

1. What does the expression $\frac{1}{2} \vec{J} \cdot \vec{A}$ represent?

- A. Power density
- B. Radiation resistance
- C. Magnetic energy density
- D. Electric energy density

Answer ||| C

Solution ||| $\frac{1}{2} \vec{J} \cdot \vec{A} = \frac{1}{2} \frac{A}{m} \cdot \frac{wb}{m^2}$ (Linear current density)

$$\frac{1}{2} \vec{J} \cdot \vec{A} = \frac{1}{2} \vec{H} \cdot \mu \vec{H} = \frac{1}{2} \mu H^2$$

Magnetic current density as

$$A/m \rightarrow \vec{H}$$

$$\vec{B} \rightarrow wb / m^2 \rightarrow \mu \vec{H}$$

2.

Which one of the following equation is not Maxwell's Equations for a time-varying field in a linear homogeneous medium?

- A. $\nabla \cdot \vec{B} = 0$
- B. $\nabla \times \vec{D} = \vec{0}$
- C. $\oint_c \vec{B} \cdot d\vec{l} = \mu_0 I$
- D. $\nabla^2 \vec{A} = \mu_0 \vec{J}$

Answer ||| B

Solution ||| $\nabla \cdot \vec{B} = 0$ Maxwell's 2nd equation

$\nabla \times \vec{D} = 0$ is not a Maxwell's Equations

$\nabla \cdot \vec{D} = \rho_v$ is Maxwell's 1st equation

$\nabla \times \vec{E} = -\frac{\partial \vec{B}}{\partial t}$ is Maxwell's 3rd equation

$\nabla \times \vec{H} = \vec{J}_c + \frac{\partial \vec{D}}{\partial t}$ is Maxwell's 4th equation

3. Match **List-i** with **List-ii** and select the correct answer using the code given below the lists:

List-i

- A) Shift registers
- B) Counter
- C) Decoder

List-ii

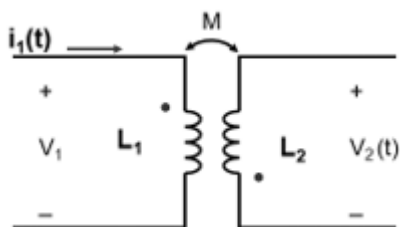
- 1) Frequency division
- 2) Addressing in memory chips
- 3) Serial to parallel data conversion

- A. A-2; B-1; C-3
- B. A-3; B-1; C-2
- C. A-2; B-3; C-1
- D. A-3; B-2; C-1

Answer ||| B

Solution ||| In any counter, the signal at the output of the last flip-flop (i.e. the MSB) will have a frequency equal to the input clock frequency divided by the MOD number of the counter.

4. Find an expression of mutual voltage V_2 of the circuit.

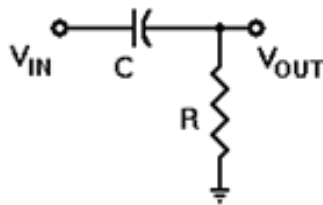


- A. $-M \frac{di_1}{dt}$
- B. $+M \frac{di_1}{dt}$
- C. $-M \frac{di_2}{dt}$
- D. $+M \frac{di_2}{dt}$

Answer ||| A

Solution ||| From the circuit, current i_1 enters the dotted terminal of coil 1 and voltage v_2 is negative at the dotted terminal of coil 2, so the mutual voltage V_2 is $-M di_1/dt$.

5. In the electric circuit, if input voltage V_{IN} is a constant DC, then:



- i. Resistor R will bypass the capacitor C
 - ii. Capacitor C will be charged
 - iii. Capacitor will be discharged
- A. both i and ii
B. both ii and iii
C. only iii
D. only i

Answer ||| A

Solution ||| In the circuit, when V_{IN} is fixed, capacitor C will charge through resistor R and there will be no charging current, so there will be no output voltage V_{OUT} .

6. A PMMC voltmeter is connected across a series combination of a DC voltage source $V_1 = 2$ V and an AC voltage source $V_2 = 3\sin 4t$, the voltmeter reads?

- A. 10 V
B. 0 V
C. 5 V
D. 2 V

Answer ||| D

Solution ||| The permanent magnet moving coil measures the DC value only. The torque will be reversed if the connected to AC, the deflection responds to the mean torque which is zero.

7. Calculate the power factor of the cable if loss angle is $\delta = 60^\circ$.

- A. Unity
- B. 0.5
- C. 0.707
- D. 0.866

Answer ||| D

Solution ||| power factor ($\cos\theta = \cos(90^\circ - \delta) = \sin\delta$)
 $\cos\theta = \sin\delta = \sin 60^\circ = 0.866$

8. The 8085 microprocessor is a

- A. 8-bit microprocessor
- B. 16-bit microprocessor
- C. 32-bit microprocessor
- D. 64-bit microprocessor
- E. 128-bit microprocessor

Answer ||| A

Solution ||| 8085 microprocessor is an 8-bit microprocessor designed by Intel.

9. In electromagnetic flow meters, the pipe through which the liquid flows is either non-conducting or electrically insulated from inside. This is done to prevent:

- A. Weakening of induced magnetic field
- B. Short-circuiting of induced voltage
- C. Obstruction of liquid flow
- D. Losses due to stray magnetic field

Answer ||| B

Solution ||| In an electro-magnetic flow meter, electrodes are mounted in the opposite side of an electrically insulated or non-conducting pipe through which the liquid flows. This pipe is surrounded by an electromagnet which produces a magnetic field. When liquid flows through the pipe, it also passes through the magnetic field. It induces a voltage in the liquid proportional to its flow, which is detected by the electrodes.

If metallic pipes were used without any electrical insulation, the induced voltage will get short-circuited. To avoid this short-circuiting of induced voltage, electrically insulated or non-conducting pipe should be used.

10. What is the dynamic Impedance offered by Ideal tank circuit in a network?

- A. Zero
- B. Resistive
- C. Infinity
- D. None of the above

Answer ||| C

Solution ||| Dynamic impedance of tank circuit = $\frac{L}{CR}$

For ideal tank circuit, $R = 0$

\therefore Dynamic impedance of ideal tank circuit will be infinity.

11. Any arbitrary signal multiplied with another arbitrary signal is always a –

- A. Non- Linear System
- B. Linear System
- C. Can be linear or, non-linear
- D. None of the above

Answer ||| A

Solution ||| A linear system should always have constant magnitude. But in the question it is talking about arbitrary signals so, the resultant system should be Non-Linear as the magnitude is not constant.

12. What is the Nyquist rate (in KHz) for the signal $x(t) = \cos(2000\pi t) + 3\sin(6000\pi t)$ is

- A. 2
- B. 4
- C. 12
- D. 6

Answer ||| D

Solution |||

$$x(t) = \cos(2000\pi t) + 3\sin(6000\pi t)$$

The highest frequency component present $x(t)$ is

$$f_m = \frac{6000\pi}{2\pi} = 3000 \text{ Hz}$$

Nyquist Rate $f_s = 2f_m = 2 \times 3000 = 6 \text{ kHz}$

13. The binary 4 bit full adder has:

- A. 7 Half adder + 3 OR gate
- B. 8 Half adder + 4 OR gate
- C. 4 Half adder + 3 OR gate
- D. 7 Half adder + 4 OR gate

Answer ||| A

Solution ||| For n bit full adder, we have:

$(2n - 1)$ Half adder + $(n - 1)$ OR gates needed.

So, for 4 bit full adder we will have:

7 Half adder and 3 OR gates needed.

14. Inductive load of resistance 20Ω and inductance 0.1 H is connected in series and switched on to an AC voltage of $V = 100 \sin(200t + \alpha)$. Find the angle such that there is no transients?

- A. 45°
- B. 60°
- C. 30°
- D. 75°

Answer ||| A

Solution ||| Solution for the $i(t)$ for R – L load

$$i(t) = \frac{-Vm}{|z|} \sin(\theta - \alpha) e^{\frac{-Rt}{L}} + \frac{Vm}{|z|} \sin(\omega t + \theta - \alpha)$$

For no transient

$$\theta - \alpha = 0$$

$$\theta = \alpha$$

$$\theta = \tan^{-1} \frac{\omega L}{R} = \tan^{-1} \left(\frac{200 \times 0.1}{20} \right)$$

$$\theta = 45$$

15. The Dirac function $\delta(t)$ is defined as

- A. $\delta(t) = \begin{cases} 1; & t = 0 \\ 0; & \text{otherwise} \end{cases}$
- B. $\delta(t) = \begin{cases} \infty; & t = 0 \\ 0; & \text{otherwise} \end{cases}$
- C. $\delta(t) = \begin{cases} 1; & t = 0 \\ 0; & \text{otherwise} \end{cases}$
- D. $\delta(t) = \begin{cases} \infty; & t = 0 \\ 0; & \text{otherwise} \end{cases} \& \int_{-\infty}^{\infty} \delta(t) dt = 1$

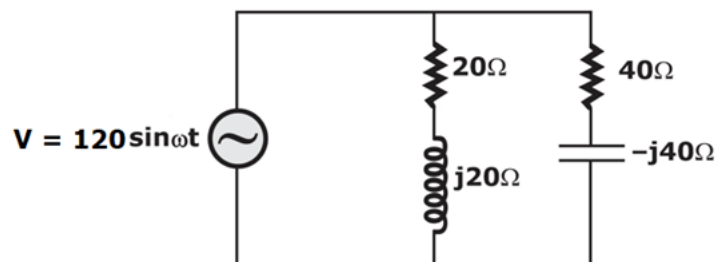
Answer ||| D

Solution |||

Dirac delta function is defined as

$$\delta(t) = \begin{cases} \infty; & t = 0 \\ 0; & \text{otherwise} \end{cases} \& \int_{-\infty}^{\infty} \delta(t) dt = 1$$

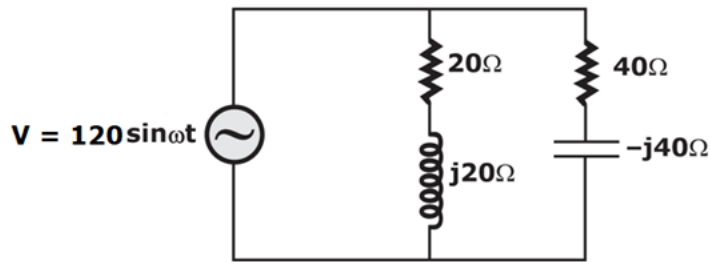
16. Find the total power delivered by the source?



- A. 90 W
- B. 270 W
- C. 180 W
- D. 360 W

Answer ||| B

Solution |||



$$I_1 = \frac{V}{Z_1}$$

$$I_1 = \frac{120 \angle 0^\circ}{20 + j20}$$

$$|I_1| = \frac{6}{\sqrt{2}}$$

$$(I_1)_{\text{rms}} = \left(\frac{6}{\sqrt{2}} \right) \times \frac{1}{\sqrt{2}} = 3 \text{ A}$$

Similarly,

$$I_2 = \frac{120}{40 - j40}$$

$$|I_2| = \frac{3}{\sqrt{2}}$$

$$|I_2|_{\text{rms}} = \left(\frac{3}{\sqrt{2}} \right) \times \frac{1}{\sqrt{2}} = \frac{3}{2} \text{ A}$$

So, the total power delivered by the source $= (I_{1\text{rms}})^2 \times 20 + (I_{2\text{rms}})^2 \times 40$

$$= (3)^2 \times 20 + \left(\frac{3}{2} \right)^2 \times 40$$

$$= 9 \times 20 + 90$$

$$= 270 \text{ W}$$

17. True RMS-reading voltmeter

- 1) Measures the RMS value of voltage accurately.
- 2) Eliminates the error due to waveform
- 3) Uses the thermocouple for heating.

Which of the above statements are correct?

- A. 1 and 2 only
- B. 1 and 3 only
- C. 2 and 3 only
- D. 1, 2 and 3

Answer ||| D

Solution |||

True rms meter measure effective value of any signal irrespective of shape and characteristics of input.

18. A barium titanate crystal is inserted in a parallel plate condenser of area $10 \text{ mm} \times 10 \text{ mm}$. The plates having a separation of 2 mm , give a capacitance of 10^{-9} F . If the value of $\epsilon_0 = 8.854 \times 10^{-12} \text{ Fm}^{-1}$, the relative dielectric constant of the crystal will be nearly

- A. 2640
- B. 2450
- C. 2260
- D. 2080

Answer ||| C

Solution |||

For a parallel plate capacitor,

$$\begin{aligned}
 \text{Capacitance, } C &= \frac{\epsilon_0 \epsilon_r A}{d} \\
 A &= 10 \text{ mm} \times 10 \text{ mm} \\
 &= 10^{-4} \text{ m}^2 \\
 d &= 2 \text{ mm} \\
 C &= 10^{-9} \text{ F} \\
 \epsilon_r &= \frac{C}{\epsilon_0 A} \cdot d \\
 &= \frac{10^{-9}}{8.854 \times 10^{-12} \times 10^{-4}} \times 2 \times 10^{-3} \\
 &= 0.2258 \times 10^4 \\
 &= 2258.86 \approx 2260
 \end{aligned}$$

19. How many multiplexers of 4:1 are required to make a 16:1 multiplexer?

- A. 4
- B. 5
- C. 2
- D. None of the above

Answer ||| B

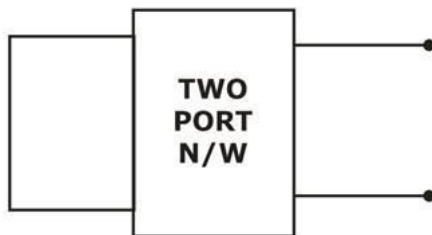
Solution |||

To accommodate 16 inputs we need 4 multiplexers of 4 : 1 and one multiplexer is required to select the 4 multiplexers

Shortcut: $\frac{16}{4} = 4$ and $\frac{4}{4} = 1$

Hence $4 + 1 = 5$

20.



In the above circuit which two-port parameter matrix can possibly be zero, given that input current and output voltage is non-zero ?

- A. I-parameter
- B. g-parameter
- C. Transmission parameter
- D. h-parameter

Answer ||| D

Solution |||

In the above two port network, input port is short circuited, so $V_1=0$ and output port is open circuited so $I_2=0$.

h-parameters are given by,

$$V_1 = h_{11}I_1 + h_{12}V_2$$

$$I_2 = h_{21}I_1 + h_{22}V_2$$

$$0 = h_{11}I_1 + h_{12}V_2$$

$$0 = h_{21}I_1 + h_{22}V_2$$

Given, I_1 , V_2 are non – zero. Therefore above equation can be satisfied if $h_{11}=h_{12}=h_{21}=h_{22}=0$

Therefore, h- parameter matrix can be zero.

Hence $[h] = \begin{bmatrix} 0 & 0 \\ 0 & 0 \end{bmatrix}$

21. For flash ADC

1) having n-bit requires $2^n - 1$ comparators

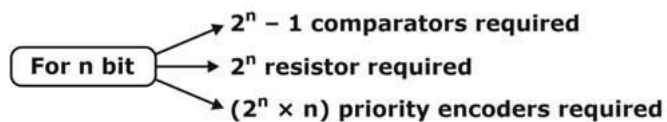
2) having n-bit requires 2^n resistors

- A. 1 only
- B. 2 only
- C. Both A and B
- D. Neither A nor B

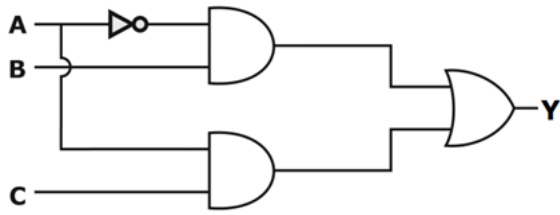
Answer ||| C

Solution |||

Flash ADC is fastest ADC of all.



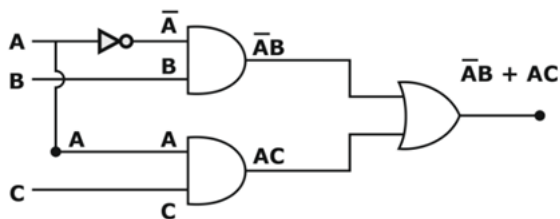
22. The Boolean expression for logic diagram shown is



- A. $A + B$
- B. $\bar{A}B + \bar{A}C$
- C. $\bar{A}B + A\bar{C}$
- D. $\bar{A}B + AC$

Answer ||| D

Solution |||



$$Y = \bar{A}B + AC$$

23. The efficiency of an SMPS is generally in the range of

- A. 40 – 50%
- B. 50 – 60%
- C. 60 – 65%
- D. 75 – 85%

Answer ||| D

Solution |||

The efficiency of SMPS is generally good and it lies in the range of 75 – 85%. Which is an advantage of SMPS.

24. When the 8085 receives an interrupt on its INTR pin

- A. The program is transferred to a call location determined by HL pair.
- B. 8085 waits till an interrupt acknowledgement is received and transfers program to a fixed call location.
- C. The call location is determined by external device.
- D. The program is directly transferred to a fixed call location.

Answer ||| C

Solution ||| When the 8085 receives an interrupt on its INTR pin, the call location is determined by external device.

25.8085 and 8086 processors are

- A. CISC processors and have Harvard architecture
- B. CISC processors and have Von Neumann architecture
- C. RISC processors and have Harvard architecture
- D. RISC processors and have Von Neumann architecture

Answer ||| B

Solution |||

Both are CISC processors and have Von Neumann architecture.

26.ALU of 8085 microprocessor consist of

- A. accumulator, temporary register arithmetic and logic circuits
- B. accumulator, arithmetic logic circuits
- C. accumulator, temporary register, arithmetic logic circuits and five flags
- D. None of the above

Answer ||| C

Solution |||

ALU of 8085 microprocessor consist of accumulator, temporary register, arithmetic logic circuits and five flags.

27.Determine the number of unused states in 8 bit Johnson Counter

- A. 248
- B. 236
- C. 240
- D. 242

Answer ||| C

Solution ||| Number of unused states in 'n' bit Johnson counter = $2^n - 2n$

For n=8, number of unused states = $2^8 - 2 \times 8 = 240$

28. A certain aluminum wire has a resistance of 5Ω at 20°C . What is the resistance of an annealed copper wire of the same size and at the same temperature?

[Use $\rho_{\text{copper}} = 1.72 \times 10^{-8}$, $\rho_{\text{aluminium}} = 2.83 \times 10^{-8} \Omega\text{-m}$]

- A. 1.04Ω
- B. 2.04Ω
- C. 3.04Ω
- D. 4.04Ω

Answer ||| C

Solution |||

For the copper and aluminum wires, respectively.

$$R = \rho_c \frac{l}{A} \text{ and } S = \rho_a \frac{l}{A}$$

Taking the ratio of the two equations causes the length and area quantities to divide out with the result that the ratio of resistances is equal to the ratio of the resistivities.

$$\frac{R}{S} = \frac{\rho_c}{\rho_a} \Rightarrow R = \frac{\rho_c}{\rho_a} \times 5$$

On putting values of resistivities,

$$R = \frac{1.72 \times 10^{-8}}{2.83 \times 10^{-8}} \times 5 = 3.04 \Omega$$

29. A series RLC circuit has a resonance frequency of 1 kHz and a quality factor of 100. If each of R, L, C is doubled from its original value, the new Q of the circuit is,

- A. 100
- B. 200
- C. 50
- D. 150

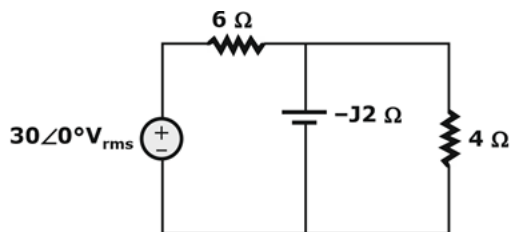
Answer ||| C

Solution ||| $Q = \frac{f_0}{B_{1W}} ; f_0 = \frac{1}{2\pi\sqrt{LC}}$

$$B.W = \frac{R}{L} \left(\text{characteristic equation} = s^2 + \frac{Rs}{L} + \frac{1}{LC} \right) \text{ or } Q = \frac{1}{R} \sqrt{\frac{L}{C}}$$

when R, L, C are doubled, then $Q_{\text{new}} = \frac{1}{2R} \sqrt{\frac{2L}{2C}} \Rightarrow \frac{1}{2} Q \Rightarrow \frac{1}{2} \times 100 = 50$

30. Determine the power factor of the entire circuit of fig as seen by the source. Calculate the average power delivered by the source.



- A. 0.973 leading and 125 W
- B. 0.876 leading and 100 W
- C. 0.546 leading and 125 W
- D. 0.345 leading and 100 W

Answer ||| A

Solution |||

The total impedance is, $z = 6 + 4 \parallel (-j2) = 6 + \frac{-j2 \times 4}{4 - j2} = 6.8 - j1.6 = 7 \angle -16.24^\circ \Omega$

The power factor is, $P_f = \cos(-13.24) = 0.9734(\text{leading})$

Since the impedance is capacitive. The rms value of the current is,

$$I_{\text{rms}} = \frac{V_{\text{rms}}}{Z} = \frac{30 \angle 0^\circ}{7 \angle -13.24^\circ} = 4.286 \angle 13.24^\circ \text{ A}$$

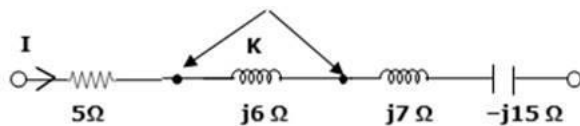
The average power supplied by the source is,

$$P = V_{\text{rms}} I_{\text{rms}} \cos \phi = (30)(4.286)(0.9734) = 125 \text{ W}$$

$$\text{or } P = I_{\text{rms}}^2 R = (4.286)^2 (6.8) = 125 \text{ W}$$

where R is the resistive part of Z.

31. Find value of k under resonance condⁿ.



- A. $\frac{1}{\sqrt{17}}$
- B. $\frac{1}{\sqrt{42}}$
- C. $\frac{1}{\sqrt{37}}$
- D. $\frac{1}{\sqrt{53}}$

Answer ||| B

Solution |||

At resonance $X_{\text{eq}} = 15$

$$2\pi f (M = k\sqrt{L_1 L_2})$$

$$X_M = k\sqrt{X_1 X_2}$$

$$2\pi f (L_{eq} = L_1 + L_2 + 2M)$$

$$X_{eq} = X_1 + X_2 + 2X_M$$

$$X_{eq} = X_1 + X_2 + 2k\sqrt{X_1 X_2}$$

$$15 = 6 + 7 + 2k\sqrt{6 \times 7}$$

$$k = \frac{1}{\sqrt{42}}$$

32. Find the inverse Laplace transform of stable function $f(t)$, if Laplace Transform of $f(t)$ is

$$\frac{s+4}{s^2+3s+2}$$

- A. $-3e^{-t}u(t) - 2e^{-2t}u(t)$
- B. $3e^{-t}u(t) - 2e^{-2t}u(t)$
- C. $-3e^tu(t) - 2e^{-2t}u(t)$
- D. $-3e^{-t}u(t) + 2e^{2t}u(t)$

Answer ||| B

Solution |||

$$F(s) = \frac{s+4}{s^2+3s+2} = \frac{A}{s+1} + \frac{B}{s+2} = \frac{3}{s+1} - \frac{2}{s+2}$$

$\therefore f(t)$ is stable, so $f(t)$ is right sided signal.
taking inverse Laplace we get

$$f(t) = 3e^{-t}u(t) - 2e^{-2t}u(t)$$

33. In CRO, horizontal beam produced during retrace time is moving from:

- A. left to right.
- B. right to left.
- C. top to bottom.
- D. bottom to top.

Answer ||| B

Solution |||

Retracement time also known as flyback time, produce a e^- array of horizontal line that travels from right to left side of CRO screen.

34. By applying 4000μ strain, 1Ω resistance change occur. If initial strain gauge resistance is 125Ω . The gauge factor will be:

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

Answer ||| B

Solution |||

$$\begin{aligned}\text{Gauge factor} &= \frac{\Delta R / R}{\Delta L / L} \\ &= \frac{\Delta R / R}{(\text{strain})} \\ &= \frac{1 / 125}{4000 \mu} = (2)\end{aligned}$$

35. Which of the following is not true?

- A. Correctness in measurement requires both accuracy and precision.
- B. It is not possible to have precise measurements which are not accurate.
- C. An instruments with 2% accuracy is better than with 5% accuracy.
- D. Reproducibility and consistency are expressions that best describe precision in measurements.

Answer ||| B

Solution |||

Precision will not confirm accuracy but accuracy will confirm precision.

36. A $1000/5A$ current transformer is operating at rated primary current and with a secondary burden of 1Ω (pure resistive). Calculate ratio error and Phase error for an exciting current of $1 A$ at a power factor of 0.4 .

- A. -0.093% , $\theta = 0.052^\circ$
- B. -0.039% , $\theta = 0.052^\circ$
- C. -0.039% , $\theta = 0.025^\circ$
- D. -0.139% , $\theta = 0.152^\circ$

Answer ||| B

Solution |||

$$\cos(90 - \alpha) = 0.4$$

$$\alpha = 23.57^\circ$$

The secondary p.f. is unity

$$\therefore \delta = 0^\circ$$

$$\text{Nominate Ratio, } K_n = \frac{1000}{5} = 200$$

Actual transformation Ratio, R

$$R = n + \frac{I_o}{I_s} \sin(\delta + \alpha) = 200 + \frac{1}{5} \sin(0 + 23.57^\circ)$$

$$R = 200.08$$

$$\therefore \text{Ratio Error} = \frac{K_n - R}{R} \times 100 = \frac{200 - 200.08}{200.08} = -0.039\%$$

$$\text{Phase Error, } \theta = \frac{180}{\pi} \left[\frac{I_o \cos(\delta + \alpha)}{nI_s} \right] = \frac{180}{\pi} \left[\frac{1 \times \cos(23.57)}{200 \times 5} \right]$$

$$\theta = 0.052^\circ$$

37. Which of the following statement is wrong regarding class C amplifier.

- A. Conduction angle for transistor is less than 180°
- B. It has very poor linearity
- C. It is suitable for use as audio amplifiers
- D. Distortion is very high in case of class-C amplifiers

Answer ||| C

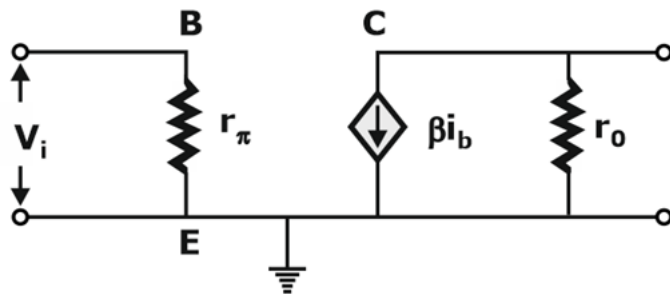
Solution |||

Class-C amplifier is heavily biased so that the output current is zero for more than one half of the input cycle. It means the conduction angle is less than 180° .

Also, class C amplifier has very poor linearity as compared to other classes of power amplifiers.

Distortion is very high in case of class-C amplifiers, so, they are not suitable for use as audio amplifiers. These amplifiers are commonly used in high frequency sine wave oscillators and certain types of radio frequency amplifiers.

38. For the given circuit output impedance Z_0 , if $h_{ie} = 1.1 \text{ k}\Omega$, $h_{fe} = 99$, $r_0 = 2.1 \text{ k}\Omega$.



- A. $2.1 \text{ k}\Omega$
- B. $4.6 \text{ k}\Omega$
- C. $8.4 \text{ k}\Omega$
- D. $1.05 \text{ k}\Omega$

Answer ||| A

Solution |||

For output impedance,

Voltage source short circuit

So, $V_i = 0$

hence, $i_b = 0$

$\beta i_b = 0$

$Z_0 = r_0 = 2.1 \text{ k}\Omega$

39. The dimension of magnetic flux density is

- A. $MT^{-1}Q^{-2}$
- B. $MT^{-1}Q^{-1}$
- C. $MT^{-2}Q^{2-}$
- D. MTQ^{-1}

Answer ||| B

Solution |||

We know that force on conductor $\vec{F} = q(\vec{v} \times \vec{B})$

$$\text{Dimension of B} = \frac{\text{dimension of F}}{\text{dimension of } v \times \text{dimension of Q}} = \frac{MLT^{-2}}{LT^{-1} \times Q} = MT^{-1}Q^{-1}$$

40. Consider the following statements:

- (1) The Early Effect in BJT refers to thermal run away.
- (2) Zener breakdown occurs when a Zener diode in forward bias.

Which of the above statements is/are correct?

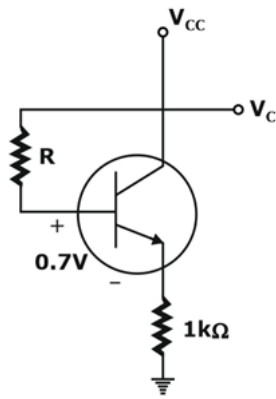
- A. 1 only
- B. 2 only
- C. both 1 and 2
- D. Neither 1 nor 2

Answer ||| D

Solution ||| The Early Effect in BJT refers to Base width modulation

Zener breakdown occurs when a Zener diode in reverse bias.

41. The emitter current in the circuit shown in figure is 3mA, $\beta = 89$, $V_{CC} = 4.5V$. Find the value of R.



- A. 48 kΩ
- B. 11 kΩ
- C. 24 kΩ
- D. 5 kΩ

Answer ||| C

Solution |||

$$I_E = 3 \text{ mA}$$

$$I_B = \frac{I_E}{\beta + 1} = \frac{3}{89 + 1} \text{ mA} = \frac{1}{30} \text{ mA}$$

→ Apply KVL in loop:

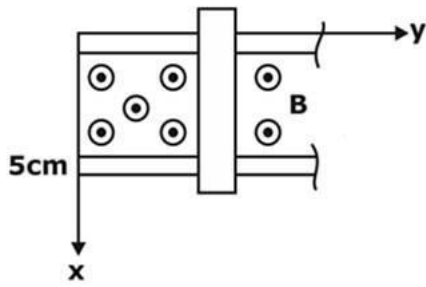
$$V_C - I_B R - 0.7 - I_E (1k) = 0$$

$$4.5 - \frac{1}{30} \times R - 0.7 - 3 = 0$$

$$R = 24 \text{ K}\Omega$$

42. A conducting bar can slide freely over two conducting rails as shown in the figure below. Calculate the voltage induced in the bar if the bar is stationed at $y = 12 \text{ cm}$ and $B = 15 \cos$

$$10^3 t \hat{a}_z \text{ m Wb/m}^2,$$



- A. $90 \sin 10^3 t$ mV
- B. $-9 \sin 10^3 t$ mV
- C. $-90 \sin 10^3 t$ mV
- D. $9 \sin 10^3 t$ mV

Answer ||| A

Solution ||| In this case, voltage induced in the bar is called as transformer emf and it is given as,

$$V = - \int \frac{\partial B}{\partial t} \cdot dS$$

$$- \frac{\partial B}{\partial t} = - \frac{\partial}{\partial t} (15 \times 10^{-3} \cos 10^3 t)$$

$$= 15 \sin 10^3 t$$

$$V = \int_{y=0}^{0.12} \int_{x=0}^{0.05} 15 \sin 10^3 t \, dx \, dy$$

$$V = 15 \times 0.5 \times 0.12 \sin 10^3 t$$

$$V = 90 \sin 10^3 t \text{ mV}$$

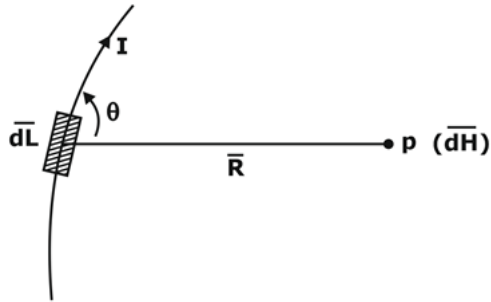
43. The programs of ROM are known as:

- A. Booting
- B. Operating system
- C. BIOS
- D. None of these

Answer ||| C

Solution ||| BIOS – Basic Input Output System is set of programs written in ROM. BIOS is used for system start-up and booting process.

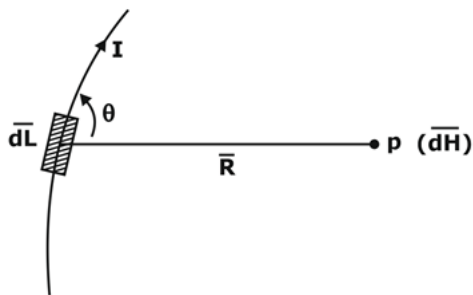
44. Magnetic field intensity at any point P due to the current element is proportional to



- A. current flowing through the conductor
- B. length of conductor
- C. $\sin \theta$ (where θ is angle b/w length & unit normal vector)
- D. All

Answer ||| D

Solution |||



\Rightarrow Magnetic field intensity at point P is given by Biot-Savart Law

$$d\vec{H} = \frac{I d\vec{L} \times \vec{R}}{4\pi R^3}$$

(or)

$$d\vec{H} \propto \frac{I d\vec{L} \sin \theta}{R^2}$$

45. It consists of two statements, one is statement (I) and other is statement (II) examine these two statements carefully and select the answer to these items using the codes given below:

Statement (I) For a varying magnetic, field electric field & magnetic field is related as

$$\nabla \times \mathbf{E} = \frac{-dB}{dt}$$

Statement (II) Capacitor opposes the sudden change in voltage across it.

- A. Both statement (I) and statement (II) are individually true and statement (II) is the correct explanation of statement (I)
- B. Both statement (I) and statement (II) are individually true but statement (II) is not correct explanation of statement (I)
- C. Statement (I) is true but statement (II) is false
- D. Statement (I) is false but statement (II) is true

Answer ||| B

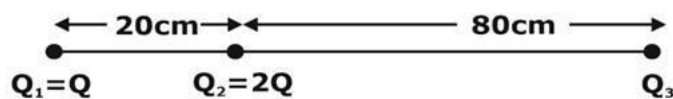
Solution |||

\Rightarrow for varying magnetic field $\nabla \times \mathbf{E} = \frac{-dB}{dt}$

\Rightarrow capacitor opposes sudden change in voltage across it

\Rightarrow as both statement are true but they not related to each other

46. A system of three electric charges Q_1 , Q_2 , Q_3 as shown in figure lying in a straight line is in equilibrium the third change Q_3 is



- A. 8Q
- B. 16Q
- C. 3Q
- D. 4Q

Answer ||| B

Solution |||

\Rightarrow System is in equilibrium so net force on Q_2 will be zero –

Force due to Q_1 is in positive X - direction so it will be positive, and due to Q_3 is in the negative X - direction so it will be negative.

$$\Rightarrow F_{Q_2} = \frac{kQ_1Q_2}{(20)^2} - \frac{kQ_2Q_3}{(80)^2}$$

\Rightarrow For equilibrium $F_{Q_2} = 0$

$$= \frac{Q_1Q_2}{1} - \frac{Q_2Q_3}{16}$$

$$Q_2Q_3 = 16Q_1Q_2$$

$$Q_3 = 16Q_1 = 16Q$$

47. It consists of two statements : Statement (I) and other is Statement (II) examine these two statement carefully and select the answer

Statement (I) An astable multivibrator is also called a free-running oscillator.

Statement (II) An astable multivibrator circuit forces an operational amplifier to operate in the saturation region

- A. statement (I) and statement (II) are individually correct and statement (II) is correct explanation of statement (I)
- B. statement (I) and statement (II) are individually correct but statement (II) is not correct explanation of statement (I)
- C. statement (I) is correct and statement (II) is incorrect
- D. statement (II) is correct and statement (I) is incorrect

Answer ||| B

Solution |||

\Rightarrow Astable multivibrators are free running oscillator which oscillate between two states continuously producing two square wave output waveforms. These both states are not stable as it changes from one state to the other all the time.

\Rightarrow The op-amp multivibrator is a non-inverting op-amp circuit that produced its own input signal with the aid of an RC feedback network it forces an operational amplifier to operate in the saturation region

48. Select the incorrect statement about clamper circuit -

- A. it changes the shape of AC signal
- B. it consists of energy storing element
- C. it consists of diode, a resistor and a capacitor.
- D. it does not change the shape of AC signal, it only add a DC level to an AC signal

Answer ||| A

Solution |||

A clamper circuit is a circuit that add a DC level to an AC signal it consists of energy storing element, Diode, Resistor, and Capacitor.

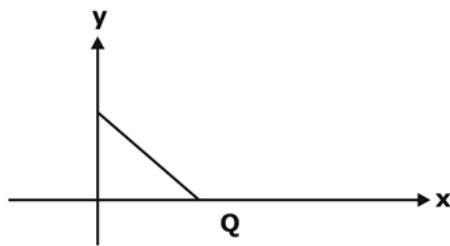
49. The operating point lies in case of class C amplifier

- A. exactly at the center of load line
- B. on X Axis
- C. Just above X-Axis
- D. Below X-Axis

Answer ||| D

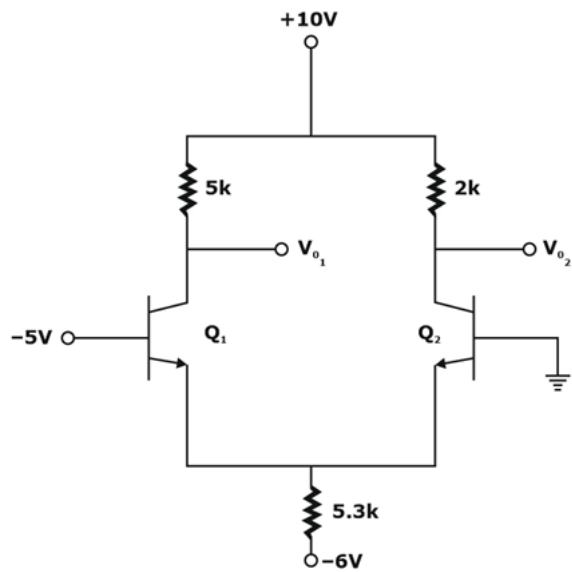
Solution |||

Position of operating point in case of class C amplifier lies below. X-Axis



⇒ it has maximum distortion & maximum efficiency (95%)

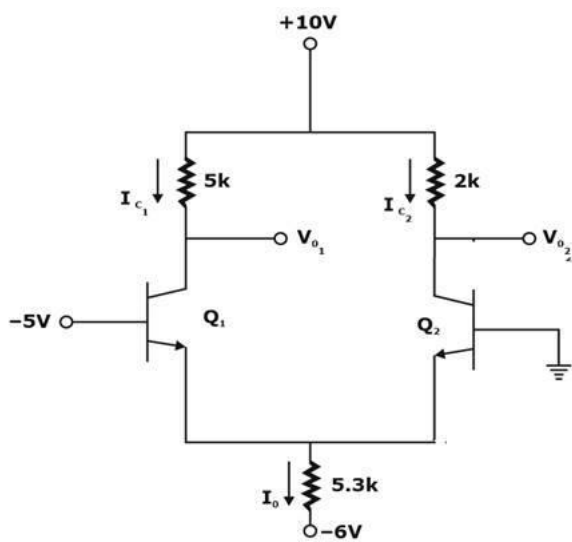
50. The differential DC output voltage $V_{01} - V_{02}$ in the circuit shown is ____ V



- A. 5V
- B. 10V
- C. 8V
- D. 2V

Answer ||| D

Solution |||



\Rightarrow the base of Q_L is biased with negative voltage hence

$Q_1 \rightarrow \text{OFF}$

$Q_2 \rightarrow \text{ON}$

$$\Rightarrow I_{C_1} = 0$$

$$\Rightarrow V_{0_1} = 10V$$

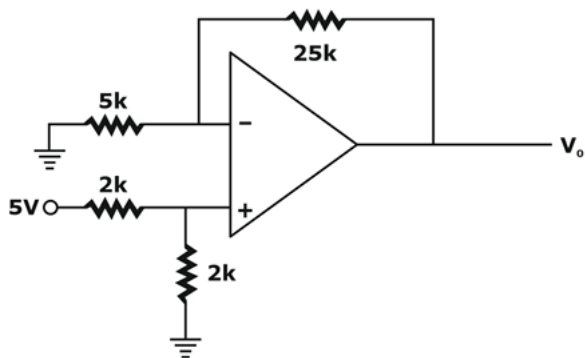
$$\Rightarrow V_{E_2} = -0.7V$$

$$\Rightarrow I_0 = \frac{-0.7V + 6V}{5.3k} = 1mA$$

$$\Rightarrow V_{0_2} = 10 - 2 \times 1 = 8V$$

$$\Rightarrow V_{0_1} - V_{0_2} = 10 - 8 = 2V$$

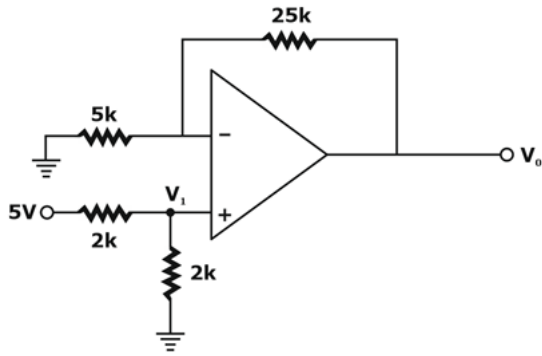
51. The output voltage of the op-amp circuit is



- A. 20 V
- B. 15 V
- C. 30 V
- D. 12 V

Answer ||| B

Solution |||



$$\Rightarrow V_1 = \left[\frac{5 \times 2}{2 + 2} \right] = \left(\frac{10}{4} \right) = 2.5 \text{ V}$$

$$\Rightarrow V_0 = V_i \left(1 + \frac{25}{5} \right) = 6V_1$$

$$V_0 = 6V_1 = 6 \times 2.5 = 15.0 \text{ V}$$

52. Calculate I_D for the n-channel MOSFET with $V_{GS} = -2 \text{ V}$, $I_{DSS} = 10 \text{ mA}$ and $V_P = -4 \text{ V}$

- A. 3 mA
- B. 5 mA
- C. 2.5 mA
- D. 6 mA

Answer ||| C

Solution |||

Current equation is given as

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

Where V_{GS} = Gate to source voltage

I_{DSS} = Drain to source saturation current

V_P = Pinch-off voltage

I_D = Drain current

Given $V_{GS} = -2 \text{ V}$, $I_{DSS} = 10 \text{ mA}$

$$V_{GS(OFF)} = V_P = -4V$$

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

$$= 10 \left(1 - \frac{-2}{-4} \right)^2 = 2.5 \times 10^{-3} A$$

$$I_D = 2.5mA$$

53. Difference and Borrow for 3 input subtractor are, if input to subtractor is 101

- A. 1, 1
- B. 0, 1
- C. 1, 0
- D. 0, 0

Answer ||| D

Solution |||

For 3 input subtractor,

$$\text{Difference (D)} = A \oplus B \oplus C$$

$$\& \text{ Borrow (B)} = \bar{A}B + BC + C\bar{A}$$

For input 101,

$$D = 1 \oplus 0 \oplus 1 = 0$$

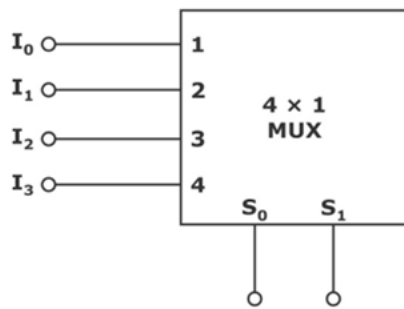
$$B = 0.1 + 0.1 + 1.0 = 0$$

54. A 4×1 multiplexer can be used to implement.

- A. Four combinational functions of 3-variables each.
- B. Two combinational function of 2-variables each.
- C. One combinational function of 6-variables.
- D. All combinational function of 2-variables.

Answer ||| C

Solution |||



$$Z = I_0 \bar{S}_0 \bar{S}_1 + I_1 \bar{S}_0 S_1 + I_2 S_0 \bar{S}_1 + I_3 S_0 S_1$$

So, the output of 4×1 MUX is a one combinational function of 6 variables.

55.The figure of merit of a logic family is given by

- A. Gain \times Bandwidth
- B. Fanout \times Propagation delay
- C. Fanout \times Power dissipation
- D. Propagation time delay \times Power dissipation

Answer ||| D

Solution |||

$$\text{Figure of merit} = \text{Propagation Delay} \times \text{Power dissipation}$$

$$(t_p) \quad (P_D)$$

56.Match list-1 with List-II.

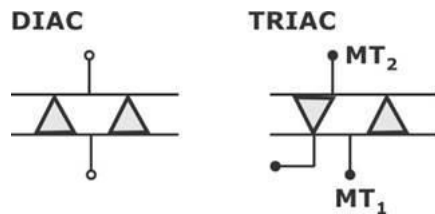
List-I		List-II	
(1)	DIAC	(A)	Two thyristors in antiparallel
(2)	TRIAC	(B)	A thyristor and a diode in antiparallel
(3)	Reverse conducting thyristor	(C)	Two diodes in antiparallel

- A. 1 – C, 2 – B, 3 – A
- B. 1 – A, 2 – B, 3 – C
- C. 1 – A, 2 – C, 3 – B

D. 1 – C, 2 – A, 3 – B

Answer ||| D

Solution |||



57. During the reverse recovery process, there will be reverse peaks in the voltage, these can be limited by

- A. Antiparallel diode.
- B. Unpolarized snubbers.
- C. Both A and B
- D. Neither A nor B

Answer ||| B

Solution |||

In any circuit there will be some parasitic component (L, C). Due to this during the recovery process there will be reverse peaks in the voltage. These maximum voltages can be limited by unpolarized snubbers.

58. Which of the following is false using PWM technique in inverter circuits?

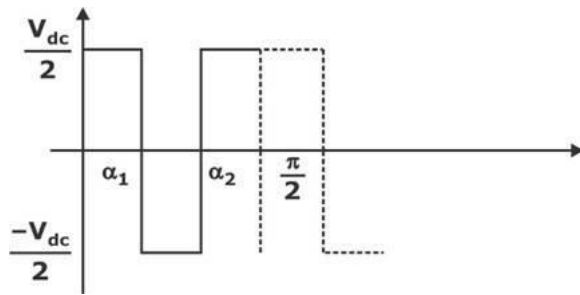
- A. We can control amplitude of output voltage.
- B. We can do harmonic elimination in output voltage.
- C. We can control amplitude and harmonic elimination at same time.
- D. Both A and B are false.

Answer ||| C

Solution |||

By PWM technique, we can control amplitude, but harmonic elimination can't control at the same time and vice-versa.

This is done by a process called “Two switching per quarter cycle [Both can control at same time].



$$V_n = \frac{4 \left(\frac{V_{dc}}{2} \right)}{n\pi} [1 - 2 \cos n\alpha_1 + 2 \cos n\alpha_2]$$

59.Free wheeling diode is also known as

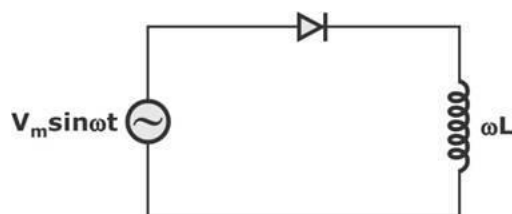
- A. Commutating diode
- B. Fly wheel diode
- C. Bypass diode
- D. All the above

Answer ||| D

Solution |||

Based on the purpose in the operation, free wheeling diode also called commutating diode, fly wheel diode and bypass diode.

60.Consider the below given circuit.



What is the RMS current in the inductor? $\left[\text{Given } \frac{V_m}{\omega L} = \sqrt{\frac{2}{3}} \right]$

- A. $\sqrt{\frac{2}{3}}$
- B. 1
- C. $\sqrt{\frac{3}{2}}$
- D. $\frac{1}{\sqrt{2}}$

Answer ||| B

Solution |||

$$V_m \sin \omega t = L \frac{di}{dt}$$

$$i = \frac{V_m}{\omega L} \cos \omega t + k$$

$$i = \frac{V_m}{\omega L} \cos \omega t - \frac{V_m}{\omega L}$$

$$i_{rms} = \sqrt{\left(\frac{V_m}{\omega L}\right)^2 \left[1 + \left(\frac{1}{\sqrt{2}}\right)^2\right]} = \frac{V_m}{\omega L} \cdot \sqrt{\frac{3}{2}}$$

$$\therefore i_{rms} = \sqrt{\frac{2}{3}} \cdot \sqrt{\frac{3}{2}} = 1$$

61. In a tuned power line, the phase shift will be

- A. 90°
- B. 180°
- C. 0°
- D. -90°

Answer ||| C

Solution |||

To cancel the effects of natural series inductance and shunt capacitance of transmission line, some external series capacitors and shunt inductors will be placed. This process is called tuning of line.

By tuning process

$$\vec{V}_r = \vec{V}_s \text{ and } \vec{I}_r = \vec{I}_s$$

In tuned line, there is no phase shift.

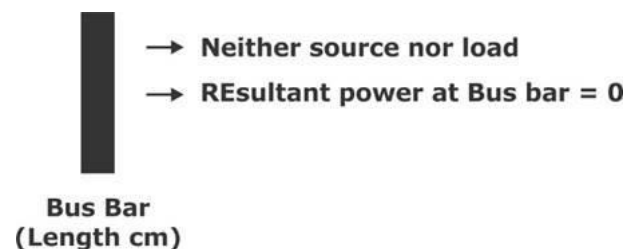
62. Which of the following is correct about Bus Bar?

- A. Bus bar is a source of power.
- B. Bus bar is a sink of power.
- C. Bus bar can act as source and sink of power based on condition.
- D. Bus bar is neither a source nor a load.

Answer ||| D

Solution |||

BUS-bar a common point where more than one equipment is working in parallel. It is a 3-phase bus bar, and three phases are identical. One of the phases is considered and it is shown by single line.



63. Which of the following statements is/are correct?

1. The initial slope of Bode magnitude plot is determined by the poles and zeroes located at origin.
2. If the polar plot for a system does not intersect the real axis, this implies that the gain margin is 0 dB.
3. The Routh array is applicable to both LTI as well as non-LTI systems.

4. The frequency at which Bode magnitude plot cuts the 0 dB axis is known as gain cross over frequency.

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

Answer ||| D

Solution |||

The initial slope of Bode magnitude plot is determined by the poles and zeroes located at origin.

The initial slope due 'n' poles at origin is $-20n$ dB/dec.

The initial slope due 'm' zeroes at origin is $20m$ dB/dec.

So, if a system has 'n' poles and 'm' zeroes,

Then, Initial slope = $[-20n + 20m]$ dB/dec

So, (1) is correct.

If the polar plot for a system does not intersect the real axis, this implies that the gain margin is either ∞ or $-\infty$ depending on the absolute stability of system.

So, (2) is incorrect.

The Routh array is applicable to only LTI systems.

So, (3) is incorrect.

The frequency at which Bode magnitude plot cuts the 0 dB axis is known as gain cross over frequency (ω_{gc}) because at ω_{gc} , magnitude of system is unity or 0 dB.

So, (4) is correct.

64. Which if the following statement is incorrect?

- A. Bandwidth increases with PD controller
- B. Integral controller improves the steady state response
- C. Peak overshoot decreases with proportional controller
- D. Noise level reduces with P-I controller.

Answer ||| C

Solution |||

With proportional controller, the damping ratio decreases. So, the peak overshoot increases.

So, Option (C) is incorrect.

65.If the impulse response of a system is $h(t) = e^{at} u(t) + e^{bt} u(-t)$, then system will be stable for?

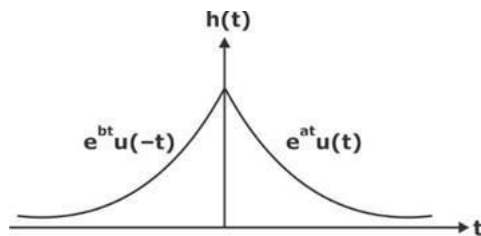
- A. $a < 0, b < 0$
- B. $a > 0, b < 0$
- C. $a < 0, b > 0$
- D. $a > 0, b > 0$

Answer ||| C

Solution |||

System will be stable if $\int_{-\infty}^{\infty} |h(\tau)| d\tau < \infty$

Above condition will be true if $a < 0$ and $b > 0$



\Rightarrow System will be stable for $a < 0$ and $b > 0$.

66.Find the value of $I = \int_{-\infty}^{\infty} (3t^2 + 1)\delta(t - 2) + (7t^2 - 1)\delta(t - 3)$.

- A. 73
- B. 74
- C. 75
- D. 72

Answer ||| C

Solution |||

By integration property of impulse function,

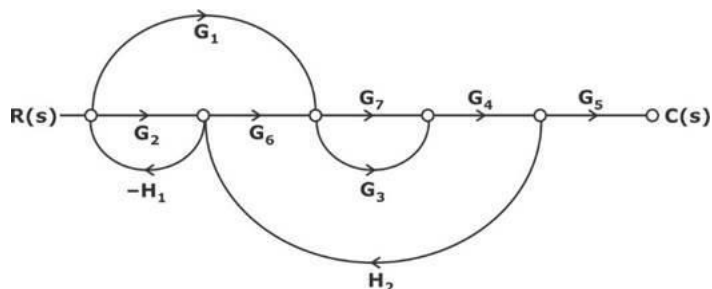
$$\int_{-\infty}^{\infty} f(t) \delta(t-a) = f(t-a)$$

$$\Rightarrow \int_{-\infty}^{\infty} (3t^2 + 1) \delta(t-2) = 3 \times (2)^2 + 1 = 13$$

$$\Rightarrow \int_{-\infty}^{\infty} (7t^2 - 1) \delta(t-3) = 7 \times (3)^2 - 1 = 62$$

$$\therefore I = 13 + 62 = 75$$

67. Determine the product of number of forward paths and number of loops for the signal flow graph shown below.



- A. 20
- B. 16
- C. 24
- D. 12

Answer ||| A

Solution |||

Forward paths:

$$P_1 = G_2 G_6 G_4 G_7 G_5$$

$$P_2 = G_1 G_7 G_4 G_5$$

$$P_3 = G_1 G_3 G_4 G_5$$

$$P_4 = G_2 G_6 G_3 G_4 G_5$$

$$\therefore \text{Total forward paths} = P = 4$$

Loops:

$$L_1 = -G_2 H_1$$

$$L_2 = G_6 G_7 G_4 H_2$$

$$L_3 = G_6 G_3 G_4 H_2$$

$$L_4 = -G_1 G_7 G_4 H_1 H_2$$

$$L_5 = -G_1 G_3 G_4 H_1 H_2$$

$$\therefore \text{Total loops} = L = 5$$

$$\therefore P \times L = 4 \times 5 = 20$$

68. **Statement (I):** A dc motor draws high current at the time of starting.

Statement (II): At starting a dc motor takes sometime to develop a non-zero value of back emf.

- A. Both statement (I) and statement (II) are true and statement (II) is correct explanation of statement (I)
- B. Both statement (I) and statement (II) are true but statement (II) is not a correct explanation of statement (I)
- C. Statement (I) is true but statement (II) is false
- D. Statement (I) is false but statement (II) is true

Answer ||| A

Solution |||

At starting $N = 0$, $E_b = 0$

$$I_a = \frac{V_0}{R_a} \rightarrow \text{huge current,}$$

So, after some time E_b increase from zero to a non-zero value.

69. **Statement (I):** Time constant is the time for the step response to reach 37% of its final value.

Statement (II): The settling time is inversely proportional to the real part of the complex pole.

- A. Both statement (I) and statement (II) are true and statement (II) is correct explanation of statement (I)
- B. Both statement (I) and statement (II) are true but statement (II) is not a correct explanation of statement (I)
- C. Statement (I) is true but statement (II) is false
- D. Statement (I) is false but statement (II) is true

Answer ||| B

Solution |||

Time constant is the time for the step response to reach 63% of its final value.

Poles $\rightarrow -\xi\omega_n \pm j\omega_d$

$$T_s = \frac{4}{\xi\omega_n}$$

$$T_s \propto \frac{1}{\xi\omega_n}$$

70. **Statement (I):** Synchronous motors are used as synchronous condenser.

Statement (II): Synchronous motor are used to improve the P.F. of the load.

- A. Both statement (I) and statement (II) are true and statement (II) is correct explanation of statement (I)
- B. Both statement (I) and statement (II) are true but statement (II) is not a correct explanation of statement (I)
- C. Statement (I) is true but statement (II) is false
- D. Statement (I) is false but statement (II) is true

Answer ||| A

Solution |||

An overexcited synchronous motor is used to improve the power factor of the load, when it is used as a synchronous condensers.

71. In a synchronous machine, if the main field flux axis is ahead of the armature field flux axis in the direction of rotation, then the machine is acting as a

- A. Synchronous motor
- B. Synchronous generator
- C. Asynchronous motor
- D. Asynchronous generator

Answer ||| B

Solution |||

In a synchronous machine, if the main field flux axis is ahead of the armature field flux axis in the direction of rotation, then the machine is acting as a Synchronous generator.

72. For the speed control of induction motor above initial base speed, if the supply frequency is increased twice,

- 1). The starting torque decrease by $1/8^{\text{th}}$ of initial value.
- 2). The maximum torque decrease by $1/4^{\text{th}}$ of initial value.

Which of the above statements are correct?

- A. 1 only
- B. 2 only
- C. both 1 and 2
- D. neither 1 nor 2

Answer ||| C

Solution |||

$$T = \frac{3}{\omega_s} \cdot \frac{V_{ph}^2}{\left(\frac{R_2^1}{s}\right)^2 + (x_2)^2} \cdot \frac{R_2^1}{s}$$

At starting $s = 1$,

$$\frac{R_2^1}{s} \lll x_2 \text{ . Then}$$

$$T_{st} = \frac{3}{\omega_s} = \frac{V_{ph}^2}{(X_2)^2} \cdot \frac{R_2^1}{s}$$

$$T \propto \frac{1}{f^3}$$

If frequency doubles starting decreased by 1/8th of initial value.

$$T_{max} = \frac{3}{\omega_s} \cdot \frac{V_{ph}^2}{2X_2}$$

$$T_{max} \propto \frac{1}{f^2}$$

Hence, maximum torque will decreased by 1/4th of initial value.

Note: $\omega_s \propto f$

$\therefore X_2 \propto f$

73. Consider the following statement for DC series motor.

- 1). A diverter resistance is kept in series with series field winding.
- 2). Increase in the value of diverter resistor the speed of motor increases.

Which of the above statements are correct?

- A. 1 only
- B. 2 only
- C. both 1 and 2
- D. neither 1 nor 2

Answer ||| D

Solution |||

A diverter resistance is kept in parallel with the series field winding, with increase in the value of diverter resistor the speed of motor decreases.

74. In a 4 pole lap wound de machine commutation technique, we have to reverse the armature current of magnitude 20 A in 10 m sec. The inductance of the coil is 2 mH in each parallel path, then the value of inductive kick will be

- A. 1V
- B. 1.5V
- C. 2V
- D. 2.5V

Answer ||| C

Solution |||

$$\text{Inductive kick} = L \frac{dI}{dt}$$

Armature current will vary from $-I_a$ to I_a , so total change in the armature current will be $2I_a$

$$= \frac{L \cdot \frac{2I_a}{A}}{T_c}$$

$$= \frac{2 \times 10^{-3} \times \frac{2 \times 20}{4}}{10 \times 10^{-3}}$$

$$= 2V$$

75. A derivative controller is the system

- A. increase the damping ratio
- B. decrease the damping ratio
- C. does not affect the damping ratio
- D. none of the above

Answer ||| B

Solution |||

Derivative controller operation results in addition of a zero in the system, due to which, the damping ratio ξ will increase.

76. A dc series generator is delivering rated torque to a grid. Suddenly prime mover of generator fails, then generator.

- A. rotate as a generator in same direction.
- B. rotate as a motor in same direction.

- C. rotate as a generator in opposite direction.
D. rotate as a motor in opposite direction.

Answer ||| D

Solution |||

When prime mover fails to supply, machine starts taking current from grid. Then for a series dc machine, series field flux is proportional to armature current hence both get reversed.

$$T \propto \phi I_a$$

$$\text{As } \phi \propto I_a$$

$$T \propto I_a^2$$

But I_a reversed

$$\text{So, } T \propto (-I_a)^2$$

$$\Rightarrow T \propto I_a^2$$

Hence, torque positive. So direction of rotation reversed.

77. A 10 kVA 400/200 V, 50 Hz transformer has maximum efficiency at 80% of full load. It has per unit resistance of 0.05. Core loss of the transformer is

- A. 800 W
B. 500 W
C. 320 W
D. 400 W

Answer ||| C

Solution |||

$$x = 8\% = 0.8$$

$$x = \sqrt{\frac{P_i}{P_{CuFL}}}$$

$$(P_{Cu})_{pu} = (R)_{pu} = 0.05 \text{ pu}$$

Full load copper loss = Base kVA \times pu copper loss

$$= 10 \times 10^3 \times 0.05$$

$$= 500 \text{ W}$$

Now,

$$0.8 = \sqrt{\frac{P_i}{500}}$$

$$P_i = (0.8)^2 \times 500$$

$$= 320 \text{ W}$$

78. The full load copper loss on HV side of a 1- ϕ transformer is 600W. The ratio between primary side resistance and secondary side resistance referred to primary side is

- A. 2 : 3
- B. 3 : 2
- C. 1 : 2
- D. 2 : 1

Answer ||| B

Solution |||

$$I_1^2 R_1 = 600 \text{ W}$$

$$I_2^2 R_2 = 400 \text{ W}$$

$$I_1^2 R'_2 = 400 \text{ W}$$

Where,

I_1 = Primary side current

I_2 = secondary side current

R_1 = primary resistance

R_2 = Secondary resistance

R'_2 = Secondary resistance referred to primary side

$$\frac{I_1^2 R_1}{I_1^2 R_2} = \frac{600}{400}$$

$$\frac{R_1}{R_2} = \frac{3}{2}$$

79.Statement-1(S1): In 3ϕ full bridge VSI, 180° conduction mode, line voltages shape is quasi square.

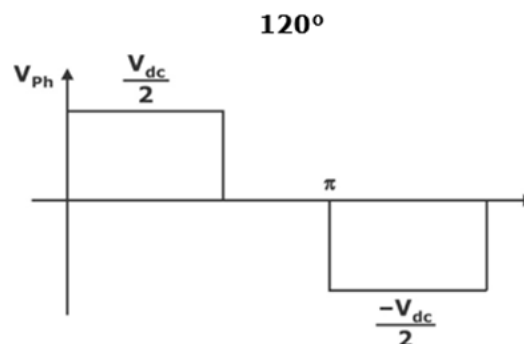
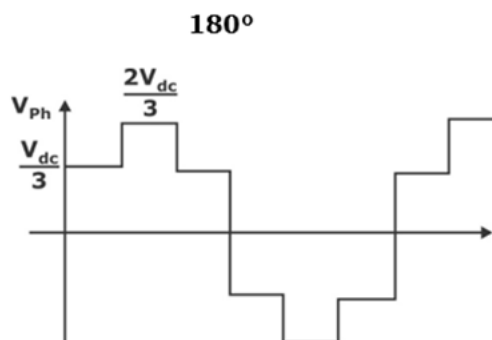
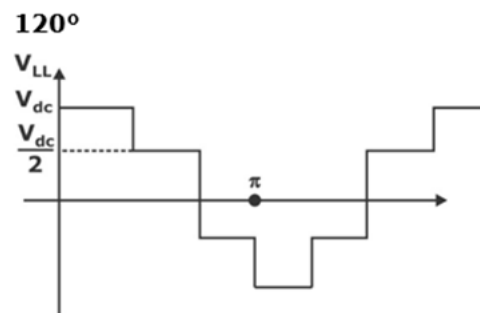
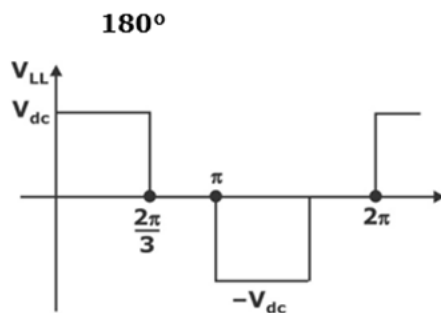
Statement-1(S2): In 3ϕ full bridge VSI, 120° conduction mode, phase voltage shape is quasi square.

Which of the above statements is/are True?

- A. S1 only
- B. S2 only
- C. Both S1 and S2
- D. Neither S1 nor S2

Answer ||| C

Solution |||



In 180° conduction

Line voltage → Quasi square.

Phase voltage → six stepped.

In 120° conduction

Line voltage → six stepped.

Phase voltage → Quasi square.

80. A signal phase half bridge inverter is operating from a 50V dc source and supplying to a resistive load. What is the distortion factor of fundamental output voltage?

- A. 80%
- B. 70%
- C. 90%
- D. 60%

Answer ||| C

Solution |||

$$\text{Distortion factor} = \frac{V_{01, rms}}{V_{rms}}$$

$$V_{rms} = \frac{V_{dc}}{2} = 25 \text{ V}$$

$$V_{01, rms} = \frac{2 V_{dc}}{\pi\sqrt{2}} = \frac{100}{\pi\sqrt{2}} = \frac{50\sqrt{2}}{\pi}$$

$$\text{D.F} = \frac{50\sqrt{2}}{\pi \times 25} = \frac{2\sqrt{2}}{\pi} = 90\%$$

81. For a power station _____ is always greater than 1 and _____ is always less than 1

- A. Load factor, Demand factor
- B. Demand factor, Diversity factor
- C. Load factor, Diversity factor
- D. Diversity factor, Demand factor

Answer ||| D

Solution |||

$$\text{Demand factor} = \frac{\text{Maximum demand}}{\text{Connected load}}$$

So, Demand factor < 1

$$\text{Diversity factor} = \frac{\text{Sum of individual maximum demand}}{\text{Maximum demand of the group}}$$

So, Diversity factor > 1

So, Option (D) is correct.

82. Which of the following is not true regarding HVDC transmission?

- A. No skin effect
- B. No line loading limit
- C. No corona loss
- D. Lower transmission losses

Answer ||| C

Solution |||

In HVDC transmission, current is uniformly distributed over the cross-section of the conductor. Hence, there is no skin effect.

The line loading limit in EHV AC lines is limited due to stability considerations but there is no such limitation in case of HVDC line.

Power loss in DC line will be lesser as compared to AC line as HVDC transmission requires only two conductors.

Corona loss is directly proportional to frequency. So, corona loss will be less in DC line as compared to AC line but it will not be zero.

83. Identify the incorrect statement among the following.

- A. Proximity effect increases the apparent resistance of conductor.
- B. By using bundled conductor, line inductance increases and line capacitance decreases.

- C. For an insulator string, string efficiency can be improved by using longer cross arms.
 D. As temperature increases, insulation resistance of cable decreases.

Answer ||| B

Solution |||

By using bundled conductors, GMR of conductors increases.

So, Line inductance decreases because
$$\downarrow L = 2 \times 10^{-7} \ln \left(\frac{\text{GMD}}{\uparrow \text{GMR}} \right) \text{ H / m}$$

And Line capacitance increases because
$$\uparrow C = \frac{2\pi\epsilon}{\ln \left(\frac{\text{GMD}}{\uparrow \text{GMR}} \right)} \text{ F / m}$$

So, statement in Option (B) is incorrect.

84. Which of the following statement is not correct?

- A. Transient stability evaluation using equal area criteria connect be used for multi machine system.
 B. Skin effect increases with increase in conductor diameter.
 C. Shackle type insulator is used at the dead end of the transmission line
 D. If load on the line is greater than the surge impedance loading, then power factor will be lagging

Answer ||| C

Solution |||

Strain type insulator is used when direction of transmission line changes across river crossing and at dead end of the transmission line whereas shackle type insulator are used in low tension cable.

So, statement in Option (C) is incorrect.

85. Which of the following statements is/are correct about various AC bridges?

- 1). Anderson's bridge is used for measurement of incremental inductance and incremental permeability.
- 2). Kelvin's double bridge method is used for measurement of low resistance.

- 3). Maxwell's inductance-capacitance bridge is not suitable for measurement of low Q-coil.
- 4). If the input signal contains different harmonics, then balancing of Wein's bridge is not possible.
- A. 1, 2 and 3
B. 1, 3 and 4
C. 2, 3 and 4
D. None of these

Answer ||| C

Solution |||

Owen's bridge is used for measurement of incremental inductance and incremental permeability.

So, statement (1) is incorrect.

Kelvin's double bridge method is used for measurement of low resistance.

So, statement (2) is correct.

Maxwell's inductance-capacitance bridge is not suitable for measurement of low Q-coil because of sliding balance problem.

So, statement (3) is correct.

If the input signal contains different harmonics, then balancing of Wein's bridge is not possible because null detector is sensitive to the frequencies.

So, statement (4) is correct.

86. Which of the following statements is/are correct about Megger instrument?

- 1). It works on the principle of electrodynamicometer.
- 2). It is used to measure the insulation resistance of cable, motor, generator etc.
- 3). Deflecting torque angle is inversely proportional to the resistance of insulator under test.
- 4). It is also used to check continuity of cable.
- A. 1, 2 and 3
B. 2, 3 and 4
C. 1, 3 and 4

D. 1, 2 and 4

Answer ||| D

Solution |||

Megger is used for measurement of very high resistance like insulation resistance of cable, motor, generator etc. It is also used to check continuity of cable and it works on the principle of electro-dynamometer.

In Megger instrument, deflecting torque angle is proportional to the resistance of insulator under test.

So, statement (3) is not correct.

87. A 4-pole 50 Hz, 200 MVA, 11 kV synchronous generator has inertia constant of 6 MJ/MVA. The electrical load is 60 MW. Find the rotor acceleration (in elec deg / s²) if the mechanical input is suddenly raised to 85 W.

- A. 198.2
- B. 162.5
- C. 187.5
- D. 215.7

Answer ||| C

Solution |||

Given, $G = 200 \text{ MVA}$, $H = 6 \text{ MJ/MVA}$, $f = 50 \text{ Hz}$

$P_m = 85 \text{ MW}$, $P_e = 60 \text{ MW}$

Accelerating power, $P_a = P_m - P_e$

$$= 85 - 60$$

$$= 25 \text{ MW}$$

$$M = \frac{GH}{180f}$$

$$= \frac{200 \times 6}{180 \times 50}$$

$$= 0.133 \text{ MJ-s/elec deg}$$

$$P_a = M a$$

$$\Rightarrow \text{Rotor acceleration, } \alpha = \frac{P_a}{M}$$

$$= \frac{25}{0.133}$$

$$= 187.5 \text{ elec deg/s}^2$$

88. A 15 MVA, 11 kV alternator has positive, negative and zero sequence resistances of 0.2 pu, 0.35 pu and 0.6 pu respectively. Find the value of neutral reactance if the fault current for a single line to ground fault should not exceed 80% of the rated line current.

- A. 6 Ω
- B. 8 Ω
- C. 9 Ω
- D. 7 Ω

Answer ||| D

Solution |||

For a single line to ground fault,

$$\text{Fault current, } I_f = \frac{3 E_a}{X_1 + X_2 + X_0 + 3 X_n}$$

Given, fault current should not exceed 80% of rated line current.

$$\therefore I_f = 0.8 \times 1 \text{ pu}$$

$$0.8 = \frac{3 \times 1}{0.2 + 0.35 + 0.6 + 3 X_n}$$

$$\Rightarrow X_n = 0.866 \text{ pu}$$

$$\Rightarrow X_n = X_n(\text{pu}) \times \frac{(kV_B)^2}{MVA_B}$$

$$\Rightarrow X_n = 0.866 \times \frac{11^2}{15} = 7 \Omega$$

89. The insulation resistance of a 10 Km single core cable is $0.6 \text{ M}\Omega$. Find the resistivity of the insulating material if the core diameter and diameter of cable over the insulation is 30 mm and 60 mm respectively.

- A. $42.86 \times 10^3 \text{ M}\Omega\text{-m}$
- B. $54.38 \times 10^3 \text{ M}\Omega\text{-m}$
- C. $37.52 \times 10^3 \text{ M}\Omega\text{-m}$
- D. None of these

Answer ||| B

Solution |||

Insulation resistance of cable is given by,

$$R_{\text{ins}} = \frac{\rho}{2\pi \ell} \ln\left(\frac{R}{r}\right)$$

Given, $\ell = 10 \text{ Km} = 10 \times 10^3 \text{ m}$

$$D = 2R = 60 \text{ mm}$$

$$\Rightarrow R = 30 \text{ mm}$$

$$d = 2r = 30 \text{ mm}$$

$$\Rightarrow r = 15 \text{ mm}$$

$$R_{\text{ins}} = 0.6 \times 10^6 \Omega$$

$$\Rightarrow 0.6 \times 10^6 = \frac{\rho}{2\pi \times 10 \times 10^3} \ln\left(\frac{30}{15}\right)$$

$$\Rightarrow \rho = \frac{2\pi \times 10 \times 10^3 \times 0.6 \times 10^6}{\ln 2}$$

$$\rho = 54.38 \times 10^3 \text{ M}\Omega\text{-m}$$

90. Consider the system as shown below:



where, $y(t) = x(e^t)$. The system is

- A. linear & causal
- B. linear & non-causal
- C. non-linear & causal
- D. non-linear & non-causal

Answer ||| B

Solution |||

Given that: $y(t) = x(e^t)$

Checking for causality:

At $t = 0$, $y(0) = x(e^0) = x(1)$

So, the output value depends upon future values, hence it is not causal i.e., non-causal.

Now, checking for linearity, we can check for homogeneity and superposition principle,

i.e., $ay(t) = ax(e^t)$

∴ It follows homogeneity.

and $y_3(t) = [y_1(t) = x_1(e^t)] + [y_2(t) = x_2(e^t)]$

⇒ $y_3(t) = x_1(e^t) + x_2(e^t)$

∴ It follows superposition.

Hence, it is linear.

So, the system will be linear and non-causal.

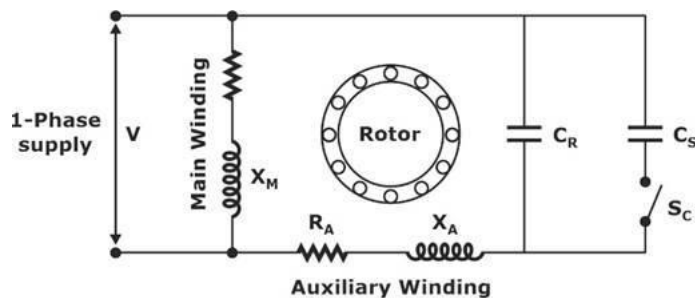
91. The type of single-phase induction motor, expected to have the maximum power factor during steady state running condition, is

- A. split phase (resistance start)
- B. shaded pole
- C. capacitor start
- D. capacitor start, capacitor run

Answer ||| D

Solution |||

Capacitor start capacitor run inductor motor have maximum power factor during steady state running condition because at steady state it have capacitor in main winding which improves the power factor.



During steady state condition only main winding taking current.

Hence, option D is correct.

92. A charger supplies 100 W at 20 V for charging the battery of a laptop. The power devices, used in the converter inside the charger, operate at a switching frequency of 200 kHz. Which power device is best suited for this purpose?

- A. IGBT
- B. Thyristor
- C. MOSFET
- D. BJT

Answer ||| C

Solution |||

1) MOSFET is used for high switching frequency & low power applications

2) MOSFET is used for high switching frequency of 100 kHz - 1 MHz. As given frequency is 200 kHz, MOSFET is used.

Extra Information:

Parameter	SCR	Power BJT	Power MOSFET	IGBT
Operating frequency	400-500 Hz	< 20 kHz	< 1 MHz	< 50 kHz
On state voltage drop	< 2V	< 2V	4-5V	3V

93. The valid positive, negative and zero sequence impedances (in p.u.), respectively, for a 220 kV, fully transposed three-phase transmission line, from the given choices are

- A. 1.1, 0.15 and 0.8
- B. 0.15, 0.15 and 0.35
- C. 0.2, 0.2 and 0.2
- D. 0.1, 0.3 and 0.1

Answer ||| B

Solution |||

For fully transposed transmission line

Positive sequence impedance, $Z_1 = Z_s - Z_m$

Negative sequence impedance, $Z_2 = Z_s - Z_m$

Zero sequence impedance, $Z_0 = Z_s + 2Z_m$

So, $Z_1 = Z_2 < Z_0$

Hence, option B is correct.

94. The transfer function of a real system, $H(s)$, is given as:

$$H(s) = \frac{As + B}{s^2 + Cs + D}$$

Where A, B, C and D are positive constants. This system cannot operate as

- A. low pass filter.
- B. high pass filter.
- C. band pass filter.
- D. an integrator.

Answer ||| B

Solution |||

$$H(s) = \frac{As + B}{s^2 + Cs + D}$$

Where, A, B, C, D are positive constants,

Put $s = 0$

$$H(s) = \frac{B}{D}$$

It is a low pass filter.

Put $s = \infty$

$$H(\infty) = 0$$

It is not a high pass filter; hence it cannot operate as high pass filter.

Hence, option B is correct.

95. Determine the type and order for the given system $G(s) H(s) = \frac{k}{s(s+1)(s^2+4s+10)}$

- A. type 0 and order 1
- B. type 1 and order 4
- C. type 3 and order 4
- D. type 4 and order 4

Answer ||| B

Solution |||

No. of pole at origin = 1

So, type of the system is 1

Total 4 pole so order is 4

96. The unity feedback system is characterized by an open loop transfer function $G(s) = \frac{k}{s(s+5)}$

Determine the gain k , so that the system will have a damping ratio of 0.5.

- A. 10
- B. 15
- C. 25
- D. 50

Answer ||| C

Solution |||

Given:

$$G(s) = \frac{k}{s(s+5)}$$

$$\text{Damping ratio } \xi = 0.5$$

Characteristics equation:

$$1 + G(s) H(s) = 0$$

$$s^2 + 5s + k = 0$$

Comparing it with standard 2nd order Characteristics equation

$$2\xi\omega_n = 5$$

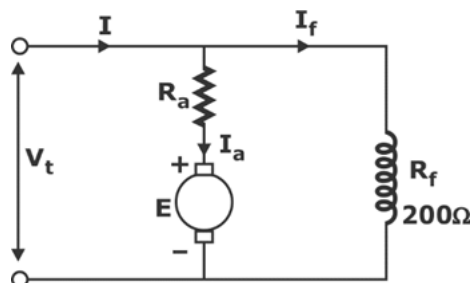
$$2 \times 0.5 \times \omega_n = 5$$

$$\omega_n = 5$$

$$\sqrt{k} = \omega_n = 5$$

$$k = 25$$

97. A 20 kW, 200V, DC shunt motor has armature circuit resistance of 0.4Ω and field circuit resistance of 200Ω . At no load and rated voltage, the motor runs at 1400 rpm and line current is 5A. At full load line current is 70A, the full load speed is_____.



- A. 1270 rpm
- B. 809 rpm
- C. 690 rpm

D. 1320 rpm

Answer ||| B

Solution |||

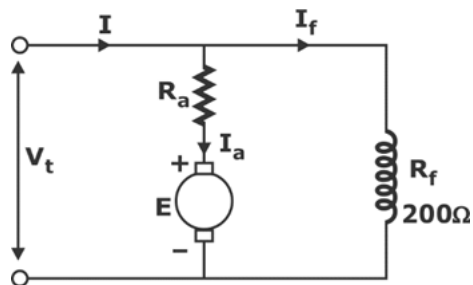
Given:

$$V_t = 200V$$

$$I_0 = 5A$$

$$R_a = 0.4\Omega$$

$$N_0 = 1400 \text{ rpm}$$



$$I_f = \frac{200}{200} = 1A$$

at No load

$$\text{Armature current, } I_a = 5 - 1 = 4 \text{ A}$$

Apply KVL

$$E = V_t - I_a R_a$$

$$E_0 = 200 - 4 \times 0.4 = 298.4 \text{ volt}$$

At full load

$$\text{Armature current, } I_a = 70 - 1 = 69 \text{ A}$$

$$\text{So, } E = 200 - 69 \times 0.4 = 172.4 \text{ volt}$$

$\therefore E \propto N$ (for shunt machine)

$$\frac{E_0}{E} = \frac{N_0}{N}$$

$$\frac{298.4}{172.4} = \frac{1400}{N}$$

$$N = 809 \text{ rpm}$$

98. A two state amplifier with negative feedback has no overshoot when damping factor k is _____.

- A. less than unity
- B. greater than unity
- C. equal to unity
- D. zero

Answer ||| C

Solution |||

We know that Peak overshoot $M_p = e^{-\frac{\xi\pi}{\sqrt{1-\xi^2}}}$

If $\xi = 1$

$$M_p = e^{-\infty} = 0$$

So, for zero overshoot damping factor should be 1.

99. Which of the following statement is false for synchronous machines?

- A. In a salient pole machine, the direct axis synchronous reactance is greater than the quadrature axis synchronous reactance.
- B. Damper bars help the synchronous motor to self start.
- C. Short circuit ratio is the ratio of the field current required to produce the rated voltage on open circuit to the rated armature current.
- D. In V-curve of a synchronous motor represents the variation in the armature current with field excitation, at a given output power.

Answer ||| C

Solution |||

We know that

Short circuit ratio is the ratio of the field current required to produce the rated voltage on open circuit to the field current required to produce rated armature current.

$$\text{shortcircuitratio} = \frac{I_f(\text{for rated open circuit voltage})}{I_f(\text{for rated short circuit current})}$$

Hence option C is wrong

100. Which of the following relay is used to protect the excitation of Alternator?

- A. Differential delay
- B. Offset Mho relay
- C. Buchholz relay
- D. Over current relay

Answer ||| B

Solution |||

Offset Mho relay is used to protect the excitation of Alternator.

101.

|||Common||| **Direction: For the given question there are two statements are given followed by four conclusions as responses. You have to consider the statements to be true even if they seem to be at variance from commonly known facts. You have to decide which one of the four given conclusions (responses) is definitely drawn from the given statements** |||End|||

Statements:

- I. There are monks among those who are felicitated for remarkable social service.
- II. Jitananda and Vidyananda are among those felicitated.

- Conclusions (Responses):**
- A. Jitananda and Vidyananda did remarkable social service
 - B. All monks do social service
 - C. Jitananda and Vidyananda are not monks
 - D. All monks are felicitated

Answer ||| A

Solution ||| From the given two statements it is clear that Jitananda and Vidyananda are among those felicitated who did remarkable social service. Thus only Conclusion I follow.

Hence, option A is correct.

102. Some trees are to be cut down. A and B together do $\frac{3}{11}$ of this work in one day. With help

of C, all trees are cut in $2\frac{1}{2}$ days then, find the total number of trees cut by A and B together in one day if C cuts 35 trees in one day.

- A. 75
- B. 30
- C. 60
- D. 50

Answer ||| A

Solution ||| Let the total no. of trees to be cut = N

Let A does work alone in 'a' days and B does it alone in 'b' days and C does it alone in 'c' days

$$\Rightarrow \frac{1}{a} + \frac{1}{b} = \frac{3}{11}$$

Work done by C in one day = $\frac{1}{c} = \frac{35}{N}$

When they work together, work is completed in $\frac{5}{2}$ days

$$\Rightarrow \frac{1}{a} + \frac{1}{b} + \frac{1}{c} = \frac{2}{5}$$

$$\Rightarrow \frac{3}{11} + \frac{35}{N} = \frac{2}{5}$$

$$\Rightarrow \frac{35}{N} = \frac{7}{55}$$

$$\Rightarrow N = 275$$

\therefore no. of trees to be cut is 275

In one day A and B complete $\frac{3}{11}$ part of work that means,

$$\Rightarrow \text{No. of trees A and B in one day} = \frac{3 \times 275}{11} = 75 \text{ trees}$$

103.

There are two mixtures A and B having milk and water in ratio 3:1 and 7:5 respectively. The milkman mixes these two mixtures in 2:3 ratio and sells the resultant mixture at the rate of 1 litre pure milk. If on selling 1 litre of mixture A for price of 1 litre of pure milk he gains Rs.14.50. Then find profit he makes on selling 1 litre of resultant mixture at the price of 1 litre pure milk.

- A. Rs. 20.3
- B. Rs. 30
- C. Rs. 15.5
- D. Rs. 16.2

Answer ||| A

Solution |||

Ratio of milk and water in mixture A = 3:1

$$\Rightarrow \text{Milk} = \frac{3}{4}$$

$$\Rightarrow \text{Water} = \frac{1}{4}$$

Ratio of milk and water in mixture B = 7:5

$$\Rightarrow \text{Milk} = \frac{7}{12}$$

$$\Rightarrow \text{Water} = \frac{5}{12}$$

If these two are mixed in ratio 2:3 i.e. $\frac{2}{3}$: 1 to form a resultant mixture C(let)

Then,

$$\text{Milk in mixture C} = \left(\frac{3}{4}\right) \times \left(\frac{2}{3}\right) + \left(\frac{7}{12}\right) \times 1 = \frac{13}{12}$$

$$\text{Water in mixture C} = \left(\frac{1}{4}\right) \times \left(\frac{2}{3}\right) + \left(\frac{5}{12}\right) \times 1 = \frac{7}{12}$$

$$\Rightarrow \therefore \text{Ratio of milk and water in mix C} = 13:7$$

Let the cost of 1 litre of pure milk be Rs. 'm'

Then for mixture A:

Milkman sells $\frac{3}{4}$ litre of milk for cost of 1 litre pure milk and gains Rs.14.5

$$\text{Cost of } \frac{3}{4} \text{ litre milk} = \frac{3m}{4}$$

$$\Rightarrow \therefore m - \frac{3m}{4} = 14.5$$

$$\Rightarrow m = \text{Rs.}58$$

Now, when he sells mixture C, in 1 litre mixture milk is $\frac{13}{20}$ litres but he sells for Rs.58

$$\Rightarrow \text{So, he gained} = 58 - \left(\frac{13}{20}\right) \times 58 = 58 - 37.7 = \text{Rs. } 20.3$$

104.Lisp is a programming language built by whom?

- A. John McCarthy
- B. Dennis Ritchie
- C. Larry Wall
- D. Rasmus Lerdorf

Answer ||| A

Solution ||| Lisp: This language is actually not widely used on the internet, but is responsible for building the internet in many ways. Invented by John McCarthy

C: The single most influential programming language today might be C created by Dennis Ritchie

Perl- Perl was invented in the late '80s by Larry Wall when he was working for NASA's Jet Propulsion Laboratory, as recounted in a book called "Programming Perl."

PHP was created in 1994 by Rasmus Lerdoff.

105.The historic convention on Biological Diversity held in Rio de Janeiro in 1992 is known as_____.

- A. CITES Convention
- B. The Earth Summit
- C. G-16 Summit

D. MAB Programme

Answer ||| B

Solution ||| Signed by 150 government leaders at the 1992 Rio Earth Summit, the Convention on Biological Diversity is dedicated to promoting sustainable development.

106.रमा ने लता को अपनी कलम दे दी है। इस वाक्य में 'को' किस कारक का चिन्ह है?

- A. कर्ता कारक
- B. सम्प्रदान कारक
- C. संबोधन
- D. अधिकरण कारक

Answer ||| B

Solution ||| इस वाक्य में को सम्प्रदान कारक का चिन्ह है। कुछ देने के लिए सम्प्रदान कारक विभक्ति का प्रयोग किया जाता है। इसमें को का प्रयोग किया जाता है।

107.What happens during electrolytic refining of zinc?

- A. It gets deposited on anode
- B. It remains in solution
- C. It gets deposited on cathode
- D. None of the above

Answer ||| C

Solution ||| * The process of refining impure metals by using electricity is electrolytic refining
* In this process, cathode is a strip of pure metal and anode is an impure metal, and a solution of soluble salt of same metal is taken as electrolyte

108.Ram and Shyam participated in an election in which all voters are required to vote.
 $\frac{3}{8}^{\text{th}}$ of the voters promised to vote Ram and rest promised to vote Shyam. on the voting day 18% of the voters went back of their promise to vote Ram and 37% of the voters went back on their promise to vote Shyam. Find the total number of voters if Ram wins by 527 votes?

- A. 2900
- B. 6800

C. 5800

D. 3400

Answer ||| B

Solution |||

Let's assume that the total votes were 800, then it is very clear that Ram assumes to get 300 and Shyam assumes to get 500.

If 18% of 300 ie. 54 went back of their promise to vote for Ram that means they will certainly vote for Shyam.

In the same way, 37% of 500 will be 185, which went back of their promise so they will certainly vote for Ram.

That means Ram got $(300-54+185) = 431$ and Shyam got $(500+54-185) = 369$.

The difference between 431 and 369 is 62 and that will be equal to 527 then by calculation the value of 100 will be 6800.

109. Table salt is a product of

- A. Weak acid and weak base
- B. Strong acid and strong base
- C. Weak acid and strong base
- D. Strong acid and weak base

Answer ||| B

Solution ||| Common salt is formed when hydrochloric acid reacts with sodium hydroxide.

110. Three years ago ratio of son & father's ages was 1: 9 respectively. Ratio of present ages of son & the mother is 4 : 21. Present ages of father is 6 years more than that of mother. Find out the age of the mother.

- A. 42
- B. 45
- C. 39
- D. 48
- E. None of these

Answer ||| A

Solution |||

Let the age of father , mother and son be 'f' , 'm' , 's' respectively.

A.T.Q,

$$\frac{s - 3}{f - 3} = \frac{1}{9}$$

$$9s - 27 = f - 3$$

$$9s - f = 24 \text{ -----(i)}$$

Now ,

$$\frac{s}{m} = \frac{4}{21}$$

$$21s = 4m$$

$$s = \frac{4m}{21} \text{ ----- (ii)}$$

Also given than $f = 6 + m$, on putting this in eq (i), we get,

$$9s - 6 - m = 24$$

$$9s - m = 30$$

After putting the value of s from eq (ii), we get,

$$9 \times \frac{4m}{21} - m = 30$$

$$\frac{12m}{7} - m = 30$$

$$5m = 30 \times 7$$

$$m = 42 \text{ years}$$

Age of the mother is 42 years.

111. झंडोत्तोलन का सन्धि विच्छेद है

- A. झंडोत् + तोलन
- B. झंडा : + तोलन
- C. झंडा + उत्तोलन
- D. झंडा + ओत्तोलन

Answer ||| C

Solution |||

संधि (सम् + धि) शब्द का अर्थ है 'मेल'। दो निकटवर्ती वर्णों के परस्पर मेल से जो विकार (परिवर्तन) होता है वह संधि कहलाता है।

झंडोत्तोलन का सन्धि विच्छेद - झंडा + उत्तोलन (गुण संधि)

नियम - अ, आ के आगे उ, ऊ हो तो ओ हो जाता है

गुण संधि - इसमें अ, आ के आगे इ, ई हो तो ए, उ, ऊ हो तो ओ, तथा ऋ हो तो अर् हो जाता है। इसे गुण-संधि कहते हैं।

112. Which one of the following physical quantity is dimensionless but has a unit?

- A. Angular displacement
- B. Solid angle
- C. Plane angle
- D. All of the above

Answer ||| D

Solution |||

• All of the above are dimensionless but they have a unit.

- The SI unit of angular velocity is expressed as radians/sec with the radian having a dimensionless value of unity.
- The dimensionless angle is defined as the length of arc divided by the radius of circle constituting the arc.
- It is dimensionless because it is the ratio of two lengths. Its unit is radian(rad).
- The solid angle is ratio of two areas. It is also dimensionless but has a unit called steradian(sr).

113. Unit digit in the expression of $[(253)^{98} \times (27)^{29} - (106)^{100} \times (605)^{45} - (16)^8 \times 279]$ is:

- A. 1
- B. 0
- C. 7
- D. 9

Answer ||| D

Solution |||

Given,

$$[(253)^{98} \times (27)^{29} - (106)^{100} \times (605)^{45} - (16)^8 \times 279]$$

$$= 3^{98} \times 7^{29} - 6^{100} \times 5^{45} - 6^8 \times 9$$

Period of 3 and 7 is 4. Period of 6 is 2 and that of 5 is 1. Therefore,

$$3^{\frac{98}{4}} \times 7^{\frac{29}{4}} - 6^{\text{even}} \times 5^{45} - 6^{\text{even}} \times 9$$

$$= 3^2 \times 7^1 - 6 \times 5 - 6 \times 9$$

$$= 9 \times 7 - \dots 0 - \dots 4$$

$$= \dots 3 - \dots 4$$

$$= \dots 9$$

Thus, Unit digit = 9

114. Who was the British Prime Minister at the time of Quit India Movement?

- A. Clement Attlee
- B. Anthony Eden
- C. Winston Churchill

D. None of the above

Answer ||| C

Solution |||

*** The “Quit India Movement” was launched on 8 August 1942, by the All India Congress Committee.**

* It was led by Mahatma Gandhi.

* He demanded to end the British rule in India.

*** Sir Winston Leonard Spencer-Churchill** was the British Prime Minister during the Quit India Movement.

* He was also known as Sir Winston Churchill.

115. युद्धभूमि

- A. अपादान तत्पुरुष समास
- B. सम्प्रदान तत्पुरुष समास
- C. संबंध तत्पुरुष समास
- D. कर्म तत्पुरुष समास

Answer ||| B

Solution |||

समास - समास का तात्पर्य होता है – संछिप्तीकरण। इसका शाब्दिक अर्थ होता है छोटा रूप। अर्थात् जब दो या दो से अधिक शब्दों से मिलकर जो नया और छोटा शब्द बनता है उस शब्द को समास कहते हैं।

युद्धभूमि का समास विग्रह – युद्ध के लिए भूमि

तत्पुरुष समास - वह समास है जिसमें बाद का अथवा उत्तर पद प्रधान होता है तथा दोनों पदों के बीच का कारक-चिह्न लुप्त हो जाता है।

कर्म तत्पुरुष - को

करण तत्पुरुष - से

सम्प्रदान तत्पुरुष - के लिए

अपादान तत्पुरुष – से (देशनिकाला - देश से निकाला)

संबंध तत्पुरुष - का, की, के

अधिकरण तत्पुरुष – में (नगरवास - नगर में वास)

116.Which of the following is a low level computer language?

- A. Scientific language
- B. FORTRAN
- C. Assembly language
- D. COBOL

Answer ||| C

Solution |||

Assembly language is a low level computer language while all other options given are high level computer language.

* High level language is a user friendly language while low level language is machine friendly language.

* They are easy to maintain and are portable while low level languages are complex to maintain and is non portable.

Examples of high level languages – FORTRAN, COBOL,etc.

117.Under which of the following Amendments to the Constitution of India is defection to another party after election made illegal?

- A. 92nd
- B. 61st
- C. 52nd
- D. 86th

Answer ||| C

Solution |||

• Constitution 52nd Amendment Act, 1985 provided provisions related to anti-defection in India.

• It added the Tenth Schedule which laid down the process by which legislators may be disqualified on grounds of defection from one political party to another.

- If a member has been elected as “Independent”, he/she would be disqualified if joined a political part.

118. Present age of father is six times that of her daughter's age. Four years hence, the father's age would be four times that of her daughter's age. Find the present ages of Father and daughter.

- A. 36 years & 6 years
- B. 32 years & 8 years
- C. 28 years & 14 years
- D. 41 years & 9 years

Answer ||| A

Solution |||

Let Present age of daughter be x years.

Present age of her father = $6x$

After 4 years,

Daughter's age will be $(x + 4)$ years & father's age = $(6x + 4)$ yrs.

ATQ –

$$6x + 4 = 4(x + 4)$$

$$6x + 4 = 4x + 16$$

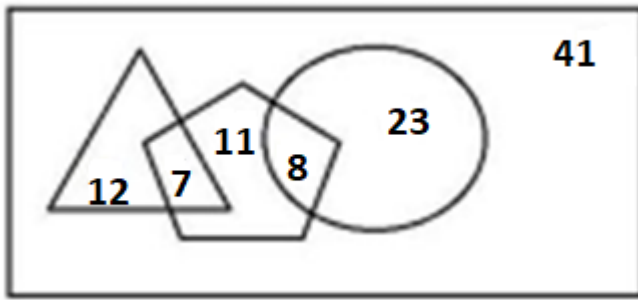
$$2x = 12$$

$$x = 6$$

Present age of daughter = 6 years & father's age = $6x = 6 \times 6 = 36$ years.

Hence, option A is the correct answer.

119. In the given Venn diagram, the ‘rectangle’ represents ‘ladies of a club’, the triangle represents ‘like to dance’, the ‘circle’ represents ‘like to sing’ and the ‘pentagon’ represents ‘like to mimic’. The numbers given in the diagram represent the number of persons in that particular category.



How many ladies of the club NEITHER like to dance NOR like to mimic?

- A. 23
- B. 64
- C. 72
- D. 26

Answer ||| B

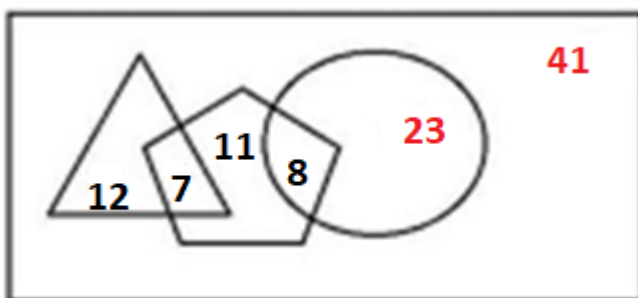
Solution |||

Rectangle represents Ladies of a club

Triangle represents like to dance

Circle represents like to sing

Pentagon represents like to mimic



ladies of the club NEITHER like to dance NOR like to mimic = $23 + 41 = 64$

Hence, option B is the correct answer.

120. Godavari river originates from

- A. Nasik
- B. Betul
- C. Amarkantak
- D. Mahabaleshwar

Answer ||| A

Solution |||

Godavari river originates from Trimbak, a place in Nasik District of Maharashtra. It flows eastwards and flows into Bay of Bengal. The river is known as Dakshin Ganga. It is one of the sacred rivers in India. It travels through three states: Maharashtra, Telangana and Andhra Pradesh.

121. Who among the following was NOT associated with the revolt of 1857?

- A. Begum Hazrat Mahal
- B. Kunwar Singh
- C. Mangal Pandey
- D. Bhagat Singh

Answer ||| D

Solution |||

- Bhagat Singh was not associated with the revolt of 1857.
- Begum Hazrat Mahal led the revolt of 1857 in Awadh and Lucknow.
- Kunwar Singh led the revolt of 1857 in Bihar.
- Mangal Pandey was an Indian soldier who played a key part in the events immediately preceding the outbreak of the Indian rebellion of 1857

122. Which of the following instruments is used to measure plant growth?

- A. Microscopes
- B. Sphygmomanometer
- C. Glucose meter
- D. Crescograph

Answer ||| D

Solution |||

- Crescograph is an instrument which is used to measure the plant growth.
- It was invented by Sir Jagadish Chandra Bose in the early 20th century.
- The Bose crescograph uses a series of clockwork gears and a smoked glass plate to record the movement of the tip of a plant or its roots.

123.The Minimum Support Price is fixed on the recommendation of?

- A. NABARD
- B. CACP
- C. ICAR
- D. CCEA

Answer ||| B

Solution |||

- **Commission of Agriculture Costs and Price or CACP** recommends for the Minimum Support Prices.
- CACP is an attached office of the **Ministry of Agriculture and Farmers Welfare**. It came into existence in January 1965.
- CACP submits its recommendations to the government in the form of Price Policy Reports every year.
- It submits MSP separately for five groups of commodities namely- **Kharif crops, Rabi crops, Sugarcane, Raw Jute and Copra**.
- As of now, CACP recommends MSPs of 23 commodities for MSP but these commodities varies every year based on recommendations.

124.Select the option that is related to the third term in the same way as the second term is related to the first term.

Spider : Insect : : Crocodile : ?

- A. Reptile
- B. Mammal
- C. Frog

D. Carnivore

Answer ||| A

Solution |||

Second denotes the class to which the first belongs.

Hence, option A is the correct answer.

125. Mosses, Liverworts, and Hornworts are examples of ____.

- A. Vascular Plants
- B. Non Vascular Plants
- C. Algae
- D. Lichens

Answer ||| B

Solution |||

* Mosses, Liverworts, and Hornworts are examples of **non-vascular plants**.

* Plants are categorised in two categories, which are as follow-

1. **Vascular Plants**- These are those plants which have heir proper organization of the systems, and bearing flowers, green leaves, stems, roots, woods, and branches.

♣ Examples of Vascular Plants- Conifers, Ferns, flowering, and non-flowering plants.

2. **Non Vascular Plants**- are those plants which do not perfectly fit with these features.

* Examples of Non Vascular Plants- Mosses, Liverworts, and Hornworts.

126. In Microsoft Word, the command for inserting a link is given through

- A. Ctrl+Z
- B. Ctrl+K
- C. Ctrl+F2
- D. Ctrl+Shift+C

Answer ||| B

Solution |||

- **Ctrl+K**- command for inserting a link
- **Ctrl+Z**-command for reverse certain commands or undo
- **Ctrl+F2**-command for displaying full pages as they are printed
- **Ctrl+Shift+C**-copies the formatting of the selection to a specified location
- **Ctrl+F**-command for opening a find box
- **Ctrl+Del**- deletes a word to the right of the cursor

127.BASIC is a computer language, here S stands for

- A. System
- B. Symbolic
- C. Saturated
- D. Standard

Answer ||| B

Solution |||

- BASIC stands for **B**eginners' **A**ll **P**urpose **S**ymbolic **I**nstruction **C**ode.
- It is a family of general purpose, high level programming language.
- It was invented in 1964 at Dartmouth University by John G Kemeny and Thomas E Kurtz.
- **BASIC .NET**, released by Microsoft in 2001, matched the functionality of Java and C# with the syntax of BASIC.

128.Cartagena Protocol and Nagoya Protocol are two supplementary of:

- A. Convention on Biological Diversity
- B. Framework Convention on Climate Change (UNFCCC)
- C. United Nations Convention to Combat Desertification
- D. Bonn Agreement

Answer ||| A

Solution |||

The Convention on Biological Diversity is a multilateral environmental agreement based on natural and biological resources.

- It was opened for signature at the Earth Summit in Rio de Janeiro on 5 June 1992 and entered into force on 29 December 1993.
- CBD has two supplementary agreements:
 - The Cartagena Protocol on Biosafety to the Convention on Biological Diversity
 - The Nagoya Protocol on Access to Genetic Resources and the Fair and Equitable Sharing of Benefits Arising from their Utilization (ABS) to the Convention on Biological Diversity
- The CBD has three main goals:
 - to protect biodiversity;
 - to use biodiversity without destroying it; and,
 - to share any benefits from genetic diversity equally.

129.If an object undergoes a uniform circular motion then which of the following statement is true about a uniform circular motion.

- A. The speed of the object varies with time
- B. The direction of the velocity vector of the object varies at a different position.
- C. The direction of the force acting on the object is directed towards the centre of the circular path.
- D. The angular velocity at all point on a rigid uniform rotating object varies with the radial position.

Answer ||| C

Solution |||

option C is correct as only centripetal acceleration is acting on the object in a uniform circular motion, and it is always directed towards the centre of the circular path.

Option A is incorrect because the speed during the circular motion does not vary with time. It remains constant.

Option B is not correct as the direction of the velocity vector remains constant, and it is always in the tangential direction.

Option D is incorrect because the angular velocity at every point for a rigid body remains the same.

130.

|||Common||| **Choose the most appropriate option to change the voice (active/passive) form of the given sentence.** |||End|||

- You are ordered to immediately vacate the lobby as sanitisation is about to start.
- A. You should immediately vacate the lobby as the sanitisation is about to start.
- B. There is an immediate order to vacate the lobby to start the sanitisation.
- C. Let the lobby be vacated immediately as the sanitisation is about to start.
- D. Immediately vacate the lobby as the sanitisation is about to start.

Answer ||| D

Solution |||

The given sentence is in passive form and expressed as an imperative sentence (order). Option C is already in passive form and thus incorrect. The use of 'should' in option A makes it incorrect, whereas in option B, the use of 'to + vacate' (infinitive) is incorrect.

Hence, option D is the correct answer.

131. The ratio of the males and females in a village of population 1350 is 5 : a respectively. If 150 females joined the village, then the ratio of male and female in village becomes 1 : 1 . Find the number of females in the village initially.

- A. 540
- B. 450
- C. 600
- D. 620
- E. 480

Answer ||| C

Solution |||

$$\text{Number of females in village} = \frac{a}{5+a} \times 1350$$

$$\text{Number of males in village} = \frac{5}{5+a} \times 1350$$

According to question,

$$\Rightarrow \left[\left(\frac{a}{5+a} \times 1350 \right) + 150 \right] = \left[\frac{5}{5+a} \times 1350 \right]$$

$$\Rightarrow 5 \times 1350 = 1350a + 150(5 + a)$$

$$\Rightarrow 6750 = 1350a + 750 + 150a$$

$$\Rightarrow 1500a = 6000$$

$$\Rightarrow a = 4$$

$$\frac{4}{9}$$

Therefore, required number of females initially in village = $\frac{4}{9} \times 1350 = 600$

Therefore, option c is correct.

132. निम्नलिखित दी हुई वर्तनी में से शुद्ध वर्तनी का चयन कीजिए?

- A. अंत्येष्टि
- B. अंत्येष्ठि
- C. अंत्येष्टी
- D. अंत्येष्ठी

Answer ||| A

Solution |||

वर्तनी – लिखने की रीति को वर्तनी या अक्षरी कहते हैं। वर्तनी का सीधा संबंध उच्चारण से होता है। हिन्दी में जो बोला जाता है वही लिखा जाता है।

अंत्येष्टि शुद्ध वर्तनी है।

133. निम्न में से उपसर्ग रहित शब्द है -

- A. कुख्यात
- B. कुचाल
- C. कुलीन
- D. कुयोग

Answer ||| C

Solution |||

कुख्यात = कु + ख्यात

कुचाल = कु + चाल

कुयोग = कु + योग

134.

|||Common||| **Select the most appropriate synonym of the given word.** |||End|||

ASTONISHMENT

- A. Composure
- B. Fright
- C. Expectation
- D. Wonder

Answer ||| D

Solution ||| The meanings of the words are:

Astonishment: great surprise.

Composure: the state or feeling of being calm and in control of oneself.

Fright: a sudden intense feeling of fear.

Expectation: a strong belief that something will happen or be the case.

Wonder: a feeling of amazement and admiration, caused by something beautiful, remarkable, or unfamiliar.

Hence, option D is the correct answer.

135.

|||Common||| **Select the most appropriate option to fill in the blank.** |||End|||

The building turned _____ ruin after the devastating fire. A. in

B. to

C. into

D. up to

Answer ||| C

Solution ||| **Let's understand the meaning of the phrasal verbs that could be made:**

- *Turn in*= give something to someone in authority
- *Turn to*= to go to someone for help when you are having difficulty dealing with a situation
- *Turn into*= be transformed into or become a particular kind of thing or person
- *Turn up to*= be found, especially by chance, after being lost

Now, let's find out the correct filler for the blank:

- In the sentence it is clearly said that there is a change of condition or state.
- Because the **wood** changed into **ashes**.
- After analyzing the meaning it is clear that "Turn into" refers to the change or transformation in state or condition.
- Thus, the blank should be filled with "**into**" to make the correct phrasal verb "**Turn into**".

Hence, **option C** is the correct answer.

136. Which state does not touch the border of Madhya Pradesh?

- A. Chhattisgarh
- B. Rajasthan
- C. Jharkhand
- D. Gujarat

Answer ||| C

Solution |||

Madhya Pradesh is the second-largest Indian state by area and the fifth largest state by population with over 75 million residents. It borders the states of Uttar Pradesh to the northeast, Chhattisgarh to the southeast, Maharashtra to the south, Gujarat to the west, and Rajasthan to the northwest.

137. Madhya Pradesh State Election Commission was set up in which year?

- A. 1991
- B. 1992
- C. 1993
- D. 1994

Answer ||| D

Solution |||

* The Madhya Pradesh State Election Commission was constituted vide the notification dated 1 February 1994 issued by the General Administration Department of the State Government.

* It came into existence on 15 February 1994 with the assumption of office by the first State Election Commissioner.

* The State Election Commissioner is appointed by the Governor.

* Basant Pratap Singh is the current State Election Commissioner of Madhya Pradesh.

138. The Bagh Caves are a group of nine rock-cut monuments, situated along the southern slopes of the Vindhya in which district?

- A. Ujjain
- B. Balaghat
- C. Dhar
- D. Khandwa

Answer ||| C

Solution |||

* The Bagh Caves are a group of nine rock-cut monuments, situated among the southern slopes of the Vindhya in Bagh town of Dhar district in Madhya Pradesh state in central India.

* These are renowned for mural paintings by master painters of ancient India.

* The Bagh Caves were quarried in the 5th -6th century AD, in the very late stages of Buddhism in India, and long after most of the Indian Buddhist Caves had been built, many of them since the 2nd or 1st centuries BCE.

139.

|||Common||| **Given below are four jumbled sentences. Pick the option that gives their correct order.** |||End|||

P. His parents were middle-class, but they suffered financially as a result of living beyond their means.

Q. When Dickens was twelve years old, his family's dire straits forced him to quit school and work in a blacking factory.

R. Charles Dickens was born on February 7, 1812, in Portsea, England.

S. Within weeks, his father was put in debtor's prison, where Dickens's mother and siblings eventually joined him.

- A. PQRS
- B. RPQS
- C. RSPQ
- D. PRSQ

Answer ||| B

Solution |||

- The first sentence should be **R** as it introduces the subject of the passage i.e. 'Charles Dickens'.
- The sentence **P** then tells about her family status. Thus **P** will follow **R**.
- The sentence **Q** comes next that mentions that he had to quit his school due to his family conditions.
- The sentence **S** further tells what happened after Charles Dickens left his school. So it comes last.

Thus, the correct sequence is: **RPQS**.

After rearranging the sentences, the passage will be: **Charles Dickens was born on February 7, 1812, in Portsea, England. His parents were middle-class, but they suffered financially as a result of living beyond their means. When Dickens was twelve years old, his family's dire straits forced him to quit school and work in a blacking factory. Within weeks, his father was put in debtor's prison, where Dickens's mother and siblings eventually joined him.**

Hence, **option B** is the correct answer.

140. निम्नलिखित में से अधम का विलोम शब्द हैं-

- A. अथ
- B. उत्तम
- C. सरस
- D. सगुण

Answer ||| B

Solution |||

विलोम – शब्दों के विपरीत अर्थ देने वाले शब्दों को विलोम शब्द कहते हैं।

अधम का विलोम शब्द 'उत्तम' होता है।

अन्य विकल्प –

अथ - इति

सरस - नीरस

सगुण – निर्गुण

141. Find at what time between 7 and 8 O'clock will the hands of a clock be in opposite direction?

- A. 66/11 minute past 7
- B. 60/11 minute past 7
- C. 90/11 minute past 7
- D. 120/11 minute past 7

Answer ||| B

Solution |||

We know that angle between clock hands

$$\theta = \left| 30H - \frac{11}{2}M \right|$$

Then $M = \frac{2}{11}(30H - \theta)$

Between 7 to 8 O'clock

H = 7, then

$$M = \frac{2}{11}(30 \times 7 - 180) = \frac{60}{11} \text{ min}$$

Hence, 60/11 minute past 7

Hence, option B is the correct answer

142. The Tuareg is a pastoral nomad living in the desert of_____.

- A. Arabia
- B. Thar
- C. Kalahari
- D. Sahara

Answer ||| D

Solution |||

- The Tuareg people are a large Berber ethnic confederation.
- They principally inhabit the **Sahara** in a vast area stretching from far **southwestern Libya to southern Algeria, Niger, Mali and Burkina Faso**.
- Traditionally nomadic pastoralists, small groups of Tuareg are also found in **northern Nigeria**.

143. Which of the following is also known as 'the guardian of the public purse'?

- A. Chief Minister
- B. Prime Minister of India
- C. Minister of law and Justice
- D. Comptroller and Auditor General of India

Answer ||| D

Solution |||

- Comptroller and Auditor General of India is also known as 'the guardian of the public purse'.
- He is the head of the Indian Audit and Accounts Department.

- It is mentioned in the Constitution of India under Article 148 – 151.

144.The latitude of the northernmost point of India, nearest to minutes, is:

- A. 36° 6'
- B. 39° 6'
- C. 37° 6'
- D. 38° 6'

Answer ||| C

Solution |||

- **The latitude of the northernmost point of India, nearest to minutes is 37° 6'.**
- **Indira Col is the northernmost point of India and It lies in the union territory of Ladakh.**
- **The mainland of India extends between 68°7'E and 97°25'E longitudes.**
- **The latitude of the southernmost point of India, nearest to minutes, is 8°4'.**
- **The southernmost part of India is the Indira Point and It is located on the island of Andaman and Nicobar.**
- **Latitude is the measurement of distance north or south of the Equator.**
- **The latitude of the North Pole is 90 degrees N and the latitude of the South Pole is 90 degrees S.**

145.Select the most appropriate option to substitute the underlined segment in the given sentence. If no substitution is required, select 'No substitution'.

While washing your hands, rub them together for 20 seconds to remove **the microbes on them.**

- A. No substitution
- B. the microbes on their
- C. the microbes on they
- D. the microbes on those

Answer ||| A

Solution |||

The underlined part of the sentence is grammatically correct.

Hence, **option A** is the correct answer.

146. Select the option that can be used as one-word substitute for the given group of words.

A musical composition made up of a series of songs or short pieces

- A. Lyric
- B. Band
- C. Medley
- D. Orchestra

Answer ||| C

Solution |||

Lyric: the words of a song

Band: a small group of musicians

Medley: a piece of music consisting of several songs

Orchestra: a large group of people who play various musical instruments together.

Hence, **option C** is the correct answer.

147.

|||Common||| **Direction:** Select the most appropriate meaning of the given idiom. |||End|||

Fair and square

- A. Beautiful in appearance
- B. According to the rules
- C. By any means available
- D. Calm and quiet

Answer ||| B

Solution |||

The idiom "**Fair and square**" means honestly and according to the rules.

Example: Election Commission of India is responsible for conducting **fair and square** elections.

Hence, **option B** is the correct answer.

148.

|||Common||| The following sentence has been divided into parts. One of them contains an error. Select the part that contains the error from the given options. |||End|||

The food / in the new eatery/ is much best than / the one in RK Puram.

- A. in the new eatery
- B. the one in RK Puram
- C. The food
- D. is much best than

Answer ||| D

Solution |||

The sentence is grammatically incorrect, and the error lies in **option D**.

The error is related to **Adjective**.

- “Best” is the superlative degree of adjective “good”. Whereas, “Better” is the comparative degree of adjective “good”.

For example:

The actual cost of the house is **highest than** we expected. [Wrong]

The actual cost of the house is **higher than** we expected. [Right]

- In the given sentence, we have used “than” which is used with the comparative degrees. Thus, comparative degree “better” should be used in place of superlative degree “best”.

- So, “**is much better than**” is the correct substitution.

Thus, the correct sentence will be: **The food in the new eatery is much better than the one in RK Puram.**

Hence, **option D** is the correct answer.

149. The ninth edition of the bilateral maritime exercise named, SLINEX between the Indian and Sri Lankan navies was held in _____.

- A. Visakhapatnam
- B. Port Blair
- C. Chennai
- D. Lakshadweep

Answer ||| A

Solution |||

* The ninth edition of Indian and Sri Lankan Navy bilateral maritime exercise SLINEX (Sri Lanka–India Naval Exercise) was conducted in two phases.

* The first one, the harbour phase was conducted at **Visakhapatnam, Andhra Pradesh** from March 7 to March 8, 2022, followed by the sea phase from March 9 to March 10, 2022 in the **Bay of Bengal**.

* In this exercise, Sri Lankan Navy was represented by SLNS Sayurata, an advanced offshore patrol vessel, and the Indian Navy was represented by INS Kiran, a guided missile corvette.

150. Which ministry has launched a Special Entrepreneurship Promotion Drive for Women named – “SAMARTH”?

- A. Ministry of Women & Child Development
- B. Ministry of Labour and Employment
- C. Ministry of Micro, Small & Medium Enterprises
- D. Ministry of Rural Development

Answer ||| C

Solution |||

* On the occasion of **International Women’s Day 2022**, **Union Minister for Ministry of Micro, Small & Medium Enterprises, Shri Narayan Rane** launched a Special Entrepreneurship Promotion Drive for Women named – **“SAMARTH”**.

* This initiative will provide women with self-employment opportunities and make them self-reliant and independent.

* Under SAMARTH, 20 per cent seats in free skill development programmes, organised under skill development schemes of the ministry, will be allocated for aspiring and existing women entrepreneurs.

* International Women's Day is observed on March 8th each year.