



MPPSC AE

Electrical Engineering

Mega Mock Test

(May 15th - May 16th 2022)

Questions &
Solutions

1. Match the following lists:

List - 1		List - 2	
(P)	Non-linear scale	(1)	Tangent Galvanometer
(Q)	Eddy current damping	(2)	Electrodynamometer
(R)	Transfer Instrument	(3)	PMMC
(S)	Absolute Instrument	(4)	MI instrument

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

Ans. D

Sol. In moving iron instrument, Deflecting torque,

$$T_d = \frac{1}{2} I^2 \frac{dL}{d\theta}$$

$$\therefore T \propto I^2$$

Hence, it has non-linear scale.

In PMMC instrument, Eddy current damping is used.

A transfer instrument is the one which is calibrated with a DC source and used without any modifications for AC measurements. Electrodynamometer is an example of transfer instrument.

Absolute instruments are defined as the instruments that give deflections in terms of physical constants and not measurable on a graduated scale.

Tangent Galvanometer is an example of Absolute instrument.

2. **Statement (I):**

In resonant circuits, the capacitor voltage or inductor current could be much lower than the source voltage or source current, and a large input signal can produce a small output signal when resonance appears in a circuit.

Statement (II):

In resonant circuits, the quality factor for a coil is defined as the ratio of the inductive reactance and the winding resistance, which is a dimensionless parameter.

- 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** the 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.

Ans. D

Sol. In resonant circuit,

$V_c = QV_s$ (series resonance)

If $Q > 1$

then $V_c > V_s$

Also, $I_L = QI_s$ (parallel resonance)

If $Q > 1$

$I_L > I_s$

So, statement I is wrong.

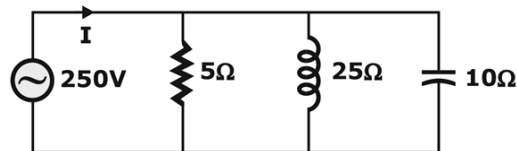
$$Q = \frac{X_L}{R}$$

$$= \frac{\omega rL}{R}$$

$$= \frac{1}{R} \sqrt{\frac{L}{C}}$$

Statement II is correct.

3. Find the source current (I) in the circuit shown below



A. 29.8 A

B. 37.2 A

C. 52.2 A

D. 68.7 A

Ans. C

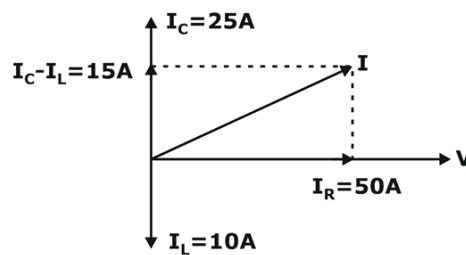
Sol. From the given figure,

$$I_R = \frac{250}{5} = 50A$$

$$I_L = \frac{250}{25} = 10A$$

$$I_C = \frac{250}{10} = 25A$$

The phasor diagram is shown below



$$\therefore I = \sqrt{15^2 + 50^2} = \sqrt{2725}$$

I = 52.2 A

4. What is the Fourier transform $G(\omega)$ of the signal of $g(t) = \frac{1}{1 + jt}$
- A. $2\pi e^\omega u(-\omega)$ B. $\pi e^\omega u(-\omega)$
 C. $0.52\pi e^\omega u(-\omega)$ D. $3\pi e^\omega u(-\omega)$

Ans. A

Sol. We know that the Fourier transfer of an exponent signal is:

$$F(e^{-at}) \iff \frac{1}{a + j\omega}$$

Also, at $a = 1$

Now using duality, we get,

$$F\left(\frac{1}{1 + jt}\right) \iff 2\pi e^\omega (-\omega)$$

5. When the quiescent point of an amplifier is biased just at the cut-off axis, so that only the positive half of the signal input is amplified and the negative half of the signal is cut off, it is referred to as
- A. class AB amplification B. class A amplification
 C. class B amplification D. class C amplification

Ans. C

Sol. When the collector current flows only during the positive half cycle of the input signal and amplifies it, the power amplifier is known as class B power amplifier.

6. A 230/2300 V Δ/Y , 3 - ϕ Transformer is rated at 230 kVA, its rated secondary current (phase) is
- A. 100 A B. $\frac{100}{\sqrt{3}}$ A
 C. $100\sqrt{3}$ A D. $\frac{200}{\sqrt{3}}$

Ans. B

Sol. Given:

$S = 230 \text{ kVA}$, Voltage rating 230/2300 V

$$\Rightarrow \text{We know } S = \sqrt{3} V_L I_L$$

$$230 \times 10^3 = \sqrt{3} \times 2300 \times I_L$$

$$\frac{230 \times 10^3}{\sqrt{3} \times 2300} = I_L = \frac{100}{\sqrt{3}}$$

$$\text{For star connection } I_L = I_{\text{Phase}} = \frac{100}{\sqrt{3}}$$

7. Consider the following statements regarding exponential Fourier series co-efficient of any real signal.

- 1). It will be conjugate symmetric.
- 2). Its real part is even and imaginary part is odd.
- 3). Its magnitude is even and its phase will be odd.

Which of the above statements are correct?

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

Ans. D

Sol. $C_k = |C_k| e^{j\angle C_k} \dots (i)$

Put $k = -k$

$$C_{-k} = |C_{-k}| e^{j\angle C_{-k}}$$

Take conjugate both sides

$$C_{-k}^* = |C_{-k}| e^{-j\angle C_{-k}} \dots (ii)$$

For real signal

$$x(t) = x^*(t)$$

$$\therefore C_k = C_{-k}^*$$

Now from equation (i) and (ii)

$$|C_k| = |C_{-k}| \rightarrow \text{Even}$$

$$\angle C_k = -\angle C_{-k} \rightarrow \text{Odd}$$

8. Two 3-φ transformers are operating in parallel then which of the following statement is correct

1. Same voltage rating & same turns ratio
2. The phase sequence must be same
3. Transformers must have the same phase group.

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

Ans. C

Sol. Necessary conditions for parallel operations

- | | |
|-----------------------------------|------------------------------------|
| ⇒ The polarities must be same | ⇒ same voltage rating & turn ratio |
| ⇒ The phase sequence must be same | ⇒ same phase group. |

Desired condition

$$\Rightarrow \left(\frac{X}{R}\right) \text{ ratio should be same}$$

⇒ % impedance of the transformer is the same

Important point ⇒ The most common connection methods used in the parallel operation are

$$\Rightarrow \Delta - \Delta, Y - Y$$

$$\Rightarrow Y - \Delta, \Delta - Y$$

9. The purpose of resistance switching is
- A. to reduce restriking voltage
 - B. to reduce current chopping
 - C. Both (a) and (b)
 - D. None of the above

Ans. C

Sol. Resistance switch causes:

- (i) Decrement in restriking voltage.
- (ii) Reduction in current chopping

10. When the value of slip of an induction motor approaches zero, the effective resistance
- A. is very low and the motor is under no-load
 - B. of the rotor circuit is very high and the motor is under no-load
 - C. is zero
 - D. of the rotor circuit is infinity and the motor is equivalent to short-circuited two-winding transformer

Ans. B

Sol. For induction motor, Effective resistance of rotor is given as $\frac{R_{20}}{s}$

Where, R_{20} = standstill rotor resistance

s = slip

Under no load, slip ≈ 0

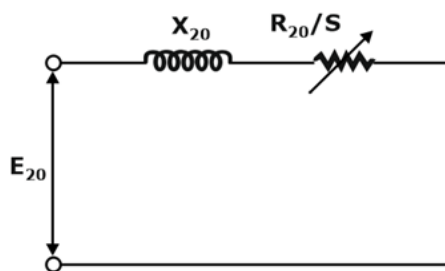
As the load on motor increases, rotor speed decreases, hence slip increases,.

Therefore,

As s approaches to zero, $\frac{R_{20}}{s} \approx \infty$

and motor is under no load

By observing the rotor equivalent circuit at line frequency.



as slip approaches zero, $\frac{R_{20}}{s} \approx \infty$ and secondary i.e. rotor winding acts as open circuit.

11. A four-pole d.c. machine armature has 54 slots. It is lap-wound with single-turn coils. How many armature coils are required?

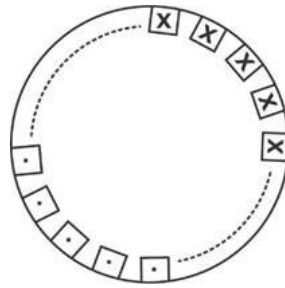
- A. 27
- B. 54
- C. 81
- D. 108

Ans. B

Sol. In 4-pole DC machine,

Slots = 54

Lap wound with single turn



Since 1 coil have only one turn.

So, each coil (or turn) require 2 slot.

$$\text{So, total coil} = \frac{54}{2} = 27$$

12. A 3 bit modulo 8 ripple counter used JK flip-flops, if the Propagation delay of each ff is 40 ns, the max clock frequency that can be used is equal to:
- A. 20 MHz
 - B. 10 MHz
 - C. 8.33 MHz
 - D. 4 MHz

Ans. C

Sol. T_d of each ff = 40 ns

3 bit modulo 8 ripple counter represent

$$n = 3$$

$$\text{max clock } f = \frac{1}{T_d \times n} = \frac{1}{40 \times 3 \times 10^{-9}}$$

$$= 8.33 \text{ MHz}$$

13. The input voltage of a Buck-Boost converter is 80 V. Determine the duty ratio if the output is 240 V?
- A. 0.25
 - B. 0.5
 - C. 0.75
 - D. 0.6

Ans. C

Sol. For Buck-Boost converter,

$$\text{Output voltage, } V_0 = \frac{\alpha V_s}{1-\alpha}$$

where V_s is the input voltage and α is the duty ratio

$$240 = \frac{80 \alpha}{1-\alpha}$$

$$3(1-\alpha) = \alpha$$

$$3-3\alpha = \alpha$$

$$3 = 4 \alpha$$

$$\Rightarrow \alpha = 0.75$$

14. Consider the following statement:

- 1) Norton's equivalent is reciprocal of Thevenin's equivalent.
- 2) Thevenin resistance is equal to Norton's resistance.
- 3) Norton's theorem is applicable to two terminals linear and active network.

Which of these statement(s) is/are correct?

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

Ans. B

Sol. By using source transformation we can convert a Thevenin equivalent into Norton's equivalent or Vice-Versa other statement are correct.

15. Consider the following statements related to d.c.-d.c. converters:

- 1) The polarity of output voltage and input voltage of a single-ended primary inductance converter is opposite.
- 2) the polarity of output voltage and input voltage of a Cuk converter is opposite.
- 3) The polarity of output voltage and input voltage of a buck-boost converter is same.
- 4) The polarity of output converter is same.

Which of the above statements are correct?

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

Ans. D

Sol. Single ended primary inductance convertor is similar to a traditional buck-boost convertor but has an advantage of having non-inverted output.

The polarity of output voltage and input voltage of a buck convertor is opposite.

The polarity of output voltage and input voltage of a buck boost converter is opposite

The polarity of output converter is same.

Hence 2 and 4 are correct.

16. Which one of the following statements is not correct for convolution?

- A. The convolution of an odd and an even function is an odd function.
- B. The convolution of two odd functions is an even function.
- C. The convolution of two even functions is an even function.
- D. The convolution of two odd functions is an odd function.

Ans. D

Sol. Let us consider the even function = $\cos t$ & the odd function = $\sin t$

For option (a),

$$f(t) = \text{odd} * \text{even}$$

$$= \sin t * \cos t$$

$$f(-t) = \sin t * \cos t$$

$$= -\sin t * \cos t$$

$$= -f(t)$$

Hence, it is odd function

For option (b),

$f(t) = \text{odd} * \text{odd}$

$f(-t) = \sin(-t) * \sin(-t)$

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

1) PID controller improves both steady state and transient response.

2) PID controller add two poles on negative real axis and one zero at origin.

A. Only 2

B. Both (1) and (2)

C. Neither (1) nor (2)

D. Only (1)

Ans. D

Sol. PID controller combines the effects of Proportional, integral and derivative controller. Hence, it improves both steady state and transient response.

Transfer function of PID controller is given by,

$$\frac{M(s)}{E(s)} = \frac{K_D s^2 + K_p s + K_i}{s}$$

Hence, it adds two zeroes on negative real axis and one pole at origin.

18. There are additional losses that arise from the non-uniform current distribution in the conductors and the core losses generated in the iron due to the distortion of the magnetic flux distribution from the load currents. Such losses are known as

A. steel losses

B. frictional losses

C. stray load losses

D. windage losses

Ans. C

Sol. Stray losses are additional losses that arises due to non-uniform current distribution if produce heat in the core. In conductor, the stray load loss is due to the circulating currents set-up by the alternating leakage flux produced by the load current in the conductors. These circulating or eddy currents make the conductor current distribution non uniform and as a result the effective resistance of the conductor current distribution non uniform and as a result the effective resistance of the conductor increases. Because of this, extra ohmic or I^2R loss is produced which is called stray load loss.

19. In servo applications for DC motor speed control, Which of the following converters is preferred?

A. DC-DC converter

B. Dual converter

C. Both (A) and (B)

D. Neither (A) nor (B)

Ans. A

Sol. In servo applications for DC motor speed control DC-DC converter is preferred.

Step up and step down choppers are use as per the speed variations.

20. Each of the items consists of two statements, one labelled as 'Statement (I)' and the other 'Statement (II)'. You are to examine these two statements carefully and select the answers to these items using the code given below.

Statement (I): When negative feedback is applied to the ideal amplifier, the differential input voltage is zero.

Statement (II): There is no current flow into either input terminal of the ideal op-amp.

- 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 the 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

Ans. B

Sol. Statement I: When negative feedback is applied to ideal amp, the differential i/p voltage is zero (virtual short) (true).

Statement II: There is no current flow into either input terminal or ideal op amp:

$$Z_1 = \infty \text{ (True)}$$

21. A transistor has $\beta = 105$ and $I_c = 840 \mu A$. What is the value of I_B ?

- A. $0.008 \mu A$
- B. $0.08 \mu A$
- C. $0.8 \mu A$
- D. $8 \mu A$

Ans. D

Sol. $I_c = \beta I_B$

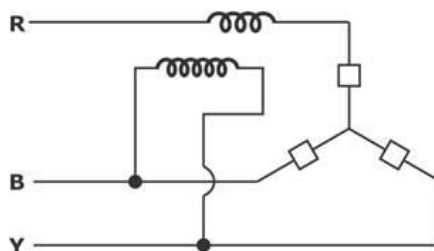
$$I_B = \frac{I_c}{\beta} = \frac{840 \times 10^{-6}}{105} = 8 \mu A$$

22. Under which of the following configurations, it is possible to measure total 3- ϕ reactive power using a single wattmeter?

- A. Current coil in R phase and pressure coil between B and Y phases
- B. Current coil in R phase and pressure coil between R and B phases
- C. Current coil in R phase and pressure coil between R and Y phases
- D. Either B or C

Ans. A

Sol.



26. In a large power transformer, a "conservator" drum is provided above the completely oil filled transformer tank and connected to it by a short pipe. The conservator drum is linked to external air through a breather. What is the purpose of providing the conservator?
- A. To store reserve oil to make up oil losses due to leakage
 - B. To prevent explosion due to rise in oil pressure inside the tank during a fault
 - C. To accommodate change in oil-level during the "load-cycle" of the transformer load
 - D. To exert additional pressure by the conservator-oil on the oil inside the main tank to prevent disintegration of oil at high temperature

Ans. C

Sol. Conservator also work as reserve oil store. But, most appropriate answer is 'c' i.e. to accommodate change in oil level during load cycle. Through conservator transformer breaths into atmosphere.

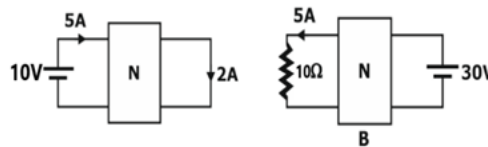
27. Which one of the following is not an example of renewable energy?
- A. Solar
 - B. Wind
 - C. Geothermal
 - D. Nuclear

Ans. D

Sol. Example of renewable energy sources:

- * Solar
- * wind
- * tidal
- * Geothermal
- * Hydro power
- * Biomass
- * Ocean energy

28. Determine current 'I' in figure 'B' assume network is resistive.



- A. 2 A
- B. 3 A
- C. 1 A
- D. 5 A

Ans. C

Sol. By Norton's theorem



By reciprocity theorem,

$$\frac{2}{10} = \frac{I_N}{30}$$

$$I_N = 6A$$

Slack bus = 1

Remaining buses = 8

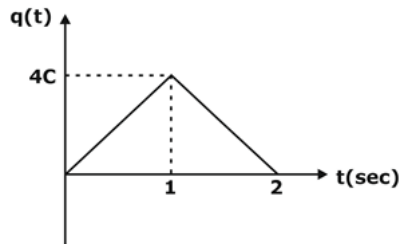
Both V, δ terms appear in Jacobian matrix dimension.

Order of Jacobian matrix,

$$= (2 \times 8 + 4) \times (2 \times 8 + 4)$$

$$= 20 \times 20$$

31. The charge variation with time is given below. If this charge supplied to 4Ω resistor then what is the power absorb by 4Ω resistor.



A. 32 W

B. 64 W

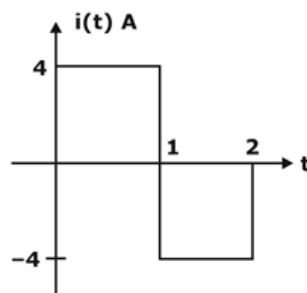
C. 48 W

D. 96 W

Ans. B

Sol. We know that $\frac{dq(t)}{dt} = i$

So, I



$$I_{\text{rms}} = \left\{ \frac{1}{2} \left(\int_0^1 4^2 dt + \int_1^2 (-4)^2 dt \right) \right\}^{\frac{1}{2}} = \left\{ \frac{1}{2} (16[t]_0^1 + 16[t]_1^2) \right\}^{\frac{1}{2}} = 4\text{A}$$

$$P = I_{\text{rms}}^2 R = 4^2 \times 4 = 64\text{W}$$

32. Arc produced in the circuit Breaker is _____

A. Positive temperature coefficient

B. Negative temperature coefficient

C. Not varies with temperature

D. None

Ans. B

Sol. \Rightarrow Arc produced in the circuit breaker has negative temperature coefficient as temperature increases arc resistance decreases

\Rightarrow The conductance of the Arc is directly proportional to the no. of free electron generated during ionization

\Rightarrow The conduction of the Arc is directly proportional to the cross-section area of the arc.

\Rightarrow Conduction of the Arc is inversely proportional to the length of Arc.

33. **Assertion (A):** A purely resistive circuit does not produce any transients.
Reason (R) : Resistor allows sudden change of voltage and current. It does not store energy in any form.
- A. Both A and R are true and R is the correct explanation of A
 - B. Both A and R are true but R is NOT the correct explanation of A
 - C. A is true but R is false
 - D. A is false but R is true

Ans. A

Sol. A pure resistive circuit does not produce any transients because resistor does not store energy in any form. It only dissipates energy in the form of heat (I^2R loss). Moreover, transients are produced only because of energy storing elements present in the circuit such as inductor and capacitor.

34. Consider the following statements for phase margin:
1. Phase margin is defined as the amount of additional phase lag at the gain crossover frequency required to bring the system to the verge of instability.
 2. The phase margin is always positive for stable feedback systems.
 3. The phase margin is always negative for stable feedback systems.

Which of the above statements is/are correct?

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

Ans. C

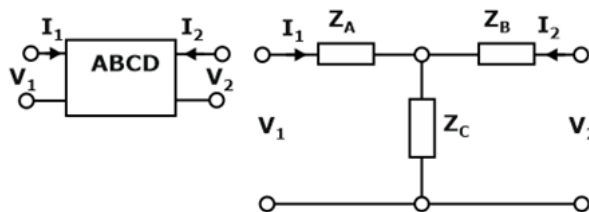
Sol. The phase margin of a system is the amount of additional phase lag required to bring the system to the point of instability.

The phase margin is given by

$$PM = 180^\circ + \angle G(j\omega)H(j\omega)$$

For stable system, the phase margin is positive but not always (i.e., in case of non-minimum phase system it may not be positive). Hence, option C is correct.

35. In terms of ABCD-parameters of a 2-port network, the parameters Z_A , Z_B and Z_C of the equivalent-T-network are, respectively



- A. $\frac{A-1}{C}$, $\frac{D-1}{C}$ and $\frac{1}{C}$
- B. $\frac{A}{C}$, $\frac{D-1}{C}$ and $\frac{1}{C}$
- C. $\frac{A-1}{C}$, $\frac{D}{C}$ and $\frac{1}{C}$
- D. $\frac{A}{C}$, $\frac{D}{C}$ and BC

Ans. A

Sol. The first two-port network is given in transmission or ABCD parameters

$$\begin{bmatrix} V_1 \\ I_1 \end{bmatrix} = \begin{bmatrix} A & B \\ C & D \end{bmatrix} \begin{bmatrix} V_2 \\ -I_2 \end{bmatrix}$$

The equations can be written as $V_1 = AV_2 - BI_2 \dots(i)$

$I_1 = CV_2 - DI_2 \dots(ii)$

The equation (i) and (ii) can be modified and rewritten as

$$V_1 = \frac{AI_1}{C} + \frac{(AD - BC)}{C} I_2$$

$$V_2 = \frac{I_1}{C} + \frac{D}{C} I_2$$

Therefore, the z-parameter of the network can be written as,

$$[Z] = \begin{bmatrix} \frac{A}{C} & \frac{AD - BC}{C} \\ \frac{1}{C} & \frac{D}{C} \end{bmatrix} \dots(iii)$$

The z-parameter for the t-circuit given can be written as

$$[Z] = \begin{bmatrix} Z_A + Z_C & Z_C \\ Z_C & Z_B + Z_C \end{bmatrix} \dots(iv)$$

Comparing (iii) and (iv) we get,

$$Z_A = \frac{A - 1}{C}$$

$$Z_B = \frac{D - 1}{C}$$

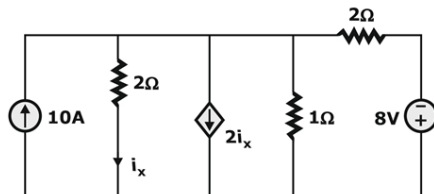
$$Z_C = \frac{1}{C}$$

36. Which method of voltage regulation of alternator give less value of regulation than its actual value.
- A. Synchronous impedance method.
 - B. mmf method.
 - C. Zero power factor method.
 - D. American standard association method.

Ans. A

Sol. The emf method or synchronous impedance method gives the value of regulation less than it's the value. Hence it is called pessimistic method of voltage regulation .
mmf method of voltage regulation than actual value.

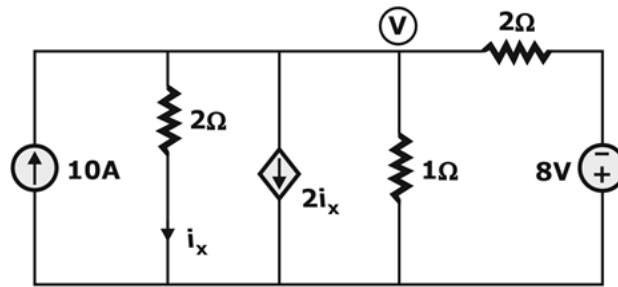
37. In the circuit shown below, what will be the power dissipated in 1Ω resistor



- A. 2 W
- B. 4 W
- C. 5 W
- D. 6 W

Ans. B

Sol.



Let voltage across 1Ω resistor is V

Applying KCL at node,

$$-10 + i_x + 2i_x + \frac{V}{1} + \frac{V + 8}{2} = 0$$

$$10 = 3i_x + \frac{3V}{2} + 4$$

$$i_x = \frac{V}{2} \Rightarrow V = 2i_x$$

$$10 = \frac{3V}{2} + \frac{3V}{2} + 4$$

$$6 = 3V$$

$$\Rightarrow V = 2V$$

Power dissipated in $1\Omega = \left(\frac{2^2}{1}\right)$

$$= 4 \text{ W}$$

38. When a separately excited d.c. motor is to be controlled from a three-phase supply fed from controlled rectifier in only first quadrant, which one of the following converters is used to serve the purpose?

- A. Half-wave converter
- B. Full converter
- C. Semi converter
- D. Dual converter

Ans. C

Sol. Semi-converter preferred over half-wave converter.

39. Which of the following acts as a protection against high voltage surges due to lightning and switching

- A. Breather
- B. Thermal overload relay
- C. Conservator
- D. Horn gaps

Ans. D

Sol. \Rightarrow The horn gap acts as a protective device for an electrical power system for high voltage surges

\Rightarrow it consists of two horn - shaped rods separated by a small distance over end of this is connected to the line and other end to the earth.

40. The sampling frequency of the signal $g(t) = \text{sinc}^2(200t)$ is
- A. 100 Hz
 - B. 200 Hz
 - C. 400 Hz
 - D. 800 Hz

Ans. C

Sol. $G(t) = \text{sinc}^2(200t) = \text{sa}^2(200\pi t)$

Fundament at frequency = $2 \times 200\pi \text{ rad} = 400\pi \text{ rad/sec}$

$$\text{Sampling frequency (in Hz)} = \frac{800\pi}{2\pi}$$

$$= 400\pi$$

41. Consider the following statements related to steady-state error for a control system :
1. Steady-state error can be calculated from a system's closed-loop transfer function for a unity feedback system.
 2. Steady-state error can be calculated from a system's open-loop transfer function for a unity feedback system.
 3. Steady-state error is the difference between the input and the output for a prescribed test input as time tends to infinity.
 4. Many steady-state errors in control systems can arise from non-linear sources.

Which of the above statements are correct?

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

Ans. D

Sol. All the given options are correct for calculation of steady state error.

For steady-state error for a control system :

1. Steady-state error can be calculated from a system's closed-loop transfer function for a unity feedback system.
2. Steady-state error can be calculated from a system's open-loop transfer function for a unity feedback system.
3. Steady-state error is the difference between the input and the output for a prescribed test input as time tends to infinity.
4. Many steady-state errors in control systems can arise from non-linear sources.

Hence, option D is correct.

42. **Statement (I):** The error constant K_p , K_v and K_a describe the ability of a unity state error.
Statement (II): Addition of an integrator in forward path increases the type of the system.
- 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

Ans. B

Sol. Both statement are individually correct but statement (II) is not a correct explanation of statement (I)

43. For certain of the reverse voltage in a transistor, the effective base width may reduce to zero resulting into the voltage breakdown. This phenomenon is called

- A. early effect
- B. avalanche multiplication
- C. punch through
- D. zones breakdown

Ans. C

Sol. As we increase the reverse bias voltage of base collector junction, depletion width increases and effective base width decreases (since base is less doped compared to collector, depletion layer protrudes more into the base the collector hence effective base width gets affected), at some point effective base width approaches zero and transistor will breakdown. This phenomenon is called punch through.

44. Which one of the following is a current- controlled device?

- A. MOSFET
- B. SIT
- C. MCT
- D. GTO

Ans. D

Sol. GTO is a Gate turn off thyristor. It can be turned on by a positive gate current and turn off by negative gate current at its gate cathode terminals.

45. Full scale o/p voltage of n-bit DAC is

- A. $(2^n - 1)$
- B. $\frac{V}{(2^n - 1)}$
- C. $(2^n - 1) \times \text{resolution}$
- D. $\frac{(2^n - 1)}{V}$

Ans. C

Sol. Full scale o/p = $(2^n - 1) \times \text{resolution}$.

46. Which one of the following statements is not correct regarding potential due to a point charge?

- A. It is directly proportional to the magnitude of the charge.
- B. It is inversely proportional to the distance from the charge.
- C. It is inversely proportional to the relative permittivity of the medium in which the charge is placed.
- D. It is directly proportional to the electric field intensity.

Ans. D

Sol. $V = \frac{Q}{4\pi\epsilon R} = \frac{Q}{4\pi\epsilon_0\epsilon_r R}$

$$V \propto Q$$

$$V \propto \frac{1}{R}$$

$$V \propto \frac{1}{\epsilon_r}$$

$$V = -\int_{\ell} \mathbf{E} \cdot d\mathbf{L}$$

Hence, option D is incorrect.

47. For a single-phase full bridge inverter, Find the RMS value of 3rd harmonic component of output voltage, If input to the inverter is 150V?

- A. 35 V
- B. 45 V
- C. 55 V
- D. 65 V

Ans. B

Sol. For 1 – ϕ full bridge inverter,

$$\text{Output voltage, } V_0 = \sum_{n=1,3,5\dots}^{\infty} \frac{4V_s}{n\pi} \sin n\omega t$$

$$\therefore V_{on(rms)} = \frac{\frac{4}{\sqrt{2}}V_s}{n\pi} = \frac{2\sqrt{2}}{n\pi} V_s$$

$$\therefore V_{03(rms)} = \frac{2\sqrt{2}}{3\pi} \times 150$$

$$= 45 \text{ V}$$

48. The applied input ac power to a half wave rectifier is 100 Watt. The dc power output obtained is 40 Watts. What is the power efficiency?

- A. 40%
- B. 60%
- C. 80%
- D. 100%

Ans. C

$$\text{Sol. Power efficiency} = \frac{\text{d.c output power}}{\text{a.c input power for half cycle}} \times 100$$

$$= \frac{40}{\left(\frac{100}{2}\right)} = 80\%$$

49. Consider a system described by

$$\begin{bmatrix} \dot{x}_1 \\ \dot{x}_2 \end{bmatrix} = \begin{bmatrix} 1 & 1 \\ -2 & -1 \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \end{bmatrix} + \begin{bmatrix} 0 \\ 1 \end{bmatrix} u$$

$$y = [1 \ 0] \begin{bmatrix} x_1 \\ x_2 \end{bmatrix}$$

Which one of the following is correct?

- A. The system is controllable only
- B. The system is observable only
- C. The system is controllable and observable
- D. The system is neither controllable nor observable

Ans. C

Sol.

Given that: $A = \begin{bmatrix} -1 & -1 \\ -2 & -1 \end{bmatrix}_{2 \times 2}$, $B = \begin{bmatrix} 0 \\ 1 \end{bmatrix}_{2 \times 1}$,

$$C = [1 \ 0]_{1 \times 2}$$

$$Q_1 = [B \ AB]$$

$$AB = \begin{bmatrix} 1 \\ -1 \end{bmatrix}_{2 \times 1}$$

$$Q_C = \begin{bmatrix} 0 & 1 \\ 1 & -1 \end{bmatrix}$$

$$\Rightarrow |Q_C| = \begin{vmatrix} 0 & 1 \\ 1 & -1 \end{vmatrix}$$

$$|Q_C| = -1$$

Since $|Q_C| \neq 0$, controllable

$$Q_0 = [C^T \ A^T C^T]$$

$$CA = [1 \ 0]_{1 \times 2} \begin{bmatrix} 1 & 1 \\ -2 & -1 \end{bmatrix}_{2 \times 2} = [1 \ 1]$$

$$Q_0 = \begin{bmatrix} 1 & 0 \\ 1 & 1 \end{bmatrix}$$

$$\Rightarrow |Q_0| = 1$$

Since $|Q_0| \neq 0$, observable the system is both controllable and observable.

50. What is the convolution of the following two signals?

$$x(t) = \begin{cases} 1, & -1 < t < 1 \\ 0, & \text{elsewhere} \end{cases}$$

And $h(t) = \delta(t + 1) + 2\delta(t + 2)$

- A. $y(t) = x(t + 1) + 2x(t - 2)$
- B. $y(t) = x(t - 1) + 2x(t + 2)$
- C. $y(t) = x(t + 1) + 2x(t + 2)$
- D. $y(t) = x(t - 1) + 2x(t - 2)$

Ans. C

Sol. $y(t) = x(t) * h(t)$

$$y(t) = x(t) * (\delta(t + 1) + 2\delta(t + 2))$$

$$= x(t + 1) + 2x(t + 2)$$

51. What is the bilateral z-transform of the signal $x(n) = a^{n+1} u(n + 1)$?

A. $\frac{z}{1 - az^{-1}} |z| > |a|$

B. $\frac{z}{1 - az^{-1}} |z| > |a|$

C. $\frac{1}{1 - az^{-1}} |z| > |a|$

D. $\frac{1}{1 + az^{-1}} |z| > |a|$

Ans. A

Sol. Let $g(n) = a^n u(n)$

So, $Z(a^n u(n))$

$$Z(a^n u(n)) = G(z) = \frac{1}{1 - az^{-1}}, |z| > |a|$$

Now, according to questions,

$$x(n) = g(n + 1) = a^{n+1} u(n + 1)$$

$$X(z) = z G(z)$$

$$= \frac{z}{1 - az^{-1}}, |z| > |a|$$

52. Consider the following statements.

- 1). EMMC measures both AC and DC current and voltage.
- 2). EMMC type Ammeter consists 2 fixed coils.
- 3). In EMMC, spring provides controlling torque.

Which of the above statements is/are correct?

A. 1 and 2

B. 2 and 3

C. 1 and 3

D. 1, 2 and 3

Ans. D

Sol. * EMMC type voltmeter and ammeter measures both AC and DC voltage and current respectively.

* EMMC type ammeter consisting of 2 fixed coil.

* For small load currents both connected in series and for large current, both connected in parallel without need of shunt resistance.

* Spring provides controlling torque.

53. Which of the following motors are commonly used in power electronic systems?

- 1. Synchronous motors
- 2. d.c. motors
- 3. d.c. motors with brushes

Select the correct answer using the code given below.

A. 1 and 3 only

B. 1 and 2 only

C. 2 and 3 only

D. 1, 2 and 3

Ans. C

Sol. Only DC motors with or without brushes is commonly used in power electronic systems.

54. The approximate pressure range for ionization gauge measuring device is
- A. 10^{-8} to 10^{-3} torr
 - B. 10^{-3} to 10^{-2} torr
 - C. 10^{-10} to 10^{-8} torr
 - D. 10^{-2} to 10^{-1} torr

Ans. A

Sol.

Vacuum pressure gauge	Range of pressure
1. Pirani gauge	0 to 10^{-4} torr (or mm of Hg)
2. Mcleod gauge	1 to 10^{-6} torr
3. Knudsen gauge	10^{-3} to 10^{-6} torr
4. Ionization gauge	10^{-8} to 10^{-3} torr

55. The arms of a four-arm bridge a b c d, supplied with sinusoidal voltage, have the following values :

Arm ab : A resistance of 200Ω in parallel with a capacitance of $1\ \mu\text{F}$

Arm bc : $400\ \Omega$ resistance

Arm cd : $1000\ \Omega$ resistance

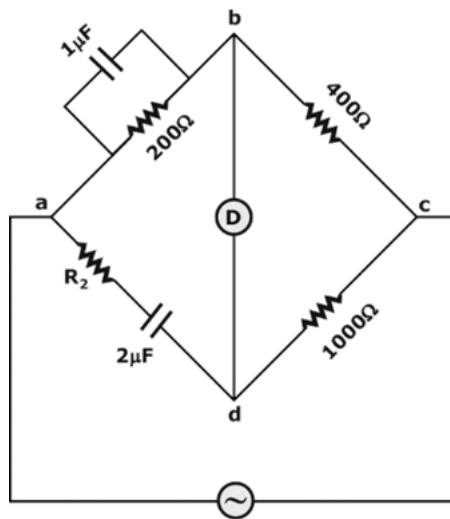
Arm da : A resistance R_2 in series with a $2\ \mu\text{F}$ capacitance

What are the values of R_2 and the frequency respectively at which the bridge will balance?

- A. $200\ \Omega$, $456\ \text{Hz}$
- B. $400\ \Omega$, $398\ \text{Hz}$
- C. $200\ \Omega$, $398\ \text{Hz}$
- D. $400\ \Omega$, $456\ \text{Hz}$

Ans. B

Sol.



Given that: $R_1 = 200\ \Omega$; $C_1 = 1\ \mu\text{F}$

$R_3 = 400\ \Omega$; $R_4 = 1000\ \Omega$; $R_2 = ?$; $C_2 = 2\ \mu\text{F}$

For balanced bridge condition, $Z_1Z_4 = Z_2Z_3$

$$\left(R_1 \parallel \frac{1}{j\omega C_1} \right) \times R_4 = R_3 \times \left(R_2 + \frac{1}{j\omega C_2} \right)$$

$$\left(\frac{R_1}{1 + j\omega R_1 C_1} \right) \times R_4 = R_3 \times \left(\frac{1 + j\omega R_2 C_2}{j\omega C_2} \right)$$

$$R_1 R_4 j\omega C_2 = R_3 \times (1 + j\omega R_2 C_2)(1 + j\omega R_1 C_1)$$

$$j\omega R_1 C_2 R_4 = R_3 (1 - \omega^2 R_1 R_2 R_1 C_2) + R_3 j\omega (R_2 C_2 R_1 C_1)$$

Equations real and imaginary part,

Real part →

$$R_3 (1 - \omega^2 R_1 R_2 C_1 C_2) = 0$$

$$\omega = \frac{1}{\sqrt{R_1 R_2 C_1 C_2}}$$

Imaginary part

$$j\omega R_1 C_2 R_4 = j\omega R_3 (R_1 C_1 + R_2 C_2)$$

$$R_1 R_4 C_2 = R_1 C_1 R_3 + R_2 R_3 C_2$$

$$R_2 = \frac{R_1 R_4 C_2 - R_1 R_3 C_1}{R_3 C_2}$$

$$R_2 = \frac{200 \times 1000 \times 2 \times 10^{-6} - 200 \times 400 \times 1 \times 10^{-6}}{400 \times 2 \times 10^{-6}}$$

$$R_2 = 400\Omega$$

$$\omega = \frac{1}{\sqrt{R_1 R_2 C_1 C_2}}$$

$$f = \frac{1}{2\pi \sqrt{R_1 R_2 C_1 C_2}}$$

$$= \frac{1}{2\pi \sqrt{200 \times 400 \times 1 \times 10^{-6} \times 2 \times 10^{-6}}}$$

$$= 397.887 \cong 398 \text{ Hz}$$

56. 'Dependability' term in power system protection gives which of the following idea?
- A. Relay should operate when it is required.
 - B. Relay should not operate when it is not required.
 - C. Data for maximum protection at minimum cost
 - D. Dependability problem leads to disturbance in grid.

Ans. A

Sol.

Dependability	Security
1) It should operate when it is required	1) It should not operate when it is not required.
2) Dependability problem leads to equipment damage.	2) Security problem leads to disturbance in grid.

57. A half-wave rectifier type a.c. voltmeter is with a 20 V rms signal What is the equivalent d.c. output voltage?
- A. 6.4 V
 - B. 9 V
 - C. 12.8 V
 - D. 18 V

Ans. B

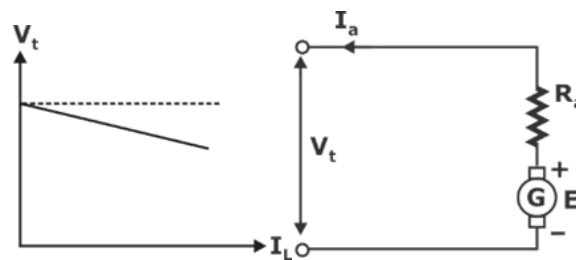
Sol. D.C. output voltage from a half-wave rectifier = $0.45 \times V_{rms}$
 $= 0.45 \times 20 = 9 \text{ V}$

58. The steady-state external performance characteristic of a d.c. generator has the relationship between

- A. generated e.m.f and field current at constant speed
- B. terminal voltage and field current, with constant armature current and speed
- C. generated e.m.f and field current, with constant armature current and speed
- D. terminal voltage and load current at constant speed

Ans. D

Sol. External characteristics of a DC generator is the current between terminal voltage and load current



59. A copper wire is 1 m long and has a uniform cross section of 0.1 mm^2 . The resistance of wire at room temperature is $0.171 \text{ } \Omega$. What is the resistivity of the material?

- A. $1.71 \times 10^{-3} \text{ } \Omega\text{m}$
- B. $1.71 \times 10^{-8} \text{ } \Omega\text{m}$
- C. $1.71 \times 10^{-5} \text{ } \Omega\text{m}$
- D. $1.71 \times 10^{-7} \text{ } \Omega\text{m}$

Ans. B

Sol. Resistance,

$$R = \rho \frac{\ell}{A}$$

$$\rho = \left[\frac{RA}{\ell} \right]$$

Given, $R = 0.171 \text{ } \Omega$, $\ell = 1\text{m}$, $A = 0.1 \text{ mm}^2$

$$\rho = \frac{0.171 \times 0.1 \times 10^{-6}}{1}$$

$$\rho = 1.71 \times 10^{-8} \text{ } \Omega\text{m}$$

60. In P-N junction diode, the reverse saturation current increases by 7.2% by a degree rise in junction temperature (in Celsius) and gets

- A. halved for every 10°C rise in temperature
- B. doubled for every 10°C rise in temperature
- C. halved for every 20°C rise in temperature
- D. doubled for every 20°C rise in temperature

Ans. B

Sol. In P-N junction diode reverse saturation current doubles for every 10°C rise in temperature.

$$I_{s1} = I_{s0} \times 2^{\left(\frac{T_2 - T_1}{10}\right)}$$

61. A parallel plate capacitor 0.8m by 0.8m has separation distance of 1 cm with permittivity $\epsilon = 4\epsilon_0$. If the potential applied between the metal plates is 20V, then the value of stored charge in the capacitor is

- A. 18.44 nC
- B. 20.18 nC
- C. 22.66 nC
- D. 28.21 nC

Ans. C

Sol.

$$C = \frac{\epsilon_0 \epsilon_r A}{d} = \frac{\epsilon A}{d}$$

$$= \frac{4 \epsilon_0 \times 0.8 \times 0.8}{1 \times 10^{-2}}$$

$$C = \frac{4 \times 8.854 \times 10^{-12} \times 0.64}{10^{-2}}$$

$$C = 2.266 \text{ nF}$$

$$Q = CV = 2.266 \times 10^{-9} \times 10 = 22.66 \text{ nC}$$

62. Transient stability criteria is

- A. Area of acceleration = area of deceleration
- B. Area of acceleration > area of deceleration
- C. Area of acceleration < area of deceleration
- D. None of the above

Ans. C

Sol. In equal area criteria, as the generator tries to match the sudden change in the load. For transient stability, Area of acceleration should be less than area of deceleration

63. Consider the following statements.

- 1) A non-moving loop area is present in the time varying magnetic field. In this case, induced emf is called transformer emf.
- 2) A moving loop area is present in the static magnetic field, in this case emf is called motional emf.
- 3) A moving loop area is present in the time varying magnetic field. In this case total emf is sum of motional emf and transformer emf.

Which of the above equation are correct?

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

Ans. D

Sol. 1. A non-moving loop area is present in the time varying magnetic field. In this case, induced emf is called transformer emf.

$$\text{emf} = \frac{-d}{dt} [B(t) (\text{area}) \cos \theta_{BS}]$$

2. A moving loop area is present in the static magnetic field, in this case emf is called motional emf.

$$\text{emf} = \oint (\vec{V} \times \vec{\beta}) \cdot d\ell$$

3. A moving loop area is present in the time varying magnetic field. In this case total emf is sum of motional emf and transformer emf.

$$\text{emf} = \frac{-d\phi}{dt} + \oint (\vec{V} \times \vec{\beta}) \cdot d\ell$$

64. A Graph has 8 branch and 6 node the number of independent KCL equation and No. of independent KVL equation respectively are-

- A. 3 & 5
- B. 5 & 4
- C. 5 & 3
- D. 4 & 5

Ans. C

Sol. No. of node $n = 6$

No. of branch $b = 8$

we know that

No. of KCL equation = $n - 1 = 6 - 1 = 5$

No. of KVL equation = $b - (n - 1) = 8 - (6 - 1) = 3$

65. In d.c. power supplies, the switching frequency is much greater than

- A. the d.c. power source frequency, enabling the transformer to be small
- B. the d.c. power source frequency, enabling the transformer to be large
- C. the a.c. power source frequency, enabling the transformer to be large
- D. the d.c. power source frequency enabling the transformer to be small

Ans. D

Sol. In DC power supplies, the switching frequency is much greater than the AC power source frequency, enabling the transformer to be small.

66. Which one of the following statements is not correct for electro-dynamometer type instrument?

- A. It can measure a range of currents and voltages up to 10A and 600 V respectively.
- B. The deflecting torque is inversely proportional to the square of the current.
- C. It can be used for both a.c. and d.c. systems.
- D. It has the same calibration for d.c. instruments as well as a.c. measurements.

Ans. B

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

$$T_d \propto I^2$$

Deflecting torque is directly proportional to the square of the current.

Hence, option B is incorrect.

67. Which of the following statements is / are correct with regard to three phase induction motor?
- 1) In cascading of two induction motor speed control technique, one induction motor must be squirrel cage while the other can be either slip ring or squirrel cage motor.
 - 2) By increasing rotor resistance, starting torque and maximum torque increases.
 - 3) Pole changing speed control technique can be used only in squirrel cage induction motor.
 - 4) Cogging and crawling phenomenon are usually not encountered in slip ring induction motor
- A. 1, 2 and 4
B. 3 and 4
C. 2 and 3
D. 1, 3 and 4

Ans. B

Sol. In cascading of two induction motor speed control technique, one induction motor must be slip ring type while the other can be either slip ring or squirrel cage motor.
By increasing rotor resistance, starting torque increases but maximum torque remains unchanged.
Pole changing speed control technique can be used only in squirrel cage induction motor.
Cogging and crawling phenomenon are usually not encountered in slip ring induction motor as their starting torque is high enough to accelerate it.

68. Which one of the following is not a method of voltage control in power system?
- A. Booster transformer
B. Tap-changing transformer
C. Series capacitor
D. Shunt inductor

Ans. C

Sol. Method of voltage control are as follows:

- Booster transformer
- Tap changing transformer
- Shunt inductor
- Shunt capacitor

Series capacitor is used to increase the steady state power limit. Not for voltage control.

69. An energy source forces a constant current of 2A for 10s to flow through a light bulb. If 2.3 kJ is given off in the form of light and heat energy, what is the voltage drop across the bulb ?
- A. 120 V
B. 115 V
C. 110 V
D. 105 V

Ans. B

Sol. Heat energy = I^2Rt

$$\text{Heat} = 2.3 \text{ kJ} = 2300 \text{ J}$$

$$I = 2\text{A}, t = 10\text{s}$$

$$\text{So, } 2300 = (2)^2 \times R \times 10$$

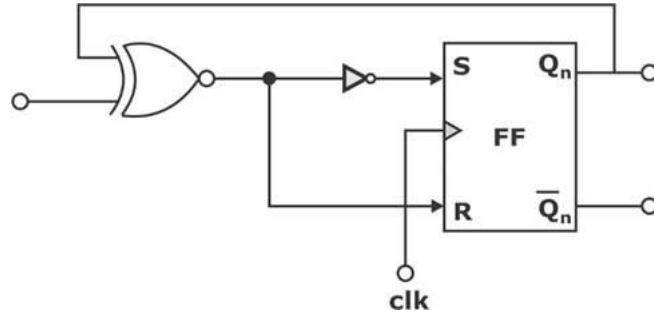
$$R = 57.5$$

Voltage drop across the bulb

$$V = IR = 2 \times 57.5$$

$$V = 115 \text{ Volts}$$

70. A S-R flip-flop is controlled into X flip-flop as shown below characteristic equation is



- A. $\bar{X} \oplus Q$
- B. $X \oplus Q$
- C. $X Q_n$
- D. $\overline{X \oplus Q_n}$

Ans. B

Sol.

X	Q_n	S	R	Q_{n+1}
0	0	0	1	0
0	1	1	0	1
1	0	1	0	1
1	1	0	1	0

$$Q_{n+1} = X \oplus Q_n$$

So, answer (B)

71. Using an auto transformer starter having 30% tapping an induction motor develops 80 Nm starting torque. New starting torque will be _____ Nm of auto transformer when tapping is doubled.

- A. 40
- B. 80
- C. 160
- D. 320

Ans. D

Sol.

$$\frac{T_1}{T_2} = \left(\frac{N_1}{N_2}\right)^2$$

Where $N_1 =$ Tapping %

$$\frac{T_1}{T_2} = \left(\frac{0.3}{0.6}\right)^2 \Rightarrow \frac{80}{T_2} = \left(\frac{0.3}{0.6}\right)^2$$

$$T_2 = 320 \text{ Nm}$$

72. If a function is given as $f = AB + \bar{A}\bar{B}$ then find its complement.

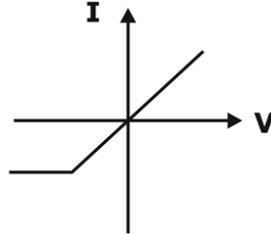
- A. 0
- B. AB
- C. $\bar{A}B + A\bar{B}$
- D. $AB + \bar{A}\bar{B}$

Ans. C

Sol. Given, $f = (AB + \bar{A}\bar{B})$

$$\begin{aligned} \text{Complement of } \bar{f} &= \overline{AB + \bar{A}\bar{B}} \\ &= \overline{AB} \cdot \overline{\bar{A}\bar{B}} \\ &= (\bar{A} + \bar{B})(A + B) \\ &= A\bar{A} + A\bar{B} + B\bar{A} + B\bar{B} \\ &= A\bar{B} + \bar{A}B \end{aligned}$$

73. A circuit characteristic is given below.



1. It is a non-linear element.
2. It is unidirectional.
3. It is active element.
4. It is bidirectional element.

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

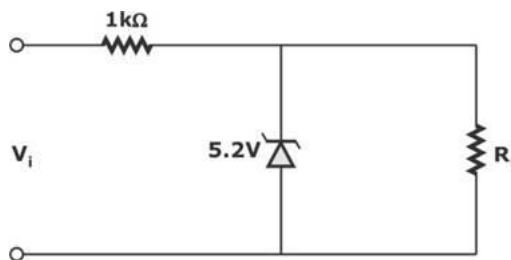
Ans. A

Sol. Since, Slope is positive so, it must be passive element.

∴ Characteristic is not symmetric about origin.

So, it is non-linear & unidirectional element.

74. The Zener diode in the regulator circuit diagram shown in figure has a Zener voltage of 5.2V and a Zener knee current of 0.2 mA . The maximum load current drawn from this circuit ensuring proper functioning over the input voltage range between 20 and 30V is.



- | | |
|------------|------------|
| A. 14.6 mA | B. 15.6 mA |
| C. 25.6 mA | D. 24.6 mA |

Ans. A

Sol. For proper functioning take $V_i = 20V$

$$I_s = \frac{V_i - V_z}{1k} = \frac{20 - 5.2}{1k} = 14.8 \text{ mA}$$

$$I_L = I_s - I_z = 14.8 - 0.2 = 14.6 \text{ mA}$$

$$R_L = \frac{V_z}{I_z} = \frac{5.2}{14.6 \text{ m}} = 356.16 \Omega$$

If $V_i = 30$, then $V_L > V_z$ here for $V_i > 20$ up to 30V, Zener diode in break down.

If we take 30V as source input for calculating maximum current, then for 20V, Zener will not be in break down which is not proper functioning.

Hence, $I_{Lmax} = 14.6 \text{ mA}$

75. Which of the following statement is not correct about PI controller?

- A. It improves steady state response
- B. It increases the Bandwidth
- C. It reduces the noise level
- D. It increases type and order of system by one

Ans. B

Sol. **PI Controller:**

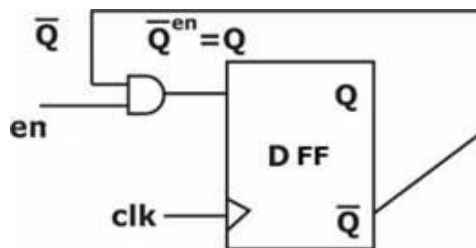
- It reduce the phase margin of system so relative stability is decreased.
- Steady state error is reduced so steady state response is improved without much affecting transient response.
- Gain cross over frequency is decreased which is a rough measure of bandwidth therefore bandwidth is decreased.
- Bandwidth is inverse of time constant. So time constant is increased.
- It is like a low pass filter
- It is attenuate the high frequency noise signal therefore signal/noise ratio is improved.

76. A switch tail ring counter is made by using a single D flip-flop. The resulting circuit is a

- A. SR flip flop
- B. JK flip flop
- C. D flip flop
- D. T flip flop

Ans. D

Sol.



When enable = 1

PS P.I NS

Q D=Q̄ Q⁺

$$\begin{bmatrix} 0 & 1 & 1 \\ 1 & 0 & 0 \end{bmatrix} - NS = \overline{PS}$$

When en = 1 then o/p is toggled.

Then T flipflop.

77. Which of the following statement is correct?
- A. Order of the system is number of open loop poles at origin.
 - B. Steady state error for order 1 system is zero for step input.
 - C. For type 1 system, position error constant is zero.
 - D. for type 2 system velocity error constant is infinite.

Ans. D

Sol. Order of the system is highest power of characteristics equation.

Steady state error for type 1 system is zero for step input.

For type 1 system position error constant is infinite.

For type 2 system velocity error constant is infinite.

Hence option D is correct.

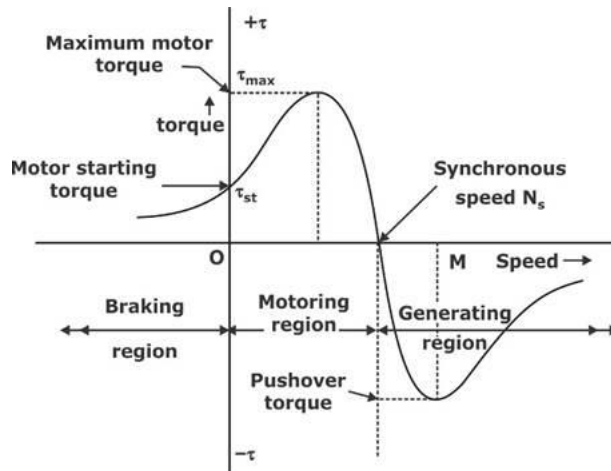
78. In generating mode, an induction machine operates as a generator with a shaft speed which is greater than the synchronous speed, if the slip is

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

Ans. D

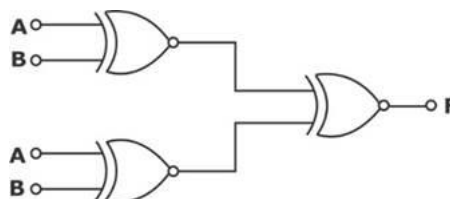
Sol. Induction motor works as generator when it runs at speed greater than synchronous speed. In other words, it should have negative slip.

Torque speed characteristics of 3-phase IM:



Hence, if $N > N_s$, then $s < 0$.

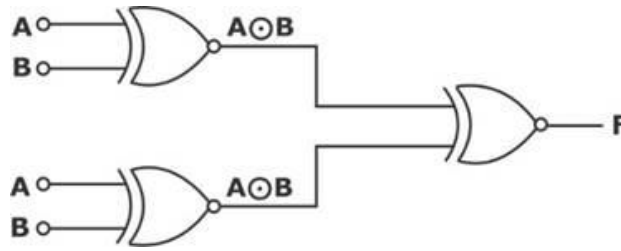
79. Consider the circuit shown in figure below, the output of the circuit is



- A. 0
- B. 1
- C. $\bar{A}B + A\bar{B}$
- D. $\overline{A \cdot B} \oplus \overline{A \cdot B}$

Ans. B

Sol.



Input of X-NOR Gate is same and same input generate logic high at the output.

80. Consider the following statements for quarter-wave symmetry:

A periodic function possesses a quarter-wave symmetry, if

- 1) it has either odd or even symmetry
- 2) it has half-wave symmetry

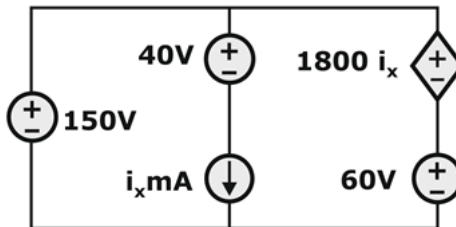
Which of the above statements is/are correct?

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

Ans. A

Sol. A signal is said to possess quarter-wave symmetry when it is either odd or even symmetry and has half wave symmetry. These signals are shifted to left or right by $T/4$ with a half-wave symmetry but the even symmetry of the original unshifted towards the odd symmetry it is said to be quarter wave symmetry.

81. For what value of i_x , connection in below diagram is valid.



- A. 40
- B. 50
- C. 60
- D. 70

Ans. B

Sol. For valid connection

it must satisfy KVL

$$150 = 1800 i_x + 60$$

$$150 - 60 = 1800 i_x \times 10^{-3}$$

$$\frac{90}{1800 \times 10^{-3}} = i_x \Rightarrow i_x = 50$$

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

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

Ans. B

Sol.

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

⇒ capacitor opposes sudden change in voltage across it

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

83. For an ADC, match the following :

- (A) flash counter (I) Integrating type
- (B) successive approx (II) fastest counter
- (C) counter ramp (III) max conversion time = N
- (D) Dual slope (IV) uses a DAC in feedback

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

Ans. D

Sol. The correct match order for ABCD will be 2341.

84. **Statement (I):** Fan regulators can use single-phase triac.

Statement (II): In low power single phase induction motors, voltage control method is effective.

- A. Both statement (I) and statement (II) are correct and statement (II) is the correct explanation of statement (I).
- B. Both statement (I) and statement (II) are correct but statement (II) is NOT the correct explanation of statement (I).
- C. Statement (I) is True but (II) is False.
- D. Statement (I) is False but (II) is True.

Ans. A

Sol. In fan regulators, a triac can be used to control the speed of the fan by voltage control and also it is effective in low power single phase induction motors.

85. Which one of the following statements is not correct related to oscillators?

- A. The frequency of a sinusoidal oscillator is determined by the condition that the loop-gain phase shift is zero.
- B. In every practical oscillator, the loop gain is slightly larger than unity and the amplitude of the oscillations is limited by the onset of non-linearity.

C. The condition of unity loop gain $-A\beta = 1$ is called the Barkhausen criterion.

D. Oscillations will be sustained if, at the oscillator frequency, the magnitude of the product of the transfer gain of the amplifier and the magnitude of the feedback factor of the feedback network are less than unity.

Ans. D

Sol. In relation to oscillators

$A\beta < 1$ is not correct

(d) option is right choice.

86. In a transformer, _____ harmonic is rich in magnetic inrush.

A. 1st

B. 2nd

C. 5th

D. 7th

Ans. B

Sol. In a transformer, 2nd harmonic is rich in magnetic inrush. Inrush currents are typically rich in harmonics, the second harmonic in particular. Therefore, the second-harmonic content in the differential currents has been traditionally used in transformer differential elements to block or to increase restraint during inrush conditions.

87. Consider for an Amplifier having open loop gain of 100.

Now, its open loop gain changes by 10%.

Then, overall gain changes by _____%.

A. 0.01

B. 0.1

C. 1

D. 10

Ans. B

Sol. Given:

Open loop gain, $AB = 100$

$$\frac{dA_f}{A_f} = \left(\frac{1}{1 + AB} \right) \frac{dA}{A}$$

$$\frac{dA_f}{A_f} = \left(\frac{1}{1 + 100} \right) \frac{dA}{A}$$

$$\text{Given, } \frac{dA}{A} = 0.1$$

$$\text{So, } \frac{dA_f}{A_f} = \frac{1}{101} \times 0.1 = 0.00099 \text{ or } 0.099\% = 0.1\%$$

88. For a EHV line, what will be the satisfactory shielding angle when the tower is on hill side?

A. 15°

B. 20°

C. 45°

D. 60°

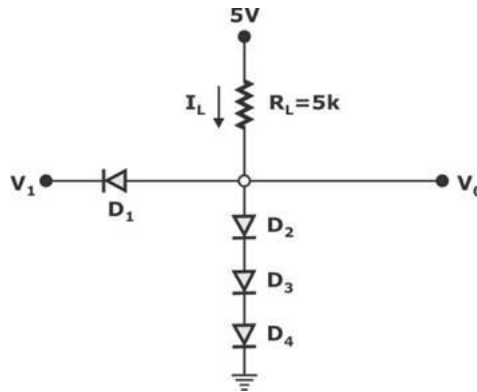
Ans. C

Sol. **Shielding Angle:**

Angle between a vertical line through the ground wire and a slanting line connecting the ground wire and phase conductor to be protected.

Generally, for EHV line it is 20° to 45°
When tower is on hill side, 45° is satisfactory angle.

89. The silicon diode circuit is shown. Calculate the load current I_L (mA) for $V_i = +0.2V$. Assume the voltage drop V_D across a conducting diode to be 0.7V, $R_L = 5\text{ k}\Omega$ and $V_{CC} = 5V$.



- A. 0.9 mA
- B. 0.82 mA
- C. 0.72 mA
- D. 0.68 mA

Ans. B

Sol. For $V_i = +0.2V$, the diode D_1 is forward biased.

The output voltage can be calculated as \rightarrow

$$V_0 = V_{D1} + V_i$$
$$= 0.7 + 0.2 = 0.9\text{ V}$$

The diodes D_2 , D_3 and D_4 can then on only when

$$V_0 = 3 \times V_D$$
$$= 3 \times 0.7 = 2.1V$$

And thus for our case these diodes will not conduct.

$$\text{Load current, } I_L = \frac{V_{CC} - V_0}{R_L}$$
$$= \frac{5 - 0.9}{5k}$$

$$I_L = 0.82\text{ mA}$$

90. Statement (I): The rotor of a reluctance motor is of unsymmetrical magnetic construction squirrel cage type.

Statement (II): Unsymmetrical magnetic construction provides variable reluctance path between stator and rotor.

- A. Both statements are true, but statement II is correct explanation of statement I.
- B. Both statements are true, but statement II is not correct explanation of statement I.
- C. Statement I is true & statement II is false.
- D. Statement II is true & statement I is false.

Ans. A

Sol. Both statements are true, but statement II is correct explanation of statement I. Hence option A is correct.

91. Which of the following properties is correct about servomotor.
- | | |
|--|---|
| A. High inertia and high starting torque | B. low inertia and low starting torque |
| C. low inertia and high string torque | D. High inertia and low starting torque |

Ans. C

Sol. Properties of servomotors

⇒ Low inertia and high starting torque

⇒ Due to low-inertia they are able to reverse direction quickly

⇒ They are able to accelerate and de-accelerate quickly.

⇒ They are able to return to a given position time after time without and drift.

92. A 230V, 50 Hz, 1ϕ full converter bridge is delivering 20A constant dc current. If source inductance is 5 mH, then drop due to source inductance in output voltage is_____.
- | | |
|--------|--------|
| A. 9V | B. 10V |
| C. 15V | D. 20V |

Ans. D

Sol. In full converter,

$$\text{drop due to source inductance} = \frac{2\omega L_s \cdot I_o}{\pi}$$

$$= \frac{2 \times 2\pi \times 50 \times 5 \times 10^{-3}}{\pi} \times 20$$

$$= 20V$$

93. In a 3ϕ induction motor, rotor is rotating at speed of N_r (rpm), stator flux is rotating at speed of N_s (rpm), then speed of stator flux with respect to rotor is
- | | |
|----------------|----------------|
| A. N_s | B. $N_s - N_r$ |
| C. $N_s + N_r$ | D. N_r |

Ans. B

Sol. Given, rotor speed (N_r) rpm

Stator flux speed N_s (rpm)

Speed of stator flux w.r.t rotor is $N_s - N_r$

Note: Speed of stator flux & rotor flux is same w.r.t. stator body.

94. Which one of the following is not a self-generating type of transducer?
- Bourdon gauge for the measurement of pressure
 - Pitot tube for the measurement of fluid flow velocity
 - Thermistor for the measurement of temperature
 - Photovoltaic cell

Ans. C

Sol. Self-Generating type of transducer:

- Bourdon gauge
- Pitot tube
- Photovoltaic cell

95. Which one of the following tests does not come under the testing types of circuit breaker?
- A. Short-circuit test
 - B. Open-circuit test
 - C. Dielectric test
 - D. Thermal test

Ans. B

Sol. Open circuit test does not come under the testing of circuit breaker.

96. Which of the following cores have linear characteristics?
- A. Steel core
 - B. CRGO core
 - C. Air core
 - D. None of the above

Ans. C

Sol. Air cores have linear magnetization characteristics i.e., they do not saturate whereas steel core and CRGO core have non-linear magnetization characteristics.

97. Which one of the following consists of op-amp in inverting mode and network of R-C components, and the op-amp being in inverting mode it serves two purposes of amplifying and at its output 180° shifted phase is obtained?
- A. Wien's bridge oscillator
 - B. R-C phase-shift oscillator
 - C. Triangular wave generator
 - D. Charging capacitor

Ans. B

Sol. Op-amp in inverting mode and network of RC components. RC phase shift oscillator.

98. A $4\frac{1}{2}$ digit voltmeter is used to measure the voltage value of 0.3861 V on a 1 V range. It would be displayed in the panel as

- A.

0	.	3	8	6	1
---	---	---	---	---	---
- B.

0	0	.	3	8	6
---	---	---	---	---	---
- C.

0	0	0	.	3	8
---	---	---	---	---	---
- D.

.	3	8	6	1	0
---	---	---	---	---	---

Ans. A

Sol. Resolution over 1 V range,

$$= \frac{1}{20000} \times 1 \text{ V} = .0001 \text{ V/division}$$

Since, it can only display only 5 digits,

So, resolution is approximately .0001

So, $4\frac{1}{2}$ digit voltmeter will display 0.3861 over 1 V range.

99. Least Power loss occurs in
- A. SCR
 - B. BJT
 - C. IGBT
 - D. MOSFET

Ans. A

Sol. Correct sequence of power loss is

$$\text{SCR} < \text{BJT} < \text{IGBT} < \text{MOSFET}$$

100. A ripple count with n flipflop can function as _____
- A. $n : 1$ B. $n/2 : 1$
 - C. $2n : 1$ D. $2^n : 1$

Ans. D

Sol. For one output, the flip flop has two possibilities each and hence for n flip flops the possible counts are $2^n : 1$.

101. Amar Shaheed Lal Padmadhar Singh who took part in the Quit India Movement was born in which district?
- A. Sidhi B. Mandla
 - C. Khargone D. Satna

Ans. D

Sol. * Amar Shaheed Lal Padmadhar Singh was born on 14 October 1913 in Kripalpur in Satna.
 * Amar Shaheed Lal Padmadhar Singh took part in the Quit India Movement.
 * He was martyred on 12 August 1942, fighting in the freedom struggle.
 * He launched a handwritten magazine called Rajput Prabhat.

102. Rani Laxmi Bai fought her last battle against on 17 June 1858 at a place called Kotah-ki Sarai.
- A. Hinej B. Melsan
 - C. Hugh Rose D. Durand

Ans. C

Sol. • Rani Laxmi Bai fought her last battle against Hugh Rose on 17 June 1858 at a place called Kotah-ki Sarai.
 • During the Indian Rebellion of 1857, Rose was given command of the Central Indian Field Force and defeated the armies at Jhansi in April 1858, at Lahore in May 1858 and at Gwalior in June 1858.
 • Hugh Rose wrote of Lakshmi Bai that "She used to dress like a man (with a turban) and rode like one. Not pretty and pock marked with small pox, but beautiful eyes and figure".
 • Rani Lakshmi Bai was born on 19 November 1828 in the town of Varanasi into a Marathi Karhade Brahmin family.

103. Which one of the following freedom fighters is not related to Madhya Pradesh?
- A. Babulal Jain B. Kesari Singh Barahath
 - C. Shankar Shah D. Sundarlal Baroh

Ans. B

Sol. * Kesari Singh Barahath was an Indian freedom fighter and Rajasthani-language poet.
 * He was born in a Charan family of Krishna Singh Barahath in the Devpura village of Shahpura.
 * In 1903, he had written a 13-couplet poem, Chetavani ra Chugatiya, in order to stop the Udaipur State Maharana Fateh Singh from coming to a meeting with the British Viceroy Lord Curzon.

* On 2 March 1914, with the help of Shahpura king Nahar Singh, he was caught and charged with the murder of a Mahant (sage), Pyare Lal and Raj Droh.

* Barahath initially worked to awaken the people of Rajasthan against British rule by educating and organising militant Kshatriyas.

* Later, he supported and helped Indian freedom fighters by supplying weapons.

104. The famous Kakanmath temple is located in which district of Madhya Pradesh?

- A. Morena
- B. Dewas
- C. Datia
- D. Sagar

Ans. A

Sol. • Kakanmath is a ruined 11th century Shiva temple located at Sihoniya town of Morena district in Madhya Pradesh.

• It was built in Gurjara-Pratihara Dynasty reign.

• The temple was named "Kakanmath" after Kakanavati or Kakanade, who was the queen of one Surajpala.

• From the Kachhapaghat inscription found in the Sas-Bahu temple in Gwalior, it can be traced that Kirtiraj built an extraordinary temple dedicated to the lord (Shiva) of Parvati in Sihoniya .

• At the feet of the entrance were two large lion statues, now located at the entrance of the Archaeological Museum, Gwalior.

105. Which city in Madhya Pradesh hosts the 'Akhil Bhartiya Kalidas Event' annually?

- A. Gwalior
- B. Ujjain
- C. Indore
- D. Bhopal

Ans. B

Sol. The Akhil Bhartiya Kalidas Samaroh is a seven-day festival held every year in the city of Ujjain, that is acquainted with literary giants of Sanskrit such as Kalidas, Vatsyayana, Bhartrihari, and appreciated Hindi writers like Shivmangal Singh Suman, Prabhakar Machve, Gajanan Madhav Muktibodh, and Pandit Surya Narayan.

106. Which of the following is related to Badhai?

- A. Folk song of Nimar
- B. Folk dance of Bundelkhand
- C. Folk song of Baghel
- D. Folk dance of Malwa

Ans. B

Sol. • Badhai is a typical folk dance of Bundelkhand.

• The majority of the people of Bundelkhand believe in goddess Sheetala at the time of calamities, such as flood, sickness and so on. On occasions like marriage or the birth of son, they beseech the goddess for her help and blessings and if their prayer is granted or wish fulfilled, both men and women go to goddess Sheetala and in tune with the rhythm of the folk musical instrument, they perform various steps. This particular rhythm is also called "Badhai".

• Other major folk dances of Bundelkhand:

- Diwari is performed every year during the festival of light Diwali/Deepawali at the end of October or first week of November according to lunar calendar.

- Ravala dance in Bundelkhand is basically a dance drama.
- Horse dance is a ceremonial dance performed by a trained horse with the loud beats of heavy drums called Rabbi.

107. In which year Bhopal became the capital of Madhya Pradesh?

- A. 1956
- B. 1957
- C. 1954
- D. 1951

Ans. A

Sol. After Independence, state reorganization commission was constituted in 1955 to reorganize state boundaries. Madhya Pradesh was formed by merging four states- Central province, Barar, Madhya Bharat, Vindhya Pradesh and Bhopal.

- Hence after all the changes Madhya Pradesh state with its new capital **Bhopal was formed on 1st November 1956.**

108. Who is the author of the book 'Golden Girl'?

- A. sunil gavaskar
- B. P.T. usha
- C. sachin tendulkar
- D. Malleswari

Ans. B

Sol. The author of 'Golden Girl' book is P.T. Usha.

109. Who started salt satyagrah in Madhya Pradesh?

- A. Sarojni Naidu
- B. Maulana Azad
- C. Pt. Govind Das
- D. Shri Vinoba Bhave

Ans. C

Sol. Salt satyagrah was launched at **Jabalpur, Madhya Pradesh** under the leadership of **Pt. Govind Das.**

110. Where is Tribal Museum established in MP?

- A. Katni
- B. Bhopal
- C. Jhabua
- D. Dhar

Ans. B

Sol. **Tribal Museum** has been established on **Shyam hills** in **Bhopal** by M.P. Government to display directly the unique features of Tribal multi-colour culture.

111. Which sub-tropical cyclone resulted in heavy rainfall in Madhya Pradesh?

- A. Isaac
- B. Kirck
- C. Daye
- D. Paul

Ans. C

Sol. Daye is a sub-tropical cyclone that resulted in heavy rainfall in Madhya Pradesh.

- A monsoon low in the Bay of Bengal has organized into Cyclonic Storm Daye and will bring another surge of rainfall to parts of eastern and northern India.
- Daye was named by Myanmar.
- Cyclone is the formation of the very low-pressure system with very high-speed winds revolving around it.

112. Which of the following is a scarce region of mineral resources in Madhya Pradesh?

- A. Rewa-Panna Plateau
- B. Bundelkhand Plateau
- C. Malwa Plateau
- D. Baghelkhand Plateau

Ans. C

Sol. • The Malwa Plateau is roughly a triangle based on the Vindhyan Hills, bounded by the Aravali Range in the west and the central Indian plateau in the north and the Bundelkhand in the east.
• This plateau has two drainage systems, one towards the Arabian Sea and the other towards the Bay of Bengal.
• In the north, the Chambal and many of its right bank tributaries, such as the Kali, the Sindh and the Parbati, are drained.
• It also includes the upper courses of Ken and Betwa.
• It is composed of an extensive lava flow and is covered by black soils.

113. Which amongst the following rivers doesn't pass through the state of Madhya Pradesh?

- A. Narmada
- B. Tapi
- C. Krishna
- D. Mahanadi

Ans. C

Sol. River Krishna passes through Maharashtra, Karnataka, Telangana and Andhra Pradesh. It doesn't pass through the state of Madhya Pradesh. Important rivers passing through Madhya Pradesh includes - the Narmada, the Tapti (Tapi), the Mahanadi, and the Wainganga (a tributary of the Godavari). The Chambal forms the state's northern border with Rajasthan and Uttar Pradesh. Other rivers include tributaries of the Yamuna and the Son (itself a tributary of the Ganges).

114. The source of the river Narmada lies in which amongst the following states?

- A. Maharashtra
- B. Madhya Pradesh
- C. Gujarat
- D. Chhattisgarh

Ans. B

Sol. River Narmada (the largest west flowing river of the Peninsula) rises near Amarkantak range of mountains in Madhya Pradesh. It is the fifth largest river in the country and the largest one in Gujarat. It traverses Madhya Pradesh, Maharashtra and Gujarat and meets the Gulf of Cambay.

115. Which amongst the following dams is located on river Betwa in Madhya Pradesh?

- A. Tigr Dam
- B. Rajghat Dam
- C. Indirasagar Dam
- D. Bheemgarh Dam

Ans. B

Sol. Of the above-mentioned dams, Rajghat dam is located on the river Betwa. It is 11200 m in length and has the hydroelectric capacity of 45 MW. It surrounds Chanderi and Ashoknagar districts. Other mentioned dams are located on - Tigr dam (Sank); Indirasagar dam (Narmada); and Bheemgarh dam (Wainganga).

116. Which amongst the following is/are the dominant vegetation type found in Madhya Pradesh?
- A. Moist Deciduous Forests
 - B. Dry Deciduous Forest
 - C. Tropical Evergreen Forests
 - D. Both (A) and (B)

Ans. D

Sol. The dominant vegetation in the state of Madhya Pradesh consists mostly of moist deciduous forests, dry deciduous forests along with the bamboo thickets as well as the mixed forests. The most common tree in the dry deciduous forests of this area is the Sal.

117. Which crop is oilseed crop of Madhya Pradesh.
- A. Soyabean
 - B. Mustard
 - C. Linseed
 - D. All of the above

Ans. D

Sol. The **Oilseed** crops are grown on **58 lakh hectare** area of land in Madhya Pradesh. Chief oilseed crops are **soyabean, mustard, linseed, groundnut and sesame.**

118. Which of the following waterfall is not situated on Narmada river?
- A. Pandav Waterfall
 - B. Dugdhdhara Waterfall
 - C. Kapildhara Waterfall
 - D. Sahastra Dhara Waterfall

Ans. A

Sol. Pandav Waterfall is situated on Ken river in Panna district. Six waterfalls are situated on Narmada River - Dhuandhar Waterfall (Jabalpur), Dugdhdhara (Anuppur), Mandahar (Khandwa), Kapildhara (Amarkantak), Dardi (Khandwa), Sahastradhara (Maheshwar).

119. Maheshwar city of Madhya Pradesh is located on the bank of which river?
- A. Tapti
 - B. Mahi
 - C. Mahanadi
 - D. Narmada

Ans. D

Sol. • **Maheshwar (Mahismati)** city of Madhya Pradesh is located along the bank of Narmada river.

• **Tewar (Tripuri)** city is also located along the bank of **Narmada river.**

120. In which area the maximum irrigation takes place using wells in Madhya Pradesh?
- A. Eastern area
 - B. Western area
 - C. North-eastern area
 - D. South area

Ans. B

Sol. Maximum irrigation takes place by using wells in **Western area. 66.98%** part is irrigated with the help of wells and tubewells. After the economic survey of **2013-14 Canals** and **Ponds** are mostly used for the irrigation purpose.

121. What is the act of creating a disguised communication as a source known to the concerned user, is called?
- A. Clickjacking
 - B. Spoofing
 - C. Phishing
 - D. Eavesdropping

Ans. B

Sol. Click asking → making multiple tabs/ clicks over a webpage to trick the user
Phishing → act of gaining financial information by replicating faulty webpages
Eavesdropping – Act of listening communication between 2 uses thorough unauthorized across.

122. Which one of the following is not a non-impact printer?

- A. Ink Jet printer
- B. Daisy wheel printer
- C. Laser printer
- D. Dye sublimation printer

Ans. B

Sol. Daisy wheel is an impact printer.

123. Which online portal offers a unique identity and presence to each panchayati raj institution in the country?

- A. India Panchayat Knowledge Portal
- B. National Panchayat Portal
- C. Panchayat.gov.in
- D. None of These

Ans. B

Sol. The **National Panchayat Portal** is a collaborative and dynamic portal which offers a **unique identity** and presence to each **panchayati raj institution** in the country

124. UMANG app launched by Ministry of Electronic and Information technology stands for:

- A. Unified Mobile Application for New-Age Governance
- B. Unified Mobile Application for Next Generation.
- C. Unified Mobile Access for Next Generation.
- D. None of the above.

Ans. A

Sol. UMANG (Unified Mobile Application for New-Age Governance) is one of the key initiatives under the Digital India program to develop a common, unified platform and mobile app to facilitate a single point of access to all government services. It is envisaged to act as a master application, which will integrate major government services from various sectors such Agriculture, Education, Health, Housing among others. The application will enable users to access e-Government services from the central Government, the State Governments, local bodies and their agencies.

125. Which of the following protocols is used for the distributed, collaborative and hypermedia information system?

- A. Wireless application protocol
- B. Hypertext transfer protocol
- C. File transfer protocol
- D. Transmission control protocol

Ans. B

Sol. **Hypertext transfer control protocol** is an application for information system based on distributed, collaborative and hypermedia. It is used in web server applications.

Wireless application protocol is a standard protocol for accessing any information from a wireless mobile network.

File transfer protocol is a network protocol to transfer computer files in any computer network between any client and server.

Transmission control protocol is a basic communication language or protocol of the Internet. It has two versions of Internet protocol - four and six.

126. National Institute of Mental Health Rehabilitation (NIMHR) is located in which of the following district of Madhya Pradesh?

- A. Devas
- B. Sehore
- C. Jhabua
- D. None of these

Ans. B

Sol. • The foundation stone for the 'National Institute of Mental Health Rehabilitation' (NIMHR), the first-of-its kind institute in India, was laid down at Sherpur Village along Bhopal-Sehore highway, District Sehore, Madhya Pradesh.

• NIMHR will be the first of its kind in the country in the area of mental health rehabilitation. It will serve as an institution of excellence for capacity building in human resource and research in the area of mental health rehabilitation, and also recommending body suggesting models/protocols for effective rehabilitation of persons with mental illness.

127. V-RAM is used for access of

- A. Video & Graphics
- B. Programs
- C. Text & Images
- D. None of these

Ans. A

Sol. V-RAM (video RAM) refers to Random Access Memory (RAM) which is used to store image or data for a computer display.

• V-RAM is a buffer between the computer processor and the display and is often called the frame buffer.

• V-RAM is the most important for applications that display complex image textures or render polygon-based 3D structures. The most common of these applications are video games or 3D graphic design programs.

128. Which of the following is a main component of Structured Query Language (SQL)?

- A. Data Manipulation Language (DML)
- B. Data Definition Language (DDL)
- C. Data Control Language
- D. All of the above

Ans. D

Sol. Structured Query Language (SQL) is a standard computer language. SQL is used to query, insert, update and modify data.

It has three main components:

- (a) The Data Manipulation Language (DML)
- (b) The Data Definition Language (DDL)
- (c) The Data Control Language (DCL)

129. Which of the following language was used in first generation computers?

- A. Assembly Language
- B. High Language
- C. Machine Language
- D. None of these

Ans. C

Sol. Machine Language was used in first generation computers. Machine language is a collection of binary digits or bits that the computer reads and interprets. It is the only language a computer is capable of understanding.

130. Which of the following is the part of a program that guides the user through the installation or setup of a software program or hardware device?

- A. Wizard
- B. Machine Language
- C. Software
- D. None of these

Ans. A

Sol. A wizard is a feature that guides the user through the installation or setup of a software program or hardware device. Unlike a manual or on-line help, a wizard guides you through the installation one step at a time and asking a series of questions.

131. There has been an increase of in the budget 2019-20 of the Department of Farmer Welfare and Agriculture Development of the Government of Madhya Pradesh.

- A. 66%
- B. 27%
- C. 42%
- D. 55%

Ans. A

Sol. * There has been an increase of 66% in the budget 2019-20 of the Department of Farmers Welfare and Agriculture Development of the Government of Madhya Pradesh.

* The Finance Minister, Mr. Tarun Bhanot, presented the budget for Madhya Pradesh for financial year 2019-20 on 10 July 2019.

* The Minister had previously presented the interim budget for the state in February 2019.

132. Which is the largest crop in terms of area and production in the state of Madhya Pradesh in Rabi season?

- A. Rice
- B. Wheat
- C. Gram
- D. Maize

Ans. B

Sol. Wheat is considered as the major crop of the state in terms of area and production. Wheat occupies the highest area under Rabi crops. The wheat producing areas of Madhya Pradesh come under the wheat belt of the country, where about 75 cm to 127 cm rainfall occurs. The main wheat growing districts are Sehore, Vidisha, Raisen, Shivpuri, Gwalior, Ujjain, Hoshangabad, Sagar, Tikamgarh, Satna, and Indore.

133. The Gram Swaraj system was launched in Madhya Pradesh on:

- A. 12 March 2005
- B. 26 January 2001
- C. 15 August 1996
- D. 1 December 1990

Ans. B

Sol. • The Gram Swaraj system was launched in Madhya Pradesh on 26 January 2001.

• Gram Swaraj is a special term coined by Mahatma Gandhi and later developed by Vinoba Bhave.

Sol. **Rajmata Vijayaraje Scindia Agricultural University** is situated in **Gwalior**. It was established in **2008** and covers **25 districts**. **6** agricultural colleges of Madhya Pradesh are affiliated from this University.

137. Panchayats of which of the following district of Madhya Pradesh are governed through PESA Act?

- A. Anooppur
- B. Sagour
- C. Mandla
- D. Datia

Ans. C

Sol. **Fifth schedule** of Indian Constitution provides for the administration of **tribal areas**. **PESA act** is implemented in **9 states** given in **fifth schedule**. **Madhya Pradesh** is one of them and the panchayats of **Mandla district** of Madhya Pradesh is governed through PESA Act.

138. Madhya Pradesh New Forest Policy was introduced in which year ?

- A. 1952
- B. 2017
- C. 2005
- D. 2015

Ans. C

Sol. In the meeting of the Council of Ministers of Madhya Pradesh on **April 4, 2005**, **state's new forest policy was approved**. Prior to that, **the state forest policy of undivided state of 1952** was working in Madhya Pradesh.

139. Where is the largest soybean plant of Asia being set up in Madhya Pradesh?

- A. Indore
- B. Mandsoore
- C. Ujjain
- D. Shivni

Ans. C

Sol. The first largest **soybean** plant of **Madhya Pradesh** was established in **shivni**, but largest in Madhya Pradesh as well as in all over **Asia** soybean plant is being established in **Ujjain city** of Madhya Pradesh.

140. Proceedings of Madhya Pradesh Legislative assembly take place in which building ?

- A. Vallabh Bhawan
- B. Indra Gandhi Bhawan
- C. Vindhyachal Bhawan
- D. Satpuda Bhawan

Ans. B

Sol. Previously proceedings of Legislative assembly used to take place in **Minto Hall**. At present **Late shrimati Indira Gandhi (Bhawan) Assembly Hall** is used for the meetings of the state assemblies. Indira Gandhi Bhawan is situated in Madhya Pradesh's capital **Bhopal**.

141. Which amongst the following cities hosts the first e-waste clinic of the country?

- A. Lucknow
- B. Noida
- C. Bhopal
- D. Jabalpur

Ans. C

Sol. On January 24, 2020 India's first e-waste clinic was opened in Bhopal, Madhya Pradesh. The e-waste clinic was inaugurated by Secretary (C K Mishra ()) to the Ministry of Environment, Forest & Climate change, MoEFCC. The e-waste clinic was jointly set up by the Central Pollution

Board Control -CPCB and Bhopal Municipal Corporation – BMC. The clinic includes segregation, processing, and disposal of waste from both household and commercial units.

142. A book titled 'The Legend Of Birsa Munda' has been written by_____.

- A. Tuhin A Sinha
- B. Ankita Verma
- C. Amitabh Ghosh
- D. Both A and B

Ans. D

Sol. • **A new book titled 'The Legend of Birsa Munda' has been authored by Tuhin A Sinha.**

• **This book is co-authored by Ankita Verma.**

• The book was released by the **Maharashtra Governor Bhagat Singh Koshiyari on January 19, 2022.**

• The book tells the extraordinary story of Birsa Munda, who courageously fought against the oppressive British Raj for the rights of his tribal community.

143. Currently, what is India's operational nuclear power capacity?

- A. 5880 MW
- B. 6380 MW
- C. 6780 MW
- D. 7380 MW

Ans. C

Sol. • India is planning to start the construction activities for 10 'fleet mode' nuclear reactors over the next three years.

• The construction of 700 MW atomic power plant in Karnataka's Kaiga will begin from 2023.

• Currently, India operates 22 reactors with a total capacity of 6780 MW in operation.

• India is planning to start the construction activities for 10 'fleet mode' nuclear reactors over the next three years.

• The construction of 700 MW atomic power plant in Karnataka's Kaiga will begin from 2023.

144. Who has been appointed as chairman of the National Accreditation Board for Hospitals & Healthcare Providers (NABH)?

- A. Renu Singh
- B. Tapan Singhel
- C. Mahesh Verma
- D. Ajay Bhusan

Ans. C

Sol. • Vice-Chancellor of Indraprastha University has been appointed as a new chairperson of the National Accreditation Board for Hospitals and Healthcare Providers (NABH).

• Renu Singh as FRI Director

• Tapan Singhel as Bajaj Allianz General Insurance's MD & CEO

• Ajay Bhusan as chairman of NFRA

• Ranjit Rath as Chairman & MD of Oil India Ltd

145. Which contingent has been awarded the Best Marching Contingent Trophy for Republic Day 2022?

- A. Indian Navy
- B. Jat Regiment
- C. Indian Air Force
- D. Gorkha Regiment

Ans. A

- Sol. • The Best Marching Contingent Trophy for Republic Day Parade 2022 to personnel of the Naval Contingent was presented by Admiral R Hari Kumar, Chief of the Naval Staff.
• The contingent was led by Lt Cdr Aanchal Sharma with Lt Shubham Sharma as platoon commanders and comprised 96 young sailors.

146. Which women's cricket team has won the title of ICC Women's World Cup 2022?

- A. England
B. New Zealand
C. India
D. Australia

Ans. D

Sol. Australia has lifted the title of ICC Women's Cricket World Cup 2022 after beating England by 71 runs at Hagley Oval in Christchurch, New Zealand.

Most Successful champion: Australian (7th)

Player of the Match 2022: Alyssa Healy

Player of the tournament 2022: Alyssa Healy

147. Which state government has announced the implementation of the scheme "Mukhyamantri Ration Apke Dwar Yojana"?

- A. Uttar Pradesh
B. Madhya Pradesh
C. Bihar
D. Jharkhand

Ans. B

Sol. • The government of Madhya Pradesh (MP) has announced the implementation of the scheme "Mukhyamantri Ration Apke Dwar Yojana", which will start from November 2021.

• Under this scheme, the ration will be provided at the doorstep of the villagers where there are no Fair Price Shops (FPS).

• The objective of Mukhyamantri Ration Aapke Dwar Yojana is to provide ration material to Divyanga and senior citizens near their homes so that they do not need to go to the ration shop of other villages to get their monthly food.

148. As a part of the 'Azadi Ka Amrit Mahotsav' the Ministry of Food Processing Industries is observing 'Food Processing Week' from _____.

- A. 1st to 7th September 2021
B. 6th to 12th September 2021
C. 8th to 15th September 2021
D. 5th to 11th September 2021

Ans. B

Sol. • To commemorate 75 years of India's independence, the Government of India is celebrating the 'Azadi Ka Amrit Mahotsav.' As a part of the celebration, the Ministry of Food Processing Industries is observing 'Food Processing Week' from 6th to 12th September 2021, under which, the Ministry is organizing various programs.

• The Ministry launched the 'Food Processing Week' 6th September, 2021, through an official video on social media platforms.

• The success story of the beneficiary of the PMFME scheme, Smt. Radhika Kamat was also published on the Ministry's website in the 'Atmanirbhar Enterprises' series.

- A webinar on Tomato Processing and Value Addition under 'One District, One Product' was also organized by the Indian Institute of Food Processing Technology at Damoh, Madhya Pradesh.
- An amount of Rs.3.16 crore Seed Capital amount has been transferred to Gram Panchayat Level Federations for 811 SHG Members.

149. Which state government has prepared the Ayush-based economic upgradation scheme 'Devaranya Yojana' with the twin objectives of improving people's health and livelihood of tribals?

- A. Uttar Pradesh
- B. Madhya Pradesh
- C. Himachal Pradesh
- D. Haryana

Ans. B

Sol. * In Madhya Pradesh, the State Government has prepared the Ayush-based economic upgradation scheme – Devaranya Yojana with the twin objectives of improving people's health and livelihood of tribals.

* For this, medicinal plants should be cultivated in the beautiful plains of the villages.

* Ayush Super Specialty Hospitals are being constructed in Indore and Bhopal.

* AYUSH and tourism will be brought together to boost employment opportunities in tribal areas under the scheme.

150. Which Tiger Reserve has won the 'Natwest Group Earth Heroes Award' in the Earth Guardian category for best management?

- A. Nagarjunsagar Srisaillam
- B. Namdapha Tiger Reserve
- C. Smiplipal Tiger Reserve
- D. Satpura Tiger Reserve

Ans. D

Sol. • Satpura Tiger Reserve of Madhya Pradesh has received 'Natwest Group Earth Heroes Award' in the Earth Guardian category for best management.

• About Satpura Tiger Reserve

o It is in Hoshangabad district and is spread over an area of 2130 square km.

o It is part of the Deccan Bio-Geographic Region.

o It is the oldest forest wealth of the country with 26 species of flora of Himalayan region and 42 species of Nilgiri forests

o It is also named as the Northern Ghats

• It accounts for 17% of India's tiger population and 12 per cent of tiger habitat.
