}{4+4} = \frac{20}{8} = 2.5\,\text{A}$$

61. Stability of a system is not affected by_____.

A. reactance of line B. losses

C. reactance of generator D. output torque

Ans. B

Sol. The seven essential factors affecting the stability are broadly classified into two parts

1) **Mechanical factors:**

1) Prime mover input torque

2) The inertia of prime mover and generator

3) The Inertia of motor and shaft load

4) Shaft load output torque

2) **Electrical factors:**

1) Internal voltages of the synchronous generator

2) The reactance of the system including the generator, line, and motor etc.

3) Internal voltage of the synchronous motor

62. During plugging, external resistance is also introduced into a circuit to limit the flowing_____.

A. current B. voltage

C. current and voltage both D. none of these

Ans. A

Sol. Plugging type braking- In this method the terminals of supply are reversed, as a result the generator torque also reverses which resists the normal rotation of the motor and as a result the speed decreases. During plugging external resistance is also introduced into the circuit to limit the flowing current. The main disadvantage of this method is that here power is wasted.

63. Buchholtz relay is operated by

A. eddy currents
B. gas pressure
C. electromagnetic induction
D. electrostatic induction

Ans. B

Sol. Buchholz relay is operated by gas pressure. Buchholz relay is used for protection against internal faults.

64. In large machines flat copper strips known as

A. windings
B. Bushes
C. risers
D. Either of these

Ans. C

Sol. In large machines, flat copper strips known as risers.

65. Determine the phase angle (in degrees) of a balanced 3-phase star connected system, if the first and the second wattmeter show readings of 200 W and 1200 W respectively.

A. 51
B. 65
C. 78
D. 84

Ans. A

Sol.

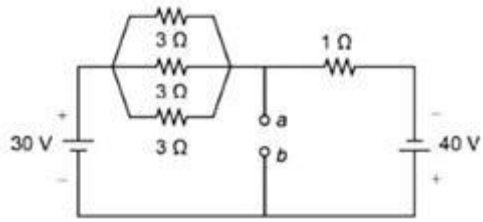
$$\phi = \tan^{-1}\left[\frac{\sqrt{3}(W_1 - W_2)}{(W_1 + W_2)}\right]$$

$$W_1 = 200W$$

$$W_2 = 1200W$$

$$\phi = \tan^{-1}\left[\frac{\sqrt{3}(200-1200)}{200+1200}\right] = -51^\circ$$

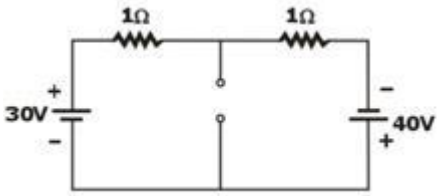
66. Determine the Thevenin's equivalent resistance (in ohms) across the terminal a and b for the electrical circuit given below.



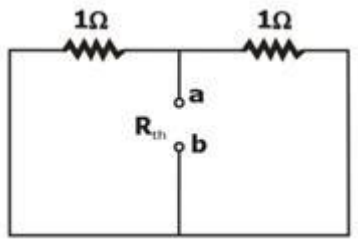
A. 1
B. 0.5
C. 0.3
D. 0.2

Ans. B

Sol. For finding R_{th}, short circuit the independent voltage source and open circuit the independent current source.



Thus,



Rth = 1 || 1

= 0.5 ohm

67. Find the number of poles required, if the frequency is 50Hz and speed of the motor is 500 rpm.

A. 24 poles

B. 12 poles

C. 5 poles

D. 10 poles

Ans. B

Sol.

Since speed $N_s = \frac{120f}{P}$

P = No. of pole

f = frequency

$500 = \frac{120 \times 50}{P}$

$P = \frac{120 \times 50}{500}$

P = 12

68. A circular bar of radius 0.5 cm is placed in a magnetic field carrying a total flux of 0.12 mWb. What will be the flux density in the air gap?

A. B = 1.52 Wb/m^2

B. B = 1.43 Wb/m^2

C. B = 1.34 Wb/m^2

D. B = 1.25 Wb/m^2

Ans. A

Sol. Given:

radius r = 0.5 cm

flux Φ = 0.12 mWb

∵ Φ = BA

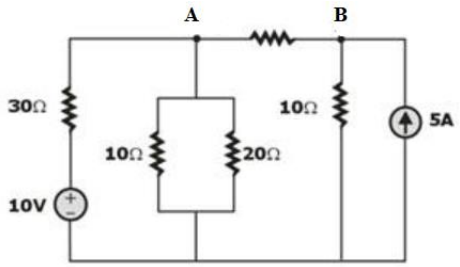
i.e. $B = \frac{\phi}{A}$, Where $A = \pi \times (0.5\text{ cm})^2$

$A = 3.14 \times 0.25 \times 10^{-4} = 0.785 \times 10^{-4}$

$B = \frac{0.12 \times 10^{-3}}{0.78 \times 10^{-4}}$

$B = 1.52\text{ wb/m}^2$

69. For the given circuit below find out the equivalent resistance or Thevenin resistance across the terminal A & B.



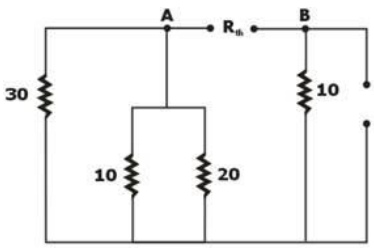
A. $R_{th} = 16.45\ \Omega$
B. $R_{th} = 12.82\ \Omega$
C. $R_{th} = 15.45\ \Omega$
D. $R_{th} = 16.82\ \Omega$

Ans. C

Sol. To calculate Thevenin Resistance for a D.C circuit in which only independent source is present first deactivate all the independent source; ie. Voltage source is replaced by short circuit & current source is replaced by open circuit.

After that open the branch across which Thevenin resistance to be find out & calculate the resistance across these two terminals.

So, circuit is replaced as-



So, $R_{th} = [30||(10||20)] + 10$

$= [30 || 6.66] + 10$

$= (5.45) + 10$

$R_{th} = 15.45\Omega$

70. A coil having resistance of 30Ω in series with an inductance of 5mH is connected to 200V, 50 Hz supply. What will be the equivalent current & power factor of the circuit?

A. $I = 6.65;\ \cos\varphi \simeq 1$
B. $I = 5.65;\ \cos\varphi \simeq 1$
C. $I = 4.65;\ \cos\varphi \simeq 1$
D. $I = 3.65;\ \cos\varphi \simeq 1$

Ans. A

Sol. Inductive reactance $X_L = 2\pi fL$

$= 2 \times 3.14 \times 50 \times 5 \times 10^{-3}$

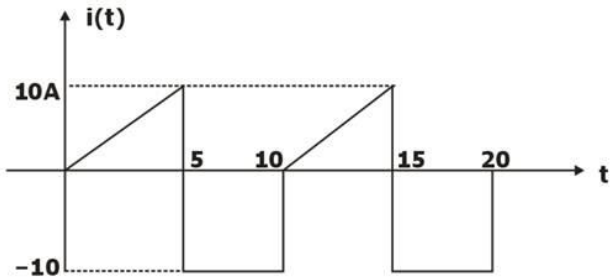
$= 1.57\ \Omega$

$\because Z = \sqrt{X_L^2 + R^2} = \sqrt{(1.57)^2 + (30)^2} \simeq 30.04$

Then circuit current $I = \frac{V_m}{z} = \frac{200}{30.04} = 6.65$

Power factor $\cos\varphi = \frac{R}{z} = \frac{30}{30.04} \approx 1$

71. If the effective current through a Resistance of 8 Ω is as shown in the figure below, then calculate the average power absorbed by the resistor?



A. 222.24W
B. 3.15kW
C. 4.13kW
D. 533.3W

Ans. D

Sol. To calculate the average power absorbed by Resistor,
we first required to find out the rms value of current through it.
So I_{rms} :
$i(t) = 2t$ for $0 < t < 5$
$i(t) = -10$ for $5 < t < 10$
Time period (T) = 10

$$\therefore I_{rms} = \sqrt{\frac{1}{10}\int_0^5 (2t)^2 dt + \int_5^{10} (-10)^2 dt}$$

$$= \sqrt{\frac{1}{10} \times 4\left[\frac{t^3}{3}\right]_0^5 + 100\left[t\right]_5^{10}}$$

$$= \sqrt{\frac{1}{10} \times \frac{4 \times 5 \times 5 \times 5}{3} + 100 \times (10-5)}$$

$I_{rms} = \sqrt{66.66} = 8.16A$

Power absorbed by 8Ω Resistor = $P = I_{rms}^2 \times R$

$P = (8.16)^2 \times 8 = 533.33$ Watt

72. Which parameters are used in Power system Modelling ?

A. h-parameter
B. Y-parameter
C. ABCD –parameter
D. None

Ans. C

Sol. ABCD parameter are also known as transmission parameter and these are used in power system to represent the transmission line parameters.

73. A consumer has 5 A each rated at 70 V, 3 room heater of 1.5 kW. On an average the consumer uses 4 A for 10 hour per day & two heater for 4 hour per day, calculate the average load of the consumer?

A. 486.24 W
B. 542.42 W
C. 616.66 W
D. 686.54 W

Ans. C

Sol. Average load = Actual Energy Consumed/time duration

Actual Energy Consumed = 4 x 10 x 70 + 2 x 1500 x 4 = 14,800

Therefore, average load = 14800/24 = 616.66 W

74. In a 132 kV, three phase system, the natural frequency of oscillation is 20 kHz, calculate maximum rate of rise of restriking voltage?

A. 18.54 kV/μ-sec
B. 23.24 kV/μ-sec
C. 11.68 kV/μ-sec
D. 13.54 kV/μ-sec

Ans. D

Sol. Maximum rate of restriking voltage $(RRRV)_{max} = \omega_n * E_{peak}$

$= [2 \times \pi \times 20 \times 1000 \times (132\sqrt{2})/\sqrt{3}] \times 1000$

$= 13536.86 \times 10^6$ V/sec

= 13.54 kV/μ-sec

75. Two resistors R_1 = (150 ± 8%) Ω, R_2 = (250 ± 4%), are connected in series. What will be the resulting limiting error of series combination of these two resistors?

A. 12 Ω
B. 10 Ω
C. 8 Ω
D. 6 Ω

Ans. A

Sol. $R = R_1 + R_2 = 150 + 250 = 400$

$$\text{Limiting error} = \frac{\delta R}{R} = \frac{\delta R_1}{R_1} \times \frac{R_1}{R} + \frac{\delta R_2}{R_2} \times \frac{R_2}{R}$$

$$\frac{\delta R}{R} = \frac{8}{150} \times \frac{150}{400} + \frac{4}{250} \times \frac{250}{400}$$

$$\delta R = 400 \times (0.02 + 0.01) = 12\,\Omega$$

76. The 8's complement of the octal number $(235)_8$ is:

A. $(542)_8$
B. $(543)_8$
C. $(541)_8$
D. $(540)_8$

Ans. B

Sol. So, the 7's complement of the octal number is-

$(777)_8 - (235)_8 = (542)_8$

Now 8's complement = (Now 7's complement + 1)

$= (542)_8 + 1$

$= (543)_8$

77. The voltage and current equation can be expanded as

$v(t) = 4 + 5 \sin(\omega t) + 10 \sin(3\omega t - 30°)$ V

$i(t) = 3 + 6 \sin(\omega t + 60°) + 12 \sin(3\omega t + 30°)$ A

The average power will be:

A. 12 W
B. 30 W
C. 37.5 W
D. 49.5 W

Ans. D

Sol. Phase difference between fundamental wave, $\theta_1 = (60° - 0°) = 60°$

Phase difference in 3rd harmonic wave, $\theta_3 = (30° - (-30°)) = 60°$

$$\therefore P_{avg} = V_0 I_0 + \frac{V_{m1} I_{m1}}{2} \cos\theta_1 + \frac{V_{m3} I_{m3}}{2} \cos\theta_3$$

$$= 4 \times 3 + \frac{5 \times 6}{2} \cos 60° + \frac{10 \times 12}{2} \cos 60°$$

$= 12 + 7.5 + 30$

$P_{avg} = 49.5$ W

78. A 500 KVA, single phase transformer, has full load copper loss of 2 kW and iron loss of 720W. what will be the value of load at maximum efficiency?

A. 500 KVA
B. 180 KVA
C. 300 KVA
D. 833.34 KVA

Ans. C

Sol. Let the percentage load at which maximum efficiency occurs be n.

For maximum efficiency,

$$n^2 P_{cu} = P_i$$

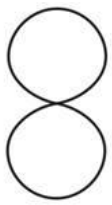
$n^2 \times 2000 = 720$

$n = 0.6$

load will be $= 0.6 \times 500$

$= 300$ KVA

79. Two signals are applied on vertical and horizontal plates of CRO. frequency of signal applied on vertical plate is 10 KHz. The following Lissajous pattern appears:



The frequency of signal on horizontal plate will be:

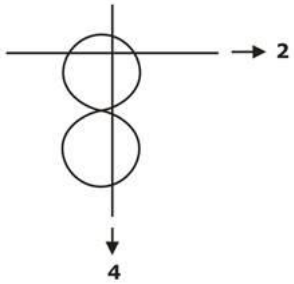
A. 20 kHz
B. 10 kHz
C. 5 kHz
D. 40 kHz

Ans. A

Sol. $f_y = 10$ kHz

as we known,

$$\frac{f_y}{f_x} = \frac{\text{Number of horizontal tangencies}}{\text{number of vertical tangencies}}$$



$$\frac{10}{f_x} = \frac{2}{4} \Rightarrow f_x = 20 \text{ kHz}$$

80. If in a transformer copper loss is 500 w than how much should be the iron loss for maximum efficiency?

A. 200 W
B. 400 W
C. 500 W
D. 700W

Ans. C

Sol. For maximum efficiency

100n loss = copper loss = 500 w

81. An ac voltage source 100 sinwt is connected to the load resistor R of 50 Ω . The average power in the load resistor R is given as:

A. 100 W
B. 200 W
C. 400 W
D. 1600 W

Ans. A

Sol.

$$V_{rms} = \frac{100}{\sqrt{2}}$$

So, $P = \frac{\left(\frac{100}{\sqrt{2}}\right)^2}{50} = \frac{10000}{2 \times 50} = 100\,W$

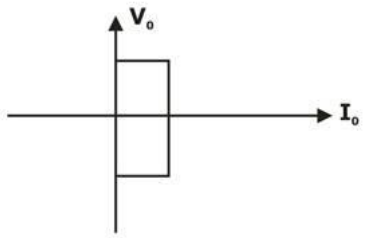
82. What is resonant frequency of 2.7 pf capacitor and a 33nH inductor?

A. 513 mHz
B. 720 GHz
C. 250 MHz
D. 533 MHz

Ans. D

Sol. Frequency $f = \frac{1}{2\pi\sqrt{LC}} = \frac{1}{2 \times 3.14\sqrt{33 \times 10^{-9} \times 2.7 \times 10^{-12}}} = 533\,MHz$

83. Which of the following chopper posses below characteristic.



A. type A chopper
B. type B chopper
C. type C chopper
D. type D chopper

Ans. D

Sol. Type D chopper passes the characteristic in which only positive current flows.

84. For the Nuclear Plants, if the effective multiplication factor k_{eff} is equal to 1. Then this condition is known as

A. Subcritical state
B. Critical state
C. Super critical state
D. None of the above

Ans. B

Sol. If $k_{eff} < 1 \Rightarrow$ Subcritical state

$k_{eff} = 1 \Rightarrow$ Critical state

$k_{eff} > 1 \Rightarrow$ Supercritical state

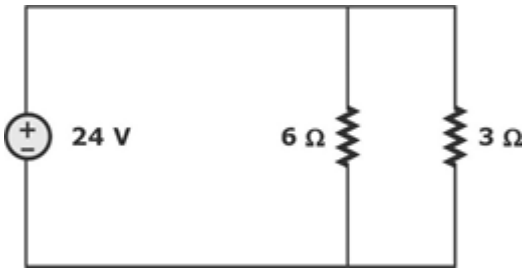
85. If the spring in PMMC instrument breaks then what happens to the deflecting torque.

A. Deflecting torque is reduced.
B. Deflecting torque is 0
C. Deflecting torque is increased
D. None of the above.

Ans. B

Sol. Since spring is connected in series with the coil So, if spring breaks, current in the coil becomes 0, due to which deflecting torque becomes 0 So pointer returns to 0 position.

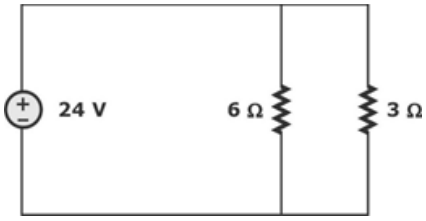
86. In the circuit below, find the voltage across 6 Ω resistance.



A. 24V
B. 8V
C. 5V
D. 6V

Ans. A

Sol.



in given figure

As the source voltage is connected parallel across 6 ohm. so voltage across 6 ohm is 24V

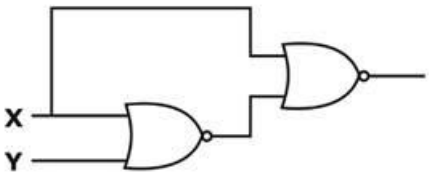
87. Noise is a function of:

A. Current
B. Voltage
C. Frequency
D. Bandwidth

Ans. D

Sol. Noise in general depends on the value of Bandwidth.

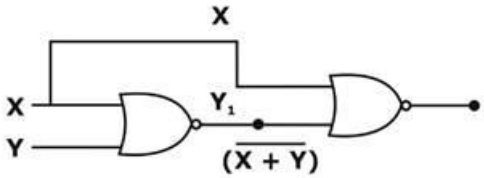
88. The given circuit can be minimized to:



A. $\overline{X}Y$
B. X
C. Y
D. XY

Ans. A

Sol.



$Y_1 = (\overline{X + Y})$

Output Y

$Y = (\overline{X + Y_1}) \quad = \quad \left[\overline{X + (\overline{X + Y})}\right]$

By Demorgan's law

$Y = \overline{X}\left[\overline{\overline{X + Y}}\right] \quad = \quad X\overline{X} + \overline{X}Y$

$y = \overline{X}[X + Y]$

$y = \overline{X}\,Y$

89. Which of the following heating methods has leading power factor?

A. Resistance
B. Induction
C. Dielectric
D. Both B and C

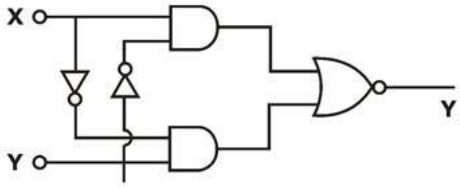
Ans. C

Sol. • Resistances heating method has unity PF.

• Induction heating method has lagging PF.

- Dielectric heating method has leading PF.

90. Logical operation performed by the digital circuit is :-



A. EX-NOR
B. NAND
C. EX-OR
D. OR

Ans. A

Sol.

Output $Y = \overline{(X\bar{Y} + \bar{X}Y)}$

$Y = \overline{(X \oplus Y)} = X \odot Y$

Output will be EX-NOR.

91. What will be the Decimal equivalent of the hexadecimal number "BC1"?

A. 3009
B. 3008
C. 3007
D. None of the above

Ans. A

Sol. Hexadecimal to Binary:

$(BC1)_{16} = (1011\ 1100\ 0001)_2$

Binary to decimal:-

$(1011\ 1100\ 0001)_2$

$= 1 \times 2^{11} + 0 \times 2^{10} + 1 \times 2^9 + 1 \times 2^8 + 1 \times 2^7 + 1 \times 2^6 + 0 \times 2^5 + 0 \times 2^4 + 0 \times 2^3 + 0 \times 2^2 + 0 \times 2^1 + 1 \times 2^0$

$= 3009$

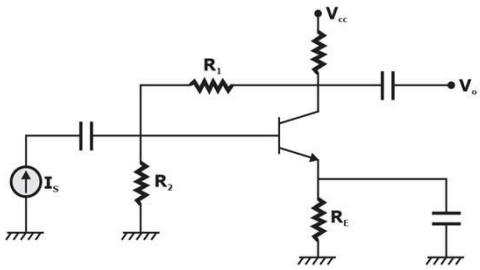
92. Pulse width modulated inverter controls-

A. Magnitude of AC output voltage only
B. Frequency of AC output voltage only
C. Both the magnitude and frequency of the AC output voltage
D. None of the above

Ans. C

Sol. Pulse width modulated inverter controls both the magnitude and frequency of the AC output voltage.

93. Type of feedback, this amplifier has?



A. Voltage-voltage feedback
B. Voltage-current feedback
C. Current-voltage feedback
D. Current-current feedback

Ans. B

Sol. Bypass capacitor is present hence R_E is not included in feedback so only R_1 is considered as feedback element R_1 directly connected to both input and output hence it is voltage sampling and shunt mixing → voltage – current feedback

94. In a Common Base Configuration, BJT has _____input impedance and _____ output impedance.

A. High, High
B. Low, High
C. Low, Low
D. High, Low

Ans. B

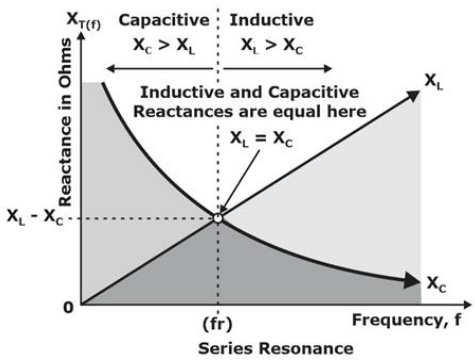
Sol. For the common base configuration to operate as an amplifier, the input signal is applied to the emitter terminal and the output is taken from the collector terminal. In the common base configuration the input impedance is very low and depending on the value of the source impedance, R_S connected to emitter terminal, input impedance values can range from between 10Ω and 200Ω. The low input impedance of the common base amplifier circuit is one of the main reason for its limited applications as a single stage amplifier. The output impedance of the CB amplifier however, can be high depending on the collector resistance used to control the voltage gain and the connected external load resistance, R_L.

95. If I a R-L-C series circuit, the frequency is below the resonant frequency, then:

A. $X_c = X_L$
B. $X_C < X_L$
C. None of the options
D. $X_c > X_L$

Ans. D

Sol. From the given diagram we can see that,



Below resonant frequency circuit behave is capacitive and,

$X_C > X_L$

96. In a pure inductive circuit if the supply frequency is reduced to 1/2, the current will?

A. be reduced to one fourth
B. be reduced by half
C. be doubled
D. be four times as high

Ans. C

Sol. Current in inductive circuit is given by,

$$i = \frac{v}{X_L}$$

$$i \propto \frac{1}{X_L}$$

$$\text{as}, X_L = 2\pi fL$$

If frequency is reduced to half then reactance is reduced to half and current will increase two times.

97. Which instrument is used to measure the high resistance?

A. Carey-Foster bridge
B. Megger
C. Kelvin's Double bridge
D. Wheat stone bridge

Ans. B

Sol. Megger is a portable instrument which is used to measure insulation resistance of the electrical machinery or system. Megger is used to measure high resistance.

98. If a dynamometer type wattmeter is connected in an ac circuit, the power indicated by the wattmeter will be:

A. Peak power
B. Average power
C. Instantaneous power
D. Volt ampere product

Ans. B

Sol. A *dynamometer type wattmeter* is most commonly employed for measurement of *power* in *a.c* as well as d.c *circuits*. The moving coil is *connected* across the load and carries current proportional to the voltage. *When power* is to be measured in a *circuit*, the instrument is suitably *connected* in the *circuit*.

99. A short shunt compound generator supplies a load current of 100 A at 250 V. The generator has the following winding resistances : shunt field=130Ω, Armature=0.1Ω and series field=0.1Ω. Find the Emf generated if the brush drop is 1 V per brush.

A. 272.0 volt
B. 262.2 volt
C. 272.2 volt
D. 262.0 volt

Ans. C

Sol.

$$I_f = \frac{250}{130} = 1.92A$$

$$I_a = 100 + 1.92 = 101.92A$$

$$E_b = 250 + 101.92 \times (0.1 + 0.1) + 2 \times 1 = 272.3V$$

100. A CRO Screen has ten divisions on the horizontal scale. If a voltage signal 5 sin(314t+45°) is examined with a line base setting of 5 msec/div, the number of cycle of signal displayed on the screen will be?

A. 5 cycles/5
B. 2.5 cycle/2.5
C. 10 cycles/10
D. 0.5 cycle/0.5

Ans. B

Sol. The input sinusoidal signal has a fundamental period of 20 ms. The time scale is such that one division denotes 5 ms. So, 10 divisions would account for 50 ms. As a result, 10 divisions could accommodate 50/20 = 2.5 cycles. So, we can observe 2 cycles lasting 40 ms and another half cycle lasting 10 ms making it 50 ms in total.

101. The area of the hysteresis loop will be least for one of the following materials. It is?

A. hard steel
B. wrought iron
C. silicon steel
D. soft iron

Ans. C

Sol. The hysteresis loop for AC excited devices is repeated every cycle of alternating current. Thus a material having large hysteresis loop area is unsuitable as the energy loss more. The Silicon steel has a small hysteresis loop area, so less hysteresis loss.

102. The no load primary current I_0 is about _____ of full load primary current of a transformer.

A. 3 -5 %
B. 3-40 %
C. above 40%
D. 15 – 30 %

Ans. A

Sol. On no load, a small amount of current is drawn from the primary side to set up the required magnetic flux in the magnetic core. This current is known as the "No Load current". The no load current is about 3-5% of the full load current and it accounts for the losses in a transformer.

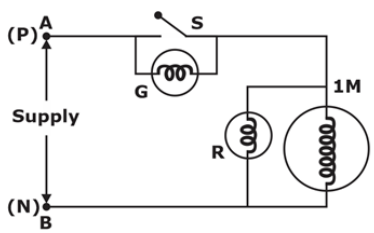
103. To prepare a P type semiconducting material the impurities to be added to silicon are?

A. Gallium, Arsenic
B. Arsenic, Antimony
C. Gallium Phosphorous
D. Boron, gallium

Ans. D

Sol. P-type semiconductors are created by doping an intrinsic semiconductor with acceptor impurities. A common p-type dopant for silicon is boron or gallium.

104. Two lamps, Green (G) and Red (R) are connected in a motor circuit as shown in the fig. The conditions under which the lamps will burn are? (Supply is available at terminals A & B)



A. Green lamp will not burn always, red lamp burns only when switch 'S' is closed.

B. Green lamp burns only when 'S' is open and red lamp burns only when 'S' is closed.

C. Green lamp burns always, red lamp burns only when switch 'S' is closed.

D. Green and red lamp burns when switch 'S' is closed.

Ans. B

Sol. When S is open The current will flow through Green lamp and it will burn. But when S is closed then current will get short circuit path through S and it will not flow through green lamp. Now current will pass through R and lamp Red will burn.

105. When a series RL circuit is connected to a voltage source V at t=0, the current passing through the inductor L at $t=0^+$ is:

A. $\frac{V}{R}$

B. zero

C. infinite

D. $\frac{V}{L}$

Ans. B

Sol. Inductor does not allow sudden change of current.

That's why current across inductor will not change abruptly.

106. If span length is doubled with no change in other factors, the sag of the line will become?

A. 8 times

B. 2 times

C. 0.5 time

D. 4 times

Ans. D

Sol. Relation between sag or deflection and span length is,

$$d = \frac{wl^2}{8T}$$

Where, d: deflection

l: span length

T: tension

$d \propto l^2$

If span length is doubled then sag or deflection will become four times.

107. The magnitude of AT required to establish a given value of flux in the air gap will be much greater than that required for Iron part of a magnetic circuit, because:

A. air is a good conductor of magnetic flux

B. air has the lowest relative permeability

C. iron has the lowest permeability

D. air is a gas

Ans. B

Sol. An air gap is a practically unavoidable part of any magnetic circuit in which there is a relative movement between different parts (e.g. in motors, generators, relays, etc). Due to increased reluctance of an air gap the flux spreads into the surrounding medium causing the flux fringing effect. It is generally an unwanted phenomenon which usually

increases proximity and eddy current loss in conductors located in the vicinity of the air gap.

108. Which of the following systems of wiring is the costliest?

. Conduit wiring.

B. Wooden casing and capping wiring.

C. TRS wiring.

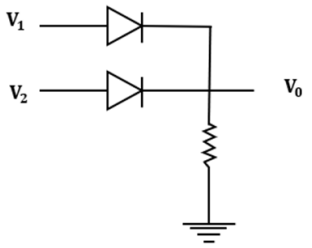
D. Cleat wiring.

Ans. A

Sol. The order of wiring with respect to its cost is as follows:

Cleat wiring < Wood casing Capping wiring < TRS wiring < Lead sheathed wiring < conduit wiring

109. The diode logic circuit represents.



A. AND

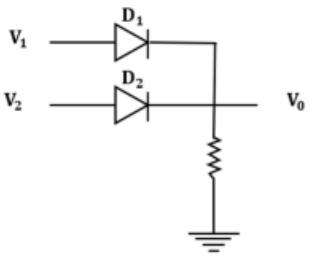
B. OR

C. NAND

D. NOR

Ans. B

Sol.

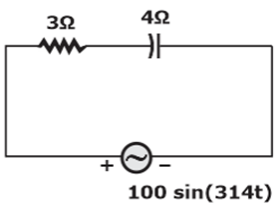


V_1	V_2	D_1	D_2	V_0
0	0	OFF	OFF	0
0	1	OFF	ON	1
1	0	ON	OFF	1
1	1	ON	ON	1

From the above table we say that the given circuit represents OR gate.

Hence, the correct option is (B)

110. Find the RMS value of current flowing through the circuit.



A. 14.14 A

B. 20 A

C. 10 A

D. 7.07 A

Ans. A

Sol.

$$f = \frac{314}{2\pi} = 50 \text{ Hz}$$

$$i(t) = \frac{V(t)}{Z} = \frac{100\sin(314t)}{R - jx_c} = \frac{100\sin(314t)}{3 - 4j}$$

$$i(t) = \frac{100}{5}\sin(314t - \phi)$$

where $\phi = \tan^{-1}\left(\frac{-4}{3}\right)$

$$i_{RMS} = \frac{i_m}{\sqrt{2}} = \frac{20}{\sqrt{2}} = 14.14 \text{ A}$$

111. Which of the following relation is incorrect?

A. cos φ = R/z

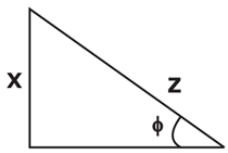
B. power factor angle $\phi = \tan^{-1}\left(\frac{X}{R}\right)$

C. R < Z always

D. tan φ = R/z

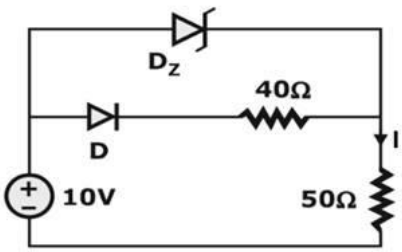
Ans. D

Sol. From the impedance Δ^{le}



$\tan\phi = \frac{X}{R}$ ∴ 'd' is incorrect

112. For the diode circuit shown V_Z = 5V, V_r = 0.7V for diode R_f is 10 Ω, then the value of I is



A. 176 mA

B. 100 mA

C. 186 mA

D. 104 mA

Ans. C

Sol. Here both diode and Zener diode are forward biased hence Zener acts as simple diode.

$$I = \frac{10 - 0.7}{50}$$

= 186 mA

113. An initially relaxed RC circuit with R = 1 MΩ and C = 2μF is switched on to a step voltage of 5 V. The voltage across capacitor after 2 sec will be?

A. 10 V
B. 5.45 V
C. 3.16 V
D. 6.32 V

Ans. C

Sol. The voltage across capacitor in RC circuit is given by:

$$V_c(t) = V_{final} + (V_{initial} - V_{final})e^{-\frac{t}{\tau}}$$

$$\Rightarrow \tau = CR = 2\ sec$$

$$\Rightarrow V_c(t) = 5 + (0 - 5)e^{-\frac{t}{2}}\ V$$

$$\Rightarrow V_c(t) = 5\left(1 - e^{-\frac{t}{2}}\right) Volts$$

$$\Rightarrow V_c(t = 2\ s) = 5(1 - e^{-1}) = 3.16\ V$$

114. Select the correct statement about Gauss Divergence theorem

A. it convert line integral to surface integral
B. it converts line integral to volume integral
C. it convert surface integral to volume integral
D. None

Ans. C

Sol. Gauss Divergence Theorem

$$\Rightarrow \oint_S F.dS = \int_V (\nabla.F)\, dV$$

⇒ it convert surface integral to volume internal

115. Symmetrical component of phase a is I_{a0} = 0A,Ia1 = 12∠30°A Ia2 = 16∠90°A then what will be the neutral current?

A. 1.5 ∠30° A
B. 2 ∠30° A
C. 3.12 ∠12° A
D. 0 A

Ans. D

Sol. We know that Neutral current $I_N = I_a + I_b + I_c$

$$= \left(I_{a_0} + I_{a_1} + I_{a_2}\right) + \left(I_{b_0} + I_{b_1} + I_{b_2}\right) + \left(I_{c_0} + I_{c_1} + I_{c_2}\right)$$

$$= 3I_{a_0} + \left(1 + \alpha^2 + \alpha\right)I_{a_1} + \left(1 + \alpha^2 + \alpha\right)I_{a_2}$$

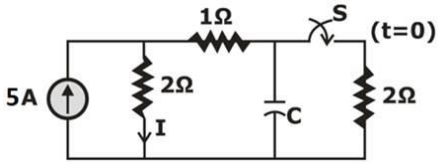
We know that $\left(1 + \alpha^2 + \alpha\right) = 0$

So, $I_N = 3I_{a_0}$

$I_N = 3 \times 0 + 0 + 0 = 0A$

Note: always neutral current is 3 times of zero sequence current.

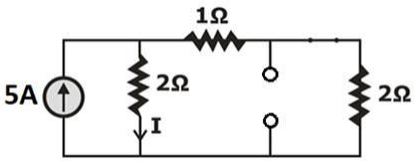
116. In the circuit shown below, switch S is closed at t = 0. The value of steady state current is _____.



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

Ans. C

Sol. At steady state capacitor behaves as an open circuit



Apply current division rule

$$I = \frac{3}{2+3} \times 5 = 3A$$

117. Which of the following is NOT a category of electrical wiring system?

A. Cleat wiring
B. Conduit wiring
C. Clipboard wiring
D. Concealed wiring

Ans. C

Sol. Types of electrical wiring system:

1. Cleat wiring
2. Casing and capping wiring
3. Batten wiring (CTS or TRS)
4. Lead sheath wring
5. Conduit wiring

- Concealed conduit wiring
- Surface conduit wiring

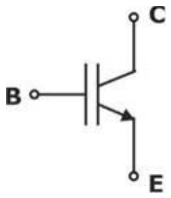
118. A modern power semi-conductor device that combines the characteristics of both BJT and MOSFET

A. GTO
B. FCT
C. IGBT
D. MCT

Ans. C

Sol. **IGBT (insulated gate biplot transistor)**

- IGBT contains advantages of Both MOSFET and BJT



Properties of IGBT

- it is bipolar device
- it has low on state voltage drop.
- Low on state conduction loss
- Low switching power los S
- High input impedance
- IGBT is Voltage controlled device
- it has positive temperature coefficient.
- secondary breakdown will not occur.

119. Which IE rule gives instruction for the restoration of persons suffering from electric shock.

A. IE Rule 37
B. IE Rule 38
C. IE Rule 39
D. IE Rule 44

Ans. D

Sol. Some rule as gives:

IE Rule 30: for services lines and apparatus on consumer's premises.

IE rule 37: for supply to vehicles, cranes etc.

IE rule 38: for cable and portable and transportable apparatus.

IE rule 39: for protection of cables by bituminous materials.

IE rule 44: Instruction for the restoration of person suffering from electric shock.

IE rule 73: for supply to X-ray and high frequency installation.

120. Which of the following semi-conductor materials is used to make green LEDs?

A. Gallium arsenide
B. Indium Gallium phosphide
C. Gallium arsenide phosphide
D. Aluminium Gallium phosphide

Ans. D

Sol. Generally, optical devices are fabricated using direct bandgap semi-conductors like Ga As. But Aluminium Gallium phosphide is used to emit green color with a wavelength range of 550-570 nm.

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