



UPPCL JE

Electrical Engineering

Mega Mock Test

(January 9th - January 10th 2022)

Questions &
Solutions

1. The hexadecimal representation of $(657)_8$ is:
- A. 1AF
 - B. D78
 - C. D741
 - D. 32F

Ans. A

Sol. Octal number 657_8
Binary representation of 657_8 is 110 101 111
Hexa decimal representation of 657_8 is 1AF

2. What is the use of JMP (Jump instruction paired) instruction in PLC?
- A. Changing the program
 - B. Cascading two programs
 - C. Causing PLC to skip over rungs
 - D. Changing the instruction

Ans. C

Sol. The JMP instruction use to cause the PLC to skip over rungs. The JMP instruction is paired with the Label (LBL) instruction by designing the same address number to each function. When the JMP rungs is true, it causes the ladder program to skip over rungs of the ladder program.

3. For a transistor, turn-off time is
- A. Sum of storage time and fall time
 - B. Maximum value of storage time
 - C. Maximum value of fall time
 - D. Sum of rise time and fall time

Ans. A

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

4. Impurity atoms to be added to pure silicon in order to make a p-type semiconductor belongs to
- A. Phosphorous
 - B. Boron
 - C. Antimony
 - D. Germanium

Ans. B

Sol. For P-type semiconductor's 3rd group elements are doped to main metal.
Example: Boron.

5. As the load on a transformer is increased, the core losses
- A. decreased slightly
 - B. increase slightly
 - C. remain constant
 - D. may decrease or increase slightly depending upon nature of load.

Ans. C

Sol. Core losses also known as iron losses are constant losses because they does not depend on the level of the load. Hence, on increase or decrease of load on transformer, there is no effect on the core losses instead of copper losses which varies with load.

6. Match List-1 with List-2 and select the correct answer using the codes given below.

List-1

List-2

A. Encoder

1. Converts decimal to binary

B. Shift right register

2. Complex de-coding circuit

C. Ripple up counter

3. Division

Options:

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

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

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

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

Ans. D

Sol. Encoder - Converts decimal to binary

Shift right register - Division

Ripple up counter - Complex de-coding circuit

7. Which of the following is not a type of insulator used in overhead transmission line?

A. Rivet type

B. Pin type

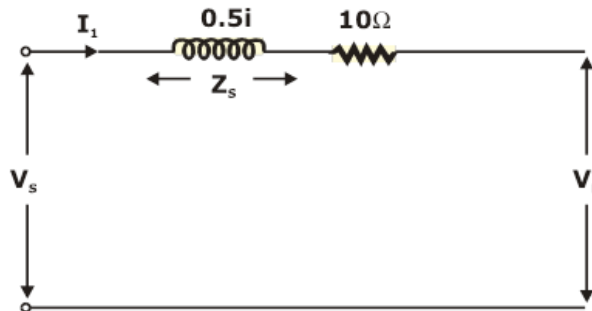
C. Suspension type

D. Strain type

Ans. A

Sol. Insulator used in over head line – Pin, suspension, strain, shackle type

8. The reflection coefficient of current short transmission line (Shown in the figure) at 'P' is ;



A. +1

B. -1

C. 0

D. 0.5

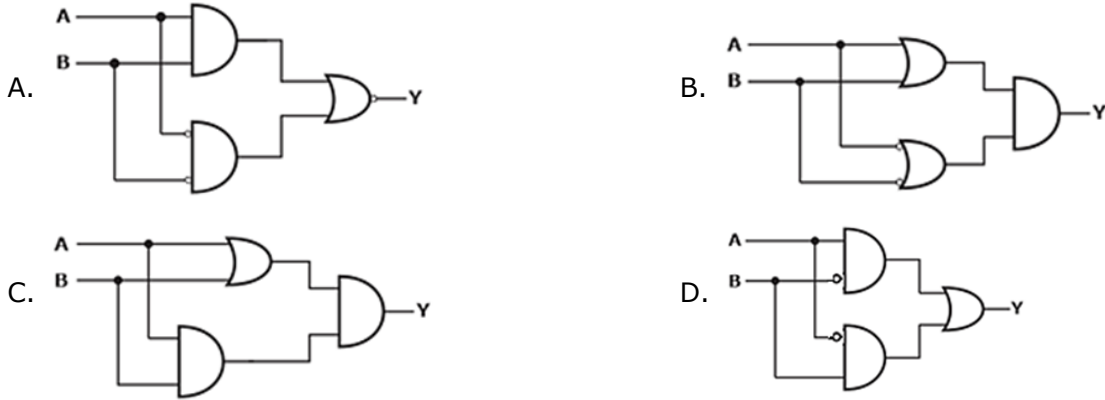
Ans. B

Sol. Since reflection coefficient of current = $\frac{Z_s - Z_L}{Z_s + Z_L}$

As circuit is at no load So $Z_L = \infty$

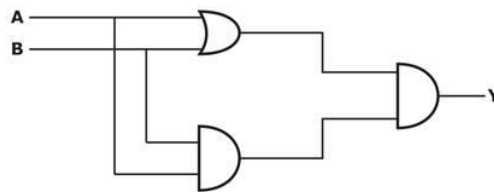
$$\text{So, } R_I = \frac{-Z_L}{Z_L} = -1$$

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



Ans. C

Sol. For option (C)



$$\begin{aligned}
 Y &= (A + B).AB \\
 &= ABA + ABB \\
 &= AB = \text{AND gate}
 \end{aligned}$$

And remain option simplifies to XOR gates.

10. A Human-Machine Interface (HMI) is used for:

- A. controlling the PLC program and interfacing the SCADA both
- B. allowing a user to interact with a device
- C. controlling the PLC program
- D. interfacing the SCADA

Ans. B

Sol. **HMIT (Human machine interface):** HMI is user interface that connect a person to a machine or device.

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

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

Ans. A

Sol. In an N-type semiconductor, we have:

$$\begin{aligned}
 n &\cong N_D = N_C e^{\frac{E_C - E_F}{kT}} \\
 \Rightarrow \frac{E_C - E_F}{kT} &= \ln \left(\frac{N_D}{N_C} \right) \Rightarrow E_F = E_C - kT \ln \left(\frac{N_C}{N_D} \right)
 \end{aligned}$$

12. AC servo-motor is basically a
- A. Capacitor motor
 - B. Two phase motor
 - C. Three phase motor
 - D. Universal motor

Ans. B

Sol. Two phase induction motor

13. When PLC program is executed, multiple repetitive processes occurred. This process of repetition is called
- A. PLC scan cycle
 - B. PLC counter
 - C. PLC rung
 - D. RTO

Ans. A

Sol. When PLC program is executed, multiple repetitive processes that occurred are called PLC scan cycle

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

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

- A. 1
- B. 0
- C. 2
- D. 3

Ans. B

Sol. The given function can be simplified as below:

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

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

$$F = A + AB + ABC$$

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

$$\Rightarrow F = A$$

So, no gate is required to implement this function.

15. For measurement of low resistance, the bridge used is
- A. Wheatstone
 - B. Kelvin
 - C. Maxwell
 - D. Anderson

Ans. B

Sol. Kelvin Bridge used to measure low Resistance value.

16. Synchronous capacitor is
- A. An ordinary static capacitor bank.
 - B. An over excited synchronous motor driving mechanical load.
 - C. An over excited motor running without mechanical load.
 - D. None of the above

Ans. B

Sol. Overexcited synchronous motor works at leading pf and supplies leading VARS just like a capacitor.

23. A 2-transistor class B power amplifier is commonly called.....amplifier.
A. dual
B. push-pull
C. symmetrical
D. differential

Ans. B

Sol. It is called a **push-pull** amplifier.

24. The first version of Windows NT was:
A. Windows XP
B. Windows NT 3.1
C. Windows 2000
D. Windows NT 3.0

Ans. B

Sol. The first version of Windows NT is 3.1

25. If the induction motor drive is capable of bidirectional power flow where limited range of speed control is required for large power applications, then this arrangement is called
A. Static conductance drive
B. Static Scherbius drive
C. Static compressive drive
D. Static reluctance drive

Ans. B

Sol. Power can flow from source to load and vice-versa, when induction motor is operated static Scherbius drive.

26. The flux in the magnetic circuit is equivalent to the _____ the electric circuit.
A. voltage in
B. heat in
C. current in
D. impedance of

Ans. C

Sol. Flow of flux is analogous to the flow of current.

27. The poles and zeroes of an all-pass network are located in which part of the s-plane?
A. Poles and zeroes are in the right half of s-plane
B. Poles and zeroes are in the left half of s-plane
C. Poles in the right half and zeroes in the left half of s-plane
D. Poles in the left half and zeroes in the right half of s-plane

Ans. D

Sol. Poles in the left half and zeroes in the right half of s-plane.

28. A 4 pole wave connected armature has 400 conductors and is driven at 1500 rpm. If the flux per pole is 10 mWb. The generated emf is
A. 210 V
B. 250 V
C. 240 V
D. 200 V

Ans. D

Sol. Generated emf is given by $E = \frac{\phi ZNP}{60A}$

$$= \frac{10 \times 10^{-3} \times 400 \times 1500 \times 4}{60 \times 2} = 200 \text{ V}$$

40. A megger is to measure insulation resistance of a cable. The cable should be connected to
- | | |
|--------------|--------------|
| A. Battery | B. DC supply |
| C. AC supply | D. No supply |

Ans. A

Sol. A megger is to measure insulation resistance of a cable. The cable should be connected to Battery.

41. The type of OLTF given below:

$$G(s) = \frac{(s + a)}{s^3 + s^2 + s + 4}$$

- | | |
|------|------|
| A. 0 | B. 1 |
| C. 2 | D. 3 |

Ans. A

Sol. Pole at origin = 0 (Open loop pole)

So, Type = 0

42. While building BUS ($m \times m$), if the added element is a branch, then the new bus impedance matrix will be of dimension:-

- | | |
|-----------------------------|------------------------------|
| A. $m \times m$ | B. $(m + 1) \times (m + 1)$ |
| C. $(m - 1) \times (m - 1)$ | D. $\frac{m(m+1)}{2} \times$ |

Ans. A

Sol. There is a change in the building BUS network size when new node is added in the network otherwise the size remains same for addition of new branch.

43. A power station consists of two synchronous generators A & B of ratings 250 MVA and 500MVA with inertia 1.6 pu and 1.0 pu respectively on their own bas MVA ratings. The equivalent pu inertia constant for the system on 100 MVA common base is:-

- | | |
|----------|----------|
| A. 2.6 | B. 1.625 |
| C. 0.615 | D. 2.0 |

Ans. A

Sol. $H_1 = 1.6, H_2 = 1.0$ p.u.

Two synchronous generator operated coherently

So $H_{eq} = H_1 + H_2 = 1.6 + 1.0 = 2.6$

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

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

Ans. D

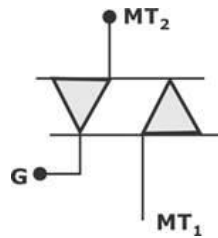
Sol. If the output of logic gate is 1 when all inputs are at logic 0, then in such gate, logic gate is either NOR gate or EX-NOR gate. Consider the truth table as shown:

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

45. Triac can conduct with
- A. positive voltage at gate only.
 - B. Negative voltage at gate only.
 - C. Either positive or negative voltage at gate.
 - D. Conduct without gate signal.

Ans. C

Sol. Triac



- 1.3 terminal bidirectional switch.
- 2.Can conduct with either positive or negative voltage at gate.
- 3.It is equivalent to two thyristors connected back-to-back with their gate terminals tied up.

46. A 3-phase, 6 pole, 120 slots alternator has a coil span of 18 slots. The short pitch angle is:
- A. 15°
 - B. 18°
 - C. 20°
 - D. 0°

Ans. B

Sol. Slot angle (β) = $\frac{180^\circ}{20/6} = 9^\circ$

18 slots means, $18 \times 9^\circ = 162^\circ$

So, short pitch angle = $180^\circ - 162^\circ = 18^\circ$

47. The illumination level in houses is in range
- A. 10-20 lumen/m²
 - B. 30-50 lumen/m²
 - C. 40-75 lumen/m²
 - D. 100-140 lumen/m²

Ans. D

Sol. The illumination level in houses is in the range of 100-140 lumen/m².

48. The decimal equivalent of Binary 110.001 is
- A. 6.25
 - B. 6.125
 - C. 62.5
 - D. 0.612

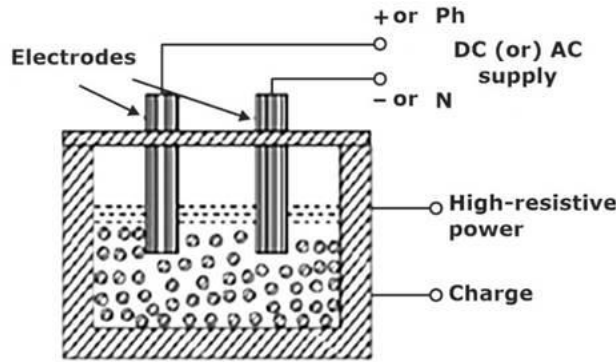
Ans. B

Sol. The binary number can be converted into decimal as follows,

$$(110.001)_2 = 4 + 2 + 0 + (1/2)0 + (1/4)0 + (1/8)1$$

$$= 6 + 0.125 = 6.125$$

52. Recognize the heating type shown in the given figure.



- A. Direct induction heating
- B. Indirect resistance heating
- C. Indirect arc heating
- D. Direct resistance heating

Ans. D

Sol. **Direct resistance heating:** In this method the material or charge to be heated is treated as resistance and current is passed through it

- The charge in the form of powder, small solid pieces or liquid.
- electrodes are inserted in the charge and connected to supply.
- In case of D.C or 1-phase A.C two electrodes are used and in case of 3-phase supply three electrode will be required.

This method used in:

- (1) Salt bath furnace
- (2) Resistance welding
- (3) Electrode boiler for heating water.

53. Marginally stable systems have closed loop transfer functions with only imaginary axis poles of multiplicity:

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

Ans. A

Sol. We know that for,

STABLE SYSTEM: for closed loop transfer functions with poles only in the left hand plane.

UNSTABLE SYSTEM: for closed loop transfer with at least one pole in the right half-plane and/or poles of multiplicity greater than 1 on the imaginary axis.

MARGINALLY STABLE: for closed transfer functions with only imaginary axis poles of multiplicity 1 and poles in the left half-plane.

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

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

Ans. D

Sol.

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

55. A shaded pole induction motor does not have the advantage of
- A. Rugged construction
 - B. Low initial as well as maintenance cost
 - C. High starting torque
 - D. Comparatively small starting current

Ans. C

Sol. high losses, poor power factor and low starting torque are key features of shaded pole IM hence they are used in small applications.

56. The most suitable gate for comparing two bit is:-
- A. AND gate
 - B. OR gate
 - C. NAND gate
 - D. EX-OR gate

Ans. D

Sol. For comparison, XOR gate is most suitable as

$$X \oplus X = 0$$

$$X \oplus Y = 1$$

Hence when the two numbers are equal, it gives 0 and for two unequal numbers, it gives 1.

57. In which welding technique vacuum is required _____.
- A. Plasma arc welding.
 - B. Laser beam welding.
 - C. Electron beam welding.
 - D. Ultrasonic welding.

Ans. C

Sol. • It is necessary to maintain a vacuum in EBW so that the electron beam is not scattered by residual gas molecules.
• Electron Beam Welding (EBW) results in tight continuous weld, low distortion and narrow heat affected zone.

58. For a closed loop control system, Negative feedback
- A. Decreases the gain
 - B. Increases the Bandwidth
 - C. Both A & B are correct
 - D. Neither A nor B is correct

Ans. C

Sol. Negative feedback

(i) Reduces Gain

(ii) Increases B.W

(iii) Make system more Accurate

(iv) Decreases sensitivity to parameter variation

59. The megohmmeter is used for measurement of:
- A. high value capacitance
 - B. medium value resistance
 - C. high value resistance
 - D. low value resistance

Ans. C

Sol. The megohmmeter is used for measurement of high value resistance.

60. When excitation of synchronous motor is increased up to normal excitation from under excitation, armature current
- A. increases
 - B. decreases
 - C. remains constant
 - D. None of the above

Ans. B

Sol. When excitation of synchronous motor is increased up to normal excitation from under excitation, armature current decreases as power factor improves.

61. Which of the following are the characteristics of DC generator?

- A. Magnetization characteristics
- B. Load characteristics
- C. Both a and b
- D. None of these

Ans. C

Sol. Magnetization characteristics and load characteristics are the characteristics of a dc generator.

62. The internal characteristics of a dc generator is plotted between the

- A. armature current and voltage generated after armature reaction
- B. field current and voltage generated at no load
- C. field current and voltage generated on load
- D. armature current and voltage generated at the output terminals

Ans. A

Sol. Internal characteristic of a dc generator is plotted between the armature current and voltage generated after armature reaction.

63. An LED made using GaAs emits radiation in

- A. Visible region
- B. Ultraviolet region
- C. Infrared region
- D. Microwave frequency region

Ans. C

Sol. Band gap energy of GaAs, $E_g = 1.43 \text{ eV}$

$$E_g = \frac{hc}{\lambda}$$

$$\lambda = \frac{6.626 \times 10^{-34} \times 3 \times 10^8}{1.43 \times 1.6 \times 10^{-19}}$$

$$= 8.688 \times 10^{-7} \text{ m} = 8688 \text{ \AA}$$

The emitted wavelength is in infrared region.

64. A bipolar HVDC transmission line has two poles:-

- A. One positive and other negative
- B. Both Positive
- C. Both negative
- D. None of the above alternatives

Ans. A

Sol. A bipolar HVDC transmission line has two poles one positive and other negative.

65. Conductively-Modulated Field Effect Transistor is also called:

- A. Insulated Gate Bipolar Transistor
- B. Metal Oxide Semiconductor Field Effect Transistor
- C. Bipolar Junction Transistor
- D. MOS-Controlled Thyristor

Ans. A

Sol. Conductively-Modulated Field Effect Transistor is also called Insulated Gate Bipolar Transistor.

66. A microcontroller at-least should consist of:
- A. RAM, ROM, I/O devices, serial and parallel ports and timers
 - B. CPU, RAM, I/O devices, serial and parallel ports and timers
 - C. CPU, RAM, ROM, I/O devices, serial and parallel ports and timers
 - D. CPU, ROM, I/O devices and timers

Ans. C

Sol. A microcontroller must consist of a processor as its CPU with some additional peripherals like RAM, ROM, serial and parallel ports, timers etc.

67. Which one of the following heating method is most inefficient method of electrical heating?
- A. Infrared Heating
 - B. Resistance Heating
 - C. Dielectric Heating
 - D. Induction Heating

Ans. A

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

68. A resistance, an inductance and a capacitance are connected in series. The values of R, X_L and X_C are 20 Ω , 30 Ω and 10 Ω respectively. The net reactance of the circuit is:
- A. 20 Ω
 - B. 10 Ω
 - C. 78.28 Ω
 - D. zero

Ans. A

Sol. Inductive and capacitance are considered as reactive element, Hence the net reactance will be

$$X_{net} = X_L - X_C$$

$$X_{net} = 30 - 10 = 20 \Omega$$

69. How many network configurations does SCADA system may use?
- A. One
 - B. Two
 - C. Three
 - D. None of the above

Ans. C

Sol. The SCADA system use three network configurations they are public, private, and hybrid.

70. Capacitive transducers are normally used for:-
- A. Static measurements
 - B. Dynamic measurements
 - C. Both static and dynamic measurements
 - D. Transient measurements

Ans. C

Sol. Capacitive transducers are normally used for both static and dynamic measurements.

71. What is/are the functions of SCADA?
- A. To monitor and gather data in real-time
 - B. Information Storage and Reports
 - C. To control manufacturing process virtually
 - D. All of the above

Ans. D

Sol. Functions of SCADA Systems:

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

- * To monitor and gather data in real-time
- * To interact with field devices and control stations via Human Machine Interface (HMI)
- * To record systems events into a log file
- * To control manufacturing process virtually
- * Information Storage and Reports

72. The voltage regulation of a transformer having 4% resistance and 5% reactance at full load, 0.8 pf lagging is:-

- A. 4.60%
- B. -4.6%
- C. -6.2%
- D. 6.20%

Ans. D

Sol. Voltage regulation (for lagging load. $= (\epsilon_r \cos\theta + \epsilon_x \sin\theta) * 100$

$$V.R. = (.04 * 0.8 + .05 * .6) * 100$$

$$= 6.20\%$$

73. PLC stands for _____ logic controller.

- A. programmable
- B. piezo-electric
- C. Process
- D. periodic

Ans. A

Sol. PLC → Programmable logic controller

74. Isolators are used for disconnecting a circuit when

- A. Line is energised
- B. Line is on full load
- C. Line carries no current
- D. Can be operated under any condition

Ans. C

Sol. Isolator cannot be operated on a Loaded line as it does not have arc quenching mechanism like circuit breaker.

75. Which of the following is a line focus collector used in a distributed power system?

- A. Parabolic mirrors
- B. Convex mirrors
- C. Concave lenses
- D. Linear fresnel reflector

Ans. D

Sol. Linear fresnel reflector is a line focus collector. Parabolic mirrors and convex mirrors may reflect sunlight but they may not be line focused collector. Lenses are not used to collect sunlight in a distributed power system.

76. Which turn on method is used to trigger the thyristors used in HVDC applications:

- A. Gate triggering.
- B. Light triggering.
- C. $\frac{dv}{dt}$ triggering
- D. Temperature triggering

Ans. B

Sol. For light triggering, a recess is made in the inner p-layer. When the recess is radiated, free charge carriers are generated initiates the turn ON process. This method is more efficient and reliable to trigger multiple number of SCR's simultaneously and where the isolation between power and control circuit is required.

77. If a four-pole synchronous generator driven at 1500 rpm feeds a 6-pole induction motor, which is loaded to run at a slip of 5%, then speed of the motor will be
- A. 1000 rpm
 - B. 950 rpm
 - C. 1500 rpm
 - D. 1450 rpm

Ans. B

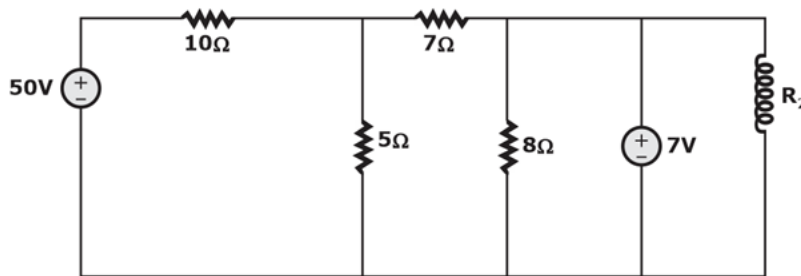
Sol. frequency of generator = $f = \frac{PNs}{120} = \frac{4 \cdot 1500}{120} = 50$

This will be the frequency of motor = 50

N_s of motor = $\frac{120 \cdot 50}{6} = 1000$

$N_r = N_s(1-s) = 1000 \cdot (1-0.05) = 950$

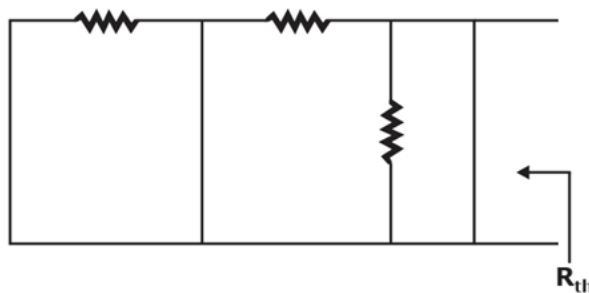
78. Thevenin's equivalent voltage and resistance for the circuit shown, when R_2 is considered as the load resistance, are :



- A. 7V and 0 Ω
- B. 21V & 7 Ω
- C. 28 V and 0 Ω
- D. 7 V and 7 V

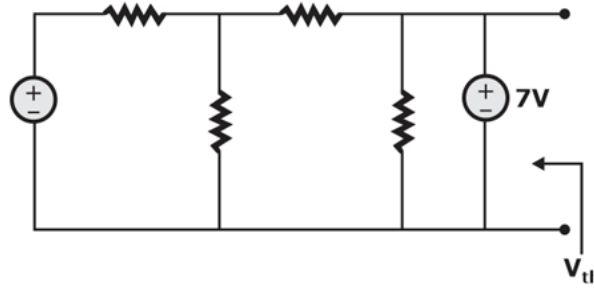
Ans. A

Sol. For Thevenin resistance



$R_{th} = 0 \Omega$

(ii) For Thevenin voltage



$V_{th} = 7V$

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

List-I

- A- Varactor diode
- B- Tunnel diode
- C- Photodiode
- D- Zener diode

List-II

- 1- To charge auxiliary storage batteries
- 2- Reference voltage
- 3- High frequency tuning circuits
- 4- High frequency switching circuit

Codes:

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

Ans. C

- Sol. (i) Zener diode is used for reference voltage.
 (ii) Tunnel diode is a high frequency switching circuit.
 (iii) Varactor diode is used for high frequency tuning purposes.

80. If temperature of a pure silicon specimen is increased, then

- A. only number of free electrons increase.
- B. only number of free holes increase.
- C. number of free holes and free electrons increases.
- D. only number of free holes decrease.

Ans. C

Sol. If Temperature of pure silicon specimen Increases then Both holes and electrons will Increase.

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

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

Ans. B

Sol. When conduction angle of increases form factor decreases as

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

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

Hence option B is correct.

82. The impedance of parallel resonating circuit would be:-

- A. Zero
- B. Maximum
- C. Minimum
- D. Infinite

Ans. B

Sol. The impedance of parallel resonating circuit would be maximum.

83. A strain gauge is a passive transducer and is employed for converting

- A. Pressure into change in resistance
- B. Force into displacement
- C. Mechanical displacement into a change of resistance
- D. None of the above

Ans. C

Sol. A strain gauge is a passive transducer and is employed for converting mechanical displacement into a change of resistance.

84. The losses in electric drive systems is/are

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

Ans. D

Sol. LOSSES IN AN ELECTRICAL DRIVE SYSTEM

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

- Electrical transmission losses: These losses depend on the drive power factor and harmonics in the line current.
- Conversion losses in the power modulator (or converter): The semiconductor converter usually has low conversion losses.
- Electric motor losses to convert electric power into mechanical power: These are determined by choice of the motor (quality of its design and selection of right rating) and quality of supply (voltage variations, unbalance, frequency variations and harmonics).
- Mechanical losses:- It is part of the transmission system such as bearings, gears, clutches, and belts.
- Losses in the load: A load in a machine required to perform a specified task such as fan, pump, and train.

85. When the current in a coil is increased from 2 A to 4 A in 0.05 seconds, the e.m.f. induced in the coil is 8 V. The self inductance of the coil is

- A. 0.8 H
- B. 0.4 H
- C. 0.2 H
- D. 0.1 H

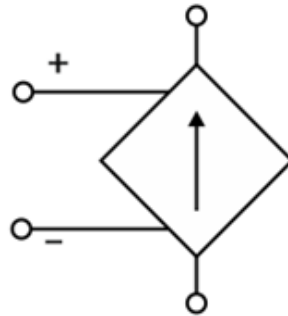
Ans. C

Sol. $v = L \frac{di}{dt}$

$$L = \frac{V}{\frac{di}{dt}} \text{ Henry}$$

$$\therefore L = \frac{8}{\frac{2}{0.05}} = 4 \times 0.05 = 0.2\text{H}$$

86. The symbol shown here is:



- A. Voltage controlled current source
- C. Current controlled voltage source

- B. Current controlled current source
- D. Voltage controlled voltage source

Ans. A

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

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

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

Ans. C

Sol.

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

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

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

$$(TUF)_s = \frac{P_{DC}}{P_{acs_1} + P_{acs_2}} = 57.3\%$$

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

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

- A. $20\sqrt{2}$ W and $10\sqrt{2}$ VAR
- B. 10 W and $10\sqrt{3}$ VAR
- C. 5 W and $5\sqrt{3}$ VAR
- D. $10\sqrt{3}$ W and -10 VAR

Ans. B

Sol. Active power, $P = VI\cos\theta$

Reactive power, $Q = VI\sin\theta$

Where θ is the phase angle difference between voltage and current phasor

$$\theta = 15 - (-45) = 60^\circ$$

$$P = 10 \cdot 2 \cos 60 = 10 \text{ W}$$

$$Q = 10 \cdot 2 \sin 60 = 10\sqrt{3} \text{ VAR}$$

89. The sign magnitude representation of -26 using 8 bits is?

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

Ans. C

Sol. $+26$ is represented by: **11010**

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

-26 Is therefore given by:

$$\Rightarrow (10011010)$$

90. Hysteresis motor can be used in which of the following ?

- A. Record player
- B. Photocopying machine
- C. Electric shaver
- D. Phonographs

Ans. A

Sol. Hysteresis motor is used where noiseless operation and constant speed is required. The application of hysteresis motor can be seen in sound recording, record players, tape recorder, electric clocks and other timing devices.

91. According to IE rules for service connection for low and medium voltage line, the height of service line conductors erected across a street must NOT be less than:

- A. 5.490 m
- B. 5.975 m
- C. 6.10 m
- D. 5.18 m

Ans. B

Sol. According to IE Rule 1956.

1. No conduction of an overhead line, including service.

⇒ Erected across a street shall at any part thereof be at a height of less than:

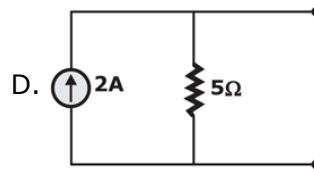
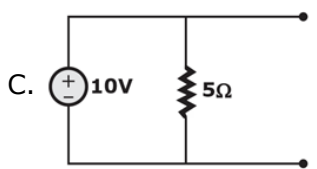
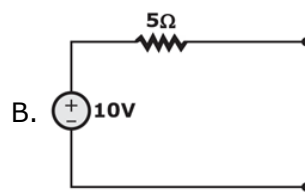
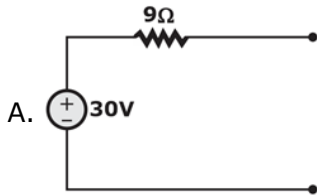
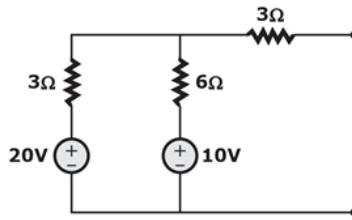
- A. For low and medium voltage line → 5.8 meter
- B. for high voltage line → 6.1 meter

When erected along a street then

A. for low and medium voltage line → 5.5 meter

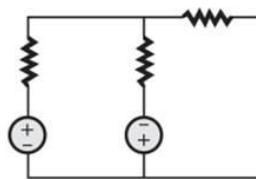
B. for high voltage line → 5.8 meter

92. Norton equivalent of the circuit given below is,

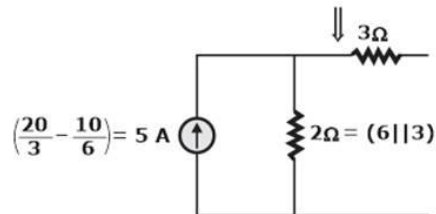
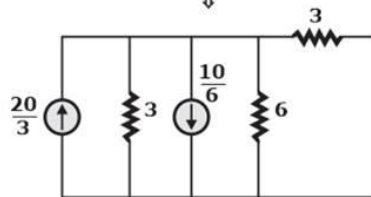


Ans. D

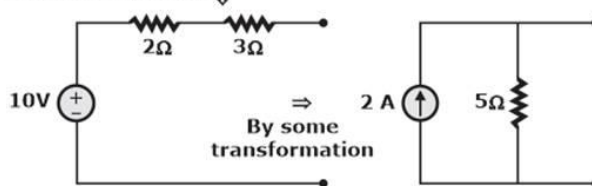
Sol.



By source transformation ↓



By source transformation ↓



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

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

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

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

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

Ans. A

Sol.

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

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

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

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

99. The element that has the biggest size in a transistor is

- A. collector B. base
C. emitter D. collector-base junction

Ans. A

Sol. During transistor action, most of the heat is produced at the collector. Therefore, it has the biggest size to dissipate heat.

100. A transfer function has its zero in the right half of the s-plane. The function

- A. is positive real B. is minimum phase
C. will give stable impulse response D. is non-minimum phase

Ans. D

Sol. Non-minimum phase functions have their zeros in the right half of the s-plane.

101. A tunnel diode is

- A. High resistivity p-n junction diode B. A slow switching device
C. An amplifying device D. A very heavily doped p-n junction diode

Ans. D

Sol. A tunnel diode is a very heavily doped p-n junction diode which is used as a very high-speed switching device.

102. The meaning of uploading in PLC is _____.

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

Ans. C

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

103. Which type of turbine is commonly used in tidal energy?

- A. Francis turbine
- B. Kaplan turbine
- C. Pelton wheel
- D. Gorlov turbine

Ans. B

Sol. The Kaplan turbine is a propeller type reaction turbine that is usually immersed completely in the fluid it derives energy from. A Kaplan turbine is beneficial in that it is able to operate in lower pressure situations where Pelton or Francis turbines cannot.

104. Which of the following are coefficients for a regulated power supply (in the expansion for change in output voltage)?

- 1) Stability factor
- 2) Output resistance
- 3) Temperature coefficient
- 4) Input resistance

Select the correct answer using the code given below:

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

Ans. D

Sol. The use of semiconductor devices in electronic devices may cause variation in temperature. These variations in dc output voltage may cause inaccurate or erratic operation or even malfunctioning of many electronic circuits. For instance, in oscillators the frequency will shift, in transmitters output will get distorted, and in amplifiers, the operating point will shift causing bias instability.

All the above-listed problems are overcome with the help of a **voltage regulator** which is employed in conjunction with an unregulated power supply. Thus, the ripple voltage is largely reduced. Thus, the supply becomes a regulated power supply.

Input resistance is not a coefficient but stability factor, Output Resistance & Temperature Coefficient are the major constraints for a Regulated Power Supply.

105. Stud and projection welding belong to the following category of welding _____.

- A. Gas welding
- B. Arc welding
- C. Resistance welding
- D. Pressure welding

Ans. C

Sol. Stud and projection welding belong to the following category of resistance welding.

106. Differential relays are used for the protection of equipment against

- A. Internal faults
- B. Over current
- C. Reverse current
- D. Reverse power

Ans. A

Sol. Differential relay works on the principle of difference between current entering and leaving the equipment. And hence it is insensible to external faults or changes.

107. Which of the following is NOT an AC drive?

- A. Induction motor drive
- B. Compound motor drive
- C. Synchronous motor drive
- D. Stepper motor drive

Ans. B

Sol. Compound motor is a dc motor and are the dc drives.

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

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

Ans. B

Sol. Inverter circuits are used in

- (1) Ups (constant voltage and constant frequency type).
- (2) Speed control of AC motors (Variable voltage and variable frequency type).
- (3) Reactive power compensation.
- (4) Stability Enhancement in power systems.
- (5) As active filters.
- (6) In solar power converters and in the power converters of wind turbines.

109. Electric current may be defined as

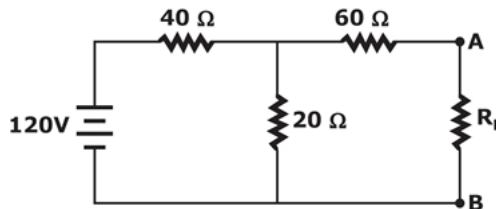
- A. Rate of transfer of electric charge
- B. Velocity of charge
- C. Capacity to store charge
- D. Charging of battery

Ans. A

Sol. Electric current is defined as heat of transfer of electric charge

$$I(\text{Amperes}) = \frac{\theta(\text{Coulomb})}{t(\text{sec})}$$

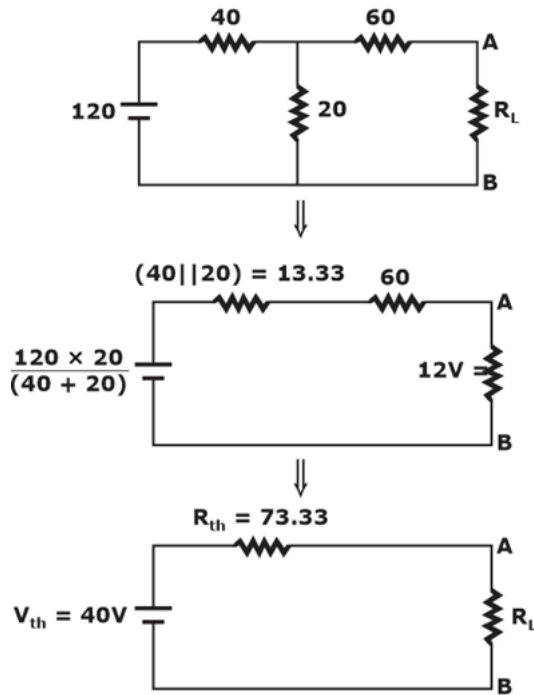
110. Calculate the value of load resistance R_L to which maximum power may be transferred from the source shown in figure.



- A. 33.73 ohm
- B. 60 ohm
- C. 73.33 ohm
- D. 100 ohm

Ans. C

Sol.



For maximum power transfer:

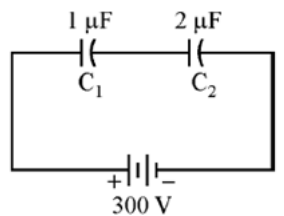
$$R_L = R_{th} = 73.33$$

111. The Maxwell bridge is used for measuring
- A. Capacitance
 - B. Dielectric loss
 - C. Inductance
 - D. Phase angle

Ans. C

Sol. Maxwell Bridge is modified form of wheat stone Bridge. Which is used to measure Inductance.

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



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

Ans. B

Sol.

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

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

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

113. Which of the following is NOT the objective of SCADA?
- A. Data Communication
 - B. Monitoring
 - C. Controlling
 - D. Planning

Ans. D

Sol. Objectives of SCADA:

1. Monitor: SCADA systems continuously monitor the physical parameters
2. Measure: It measures the parameter for processing
3. Data Acquisition: It acquires data from RTUs (Remote Terminal Units), data loggers, etc
4. Data Communication: It helps to communicate and transmit a large amount of data between MTU and RTU units
5. Controlling: Online real-time monitoring and controlling of the process
6. Automation: It helps for automatic transmission and functionality

114. In parallel magnetic circuit, the total ampere turn is equal to the:

- | | |
|---|---|
| A. ampere turn of only one smallest part | B. ampere turn of only one longest part |
| C. difference of ampere – turn of each path | D. sum of ampere – turn of each path |

Ans. D

Sol. Sum of ampere-turn of each path is the total ampere-turn in parallel magnetic circuit.

115. Consider the following statements:

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

- 1- direct energy band gap.
- 2- indirect energy band gap.
- 3- any value of forbidden energy band gap.
- 4- right value of band gap corresponding to light wavelength.

Which of these statements is/are correct?

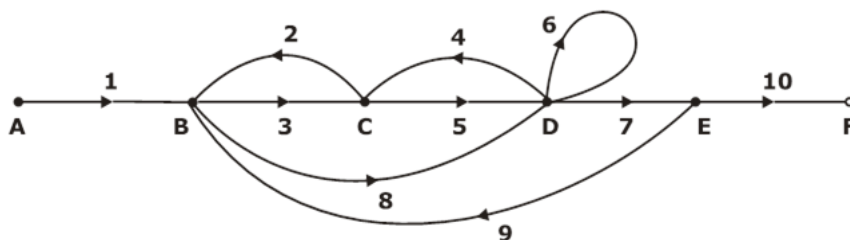
- | | |
|------------|------------|
| A. 1 only | B. 1 and 4 |
| C. 2 and 3 | D. 2 and 4 |

Ans. B

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

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

116. In signal flow grain shown below, the number of forward paths and the number of individual loops are respectively



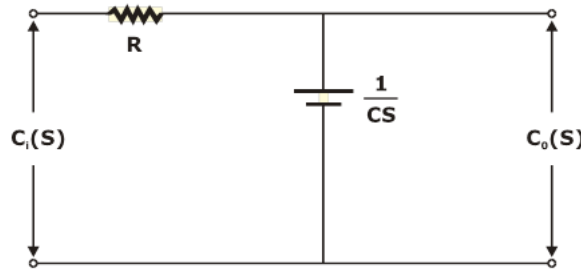
- | | |
|----------|----------|
| A. 2 & 5 | B. 2 & 6 |
| C. 1 & 7 | D. 2 & 7 |

Ans. A

Sol. forward path

$P_1 = 1, 3, 5, 7, 10$

Sol.



Applying voltage division rule

$$C_o(s) = \frac{1/Cs}{R + 1/Cs} C_i(s)$$

$$\frac{C_o(s)}{C_i(s)} = \frac{1}{RCs + 1}$$

120. Laws of Illumination states that:

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

Ans. D

Sol. Laws of Illumination states that Inverse Square Law Intensity is inversely proportional to the square of the distance from the source. $E = I / r^2$

121. Which of the following motors is used in household refrigerators?

- A. AC series motor
- B. DC shunt motor
- C. Reluctance motor
- D. Single phase induction motor

Ans. D

Sol. Single phase induction motor is used in household refrigerators.

122. While making the choice of drive, which of the following factors is NOT considered?

- A. Speed of driving and driven machines
- B. Cost
- C. Drive machine temperature
- D. Space available

Ans. C

Sol. Following factors is considered while making the choice of drive.

- (1) Nature of electric supply
- (2) Capital and running cost
- (3) Maintenance cost
- (4) Available space
- (5) Nature of load
- (6) Size, rating and duty cycle of motors
- (7) Starting condition of load
- (8) Electric motor and its characteristics

123. The temperature first rises by 18 degree Celsius and then falls by 23 degree Celsius. If the initial temperature is 27 degree Celsius, what is the final temperature?

- A. 22 degree Celsius
- B. 23 degree Celsius
- C. 24 degree Celsius
- D. 25 degree Celsius

Ans. A

Sol. The temperature first rises by 18 degree Celsius and then falls by 23 degree Celsius.

Then,

$$27^{\circ}\text{C} + 18^{\circ}\text{C} - 23^{\circ}\text{C}$$

$$= 45^{\circ}\text{C} - 23^{\circ}\text{C}$$

$$= 22^{\circ}\text{C}$$

124. The cycle time of a PLC is the time it takes to

A. read all the input signals.

B. read all the input signals, run the program and update outputs.

C. read an input signal.

D. check all the input signals against the program.

Ans. B

Sol. PLC cycle time is defined as the time it takes to run the cyclic code start to finish once with interrupts.

125. A PAL logic device generally consists:

A. Fixed OR and fixed AND array

B. Fixed OR and programmable AND array

C. Programmable AND and programmable OR array

D. Fixed AND and programmable OR array

Ans. B

Sol. Fixed OR and programmable AND array

126. Cheapest system of wiring is

A. casing and capping

B. cleat wiring

C. batten wiring

D. conduit wiring

Ans. B

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

127. When maximum power transfer takes place, the efficiency of power transfer of the circuit is:-

A. 25%

B. 50%

C. 75%

D. 100%

Ans. B

Sol. When maximum power transfer takes place, the efficiency of power transfer of the circuit is 50%.

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

A. IE Rule – 50

B. IE Rule – 61

C. IE Rule – 64A

D. IE Rule – 44A

Ans. C

Ans. A

Sol. For a forward biased pn-junction diode diffusion capacitance varies linearly with current.

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

133. Logic function $AB'D + AB'D'$ can be reduced to

- | | |
|--------------------|--------------------|
| A. \overline{AB} | B. $A\overline{B}$ |
| C. \overline{BD} | D. $A\overline{D}$ |

Ans. B

$$\begin{aligned} \text{Let } X &= \overline{A}BD + A\overline{B}D \\ &= \overline{A}B(D + \overline{D}) \end{aligned}$$

Sol.

$$\begin{aligned} &= \overline{A}B \cdot 1 \\ &= \overline{A}B \end{aligned}$$

134. A 1 H pure inductor carrying a current of 3 A will store energy of:

- | | |
|----------|----------|
| A. 4.5 J | B. 9 J |
| C. 9 W | D. 4.5 W |

Ans. A

Sol. Energy stored in inductor is given by

$$E = \frac{1}{2}LI^2$$

$$E = \frac{1}{2} \times 1 \times 3^2$$

$$E = 4.5 \text{ Joule}$$

135. A 3- ϕ , 50 Hz Induction motor has 4 poles. If the slip is 2% at a certain load, then the speed of the rotor is

- | | |
|-------------|-------------|
| A. 1470 rpm | B. 1450 rpm |
| C. 1500 rpm | D. 1425 rpm |

Ans. A

Sol. Synchronous speed $N_s = \frac{120f}{P} = \frac{120 \times 50}{4} = 1500 \text{ rpm}$

$$S = \frac{N_s - N_r}{N_s} \Rightarrow \frac{N_r}{N_s} = 1 - s = 1 - 0.02 = 0.98$$

$$N_r = 0.98 \times 1500 = 1470 \text{ rpm}$$

136. The dielectric loss of a capacitance can be measured by
- A. Hay bridge
 - B. Maxwell bridge
 - C. Anderson bridge
 - D. Schering bridge

Ans. D

Sol. Schering bridge is used to find Dielectric loss.

137. A collection of gas and dust which appears as a bright ball of light in the sky with a glowing tail is called
- A. Star
 - B. Comet
 - C. Constellation
 - D. Galaxy

Ans. B

Sol. A comet is an icy small Solar System body that, when passing close to the Sun, heats up and begins to outgas, displaying a visible atmosphere or coma, and sometimes also a tail. These phenomena are due to the effects of solar radiation and the solar wind upon the nucleus of the comet. Comet nuclei range from a few hundred metres to tens of kilometres across and are composed of loose collections of ice, dust, and small rocky particles. The coma and tail are much larger and, if sufficiently bright, may be seen from the Earth without the aid of a telescope. Comets have been observed and recorded since ancient times by many cultures.

138. An open-loop system is better than a closed-loop system in terms of
- A. Accuracy
 - B. Stability
 - C. Noise reduction
 - D. Sensitivity

Ans. B

Sol. An open-loop system is better than a closed-loop system in terms of Stability.

139. As per IE rules the permissible variation of voltage at the consumer end is:
- A. ±6%
 - B. ±10%
 - C. ±12%
 - D. ±2%

Ans. A

Sol. Indian Electricity Rules

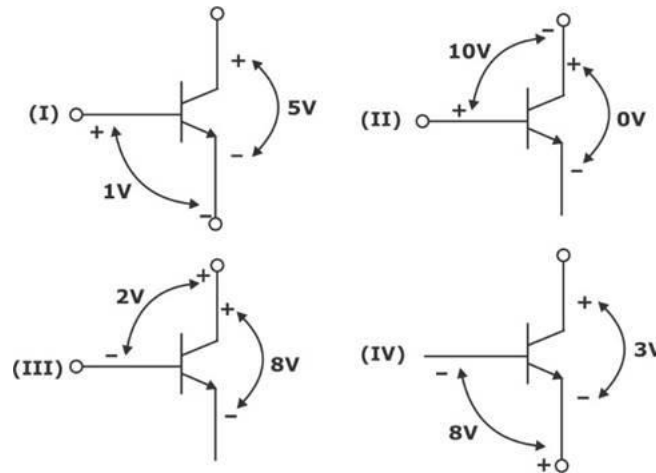
As per Rule 54. Declared voltage of supply to consumer:

Except with the written consent of the consumer or with the previous sanction of the State Government a supplier shall not permit the voltage at the point of commencement of supply as defined under rule 58 to vary from the declared voltage-

1. in the case of low or medium voltage, by more than 6 per cent; or
2. in the case of high voltage, by more than 6 per cent on the higher side or by more than 9 per cent on the lower side; or
3. in the case of extra high voltage, by more than 10 per cent on the higher side or by more than 12.5 per cent on the lower side:]

PROVIDED that in the case of high voltage, the voltage variation limit of 12.5 per cent may continue till the 31st March, 1974.]

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



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

Ans. D

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

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

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

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

\rightarrow saturation region

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

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

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

Cut off region

141. Match List-I (Optical devices) with List-II (Electrical/optical characteristics) and select the correct answer using the codes given below the lists:

List-I

- A) LASER
- B) Solar cell
- C) Photodiode
- D) LED

List-II

- 1) Emits monochromatic light of low intensity.
- 2) Consumes electrical power due to the incident light
- 3) Delivers power to a load
- 4) Emits monochromatic light of high intensity

Codes:

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

Ans. C

Sol.

142. Which among these is a type of batten wiring?

- A. Metal sheathed wiring
- B. TRS or PVC wires
- C. Both metal sheathed wiring and TRS or PVC wires
- D. None of these

Ans. C

Sol. Group of Single or double or three core cables are used to be laid on straight teak wooden batten. The cables are hold with help of tinned brass link clip or buckle clip. Brass pins are used to fix the buckle clips on the wooden batten. Buckle clips is fixed with brass pin on the wooden batten at an interval 10 cm for horizontal runs and 15 cm for vertical runs. TRS and PVC wires metal sheathed wiring are batten wiring.

143. Which is the power semiconductor device having highest switching speed?

- A. SCR
- B. IGBT
- C. MOSFET
- D. GTO

Ans. C

Sol. MOSFET is a majority charge carrier device so there is no minority charge carrier storage, so it has highest speed.

144. The speed of a blower is controlled by a dc motor which is supplied from 1-φ ac source. The most suitable ac to dc converter is:

- A. 1-phase half wave rectifier.
- B. 1-phase fully controlled bridge converter.
- C. 1- phase semiconductor.
- D. 1-phase uncontrolled rectifier.

Ans. C

Sol. Variable voltage is required to control the speed, therefore uncontrolled rectifier cannot be used.

→ For one-quadrant operation, 1 – φ semi-conductor is preferred over 1 – φ fully controlled converter because of following reasons:

- Higher value of dc output voltage because of freewheeling action.
- It is cheaper than 1 – φ full converter.
- Because of freewheeling action, it provides better power factor.

145. The inductance of a high Q inductor can be measured using a:-

- A. Hay’s bridge
- B. Schering bridge
- C. Wein’s bridge
- D. Maxwell bridge

Ans. A

Sol. The inductance of a high Q inductor can be measured using a Hay’s bridge.

Ans. B

Sol. In load frequency control the area control error is negative if net power flow out of an area is low.

151. Which of the following city has become the world's first paperless government?

- A. New York, USA
- B. Dubai, UAE
- C. Tokyo, Japan
- D. Berlin, Germany

Ans. B

Sol. * **Dubai, United Arab Emirates** has become the **world's first paperless government**.

* It was announced by the United Arab Emirate's Crown Prince, Sheikh Hamdan bin Mohammed bin Rashid Al Maktoum.

* The city has achieved this feat under the '**Dubai Paperless Strategy**' which was launched in **2018**.

* Abu Dhabi is the capital city of UAE.

* Dirham is the official currency of UAE.

152. World Soil Day is observed every year on_____.

- A. 4th December
- B. 6th December
- C. 5th December
- D. 7th December

Ans. C

Sol. • World Soil Day is observed every year on **December 5**.

• The World Soil Day 2021 was observed with the theme "**Halt soil salinization, enhance soil production**".

• The proposal for a World Soil Day was first recommended in the year 2002 by the International Union of Soil Sciences (IUSS).

• In 2013, the United Nations General Assembly declared December 5, 2014, to be the first official World Soil Day.

153. Consider the following pairs:

River	Location
1. Bhagirathi meets the Alaknanda	Vishnu prayag
2. Dhaulī meets the Alaknanda	Devprayag
3. Yamuna meets Betwa	Near Etawah

Which of the pairs given above are correctly matched?

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

Ans. B

Sol. At Devprayag, the Bhagirathi meets the Alaknanda; hereafter, it is known as the Ganga. The Alaknanda has its source in the Satopanth glacier above Badrinath. The Alaknanda consists of the Dhaulī and the Vishnu Ganga which meet at Joshimath or Vishnu Prayag.

Below Etawah Yamuna receives a number of southern tributaries, the largest of which are the Chambal, the Sindh, the Betwa, and the Ken.

154. Prayag Inscription is dedicated to-

- A. Ashoka
- B. Chandragupta Murya
- C. Ajatshatru
- D. Samudragupta

Ans. D

Sol. Prayag inscription by Harisen was dedicated to Samudragupta. He was called Napoleon of India for his conquests by Vincent Smith. He was also known as Kaviraj for his patronizing of art.

155. Study of Liver is called _____.

- A. Hepatology
- B. Ichthyology
- C. Histology
- D. Mycology

Ans. A

Sol. Hepatology is the branch of medicine that incorporates the study of liver, gallbladder, biliary tree, and pancreas as well as management of their disorders. Although traditionally considered a sub-specialty of gastroenterology, rapid expansion has led in some countries to doctors specializing solely on this area, who are called hepatologists.

156. NISAR satellite will be launched by

- A. ISRO
- B. NASA
- C. Both A and B
- D. Neither A nor B

Ans. C

Sol. • NISAR satellite will be jointly launched by **ISRO** and **NASA**.
• It is likely to be the **world's most expensive** Earth-imaging satellite.
• **NASA** is the **space agency** of the **USA**; the head of NASA is **Jim Bridenstine**.

157. Where did Harsh Vardhan host the Buddhist Maha-Sammelan in UP?

- A. Kashi
- B. Prayag
- C. Ayodhya
- D. Sarnath

Ans. B

Sol. Harshavardhana organized the Buddhist Mahasammelan in Prayag (Uttar Pradesh). Harshavardhana used to hold religious meetings in Prayag in the interval of every 5 years. This was known as 'Mahamokshak Parishad', whose duration was of 75 days.

158. Jaunpur city was founded in whose memory?

- A. Gasududdin Tughluq
- B. Mohammed-bin-Tughlaq
- C. Firoz Shah Tughluq
- D. Akbar

Ans. B

Sol. Jaunpur historically known as Sheeraz-e-Hind, was founded by the Sultan of Delhi Feroz Shah Tughlaq and named in memory of his cousin, Muhammad bin Tughluq, whose given name was Jauna Khan.

* He worked for Hindu Muslim unity through Al Hilal newspaper.

167. Currently how many wetlands sites in India are listed in Montreux Record?

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

Ans. A

Sol. * Currently **2 wetland sites** in India are listed in Montreux Record.

* These two sites are-

1. Keoladeo National Park (Rajasthan)

2. Loktak Lake (Manipur)

* **Montreux Record** is a register of wetland sites on the List of Wetlands of International Importance under Ramsar Convention.

168. Which of the following is an inorganic mineral:

- A. Oil
- B. Petroleum
- C. Coal
- D. Mica

Ans. D

Sol. • Mica is an inorganic mineral.

- Organic minerals are made up of buried plants and animals.
- Examples of organic minerals – Petroleum, oil, coal etc.
- Minerals like Mica, Limestone, graphite etc. are inorganic minerals.
- Organic minerals are also known as fossil fuels or Mineral fuels.

169. "The term Ecosystem" profounder is?

- A. Haeckel
- B. Clement
- C. Daly
- D. A.G. Tansley

Ans. D

Sol. * The term "Ecosystem" profounder is A.G. Tansley.

* The Single Climate Theory was given by Clement.

* The Glacier Control Theory was given by Daly.

* The Multiple Climate Theory was given by AG Tansley.

170. Which of the following diseases is caused by protozoa?

- A. Cholera
- B. Diphtheria
- C. Pneumonia
- D. Malaria

Ans. D

Sol. Malaria disease is caused by a protozoan parasite called Plasmodium, and its carrier is female anaphalese mosquito.

Protozoan infections are parasitic diseases caused by organisms formerly classified in the Kingdom Protozoa.

171. NISAR satellite will be launched by

- A. ISRO
- B. NASA
- C. Both A and B
- D. Neither A nor B

Ans. C

Sol. • NISAR satellite will be jointly launched by **ISRO** and **NASA**.
• It is likely to be the **world's most expensive** Earth-imaging satellite.
• **NASA** is the **space agency** of the **USA**; the head of NASA is **Jim Bridenstine**.

172. Which of the given options would be a logical sequence of the following words?

- 1) Script
- 2) Shooting
- 3) Editing
- 4) Promotion
- 5) Release

- A. 3, 1, 5, 4, 2
- B. 1, 3, 5, 4, 2
- C. 1, 2, 3, 4, 5
- D. 5, 4, 1, 2, 3

Ans. C

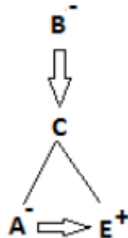
Sol. The meaningful order of words:
Script → Shooting → Editing → Promotion → Release
Thus, the logical sequence will be 1, 2, 3, 4, 5.
Hence, option C is the correct answer

173. A is the brother of E. B is the mother of C. E is the daughter of C. How is B related to A?

- A. Grandmother
- B. Grand-daughter
- C. Mother
- D. Great- grandmother

Ans. A

Sol.



From the given information given in the question, it is clear that B is the grandmother of A.
Hence, option A is the correct response.

174. What is the mirror image of 02:20?

- A. 10
- B. 10:40
- C. 09:40
- D. 08:40

Ans. C

Sol. 11:60 – 02:20 = 09:40

175. Select the letter-pair that can replace the question mark (?) in the following series.

GK, HJ, JH, ME, ?

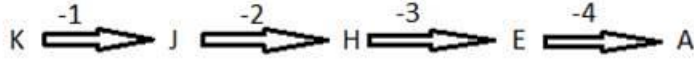
- A. PA
- B. QB
- C. QA
- D. PB

Ans. C

Sol. First alphabet of the letter- pair increases in the following way, as shown below



Second alphabet of the letter- pair decreases in the following way, as shown below



So the next letter pair in the series will be QA.

Hence, option C is the correct answer.

176. X is 39th from right end and Y is 19th from left end. If they interchange their places Y becomes 25th from left end then what is number of students?

- A. 65
- B. 61
- C. 63
- D. 69

Ans. C

Sol. No of X from right = 39th

No of Y from left = 19th

After interchange

Y takes place of X who is 39th from right

Now place of Y is 25th from left

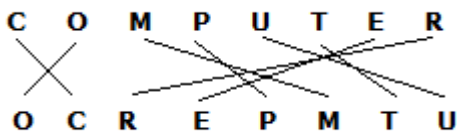
Total no of students = 39 + 25 - 1 = 63

177. In a code language, COMPUTER is written as OCREPMTU. How will DAUGHTER be written in the same language?

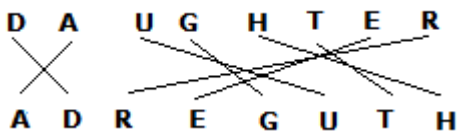
- A. READTHGU
- B. ADTHREGU
- C. ADREGUTH
- D. ADERUGTH

Ans. C

Sol.



Similarly,



Hence, option C is the correct answer.

Statement : Buy 'X' TV for better sound quality - An advertisement.

Assumptions :

I. 'X' TV is the only TV in the market.

II. 'X' TV is the costliest.

III. People generally ignore such advertisements.

A. Only assumption I is implicit.

B. None of the assumptions is implicit

C. Only assumption II is implicit.

D. All assumptions are implicit

Ans. B

Sol. Assumption I is incorrect as statement states to Buy X for better quality. That means there are other TV in market.

Assumption II is irrelevant as statement do not talk about pricing.

Assumption III is talk about perspective of people an irrelevant.

Hence option B is correct.

181. A statement is given followed by two course of action. Candidate is required to grasp the statement and analyses the problem or policy it mentions and then decide which course of action logically follows.

Statement:

Senior journalist Ram Prakash receives the Milanka award for 'giving Words to the wordless'.

Course of action:

I. This prestigious award should not be given to him as he always criticizes most of the government policy.

II. This prestigious award should be given to him as his "Peak Time" programme "deals with real-life, under-reported problems of ordinary people".

A. Only I follows

B. Only II follows

C. Both I and II follow

D. Either I or II follows

Ans. B

Sol. Course of action: I. This prestigious award should not be given to him as he always criticizes most of the government policy.(It does not follow as one can praise or criticize government's policy.)

II. This prestigious award should be given to him as his "Peak Time" programme "deals with real-life, under-reported problems of ordinary people".(It follows as he deals with problems of ordinary people in his newsroom.)

So, Only II follows.

182. **In the question, a statement is given, followed by two arguments, I and II. You have to consider the statement to be true even if it seems to be at variance from commonly known facts. You have to decide which of the given arguments, if any, is a strong argument.**

Statement :

Should rock shows be allowed to run till midnight at tourist places?

Arguments :

I. Yes, more tourists arrive due to rock shows. Tourism is good for local economy.

II. No, local traditions are harmed due to tourism.

A. if only argument I is strong.

B. if only argument II is strong.

C. if both I and II are strong.

D. if neither I nor II is strong.

Ans. A

Sol. Since the 1st argument gives a valid reason as why rock shows should not be banned. Therefore, only 1st argument is strong. Argument II is invalid as tourism is not bad for local tradition.

Hence, option A is the correct answer.

183. You are given a question followed by two statements numbered I and II. You have to decide whether the data provided on the statements are sufficient to answer the question.

Question: What does 'sen' stand for in the code language?

I. In the code language, 'you are beautiful' is written as 'sen tou ki'.

II. In the same code language, 'will you have coffee' is written as 'ti sen ae toce'.

A. Statement I alone is sufficient.

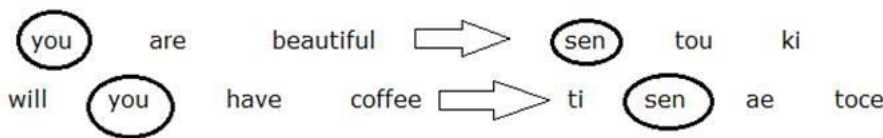
B. Both statements I and II together are not sufficient.

C. Statements II alone is sufficient.

D. Both statements I and II together are necessary.

Ans. D

Sol.



From both statements I and II, we can conclude that 'sen' is the code language for 'you'.

Hence, option D is the correct answer.

184. **Direction:** Each of the questions below consists of a question and three statements numbered I, II and III are given below it. You have to decide whether the data provided in the statements are sufficient to answer the question.

Who is brother in law of Sheetal?

I. Sheetal is married to the brother of Rekha. Rita is the daughter of Sheetal.

II. Rohit and Raju are the two brothers of Rekha.

III. Only Rohit has no child.

A. Only I and III are sufficient to answer the question.

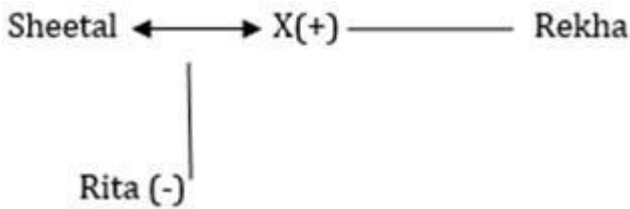
B. All I, II and III are required to answer the question.

C. Only II and III are sufficient to answer the question.

D. Question cannot be answered even with All I, II and III.

Ans. B

Sol. From I:



Sheetal is married to brother of Rekha. Rita is daughter of Sheetal.

From II: Rohit — Rekha — Raju.

Rohit Rekha Raju. Rohit and Raju are the two brother of Rekha.

From III: Rohit has no child.

From I, II and III: Sheetal X(+) Rohit Rekha Raju

Rita (-)

Question can be answered with All I, II and III because Sheetal is married to Rekha’s brother Raju.

185. In the following question, one/two statements are given followed by two/three conclusions I, II and III. 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 of the given conclusions, if any, follow from the given statements.

Statement :

All cities are towns.

Some cities are villages.

Conclusions :

I. All villages are towns.

II. No village is a town.

III. Some villages are towns.

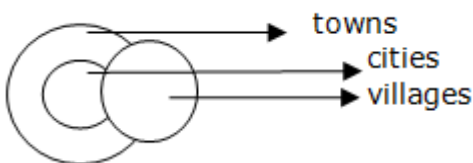
A. Only conclusion (III) follows

B. Only conclusion (I) follows

C. Only conclusion (II) follows

D. None of these

Ans. A



Sol.

(i) All villages are towns is not true.

(ii) No village is a town is not true as some villages are definitely towns.

(iii) Some villages are towns is true.

Thus from the above Venn diagram **conclusion III follows.**

Hence, option A is correct.

186. Select the missing number from the given responses.



- A. 1
- B. 4
- C. 9
- D. 25

Ans. D

Sol. Pattern
 $2^2, 3^2, 4^2$
 $1^2, 2^2, 3^2$
 $3^2, 4^2, 5^2$

187. Find the missing number in the series.

75, 96, 116, 135, 153, ?

- A. 173
- B. 170
- C. 178
- D. 175

Ans. B

Sol. The sequence is going like this

$75+21= 96$

$96 +20=116$

$116 +19=135$

$135 + 18=153$

So the next would be $153 + 17=170$

which gives us 170 as our answer

Hence B

188. In the following question, select the missing number from the given alternatives.

106	64	14
98	62	12
84	45	?

- A. 13
- B. 24
- C. 36
- D. 48

Ans. A

Sol. We can relate rows as $106-64 = 42$ i.e. $14*3$

Second row can be related as $98-62 = 36$ i.e. $12*3$

So for the third row also, do the same things $84-45 = 39$

Now we need to find the number which would divide 39 by 3 so $39/3=13$.

So, 13 would be the answer.

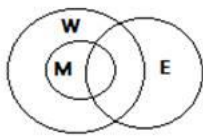
Hence, option A is correct.

189. Select the Venn diagram that best represents the relationship between the following classes.
Women, Mother, Engineer



Ans. A

Sol. The ven diagram that best represents the relation between the given class is as shown below:



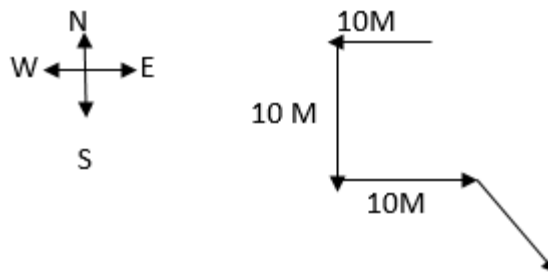
Hence, option A is the correct answer.

190. Vijay walks 10 meters westward, then turns left and walks 10 meters. He then again turns left and walks 10 meters. He takes a 45-degree turn rightwards and walks straight. In which direction is he walking now?

- A. South
- B. West
- C. South East
- D. South West

Ans. C

Sol.



From the fig, it is clear that Vijay is walking towards South-East direction.
Hence, option C is correct.

191. 'खम्भा' शब्द का तत्सम शब्द क्या है?

- A. पिलर
- B. टावर
- C. स्तम्भ
- D. इनमें से कोई नहीं

Ans. C

Sol. खम्भा एक तद्भव शब्द है जबकि इसका तत्सम शब्द स्तम्भ होता है। स्तम्भ एक पुल्लिंग शब्द है।

तद्भव= तत्+भाव जिसका अर्थ है विकसित या उससे उत्पन्न होना। अर्थात वे शब्द जो संस्कृत या उससे उत्पन्न हुए हैं। या ऐसे संस्कृत शब्द जो कुछ रूप परिवर्तन के साथ हिंदी शब्दावली में आ गए।

तत्सम= तत्+सम= उसके समान अर्थात ऐसे शब्द जो संस्कृत से हिंदी में आये और ज्यों के त्यों रहे, तत्सम शब्द कहलाते हैं।

जो संज्ञापद पुरुष वर्ग के वाचक होते हैं, अथवा जो शब्द पुरुष जाति के अंतर्गत माने जाते हैं वे पुल्लिंग कहलाते हैं। जैसे-लड़का, आदमी, घोड़ा, शेर, बकरा, राजा, कुत्ता, पेड़, सिंह, बैल, घर आदि।

192. 'दासत्व' किस प्रकार की संज्ञा है?

- A. पदार्थवाचक
B. व्यक्तिवाचक
C. भाववाचक
D. जातिवाचक

Ans. C

Sol. 'दास' शब्द में 'त्व' जोड़ने पर भाववाचक संज्ञा 'दासत्व' बनती है।

193. निम्न में से कौन सा शब्द एकवचन का शब्द है?

- A. कौए
B. कौआ
C. लड़के
D. केले

Ans. B

Sol. निम्न में से कौआ शब्द एक शब्द वचन है। जहाँ शब्द के जिस रूप से संख्या के एक होने का बोध होता है उसे एकवचन कहते हैं। कौए, लड़के, केले, ये शब्द बहुवचन के हैं क्योंकि ये संख्या में एक से अधिक होने का बोध करा रहे हैं।

194. 'कोष-कोश' शब्द-युग्म का सही अर्थ है:

- A. खजाना, शब्द-संग्रह
B. खजाना, दूरी
C. शब्द-संग्रह, खजाना
D. दूरी, शब्द-संग्रह

Ans. A

Sol. 'कोष-कोश' शब्द-युग्म का सही अर्थ 'खजाना, शब्द-संग्रह' है।

कोष का अर्थ - खज़ाना, भंडार, धन-दौलत रखने की जगह

कोश का अर्थ - शब्दकोश बनाने वाला, शब्द-संग्रह

195. 'हर समय दूसरों की कमियाँ ढूँढने वाला' - वाक्यांश के लिए सार्थक शब्द होगा :

- A. छिद्रान्वेषी
B. चुगलखोर
C. दुष्ट
D. आलोचक

