

1. Which district of Rajasthan has the maximum sex ratio?

- A. Pali
- B. Rajsamand
- C. Banswara
- D. Dungarpur

Answer ||| D

Solution ||| The Sex ratio of Rajasthan is 928 according to Census 2011. Dungarpur (994), Rajsamand (990), Pali (987), Pratapgarh (983), Banswara (980) are the top five districts which have maximum sex ratio. And Dholpur (846), Jaisalmer (852), Karoli (861), Bharatpur (880) have Minimum Sex ratio.

2. How much population percentage growth in Rajasthan in Census 2011 as compared to 2001?

- A. 20.17%
- B. 21.31%
- C. 21.76%
- D. 21.02%

Answer ||| B

Solution ||| As per details from census 2011, Rajasthan has the population of 6.86 crores, an increase from figure 5.65 crore in 2001. Male population percentage in Rajasthan is 51.86%. And female population percentage is 48.14%.

3. Where does "Veera Tara" mela fills in Rajasthan?

- A. Bikaner
- B. Jaisalmer
- C. Barmer
- D. Jodhpur

Answer ||| C

Solution ||| Other fairs in Barmer are: -

- 1. Mallinaath Cattle fair
- 2. Nakoda ji ka mela
- 3. Thar Festival
- 4. Mallinaath cattle mela

4. Where does “Kapil muni mela” held in Rajasthan?

- A. Ganganagar
- B. Hanumangarh
- C. Bikaner
- D. Churu

Answer ||| C

Solution ||| Other fairs in Bikaner are: -

Karni mata ka mela—Deshnok (Bikaner)  
Camel festival---Bikaner  
Kapil muni ka mela---Kolayat (Bikaner)

5. Where does Salasar Balaji fair held in Rajasthan?

- A. Sikar
- B. Jhunjhunu
- C. Churu
- D. Alwar

Answer ||| C

Solution ||| Salasar Balaji fair held in Churu.

Other fairs are: -

GOGA Naomi Mela - GOGAMEDI (Hanumangarh)  
NARHAD Peer Mela- Jhunjhunu  
Gautameshwer- Pratapgarh  
Mehndipur Balaji mela- Dausa

6. Calculate the total energy stored in magnetic field in a solenoid having inductance 100mH when carrying a current of 30 A –

- A. 15 J
- B. 45 J
- C. 60 J
- D. 40 J

Answer ||| B

Solution ||| Energy stored in magnetic field is given by,

$$E = \frac{1}{2}LI^2 = \frac{1}{2} \times 100 \times 10^{-3} \times 30 \times 30 = 45 J$$

7.What is the true fact regarding Ward-Leonard System of Speed Control of DC motor?

- A. This system has inherent regenerative braking capacity.
- B. Smooth speed control of DC motors over a wide range in one direction is possible.
- C. Installation and maintenance cost is quite low.
- D. Both A & C

Answer ||| A

Solution ||| By varying the applied voltage to the armature, the speed of the DC motor can be controlled and based on this principle Ward-Leonard Method works.

The speed of a DC motor is controlled by varying the voltage fed to the generator field windings, which varies the output voltage of the generator. The varied output voltage will change the voltage of the motor, since they are connected directly through the armature. Consequently, changing the voltage fed to generator field windings will control the speed of the motor.

Higher initial cost and maintenance cost due to use of two additional machines of the same rating as the main motor.

Smooth speed control over a wide range in both directions is possible and has inherent regenerative braking capacity.

8.Fleming's right hand rule is applicable to

- A. DC generator
- B. DC motor
- C. Alternator
- D. Transformer

Answer ||| A

Solution ||| Fleming's Right Hand Rule (For DC generators) shows the direction of induced current when a conductor attached to a circuit moves in a magnetic field. It can be used to determine the direction of current in a generator's windings.

When a conductor such as a wire attached to a circuit moves through a magnetic field, an electric field is induced in the wire due to Faraday's Law of Electromagnetic Induction. The current in the wire can have two possible directions. Fleming's right-hand rule gives which direction the current flows.

The right hand is held with the thumb, index finger and middle finger mutually perpendicular to each other (at right angles), as shown in the diagram. The thumb is pointed in the direction

of the motion of the conductor relative to the magnetic field. The first finger is pointed in the direction of the magnetic field. Then the second finger represents the direction of the induced or generated current within the conductor (from the terminal with lower electric potential to the terminal with higher electric potential, as in a voltage source).

9. A mercury vapour lamp produces

- A. yellow light
- B. Red light
- C. orange light
- D. Greenish blue

Answer ||| D

Solution ||| Clear mercury lamps produce white light with bluish-green tint due to mercury's combination of spectral lines.

10. Which fault is more severe \_\_\_\_\_

- A. 3-phase symmetrical fault
- B. single to ground fault
- C. LLG fault
- D. Double line fault

Answer ||| A

Solution ||| Three phase symmetrical faults are known to be the most severe in a power system due to large fault current.

11. What is the importance of load shedding?

- A. to improve the power factor
- B. to reduce the peak demand
- C. to run the equipment efficiency
- D. to repair the machine

Answer ||| B

Solution ||| Load shedding is a way to distribute demand for electrical power across multiple power sources.

12.Lap winding is employed in a dc machine of

- A. low current and high voltage rating
- B. low current and low voltage rating
- C. high current and low voltage rating
- D. high voltage and high current rating

Answer ||| C

Solution ||| Lap winding carries more current because it has more parallel path than wave windings.

13.A GTO thyristor

- A. Requires a special turn off circuit like SCR
- B. Can be turned off by removing a gate pulse
- C. Can be turned off by negative current pulse at gate
- D. Can be turned off by positive current pulse at gate

Answer ||| C

Solution |||

It can be turned off by negative current pulse at gate terminal.

14.In a DC machine, the stator frame serves as

- A. to verticate the armature
- B. to hold the armature stamping
- C. to protect the whole machine
- D. as a return path for the flux

Answer ||| D

Solution ||| Stator provide the return path for the flux in the DC Machine.

15.Salient pole type alternator are generally used on

- A. low voltage alternator
- B. hydrogen cooled prime mover
- C. high speed prime mover
- D. low and medium speed prime movers

Answer ||| D

Solution ||| Salient pole alternator have large number of poles and operate at lower speed to avoid centrifugal unbalanced condition/situation.

16. Magnetization curve in a DC generator is graph between :

- A. Terminal voltage vs Armature current
- B. Armature voltage vs Armature current
- C. Armature terminal voltage vs Field current
- D. None of the Above

Answer ||| C

Solution ||| Magnetization curve of DC generator is that curve which gives the relation between field current and the armature terminal voltage an open circuit.

17. A lighting arrestor is usually located nearer to

- A. Isolator
- B. Bus bar
- C. Transformer
- D. Circuit breaker

Answer ||| C

Solution ||| Lighting arrestors are used to protect the terminal equipment's of a power substation.

18. Interpoles are meant for

- A. Reducing sparking at the commutator
- B. Strengthening the main field
- C. Increasing the counter emf
- D. Increasing the speed of the motor

Answer ||| A

Solution ||| Interpoles are used to reduce the effect of armature reaction and also to nullify of induced emf, generated in the coil undergoing commutation. Due to this emf, the sparking occurs and Interpoles help in reducing the sparking occurring at the commutator.

19.In a 3-Phase System, Three wattmeter method of Power measurement can be used to measure power in

- A. Balanced circuits only
- B. Unbalanced circuits only
- C. Both Balanced and Unbalanced circuits
- D. None of these

Answer ||| C

Solution ||| For Balanced Circuit, Power can be calculated using 1 wattmeter as well as 3 wattmeter. while for unbalanced Circuit, Three wattmeters are required for measuring power.

20.In a synchronous motor, damper winding are placed on

- A. Stator frame
- B. Rotor shaft
- C. Pole faces
- D. None of these

Answer ||| C

Solution ||| Damper winding are placed on pole faces of the rotor part of synchronous motor.

21.If the excitation of an alternator operating in parallel with other alternator is increased above the normal value of excitation, its

- A. Power factor becomes more leading
- B. Power factor becomes more lagging
- C. Output current decreases
- D. Output KW decreases

Answer ||| B

Solution ||| In case of alternator:

When its excitation is increased, it delivers more lagging reactive power to load.  
Hence, an overexcited alternator operates at lagging power factor.

22. When the rotor of the three phase induction motor is blocked, then the value of the slip is

- A. 0
- B. 1
- C. Negative
- D. Full load slip

Answer ||| B

Solution ||| Blocked rotor means,  $N_r = 0$

Therefore the slip becomes

$$s = \frac{N_s - N_r}{N_s} = \frac{N_s}{N_s} = 1$$

23. In high transmission lines, the topmost conductor is

- A. R phase conductor
- B. Y phase conductor
- C. B phase conductor
- D. Neutral phase conductor

Answer ||| D

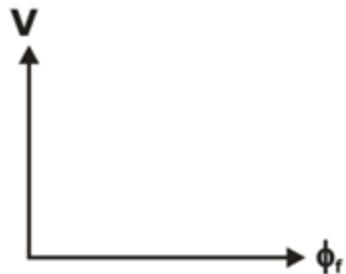
Solution ||| Earth conductor or neutral phase conductor is placed at the top of the high transmission lines because it is used to protect the lines from lightning.

24. A synchronous motor is operating at a zero power factor lagging. The armature reaction in the synchronous motor is \_\_\_\_ ?

- A. purely demagnetizing
- B. partly cross magnetizing and partly demagnetizing
- C. purely cross magnetizing
- D. purely magnetizing

Answer ||| D

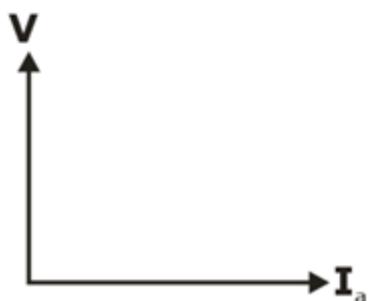
Solution ||| In case of synchronous motor



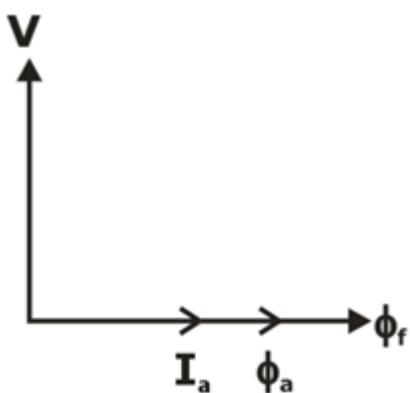
Where  $V$  = terminal voltage

$\phi_f$  = main field flux

For a zero power factor lagging, the armature current is lagging  $90^\circ$  by voltage.



So,



So armature flux is in the direction of main field flux, so armature reaction is purely magnetizing for this case.

25.Low resistance method for the Arc extinction is used for

- A. only DC
- B. only AC
- C. Both DC and AC
- D. None of these

Answer ||| B

Solution |||

Arc extinction methods are two types

- (i) High Resistance method
- (ii) Low resistance method

In high resistance method we increases the resistance of arc so that the arc current can be reduce.

Low resistance method is applicable only for AC circuit and it is possible these because of presence of natural zero of current. The arc get extinguished at the natural zero of AC wave.

26. Plug-setting multiplier is

- A. it is the ratio of pick up current to fault current in the relay coil
- B. It is the ratio fault current in relay coil to product of rated secondary current and current setting
- C. It is the ratio of current setting to product of fault current and rated secondary current of C.T
- D. It is the ratio of rated secondary current of C.T. to fault current in the relay coil

Answer ||| B

**PSM (Plug Setting Multiplier)**

$$= \frac{\text{Fault current in relay coil}}{\text{Pick up current}}$$

Pick up current = rated secondary current of CT  $\times$  current setting

$$\text{PSM} = \frac{\text{fault current in relay coil}}{\text{rated secondary current} \times \text{current setting}}$$

Solution |||

27. A dual trace CRO has

- A. 3-electron gun and two 2-pole switches
- B. one electron gun and one 2-pole switch
- C. 2 electron gun and one 2-pole switch
- D. one electron gun and two 2-pole switch

Answer ||| B

Solution |||

In a dual trace CRO has one electron gun and one two pole switch. The electronic switch passes one channel at a time into the vertical plate of CRO.

28.If an induction type energy meter runs fast, it can be slowed down by.

- A. Adjusting the position of break magnet and moving it closer from the centre of disc.
- B. drilling two diametrically opposite holes in the rotating disk.
- C. Adjusting the position of breaking magnet and moving it away from the centre of disc.
- D. None of the above

Answer ||| C

Solution |||

In the induction type energy meter, the breaking torque increases when magnet is moved outward radially, and it reduces when magnet is moved inward radially.

So, to slow downed the meter, breaking torque must be increases.

29.The blinking of fluorescent tube may be due to:

- A. Low circuit voltage
- B. Loose contacts
- C. Defective starter
- D. All of these

Answer ||| D

Solution |||

The blinking of fluorescent tube may be due to

- defective starter

- wrong connection
- loose contacts
- low circuit voltage

30. Resistance switching is normally restored in case of

- A. Bulk oil C.B.
- B. Air blast circuit breaker
- C. Low oil circuit breaker
- D. All of the above

Answer ||| B

Solution |||

The resistance switching is normally restored in case of air blast circuit breaker.

31. Match the following:

Peasant Movement

(i) Marwar

(ii) Eki

(iii) Begun

(iv) Bundi

Leader

a) Nathura Sharma

b) Ramnarayan Chaudhary

c) Motilal Tejawat

d) Jaynarayan Vyas

- A. (i) - (a); (ii) - (b); (iii) - (c); (iv) - (d)
- B. (i) - (a); (ii) - (c); (iii) - (b); (iv) - (d)
- C. (i) - (a); (ii) - (b); (iii) - (d); (iv) - (c)

D. (i) - (d); (ii) - (c); (iii) - (b); (iv) - (a)

Answer ||| D

Solution |||

Marwar Peasant Movement: This movement was started in the year 1923. The leader of this movement was Jaynarayan Vyas.

Eki Peasant Movement: Started in 1920, Eki Peasant Movement was headed by Motilal Tejawat.

Begun Peasant Movement: The Centre of this movement was Raita Village. It was started in 1921. Leaded by Ramnarayan Chaudhary.

Bundi Peasant Movement: Started in 1926, and leaded by Nathuram Sharma.

32. Match the following:

Peasant Movement - Dominant Caste

- (i) Bijolia Movement - a) Dhaakad
- (ii) Sikar And Shekhawati Movement – b) Jat
- (iii) Mewar Movement – c) Bhil
- (iv) Sirohi Movement – d) Garasiya

- A. (i) - (a); (ii) - (b); (iii) - (c); (iv) - (d)
- B. (i) - (a); (ii) - (c); (iii) - (b); (iv) - (d)
- C. (i) - (a); (ii) - (b); (iii) - (d); (iv) - (c)
- D. (i) - (b); (ii) - (a); (iii) - (c); (iv) - (d)

Answer ||| A

Solution |||

The Rajasthan peasant movement was on its own and it was leaded by amateur leaders and peasant class, though it was castiest in nature.

Dhaakad caste played an important role during the bijolia movement.

Sikar and Shekhawati movement was dominated by the Jats.

In Mewar and Sirohi movements, the Bhils and the Garasiya were the driving force behind it.

33. Who was the first lady governor of Rajasthan?

- A. Anandi Behen Patel
- B. Vasundhara Raje
- C. Pratibha Patil
- D. Girija Choudhary
- E. None of the Above

Answer ||| C

Solution |||

- Pratibha Patil was born on December 19, 1934, in Nadgaon village of Jalgaon District, Maharashtra. Smt. Patil assumed office as the 12th President of India on July 25, 2007.
- She was the first woman to have been elected to this august office. Immediately prior to the election as the President of India; Smt. Patil was the Governor of Rajasthan from November 8, 2004, till June 21, 2007, thus making her the first woman to assume the office of governor of Rajasthan.

34. The technology “CMOS” used for fabricating integrated circuits refers to

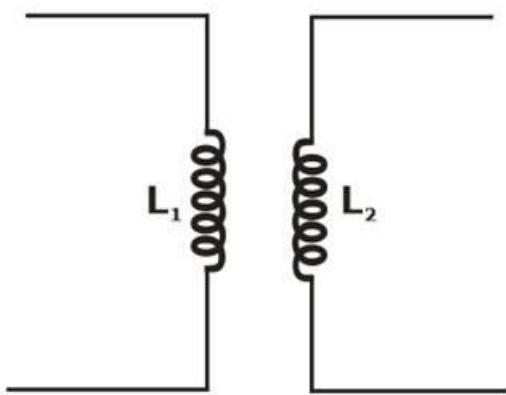
- A. Compound metal oxide semiconductor
- B. Complementary metal oxide semiconductor
- C. Conditional metal oxide semiconductor
- D. Compound metal oxide superconductor

Answer ||| B

Solution |||

CMOS refers to complementary metal oxide semiconductor.

35. Two coils with inductance  $L_1=10\text{ H}$  and  $L_2=10\text{ H}$  is shown below:



If the coupling factor  $k = 0.5$ , Calculate mutual inductance between the coil:

- A. 10
- B. 4
- C. 5
- D. 2

Answer ||| C

Solution |||

Mutual inductance is given by  $M = k\sqrt{L_1 L_2}$

$$M = 0.5\sqrt{10 \times 10}$$

$$M = 5$$

36. The reluctance and the MMF in a circuit is directly proportional to which of the following quality.

- A. Length of magnetic path ( $l$ )
- B. Magnetic permeability ( $\mu$ )
- C. Area of cross- section ( $A$ )
- D. All of the above.

Answer ||| A

Solution |||

$$\text{Reluctance} = \frac{l}{\mu A} \propto l$$

$$MMF = \phi R \propto R \propto I$$

So, MMF  $\propto I$

Hence option A is correct.

37. In three phase cycloconverters, the reduction factor is given by

- A.  $\left( \frac{\text{Input frequency}}{\text{Output frequency}} \right)$
- B.  $\sqrt{\frac{\text{Output frequency}}{\text{Input frequency}}}$
- C.  $\sqrt{\frac{\text{Input frequency}}{\text{Output frequency}}}$
- D.  $\frac{\text{Output frequency}}{\text{Input frequency}}$

Answer ||| D

Solution ||| Reduction factor = 
$$\frac{\text{Output frequency}}{\text{Input frequency}}$$

38. In which district of Rajasthan is the nuclear power plant located?

- A. Udaipur
- B. Chittorgarh
- C. Banswara
- D. Alwar

Answer ||| B

Solution |||

Rawatbhata nuclear power plant is located in Chittorgarh district. This Rajasthan atomic power plant is the first in Rajasthan, the second nuclear power plant in the country. It was established in 1973 in collaboration with Canada. It is based on uranium 235 or nuclear power. It has a capacity of 1300 MW. All the institutes associated with this nuclear power plant are located in Kota district.

39.

Who is also known as Vaishno Devi of Thar?

- A. Karni Mata
- B. Sati Mata
- C. Hichki Mata
- D. Tanot mata

Answer ||| D

Solution |||

Raja Kehar established Tanotia Devi temple by settling the town in the name of his son Tanu.

It is also known as Vaishano Devi of Thar, Goddess of Army, and Rumal Devi. Here Vijay Stambha, the symbol of victory of India in the Indo-Pak war in 1965 is also situated. Temple of Tanot Mata is located in Jaisalmer district.

40. When was Rajasthan Information Commission formed?

- A. 18 April 2006
- B. 18 April 2005
- C. 18 April 2007
- D. 18 April 2008

Answer ||| A

Solution |||

The State Information Commission is a statutory and autonomous body like the Central Information Commission. The State Information Commission in Rajasthan was constituted on 18 April 2006. The State Information Commission will have a State Chief Information Commissioner and Information Commissioner as per the requirement, which is appointed by the Governor.

Tenure of the Chief Information Commissioner will be 5 years and 65 years of age from the date of joining the post, whichever is earlier.

41. What is the time of the first assembly of Rajasthan?

- A. 1951-1956
- B. 1952-1957
- C. 1954-1959

D. 1953–1958

Answer ||| B

Solution |||

The term of the first assembly of Rajasthan was from 1952 to 1957. Three Chief Ministers were formed during this period.

First elected Chief Minister Tikaram Paliwal

Second Jai Narayan Vyas became the only Chief Minister nominated and elected Chief Minister.

Third Mohanlal Sukhadia - The longest tenure (from 1954 to 1970).

42. Which famous war was fought on 18 June 1576?

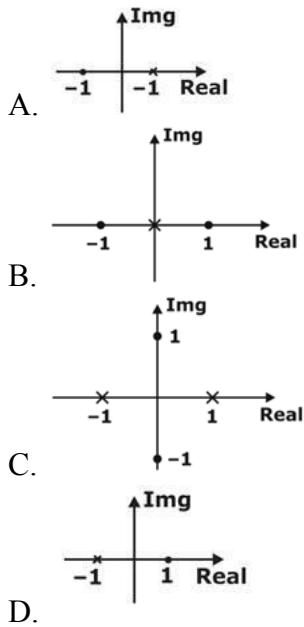
- A. Dewar
- B. Haldighati
- C. Chittor
- D. Khanwa

Answer ||| B

Solution |||

On 18 June 1576, the famous Haldighati war was fought between Akbar and Maharana Pratap. Maharana Pratap was the son of Uday Singh who was born on 9 May 1540 in Kumbhalgarh. Pratap ruled the throne of Mewar for only 25 years, but within this time, he earned a work that crossed the boundary of the country and became immortal. Pratap was called Kika in the mountainous part. The historical battle of Haldighati was fought between Akbar's representative Mansingh and Maharana Pratap. However, in this, Mansingh failed to kill or imprison Pratap.

43. Which of the pole zero plot corresponds to an even function



Answer ||| C

Solution |||

For a signal to be even, it must be either two sided or finite duration, therefore  $x(s)$  has poles, the ROC must be strip in the s-plane

$$\text{For (a), } x(s) = \frac{As}{(s+1)(s-1)}$$

$$\text{So } x(-s) = \frac{-As}{(s+1)(s-1)} = -x(s)$$

So  $x(t)$  is not even

For (b), ROC can not be chosen to correspond to a two sided function  $x(t) \Rightarrow$  Not even

$$\text{for (c), We have } x(s) = \frac{A(s-j)(s+j)}{(s+1)(s-1)}$$

$$= \frac{A(s^2 + 1)}{(s^2 - 1)}$$

$$\text{So } x(-s) = \frac{A(s^2 + 1)}{s^2 - 1} = x(s)$$

So even

for (d) ,ROC cannot be chosen to corresponding to a two sided function  $x(t) \Rightarrow$  So not even

44.Barsingsar Thermal Project is located in which district?

- A. Bikaner
- B. Jaisalmer
- C. Jodhpur
- D. Nagaur

Answer ||| A

Solution |||

Barsingsar Thermal Project is located in Bikaner district.

A lignite based power project plant has been constructed at this location by Neyveli Lignite Corporation, a Government of India Enterprise.

45. When and where was the first sugar mill in Rajasthan established?

- A. 1932 Bhupalsagar
- B. 1945 Abhaneri
- C. 1936 Bagdari
- D. 1944 Keshoripatan

Answer ||| A

Solution |||

The 'Mewar Sugar Mills' sugar mill was first established in Rajasthan in 1932 in Bhopal Sagar of Chittorgarh district, which is currently closed. It is the first sugar mill in the state. The Ganganagar Sugar Mills was established in Srigananagar in 1935. The work of making sugar in it started in 1946.

46. What is the length of Rajasthan from north to south?

- A. 828 km
- B. 848 km
- C. 836 km
- D. 826 km

Answer ||| D

Solution |||

Rajasthan is located in the western part of the map of India. The shape of Rajasthan is like a rhombus. Rajasthan is 869 kilometers from east to west, while 826 kilometers from north to south. The latitudinal extension of Rajasthan is  $23^{\circ} 03'$  North to  $30^{\circ} 12'$  North with a difference of  $7^{\circ} 09'$  minutes. The longitudinal extension of Rajasthan is  $78^{\circ} 17'$  E longitude from  $69^{\circ} 30'$  East longitude. The difference is  $8^{\circ} 47'$  minutes.

The Tropic of Cancer cuts Rajasthan in Banswara and Dungarpur districts. Because of this, the sun shines right here on 22 June.

47. Where is the Charchauma temple located?

- A. Kota
- B. Bikaner
- C. Karauli
- D. Banswara

Answer ||| A

Solution |||

The Charchauma Temple is located in the village of Charchuma in Ladpura tehsil, Kota. This temple belongs to the Shaiva sect. The temple is built in the Nagara style of architecture. The Shivling is made of black stone and has four faces. Behind the temple is a black stone statue of Shakti. This temple is of Gupta era. The main festival is held on Shivaratri, but the festival is also organized on Anantchaturdashi in the month of Bhadwa.

48. Where is the Dev Somnath temple situated?

- A. Bikaner
- B. Udaipur
- C. Rajasmand
- D. Dungarpur

Answer ||| D

Solution |||

On the banks of Som river, there is an old and beautiful Shiva temple called Deo Somnath built in the 12th century. Built of white stone, the temple has imposing turrets. One can see the sky from within the temple. Though there is a perfect adaptation of parts in the masonry,

yet it gives the impression that individual stones are crumbling. The temple has 3 exits, one each in the east, the north and the south. The entrance gates are two-storeyed. The Garba Garah has a high dome. In front of it is the Sabha Mandap – built on 8 majestic pillars. There are Twenty Torans of which four still exist. Others were destroyed by the floodwaters of the Som. The idol of the deity is in a chamber, eight steps below and the entrance is from the Sabha Mandap. There are several inscriptions by pilgrims and the oldest belongs to 1493 A.D. Several warriors were cremated near the temple and memorials have been raised in their honour.

49. Among the following, which is/are the gates in Bala Qila?

- A. Laxman Pol
- B. Suraj Pol
- C. Chand Pol
- D. All of the above

Answer ||| D

Solution |||

The Bala Qila (meaning young fort) was built on the foundations of a 10th century mud fort and is a towering structure set atop a hill. Strong fortifications, graceful marble columns and delicate latticed balconies make up the fort. Bala Qila can be entered through six gates, namely Jai Pol, Suraj Pol, Laxman Pol, Chand Pol, Krishan Pol and Andheri Gate.

50. Which dance is performed by Bhil Tribe?

- A. Gindad dance
- B. Chang dance
- C. Gair dance
- D. Jhumar dance

Answer ||| C

Solution |||

\* It is performed in Mewar region. However, its variations, like the Dandi Gair, is found in the Marwar region and Gindad is found in the Shekhawati region

\* It is performed by both men and women together.

\* It is performed on the occasion of Holi.

\* The Gair dance is performed by both Men and Womenfolk holding wooden sticks.

\* It is a group dance consisting of two circles where groups of dancers moving in and out a big circle.

51. The cultivators who had no cultivable land in their own villages and were allowed to take up land in other villages were called

- A. Bhumias
- B. Istamaradars
- C. Pahi Kashats
- D. Jagir

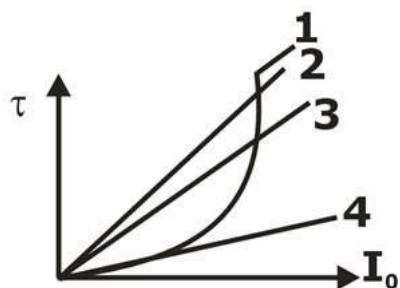
Answer ||| C

Solution |||

The cultivators who had no cultivable land in their own villages were allowed to take up land in other villages. They were known as Pahi Kashats. The villagers were always opposed to such tenants as they preferred to have the advantage of grazing their cattle on the land which otherwise might remain fallow.

52. In the torque current characteristics shown, match the current sequence:

- (i) Series motor
- (ii) Shunt motor
- (iii) Cumulative compound motor
- (iv) Differential compound motor.



- A. 1 – (i), 2 – (ii), 3 – (iv), 4 – (iii)
- B. 1 – (iv), 2 – (iii), 3 – (ii), 4 – (i)
- C. 1 – (i), 2 – (iii), 3 – (ii), 4 – (iv)
- D. 1 – (i), 2 – (ii), 3 – (iii), 4 – (iv)

Answer ||| C

Solution |||

Same as above

53. Who was the first Rajasthani to be nominated in Rajya Sabha?

- A. Narayan Singh Manaklao
- B. Beem singh
- C. Bhairon singh Shekhawat
- D. Tikaram Paliwal

Answer ||| A

Solution |||

- Narayan Singh Manaklao was the first Rajasthani to be nominated in Rajya Sabha.
- He was nominated during August 2003 to August 2009.
- He was honored with Padma Shri in 1986.
- He was also awarded from Padma Bhushan in 1991 by Govt. of India.

54. While signing the instrument of accession with Union of India, which princely state king said that “I am signing my death warrant”?

- A. Maharawal Chandraveer Singh of Banswara
- B. Maharana Bhupal Singh
- C. Heeralal devpura
- D. Mohan lal Sukhadia

Answer ||| A

Solution |||

- “I am signing my death warrant”, Maharawal Chandraveer Singh of Banswara said this.
- In 1527, The Banswara State was founded.
- In 1527, After the death of Rawal Udai Singh of Vagad at the Battle of Khanwa, where he fought alongside Rana Sanga against Babar, his territories were divided into the states of Banswara State and Dungarpur State.

- The Banswara was merged into the Indian Union in 1949.
- Chandraveer singh ruled from 29 July 1944 to 15 August 1947.

55. In which year, the President's rule was implemented for the first time in Rajasthan?

- A. 1968
- B. 1970
- C. 1965
- D. 1967

Answer ||| D

Solution |||

- The President's rule was implemented for the first time in the Rajasthan in 1967.
- President Rule has been imposed four times in Rajasthan till now,
  - o First- From 13 March to 26 April 1967.
  - o Second – From 30 April 1977 to 21 June 1977.
  - o Third- From 17<sup>th</sup> February 1980 to 5<sup>th</sup> June, 1980.
  - o Fourth- from 15 December 1992 to 3 December 1993.

56. “Sati practice” was first declared illegal in Rajasthan in

- A. 1830
- B. 1822
- C. 1835
- D. 1820

Answer ||| B

Solution |||

\*In 1822, “Sati practice” was first declared illegal in (Bundi) Rajasthan.

\*Major tradition banned in Rajasthan are as follows-

\* In 1844, a political agent of Jaipur banned Samadhi Pratha.

\* In 1833, the political agent, Wilkinson's efforts led to the ban of Girl foeticide in Kota.

\* Bundi became the second state to ban female foeticide in 1834.

\* In 1841, British authorities tried to limit the ill impacts of 'Tyag Pratha' in Jodhpur.

\*Rani Sati-

\*“Rani Sati’s festival held in Jhunjhunu.

\*Rani Sati is also known as Narayani Devi and referred to as Dadiji.

\*Rani Sati Temple is a temple located in Jhunjhunu district, in the state of Rajasthan. It is the largest temple in India devoted to Rani Sati.

57.The correct statements with respect to SMPS are:

1. Transistors are used in active region.

2. Switching is done at high frequency.

3. SMPS supplies are small in size.

A. 1 and 2

B. 1 and 3

C. 2 and 3

D. 1, 2, and 3

Answer ||| C

Solution |||

In SMPS, transistor operates in switch mode at very high frequency.

Cut off region is used for off state and saturation region is used for ON state.

→ As such a high frequency, the size of filter as well as transformer is reduced. So these are compact in size.

→ With the availability of high-speed devices like power MOSFET, SMPS is popularity used now a days.

58.If the flux of a DC motor approaches zero, its speed will:

- A. Approach Infinity
- B. Approach Zero
- C. Remain Unchanged
- D. Be Between Zero and Infinity

Answer ||| A

Solution |||

By increasing or decreasing flux, the speed of the DC motor decreases or increases respectively. Therefore, if the field circuit of DC motor is suddenly opened or flux approaches zero, its speed becomes dangerously high.

59.Which of the following methods is used to measure medium resistance?

- A. Potentiometer method
- B. Direct Deflection method
- C. Wheatstone Bridge method
- D. Kelvin Double Bridge method

Answer ||| C

Solution |||

Wheatstone Bridge method is used to measure medium resistance.

60.Which of the following statements regarding a shell type transformer is INCORRECT?

- A. It provides shorter magnetic path
- B. Natural cooling is quite good
- C. It gives better support against electromagnetic forces between current carrying transformer
- D. Magnetizing current is lesser as compared to core type

Answer ||| B

Solution |||

The magnetic flux flows through two closed magnetic paths which decrease the core losses and hence increase the efficiency of transformer and provide shorter magnetic path. So, shell type transformer gives more output compared to similar core type transformer. One of the main benefits using shell-type is that the core gives a good support against the electromagnetic forces that can occur between the current carrying conductors during the case of a short-circuit. Forced air or forced oil cooling is essential in shell type transformer as heat

generated during working, cannot get dissipated easily from windings due to surrounding yoke and limbs.

61.Thevenin's theorem cannot be applied to:

- A. active circuit
- B. passive circuit
- C. nonlinear circuit
- D. linear circuit

Answer ||| C

Solution ||| Thevenin's theorem cannot be applied to networks which contains non-linear elements. This theorem is applicable only linear circuits or networks. Thevenin's theorem cannot be used for determining the efficiency of the circuit.

62.During the resistance welding, the heat produced at the joint is proportional to?

- A. Volt-Ampere
- B.  $I^2 R$
- C. Voltage
- D. Current

Answer ||| B

Solution ||| Heat produced is given by,

$$H = I^2 R t$$

$$H \propto I^2 R$$

63.One sine wave has a period of 2 ms, another has a period of 5 ms, and other has a period of 10 ms. Which sine wave is changing at a faster rate?

- A. sine wave with period 2 ms
- B. all are at the same rate
- C. sine wave with period of 10 msec
- D. sine wave with period 5 ms

Answer ||| A

Solution ||| Using formula,

$$f = \frac{1}{T}$$

For wave period of 2 ms

$$T_1 = 2 \text{ ms}$$

$$f_1 = \frac{1}{2 \times 10^{-3}} = 500 \text{ Hz}$$

Similarly,

$$f_2 = \frac{1}{5 \times 10^{-3}} = 200 \text{ Hz}$$

$$f_3 = \frac{1}{10 \times 10^{-3}} = 100 \text{ Hz}$$

So, the wave with a period of 2 milliseconds has to complete a whole cycle in less time and therefore changes at a faster rate.

64. In Bipolar Junction transistors, the type of configuration which will give both voltage gain and current gain is:

- A. CB
- B. CE
- C. CC
- D. None of the options

Answer ||| B

Solution ||| **Bipolar Transistor** is a three terminal device, there are basically three possible ways to connect it within an electronic circuit with one terminal being common to both the input and output.

CB has voltage gain but no current gain.

CE has both current and voltage gain.

CC has current gain but no voltage gain.

65.In a Parallel RLC circuit if the lower cut-off frequency is 2400 Hz and the upper cut off frequency is 2800 Hz. What is the band width?

- A. 5200 Hz
- B. 2400 Hz
- C. 400 Hz
- D. 2800 Hz

Answer ||| C

Solution ||| Bandwidth for parallel RLC circuit –

$$\omega_o = \omega_2 - \omega_1$$

$$\omega_o = 2800 - 2400 = 400\text{Hz}$$

66.When the current through the coil of an electromagnet reverses, the:

- A. magnetic field collapses
- B. direction of the magnetic field reverses
- C. direction of the magnetic field remains unchanged
- D. magnetic field expands

Answer ||| B

Solution ||| When you change the direction of current, the curl magnetic field will just reverse the direction. If with the former current direction the magnetic field were clockwise, now on reversing the direction, the magnetic field will be counter clockwise.

67.Two alternators A and B are operating in parallel. If the excitation of A is increased, then:

- A. both real and reactive power of A are increased.
- B. the reactive power of A is decreased.
- C. the reactive power of A is increased while that of B is unchanged.
- D. the reactive power of A is increased while that of B is decreased.

Answer ||| D

Solution |||

When excitation of alternator A increases, it supplies more lagging VARs whereas the alternator B will now supply less lagging VARs i.e. reactive power decreases.

68. Protection against negative sequence currents is provided for:

- A. generators
- B. transmission lines
- C. transformers
- D. motors

Answer ||| A

Solution |||

Phase to phase fault mainly occurs because of the negative sequence component. Negative Sequence relay protects generators from the unbalanced load by detecting negative sequence current.

69. Projection welding can be considered as a mass production form of:

- A. seam welding
- B. upset welding
- C. spot welding
- D. flash welding

Answer ||| C

Solution |||

Projection welding involves the joining of parts by a resistance welding process which closely resembles spot welding. Projection welding may be carried out with one projection or more than one projection simultaneously.

70. In which of the following transformers is the secondary current of the same order as that of the magnetizing current?

- A. Distribution transformers
- B. Potential transformers
- C. Power transformers
- D. Current transformers

Answer ||| B

Solution |||

The secondary current is of the same order as that of the magnetizing current in case of potential transformers because the potential transformers measures the voltage (i.e. ideally open circuited) and requires only the magnetising current across the winding.

71.In which year was the Marwar public society ordinance issued?

- A. 1930
- B. 1928
- C. 1941
- D. 1934

Answer ||| D

Solution |||

- **In the year 1934 AD**, Marwar public society ordinance **was issued**.
- The first Chairman of Marwar Prajamandal was Bhanwar lal saraf.
- **In 1934, Marwar Prajamandal was formed**.
- The famous personality of Marwar prajamandal was **Jay Narayan Vyas**.

72.Sangeetraj which was composed by Maharana Kumbha is divided into how many parts?

- A. Seven
- B. Four
- C. Nine
- D. Five

Answer ||| D

Solution |||

- Sangeetraj which was composed by **Maharana Kumbha** is divided into 5 parts.
- The 5 parts are **PathyaRatankosh, NrityaRatankosh , GeetRatankosh, VadhyRatankosh and RasRatankosh**.
- **Other writings of Kumbha are Sudh Prabandh, Sangeet Mimansa, Kaamraj Ratisar, Sangeet Ratnakar etc.**
- Kumbha;s court was adorned by famous personalities like **Mahesh, Mandan, Atri etc.**

- Kumbha built **Achalgarh fort, Kumbhalgarh fort, Basant fort, Kirtistambh** etc.

73. Match the following: Sect: Main Centre or Head quarters

- A) Gudhar Sect - i) Jodhpur
  - B) Nawal Sect - ii) Dantara (Bhilwara)
  - C) Charandasi Sect - iii) Delhi
  - D) Alkhiya Sect - iv) Bikaner
- A. (i) (ii) (iii) (iv)
  - B. (ii) (i) (iii) (iv)
  - C. (ii) (iii) (i) (iv)
  - D. (i) (iv) (iii) (ii)

Answer ||| B

Solution |||

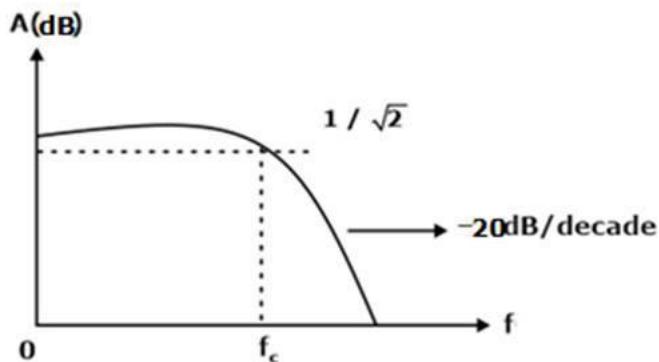
- **Nawal Sect, Gudhar Sect, Charandasi Sect and Alkhiya Sect are Nirgun sects.**
- Gudhar (Dantara) Sect started was initiated by Saint Dasji, this sect people wear yellow cloths.
- Naval (Jodhpur )sect was started by Saint Navaldasji
- **In 18th century, Charandasi sect (Delhi) was started by Saint Charandasji.**
- By Swami LalGiri, **Alkhiya Sect (Bikaner)** was started.

74. In the first order low pass filter, which one of the following statements is not correct?

- A. It has the maximum gain at frequency of 0 Hz
- B. At higher cutoff frequency, the gain falls to 0.707 times the maximum gain.
- C. For frequency greater than higher cutoff frequency, the gain decreases at a constant rate of –20 dB/decade.
- D. It has the maximum gain in stop band.

Answer ||| D

Solution |||



First order low Pass filter:

- A. It has the maximum gain at frequency of 0 Hz.
- B. At higher cutoff frequency, the gain falls to 0.707 times the maximum gain.
- C. For frequency greater than higher cutoff frequency, the gain decreases at a constant rate of  $-20\text{ dB/decade}$ .

75. Sirohi comes under which division of Rajasthan?

- A. Jodhpur
- B. Udaipur
- C. Ajmer
- D. Jaipur

Answer ||| A

Solution |||

- \* Sirohi comes under the Jodhpur division of Rajasthan.
- \* There are total of seven divisions in Rajasthan, which are as follows-

<b>Division</b>	<b>No. of Districts</b>	<b>Name of Districts</b>
<b>Ajmer</b>	4	Ajmer, Bhilwara, Nagaur and Tonk
<b>Bharatpur</b>	4	Bharatpur, Dholpur, Karauli and Sawai Madhopur
<b>Bikaner</b>	4	Bikaner, Churu, Ganganagar, Hanumangarh
<b>Jaipur</b>	5	Jaipur, Alwar, Jhunjhunu, Sikar and Dausa
<b>Udaipur</b>	6	Banswara, Chittorgarh, Dungarpur, Udaipur and Rajsamand
<b>Kota</b>	4	Baran, Bundi, Jhalawar and Kota
<b>Jodhpur</b>	6	Barmer, Jaisalmer, Jalore, Jodhpur, Pali and Sirohi

76. Potash reserves are found in which of the following districts of state?

- A. Srigananagar and Hanumangarh
- B. Nagaur and Pali
- C. Jaipur and Dausa
- D. Kota and Jhalawar

Answer ||| A

Solution |||

- \* Around **2400 million** tonnes of potash reserves are found in **Sri Ganganagar and Hanumangarh districts**.
- \* It is approximately **4 times the global reserves** found of potash.
- \* According to a research paper published by CIMFR, potash exploration was carried out by the Geological Survey of India (GSI) from 1974 to 1991 in Nagaur, Churu, Bikaner, Hanumangarh and Ganganagar districts.
- \* GSI reported a 350-km-long and 200-km-wide potash-bearing deposit. This basin has been considered the south-eastern extension of the salt range of Pakistan.
- \* **RSMM, Rajasthan Government and Mining Exploration Corporation Ltd.** Signed an MoU to carry out the economic feasibility of potash mining in this area.
- \* **Use of Potash-**
  - \* It is mainly used in fertilizers.
  - \* It is also used in manufacturing glass, explosives and petrochemicals.

77. Who was the first female speaker of the Rajasthan Legislative Assembly?

- A. Sharda Bhargava
- B. Gyatri devi
- C. Sumitra Singh
- D. Kamala beniwal

Answer ||| C

Solution |||

The first female Speaker of the Rajasthan Legislative Assembly was Sumitra Devi.

\* **Sharda Bhargava** was the first female parliamentarian from Rajasthan (1952).

\* **Gayatri Devi – first female Lok Sabha member**

\* **Sumitra Devi** – First female speaker of the legislative assembly.

\* **Vasundhara Raja** was elected five times continuously for Lok Sabha (1989, 1991, 1996, 1998, and 1999).

78. Which of the following architect is also known as 'Taj Mahal of Marwar'?

- A. Mehrangarh
- B. Jaswant Thada
- C. Lalgarh of Bikaner
- D. Patwon Ki Haweli

Answer ||| B

Solution |||

\* **Jaswant Thada** of Jodhpur is also known as "**Taj Mahal of Marwar**".

\* It was built in memory of **Maharaja Jaswant Singhji II of Jodhpur (1873-1895) by his son Maharaja Sardar Singhji (1895-1911)** completed in 1906 A.D.

\* The main hall has been built like a temple where puja (ritual) is also performed.

\* The worship of ancestors is common to the Rajput clans.

\* Today, Jaswant Thada is managed and looked after by the **Mehrangarh Museum Trust (MMT) and is open to public**.

\* Sardar Singh's uncle, Maharaj Pratap Singh and a council of regency assisted him for the first three years until he reached eighteen.

\* Sardar Singh **visited Europe in 1901**, and is known for his involvement in extending the railway from Jodhpur to Hyderabad.

79. Where is 'Kasre-Ilam' located?

- A. Kota
- B. Bundi
- C. Baran
- D. Tonk

Answer ||| D

Solution |||

\* Kasre Ilam is located at **Tonk**.

\* This Institute is well known to the world for its rare manuscripts on Historiography, Orientalogy, Islamic Studies, Sufism, Urdu, Arabic and Persian Literature, Catalogues, Medicines, Auto-biographies, Medieval History, Literature based on Independence, Calligraphy etc.

\* **Dr. Saulat Ali Khan** is its present Director.

\* Presently its name is changed to '**Maulana Abul Kalam Azad Arabic Persian Research Institute**'.

\* It was formed on 4<sup>th</sup> October, 1978.

\* **Nawab Mohamad Ali of Tonk** collected approx 1 lakh manuscripts and literature books from around the world here.

80. Who was the painter of famous Rajasthani painting 'Bani Thani'?

- A. Samant Singh
- B. Mordhawaj Nihalchand
- C. Nisarddin
- D. Rukmuddin

Answer ||| B

Solution |||

- \* The period of **Raja Sawant Singh** (1748 - 1764 AD) is called golden age from the point of view of Kishangarh style.
- \* The maidservant brought by her mother from the periphery of Delhi got absorbed in his mind.
- \* The name of this beauty was Bani-Thani. Soon she became his paswan.
- \* Nagri Das ji's love of poetry, singing, music love from Bani-Thani and **artist Mordhwaj Nihalchand's painting made the painting of Kishangarh** at the highest place at this time.
- \* Nagri Das's paswan Bani-Thani is inscribed as Radha.
- \* The major painters of Kishangarh style are -**Amirchand, Dhanna, Bhanwarlal, Chhotu, Suratram, Surdhwaj, Peacock Dhwaj Nihalchand, Nanakram, Sita Ram, Badan Singh, Amru, Surajmal, Ramnath, Josh, Sawairam, Tulsidas and Laldi Das.**

81. As per Census 2011, which district of Rajasthan had the minimum decadal growth rate?

- A. Kota
- B. Hanumangarh
- C. Sri Ganganagar
- D. Jalore

Answer ||| C

Solution |||

- \* As per Census 2011, Sri Ganganagar district of Rajasthan had the minimum decadal growth rate.
- \* 2011 Census Data of Rajasthan-**
- \* 2001-2011 Decadal growth of state – 21.3**
- \* Highest Decadal growth district – Barmer
- \* Lowest Decadal growth district – Sri Ganganagar
- \* Population Density of State- 200**
- \* Highest population density district – Jaipur
- \* Lowest population density district – Jaisalmer
- \* Sex ratio of state – 928**

\* Highest sex ratio district – Dungarpur

\* Lowest Sex ratio district – Dholpur

**\* Literacy rate of State- 66.1%**

\* Highest literacy rate district – Kota

\* Lowest literacy rate district – Jalore

82. Who founded the Rajasthan Sewa Sangh?

- A. Chandmal Surana
- B. Govind Giri
- C. Vijay Singh Pathik
- D. Arjunlal Sethi

Answer ||| C

Solution |||

Rajasthan Sewa Singh-

\* It was formed in **1919 by Vijay Singh Pathik**

\* **Ramnarayan Chaudhary and Haribahi Kinkar** were also among founding members.

\* It was formed in **Wardha**

**Objective** – To aware masses and to foster the public awakening movements in Rajasthan

\* Its branches were working in Jaipur, Jodhpur, Kota and Bundi.

The other institutions are as follows-

\* **Samp Sabha – Govind Giri**

\* **Marwar Sewa Sangh – Chandmal Surana**

\* **Vardhaman Vidhaylay – Arjun Lal Sethi**

83. Desh Hiteshani Sabha was organised in Mewar under leadership of which Maharana?

A. Fateh Singh

B. Sawant Singh

- C. Sajjan Singh
- D. Amar Singh II

Answer ||| C

Solution |||

\* Desh Hiteshani Sabhi was formed under leadership of **Maharana Sajjan Singh in 1877.**

\* Its **major aims were-**

\* To rationalize the extravagance occurs in Rajput Marriages.

\* To frame rules regarding polygamy for Rajputs, Brahamans and Mahajans.

\* The other important socio reformist organization formed during the time of Maharaja Sajjan Singh was-

\* **Waltar Krit Hitkarini Sabha-**

\* It was formed under **AGG Colonel Walter in 1888.**

\* It was related to rationalizing the expenditure on deaths and to set marriage age of boys and girls.

\* It was formed in Ajmer.

\* Marriage age for boys was put 14 years and 18 years for girls.

\* The '**Tika**' and '**Rit**' rituals were ended.

84. Muhnoot Nainse was a great scholar of Marwar. He was present in the court of which of the following kings?

- A. Rao Maldev
- B. Jaswant Singh
- C. Mansingh II
- D. Hanumant Singh

Answer ||| B

Solution |||

\* Muhnoot Nainse was a contemporary of **Maharaja Jaswant Singh Rathor of Marwar.**

\* He wrote the very famous book '**Marwad Pargana Ri Vigat**' and '**Nainsi Ri Khyat**'.

- \* Marwan Pargana Ri Vigat provides details of seven parganas under Maharaja Jaswant Singh. That's why, it is also known as the **Gazetteer of Marwar**.
- \* In this book history of each pargana is given at the beginning and then by summarizing the different income etc. of the villages of Khalsa and Jagir, its line with the geographical location of each village under the pargana, the income of five years and yield of the village Specific things, etc., are also mentioned.
- \* Literary works of Jaswant Singh-
  - Bhasha Bhushan**
  - Aprokh Sidhant**
  - Anubav Prakash**
  - Sidhant Saar**
  - Aanand Vilas**

85. Who was the chief architect of Hawa Mahal of Jaipur?

- A. Mordhwaj Nihalchand
- B. Lalchand
- C. Mirchand
- D. None of above

Answer ||| B

Solution |||

- \* **Lal Chand** was the chief architect of Hawa Mahal.
- \* Hawa Mahal was constructed in the reign of **Pratap Singh in Japur in 1799**.
- \* It is a **five story** building and contains **953 windows**.
- \* From outside it appears as **crown of Sri Krishna**.
- \* **This architectural feature also allowed cool air from the Venturi effect to pass through.**
- \* Its five stories are-
  - Sarat Mahal**
  - Ratan Mahal**

\* **Vichitra Mahal**

\* **Prakash Mahal**

\* **Hawa Mahal**

86.

Match List I and List II, and select the correct answer using the questions given below:

**Position**

- A) Chief Secretary
- B) Lokpal
- C) RPSC Chairman
- D) State Election Commissioner

**Person**

- I. Niranjan Arya
- II. Bhupender Singh Yadav
- III. Pratap Krishan Lohra
- IV. PS Mehra

Codes:

- A. A-I B-III C-IV D-II
- B. A-III B-IV C-III D-II
- C. A-IV B-I C-II D-III
- D. A-I B-III C-II D-IV

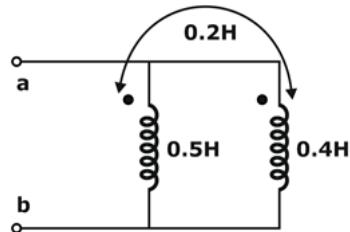
Answer ||| D

Solution |||

\* The correct match is as follows:

Position	Person
Chief Secretary	Niranjan Arya
Lokpal	Pratap Krishan Lohra
RPSC Chairman	Bhupender Singh Yadav
State Election Commissioner	PS Mehra
<b>Some other important personalities</b>	
Chief Justice	Indrajit Mohanti
Rajasthan Human Rights Commission Chairman	Gopal Krishan Vyas
Chief Election Officer	Praveen Gupta

87.8 consider the circuit shown in figure below the equivalent inductance across a & b is \_\_\_\_\_.



- A. 0.32 H
- B. 0.23 H
- C. 0.64 H
- D. 0.46 H

Answer ||| A

Solution |||

As seen from the figure it is a parallel combination

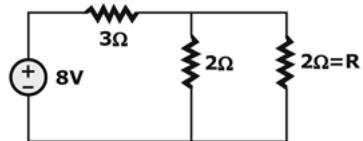
$$L_{ab} = \frac{L_1 L_2 - M^2}{L_1 + L_2 - 2M}$$

$$L_{ab} = \frac{0.5 \times 0.4 - (0.2)^2}{0.5 + 0.4 - 2 \times 0.2}$$

$$L_{ab} = \frac{0.2 - 0.04}{0.9 - 0.4} = \frac{0.16}{0.5} = 0.32H$$

So Answer A will be correct.

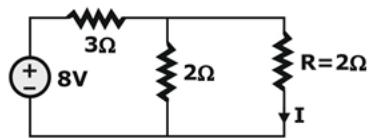
88. If R changed to  $3\Omega$  then what is change in current flowing through R.



- A. 0.478
- B. 0.238
- C. 0.516
- D. 0.258

Answer ||| B

Solution |||



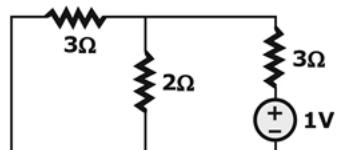
$$I = \frac{1}{2} \times \frac{8}{3 + (2||2)} = 1A$$

Now according to compensation theorem

$$V_s = \Delta Z \cdot I$$

$$= (3 - 2) \times 1$$

Short circuit voltage source.



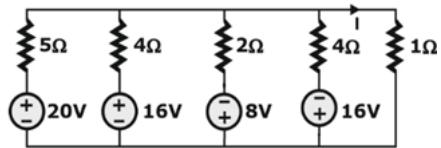
$$R_{eq} = 3 + (3||2)$$

$$= 4.2 \text{ V}$$

$$I = \frac{1}{4.2}$$

$$= 0.238 \text{ A}$$

89. Consider the given circuit shown in figure, determine the value of I.



- A. 0 A
- B. 2 A
- C. 3 A
- D. 4 A

Answer ||| A

Solution |||

By using Millman's theorem

$$V_{th} = \frac{20 \times \frac{1}{5} + 16 \times \frac{1}{4} - 8 \times \frac{1}{2} - 16 \times \frac{1}{4}}{\frac{1}{5} + \frac{1}{4} + \frac{1}{2} + \frac{1}{4}}$$

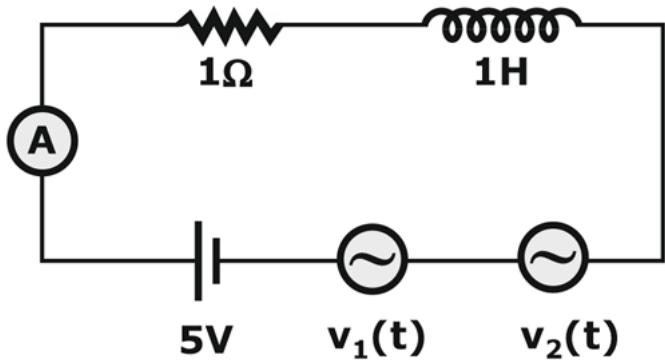
$$= 0 \text{ V}$$

$$R_{th} = \frac{1}{5} + \frac{1}{4} + \frac{1}{2} + \frac{1}{4}$$

$$R_{th} = 0.833 \Omega$$

$$I = \frac{V_{th}}{R_{th} + R_L} = \frac{0}{0.833 + 1} = 0 \text{ A}$$

90. Find the reading of moving iron Ammeter in the circuit shown below, where  $v_1(t) = 10 \sin t$  V and  $v_2(t) = 10\sqrt{5} \sin 2t$  V.



- A. 5 A
- B. 10 A
- C.  $10\sqrt{2}$  A
- D.  $5\sqrt{2}$  A

Answer ||| B

Solution |||

Since there are different frequency sources present in the circuit, so superposition theorem should be used to find the response.

(1) When only  $V_1 = 10 \sin t$  V is operating,

Angular frequency,  $\omega = 1$  rad/sec

Inductive reactive,  $X_L = \omega L$

$$\therefore X_L = 1 \times 1 = 1\Omega$$

Impedance,  $Z = 1 + j1$

$$|Z| = \sqrt{1^2 + 1^2} = \sqrt{2}\Omega$$

$$\therefore I_{1\text{rms}} = \frac{V_{1\text{rms}}}{|Z_1|} = \frac{10/\sqrt{2}}{\sqrt{2}} \Rightarrow I_{1\text{ rms}} = 5\text{A}$$

(2) When only  $V_2 = 10\sqrt{5} \sin 2t$  V is operating,

Angular frequency,  $\omega = 2$  rad/sec

$$X_L = \omega L = 2 \times 1 = 2 \Omega$$

$$Z = 1 + j2$$

$$|Z| = \sqrt{1^2 + 2^2} = \sqrt{5}\Omega$$

$$\therefore I_{2\text{rms}} = \frac{V_{2\text{rms}}}{|Z_2|} = \frac{\frac{10\sqrt{5}}{\sqrt{2}}}{\sqrt{5}} \Rightarrow I_{2\text{rms}} = 5\sqrt{2}\text{A}$$

(3) When only 5V(DC) is operating,

$$\omega = 0, \therefore X_L = 0$$

$$Z = 1\Omega$$

$$I_3 = \frac{V}{Z} = \frac{5}{1} = 5\text{A}$$

$$\therefore \text{Ammeter reading} = \sqrt{I_1^2 + I_2^2 + I_3^2} = \sqrt{5^2 + (5\sqrt{2})^2 + 5^2} = 10\text{ A}$$

91. Which of the following statement is incorrect

- A. Static Electric field is conservative
- B. Magnetic field is solenoidal
- C. Electric field is not solenoidal
- D. Magnetic field is irrotational

Answer ||| D

Solution |||

For Static Electric field,

$$\nabla \times \vec{E} = 0$$

$\therefore$  Static electric field is conservative or irrotational

$$\nabla \cdot \vec{B} = 0 \Rightarrow \text{Magnetic field is solenoidal}$$

$$\nabla \cdot \vec{D} = \rho_v$$

$$\vec{D} = \epsilon \vec{E}$$

$$\varepsilon \nabla \cdot \bar{E} = \rho_v$$

$$\nabla \cdot \bar{E} = \frac{\rho_v}{\varepsilon}$$

$\therefore \nabla \cdot \bar{E} \neq 0 \Rightarrow$  Electric field is not solenoidal

$$\nabla \times \bar{H} = J$$

$$B = \mu H$$

$$\Rightarrow \nabla \times \bar{B} = \frac{J}{\mu}$$

$\therefore \nabla \times \bar{B} \neq 0 \Rightarrow$  Magnetic field is rotational.

92. In a parallel resistive circuit, opening a branch result in

- 1) Increase in total resistance
- 2) Decrease in total power
- 3) No change in branch voltage

Which of the above is /are correct?

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

Answer ||| D

Solution |||

If total resistance in parallel circuit is  $R_T$ , then

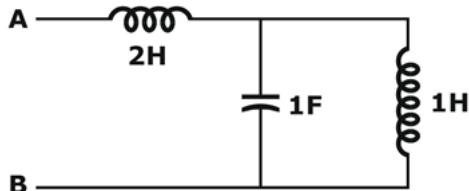
$$\frac{1}{R_T} = \frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_3} + \dots$$

Now, if a Branch is open, then total resistance increases.

As power  $(P_T) = \frac{V^2}{R_T}$ , total power decreases with increase in total resistance.

But in parallel circuit, no change in voltage.

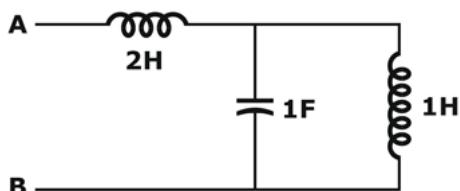
93. Resonance frequency of the circuit shown below is



- A. 3 rad/sec
- B. 5 rad/sec
- C.  $\sqrt{\frac{3}{2}} \text{ rad/sec}$
- D.  $\sqrt{\frac{2}{3}} \text{ rad/sec}$

Answer ||| C

Solution |||



Impedance at frequency  $\omega$  rad/sec

$$z = 2j\omega + \frac{(j\omega \times 1) \times \frac{1}{j\omega \times 1}}{j\omega + \frac{1}{j\omega \times 1}}$$

$$z = 2j\omega + \frac{j\omega}{1 - \omega^2}$$

$$z = j \left( 2\omega + \frac{\omega}{1 - \omega^2} \right)$$

$$z = j \left( 2\omega + \frac{\omega}{1-\omega^2} \right)$$

For calculation of resonance frequency imaginary part of  $z = 0$

$$\left( 2\omega + \frac{\omega}{1-\omega^2} \right) = 0$$

$\omega = 0$  (not possible)

and

$$2 + \frac{1}{1-\omega^2} = 0$$

$$2 - 2\omega^2 + 1 = 0$$

$$2\omega^2 = 3$$

$$\omega^2 = \frac{3}{2}$$

$$\Rightarrow \omega = \sqrt{\frac{3}{2}} \text{ rad/sec}$$

94. The spring material used in a spring control device should have following property-

1. Must be low temperature coefficient
  2. Should have low specific resistance.
  3. Should have magnetic properties
- A. 1 and 2 only  
 B. 2 and 3 only  
 C. 1 and 3 only  
 D. 1, 2 and 3

Answer ||| A

Solution |||

The essential requirements for spring material are-

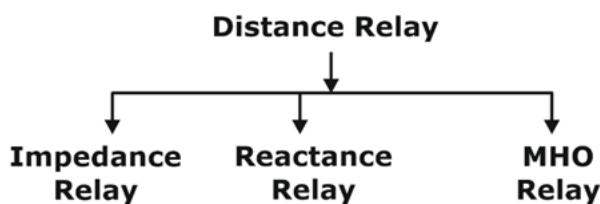
1. They should be non-magnetic
2. They should be proof from mechanical fatigue
3. They should have low resistance temperature coefficient

95. Which relay is best suited for long distance protection?

- A. Impedance relay
- B. Reactance relay
- C. MHO relay
- D. Over-current relay

Answer ||| C

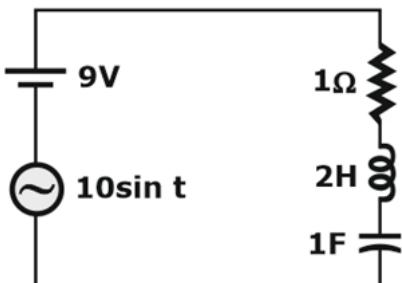
Solution |||



Relay	Uses
Impedance	Medium distance
Reactance	Small distance
MHO/Admittance	Long distance

Hence, for long distance protection of transmission line MHO relay is suited.

96. Find the voltage across the capacitor in the circuit shown below.



- A.  $9 + 7.07 \sin(t - 135^\circ)$  V
- B.  $9 + 1.414 \sin(t - 225^\circ)$  V
- C. 9 V
- D.  $9 - 1.414 \sin(t + 135^\circ)$  V

Answer ||| A

Solution |||

Since there are different frequency sources present in the circuit. So, superposition theorem must be used to obtain the response.

(1) When  $V_1 = 10 \sin t$  is operating

$$\omega = 1 \text{ rad/s}$$

$$X_L = \omega L = 1 \times 2 = 2\Omega$$

$$X_C = \frac{1}{\omega C} = \frac{1}{1 \times 1} = 1\Omega$$

$$Z_1 = R + j(X_L - X_C)$$

$$Z_1 = 1 + j(2 - 1)$$

$$Z_1 = 1 + j\sqrt{2} \angle 45^\circ$$

$$i_1 = \frac{V_1}{Z_1} = \frac{10 \sin t}{\sqrt{2} \angle 45^\circ}$$

$$i_1 = 5\sqrt{2} \sin(t - 45^\circ)$$

$$V_{C_1} = i_1 \times (-jX_C)$$

$$= i_1 \times (-j1)$$

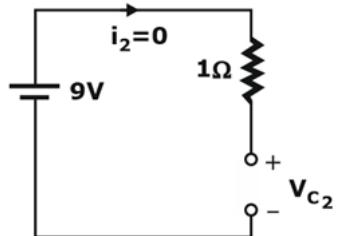
$$= 5\sqrt{2} \sin(t - 45^\circ) \times (-j1)$$

$$V_{C_1} = 5\sqrt{2} \sin(t - 135^\circ)$$

$$V_{C_1} = 7.07 \sin(t - 135^\circ)$$

(2) When  $V_2 = 9V$  (DC) is operating

$$\omega = 0 \Rightarrow X_L = \omega L = 0 \text{ and } X_C = \frac{1}{\omega C} \rightarrow \infty$$



$$\Rightarrow V_{C_2} = 9V$$

By superposition theorem,

$$V_C(t) = V_{C_1} + V_{C_2} = 7.07 \sin(t - 135^\circ) + 9V$$

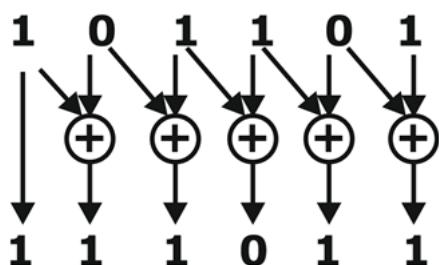
97. Gray code equivalent of binary number 101101 is

- A. 101010
- B. 111000
- C. 111011
- D. 100111

Answer ||| C

Solution |||

Binary to Gray code conversion



98. The problems of the binary-weighted resistor digital to analog convertor (DAC) can be overcome by using

- A. a flash DAC
- B. a staircase DAC
- C. an R-2R ladder DAC
- D. an 8-bit binary weighted resistor DAC

Answer ||| C

Solution |||

### **Weighted resistor DAC**

⇒ in this DAC requires n number of resistors.

⇒ Resistor different value requires that rate  $2R, 2^2R, 2^3R \dots 2^nR$

⇒ To overcome this problem of weighted resistor DAC R-2R ladder resistor DAC is used. Which used only two resistor of size R & 2R.

99. Corona loss depends on

1. Radius of conductor
2. Spacing between conductors
3. Atmosphere
4. line voltage

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

Answer ||| D

Solution |||

Corona loss is given by peek's formula.

$$P_c = \frac{244}{\delta} (f + 25) (V_{ph} - V_d)^2 \sqrt{\frac{r}{D}} \times 10^{-5} \text{ kW / km / phase}$$

Where,  $P_c$  = corona power loss

f = frequency

$V_{ph}$  = phase voltage

$V_d$  = Disruptive voltage

$r$  → Radius of conductor

$D$  → distance between conductors

It also affected by atmosphere, surface irregularity, rough surface, operating voltage, and Air Density factor.

100. Consider the following statements regarding HVDC Distribution system

- 1) Less insulation is needed
- 2) Reliability is high
- 3) Transmit more power over a longer distance
- 4) Reduce line cost due to fewer conductors

Select the correct statements

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

Answer ||| D

Solution |||

### **HVDC Distribution System**

- ⇒ Better voltage regulation & control ability
- ⇒ low power losses
- ⇒ Transmit more power over a longer distance
- ⇒ less insulation is needed
- ⇒ Reliability is high
- ⇒ A synchronous interconnection is possible
- ⇒ Reduced line cost due to fewer conductor

⇒ Towers are cheaper, simple, and narrow

101. Symmetrical component of phase a is  $I_{a_0} = 0A$ ,  $I_{a_1} = 12\angle 30^\circ A$ ,  $I_{a_2} = 16\angle 90^\circ A$  then what will be the neutral current?

- A.  $1.5 \angle 30^\circ A$
- B.  $2 \angle 30^\circ A$
- C.  $3.12 \angle 12^\circ A$
- D.  $0 A$

Answer ||| D

Solution |||

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

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

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

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

So,  $I_N = 3I_{a_0}$

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

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

102. Which of the following cores have linear characteristics?

- A. Steel core
- B. CRGO core
- C. Air core
- D. None of the above

Answer ||| C

Solution |||

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

103.In which of the following instructions, no flags are affected?

1) STAX

2) DCR

3) CMA

4) CMC

A. 1 and 4

B. 2 and 3

C. 1 and 3

D. 2 and 4

Answer ||| C

Solution |||

STAX : Store accumulator indirect

DCR : Decrement source by 1

CMA : Complement accumulator

CMC : Complement carry

In STAX and CMA instruction, no flags are affected.

In DCR operation, except carry, all flags are affected.

In CMC instruction, the carry flag is modified, no other flags are affected.

104.In a DC machine, armature MMF is

A. Stationary in space

B. Having triangular space distribution

C. Both (a) and (b)

D. Neither (a) Nor (b)

Answer ||| C

Solution |||

In a DC machine, armature MMF is stationary in space and has triangular space distribution.

105. For a purely inductive rotor of a 3 – phase induction machine, if rotor power factor angle is  $90^\circ$ , then electromagnetic torque becomes

- A. 0
- B. Maximum
- C. In between minimum to maximum
- D. None of the above

Answer ||| A

Solution |||

$$T_e = \frac{\pi}{8} P^2 \phi F_2 \sin(90^\circ + \theta_2)$$

Where  $\theta_2$  = Rotor power factor angle =  $90^\circ$  (Given)

$$\text{So, } T_e = \frac{\pi}{8} P^2 \phi F_2 \sin(90^\circ + 90^\circ)$$

$$T_e = \frac{\pi}{8} P^2 \phi F_2 \sin 180^\circ$$

$$= 0$$

106. ‘Dead Zone’ is defined as

- A. Initial warm up time of an instrument
- B. largest change in Input quantity, for which there is no instrument output
- C. Respond time of an instrument
- D. Unmeasured instrument reading beyond instrument maximum range

Answer ||| B

Solution |||

Dead zone is defined as the largest change in the physical variable to which instrument does not respond.

107. Consider the following statements about Diamond:

- 1) Diamond crystal structure is a variant of Zinc blende.
- 2) Diamond has very high thermal conductivity.
- 3) Diamond has very high electrical conductivity.

Which of the above statements is/are correct?

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

Answer ||| A

Solution |||

Diamond crystal structure is a variant of Zinc blende in which carbon atoms occupy all positions (both  $Z_n$  and S)

Diamond has very high thermal conductivity and very Low electrical conductivity.

108. Which of the following in NOT the correct properties of ceramics?

- A. High strength
- B. High Hardness
- C. Low creep resistance
- D. Low toughness

Answer ||| C

Solution |||

Properties of ceramic are:

- High strength
- High hardness
- High creep resistance
- Low toughness

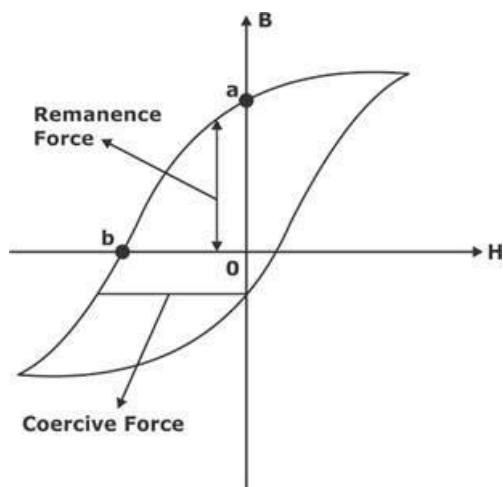
109. Which of the following magnetic materials have high remanence and large coercivity?

- A. Diamagnetic material
- B. Hard magnetic material
- C. Soft magnetic material
- D. None of the above

Answer ||| B

Solution |||

Hard magnetic material has large hysteresis loop area, So, hysteresis loss is also more, remanence is high and coercivity is large.



110. A reverse conducting thyristor (RCT) normally replaces

- A. A pair of antiparallel thyristors in a circuit.
- B. A combination of a thyristor and an antiparallel diode in a circuit.
- C. A thyristor in situation where it is not required to have reversed blocking capability at all.
- D. Converter grade thyristor.

Answer ||| B

Solution |||

RCT may be considered as a thyristor with a built in antiparallel diode.

111. Proximity effect causes \_\_\_\_\_ in conductor internal reactance.

- A. Increase
- B. Decrease
- C. No change
- D. None of the above

Answer ||| B

Solution |||

Similar to the skin effect, proximity effect causes current distribution to get affected which ultimately increases the conductor resistance and reduces the self-reactance.

112. Hand tool application uses which of the following motors?

- A. AC series motor
- B. Shaded pole motor
- C. Resistance motor
- D. None of the above

Answer ||| A

Solution |||

For hand tool applications, AC series motor is used.

So, Option (A) is correct.

113. For a transformer

S1: Eddy current loss depends on frequency but not on voltage.

S2: Hysteresis loss depends on frequency and voltage both.

Choose the correct option

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

Answer ||| B

Solution |||

$$\text{Eddy current loss} = K_e f^2 B_m^2$$

Since  $B_m \rightarrow$  Depends on voltage and frequency

So Eddy current loss depends on Both V, F

So, S1  $\rightarrow$  False

Hysteresis loss  $\rightarrow$  depends on frequency and voltage both

So S2  $\rightarrow$  True

114. Swinburne's Test is related to

- A. Transformer
- B. Induction Machine
- C. Synchronous Machine
- D. DC Machine

Answer ||| D

Solution |||

Swinburne's test is the most commonly used and simplest method of testing of shunt and compound wound DC machines which have constant flux. In this test the efficiency of the machine at any load is pre-determined. We can run the machine as a motor or as a generator.

115. Temperature at which antiferromagnetic material converts to paramagnetic material is known as \_\_\_\_\_ temperature.

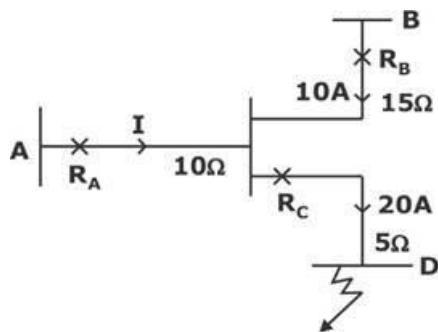
- A. Curie
- B. Curie-Weiss
- C. Neel
- D. Debye

Answer ||| C

Solution |||

Temperature at which antiferromagnetic material converts to paramagnetic material is known as Neel temperature.

116.What is the impedance seen by relay A (in  $\Omega$ ) in the below arrangement?



- A.  $5\Omega$
- B.  $20 \Omega$
- C.  $25 \Omega$
- D.  $10 \Omega$

Answer ||| B

Solution |||

$$Z_{\text{seen},A} = \frac{V_A}{I_A} = \frac{10(10) + 20(5)}{10}$$

$$= \frac{200}{10} = 20 \Omega$$

117.A surge travel to the end of a long OH line of length ' $l$ ' km takes time of 3 msec. What will be the length of transmission line?

- A. 1000 km
- B. 600 km
- C. 500 km
- D. 900 km

Answer ||| D

Solution |||

Speed of light = speed of surge =  $3 \times 10^8$  m/s

Length = velocity  $\times$  time

$$= 3 \times 10^8 \times 3 \times 10^{-3}$$

$$= 9 \times 10^5 \text{ m} = 900 \text{ km}$$

118.Low load or friction adjustment in single phase induction type energy meter is done

- A. By adjusting position of break magnet
- B. By providing holes or slots on rotating disc
- C. By using shading loop
- D. None of these

Answer ||| C

Solution |||

Various compensation in energy meter is given as:

Over friction or creeping: By providing holes or slots on rotating disc.

Low load or friction adjustment: By using shading loop.

Speed adjustment: By adjusting position of break magnet.

Hence, Option (C) is correct.

119.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
---	---	---	---	---	---

Answer ||| A

Solution |||

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.

120. Which among the following statements are true regarding "avalanche" and "zener" breakdown?

- 1) For avalanche breakdown, electron hole pairs are responsible but for Zener breakdown, only electrons are responsible.
  - 2) The Avalanche breakdown voltage has positive temperature coefficient and Zener breakdown voltage has negative temperature coefficient.
  - 3) Junction is completely destroyed in avalanche breakdown but not in Zener breakdown.
  - 4) In avalanche breakdown, breakdown voltage is inversely proportional to temperature and in Zener breakdown, it is proportional to temperature.
- A. 1,2 and 4  
B. 2, 3 and 4  
C. 1,2 and 3  
D. All statements are correct

Answer ||| C

Solution |||

Zener breakdown voltage is not proportional to temperature, it has a functional dependency on temperature.

Similarly, avalanche breakdown voltage also has a functional dependency on temperature.

So, statement 4 is not correct.