AE - JE

SSC JE – 2023 (11-10-2023)

Engineers Wallah

Electrical Engineering

Q1 What is the magnetizing current of a transformer?
(A) The current flowing through the insulation between the primary and secondary windings.
(B) The current drawn by the primary winding when the secondary is on open circuit.
(C) The current drawn by the secondary winding when a load is connected.
(D) The current flowing through the ferromagnetic core.

Q2 Which of the following is NOT an application of a shaded-pole induction motor?
(A) Table fan
(B) Hair drier
(C) A lift of a building
(D) Fans for refrigeration

Q3 What kind of metal does continuous bus bar wire typically consist of?
(A) Plastic
(B) Neither copper nor aluminium
(C) Iron
(D) Copper or aluminium

Q4 Find the ripple frequency of the halfwave rectifier if the input operating frequency is 50 Hz:
(A) 500 Hz   (B) 100 Hz
(C) 50 Hz   (D) 25 Hz

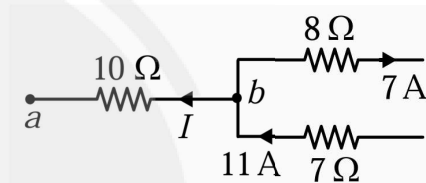**Q5** What inductance would be needed to store 2 kWh of energy in a coil carrying a 100 A current?
(A) 1440 H   (B) 100 H
(C) 0.4 H   (D) 4 H

Q6

Current (I) expression of a diode is given by: (where symbols have usual meaning)

(A) $I = I_0 \left(e^{\frac{qv}{\eta T}} - 1 \right)$

(B) $I = I_0 \left(e^{\frac{qv}{\eta kT}} - 2 \right)$

(C) $I = I_0 \left(e^{\frac{qv}{\eta kT}} \right)$

(D) $I = I_0 \left(e^{\frac{qv}{\eta kT}} - 1 \right)$

**Q7** The value of voltage V_{ab} in the figure shown below is:

(A) 0 V   (B) − 40 V
(C) − 190 V   (D) 40 V

Q8 In a PMMC instrument, if the controlling torque is too high, what effect will it have on the accuracy of the instrument?
(A) The instrument will stop working.
(B) The accuracy of the instrument will decrease.
(C) The accuracy of the instrument will increase.
(D) The accuracy of the instrument will remain unaffected.

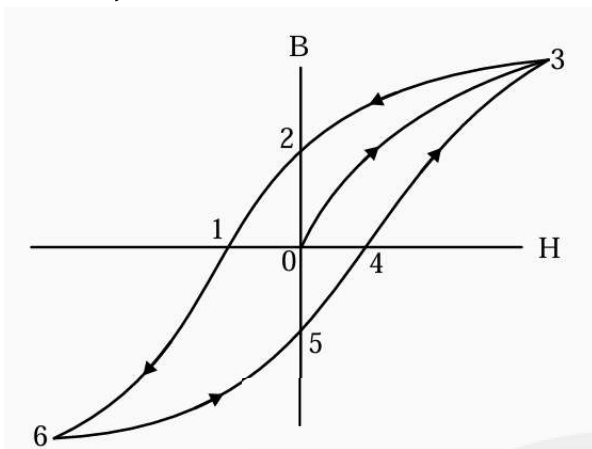**Q9** What will be the reactive power in the given power triangle?
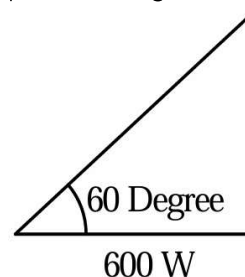
(A) 1039 VAR Leading
(B) 1200 VAR Leading

(C) 1039 VAR Lagging

(D) 1200 VAR Lagging

Q10 Which of the following portions represents retentivity in the BH curve shown below?

(A) 1   (B) 3

(C) 2   (D) 6

Q11 Which of the following options shows the correct proportion of helium and neon gases in the mixture for helium–neon laser?

(A) 90% of helium and 10% of neon

(B) 20% of helium and 20% of neon

(C) 10% of helium and 90% of neon

(D) 80% of helium and 20% of neon

Q12 Which of the following parts is NOT present in a typical brushless DC motor?

(A) Fixed armature

(B) Commutator

(C) Permanent magnet

(D) Electronic controller

Q13 FET is like a switched-on condition when it operates in_____ mode.

(A) Ohmic   (B) Inversion

(C) Saturation   (D) Cut off

Q14 Select the INCORRECT statement(s) regarding squirrel-cage induction generators used in wind power plants:

A) They can be used in both constant-speed and variable-speed applications.

B) They work within a narrow speed range, which is slightly above the synchronous speed.

C) Squirrel-cage induction generators are more expensive than wound-rotor induction generators.

(A) Only A   (B) Only C

(C) Only B   (D) A and B

Q15 The permanent magnet synchronous motor has a configuration almost identical to the conventional synchronous machine with the absence of _____.

(A) Air gap between stator and rotor

(B) Field winding and slip ring

(C) Stationary magnetic field

(D) Field winding and rotating magnetic field

Q16 Which of the following lamps is suitable for highway lighting?

(A) Sodium vapor light

(B) Neon lamp

(C) Fluorescent lamp

(D) Incandescent lamp

Q17 The value of the current I_2 if I_1 is equal to 10 A, is:

(A) 0 A   (B) $\frac{100}{R_3}$ A

(C) $\frac{100}{R_2}$ A   (D) 10 A
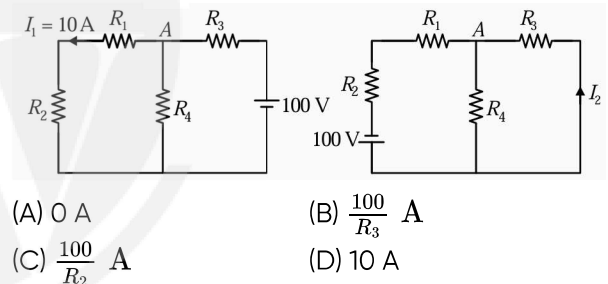
Q18 In a radial distribution system, a separate feeder radiates from a single substation and feeds the distributors at _____.

(A) One end only   (B) Three ends

(C) Two ends   (D) Four ends

Q19 Which of the following statements is true regarding the voltage drop due to armature reaction for leading power factors in an alternator?

(A) The voltage drop remains constant irrespective of the power factor.

(B) The voltage drop is not affected by the power factor.

(C)

The voltage drop increases with an increase in the power factor.

(D) The voltage drop decreases with an increase in the power factor.

Q20 In applications such as drink and food mixers and sewing machines _____ is used.
(A) AC series motor
(B) Split-phase IM motor
(C) Universal motor
(D) Repulsion motor

Q21 A resistor of resistance R Ω is connected in series with a coil having an inductance of L Henry. If X_L is the value of inductive reactance, what is the value of the net impedance of the circuit?
(A) $\frac{\sqrt{R}}{X_L}$ (B) $\sqrt{R^2 + X_L^2}$
(C) $\sqrt{R^2 - X_L^2}$ (D) $\sqrt{\frac{X_L}{R}}$

Q22 Which of the following motors DO/DOES NOT use three-point starters?
(A) Both DC shunt and compound motors
(B) DC series motor
(C) DC shunt motor
(D) DC compound motor

Q23 Because of their high efficiency and high speed, synchronous motors are well suited for_____.
(A) Blowers
(B) Electric tractions
(C) Ceiling fans
(D) Mixer grinders

Q24 A coil consists of 1000 turns having a cross-sectional area of 0.4 mm^2 . The mean length per turn is 40 cm and the resistivity of the wire is 0.02 μΩ-m. The resistance of the coil is _____.
(A) 40 Ω   (B) 200 Ω
(C) 20 Ω   (D) 20 μΩ

Q25 What will be the direction of deflecting torque in a moving iron instrument if the direction of current in the coil is reversed at the same magnitude?
(A) Reverse direction

(B) Reduced to zero
(C) Same direction
(D) Reduced by half

Q26 Which of the following statements is/are true regarding the all-day efficiency of a transformer?
(i) All-day efficiency is also called commercial efficiency.
(ii) All-day efficiency primarily depends on the duration of load and amount of load.
(iii) All-day efficiency is achieved when the iron losses are less.
(A) Only (ii) is true
(B) Both (ii) and (iii) are true
(C) Both (i) and (iii) are true
(D) Both (i) and (iii) are true

Q27 A wind turbine with a rotor diameter of 60 m is installed in an area with an average wind speed of 4 m/s. Find the wind power density in watts per square meter, assuming that the air density in the area is 1.5 kg/m^3.
(A) 542.6 kW/m^2
(B) 736.45 kW/m^2
(C) 271.3 kW/m^2
(D) None of the above

Q28 In electrical applications, the coil of an infrared lamp is made up of _____.
(A) Copper   (B) Tungsten
(C) Iron   (D) Nichrome

Q29 In case of electrical energy, the joule is also expressed as the _____.
(A) Joule-second   (B) Meter-second
(C) Newton-second   (D) Watt-second

Q30 What is core-stepping in core-type transformers?
(A) A method to reduce the length of the mean turn
(B) A method to increase the length of the mean turn
(C) A method to increase the R loss
(D) A method to reduce the space factor

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Q31 Which of the following CANNOT be caused due to excessive voltage drop in an electric distribution system?
(A) Electric heaters to heat poorly
(B) Electric lights to burn dimly
(C) Electric motors to run colder than normal
(D) Electric lights to flicker

Q32 When two or more sinusoidal waves are precisely in step with one another, they are said to be:
(A) In phase
(B) Out of phase
(C) 60 degrees lagging
(D) 60 degrees leading

Q33 In the split-phase induction motor, the starting torque of the resistance start motor is about _____ the full load torque.
(A) 0.15 times   (B) 1.5 times
(C) 15 times   (D) 150 times

Q34 Find the current flowing through the 7 Ω resistor.
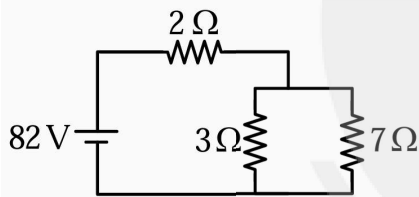
(A) 6 A   (B) 14 A
(C) 20 A   (D) 7 A

Q35 The shaded-pole induction motors are of _____.
(A) Low cost   (B) Very high cost
(C) High cost   (D) Zero cost

Q36 Which of the following is the application of soft magnetic materials?
(A) Microphones
(B) Permanent magnets
(C) Speakers
(D) Electromagnets

Q37 What is the reason for providing corrugated or radiators on the sides of transformer tanks?
(A) To increase the dielectric strength of the oil

(B) To provide sufficient cooling area
(C) To reduce the size of the transformer tank
(D) To provide a very small surface area to dissipate heat generated

Q38 Which of the following is NOT the requirement of a DC servomotor?
(A) High accuracy
(B) Linear torque-speed characteristics
(C) Less torque to weight ratio
(D) Better precision

Q39 Which of the following points clearly describes the need for a back-to-back converter connected to the rotor of a doubly fed induction generator [DFIG] used in wind power plants?
(i) It feeds the rotor with currents of fixed frequency and thus, helps in achieving a fixed range of speed.
(ii) It feeds the rotor with currents of varying frequency and thus, helps in achieving various ranges of speed.
(iii) It helps in power factor correction by adjusting the active power output of the DFIG.
(iv) It helps in power factor correction by adjusting the reactive power output of the DFIG.
(A) (i) an (iv)   (B) (i) and (iii)
(C) (ii) and (iii)   (D) (ii) and (iv)

Q40 What is the purpose of laminating the core of a transformer?
(A) To increase the eddy current loss
(B) To make the core heavier
(C) To minimize the eddy current loss
(D) To induce eddy current loss

Q41 The depletion layer capacitance is essentially the capacitance of a _____ p-n junction.
(A) Forward-bias   (B) Saturated
(C) Reverse-bias   (D) Cut-off

Q42 In an AC circuit, the peak voltage is 388 V. Its effective voltage is:
(A) 300 V   (B) 275 V

(C) 230 V　　　　　　　(D) 200 V

Q43 A repulsion start induction run single phase motor runs as an IM only when_____.
(A) The commutator segments are short-circuited
(B) Stator winding is reversed
(C) Brushes are shifted to neutral phase
(D) Short circuit is disconnected

Q44 Which of the following lamps are used in searchlights?
(A) Arc lamps
(B) Neon lamps
(C) Fluorescent lamps
(D) Sodium vapor lamp

Q45 What is the maximum electric field when V_{bi} = 3 V, V_R = 4 V, and the width of the semiconductor is 7 cm?
(A) −200 V/m　　　　　(B) −400 V/m
(C) 300 V/m　　　　　(D) 200 V/m

Q46 A voltage source having some internal resistance delivers a 2 A current when a 5 Ω load is connected to it. When the load is 10 Ω, then the current becomes 1.6 A. Calculate the power transfer efficiency of the source for a 15 Ω load.
(A) 90%　　　　　　　(B) 50%
(C) 10%　　　　　　　(D) 100%

Q47 Which of the following motors is used for shears and presses?
(A) DC compound motor
(B) Stepper motor
(C) DC shunt motor
(D) DC series motor

Q48 Which of the following is the outermost layer of an underground cable?
(A) Sheath　　　　　　(B) Armouring
(C) Insulation　　　　(D) Serving

Q49 An RLC series circuit has R = 5 Ω and L = 1 H. Which of the following values of capacitance will make this circuit critically damped?

(A) 0.08 F　　　　　　(B) 0.20 F
(C) 0.30 F　　　　　　(D) 0.16 F

Q50 An electrodynamometer is widely used as a _____.
(A) Low impedance circuit
(B) Transfer instrument
(C) Calibration instrument and transfer instrument
(D) Calibration instrument

Q51 The value of a series resistor is required to limit the current through an LED to 36 mA with a forward voltage drop of 3 V, when connected to a 12 V supply.
(A) 250 m Ω　　　　　(B) 25 Ω
(C) 250 Ω　　　　　　(D) 4000 Ω

Q52 A 64kΩ resistor has a specified maximum power dissipation of 1000 watts. The maximum current that may be passed through the resistor is _____.
(A) $\frac{1}{8}$ A　　　　　(B) 64 A
(C) 8 A　　　　　　　(D) 32 A

Q53 The most important consideration when making a detailed estimate is:
(A) Only the quantity of the materials
(B) Quantity, transportation and availability of materials
(C) Only transportation of materials
(D) Only availability of materials

Q54 The ratio of the area under the load curve to the total area under the rectangle in which it is contained gives the value of_____.
(A) Utilization factor
(B) Diversity factor
(C) Load factor
(D) Average demand

Q55 A constant voltage source is applied between the two ends of a wire. If the length of the wire is doubled and the radius remains the same, then the rate of heat developed in the wire _____.

(A) Will be halved
(B) Will be zero
(C) Will be 4 times
(D) Will remain the same

Q56 A non-inductive resistor of 50 Ω is connected in series with a coil of inductance 0.25 Henry and of negligible resistance across a 250 V, 50 Hz supply. The net impedance of the circuit is given by 93.07 2. Find the value of reactive power.
(A) 567.59 VAR
(B) 1022.14 VAR
(C) 1091.25 VAR
(D) 727.5 VAR

Q57 In electromagnetism, the pattern of the magnetic field inside a solenoid is _____.
(A) Of parallel straight lines
(B) Of perpendicular lines
(C) Circular
(D) Of curved lines

Q58 In a phasing-out test, a voltmeter connected to the winding shows deflection when the supply is given; this indicates that this is _____.
(A) Tertiary winding only
(B) Both primary and secondary winding
(C) Secondary winding only
(D) Primary winding only

Q59 The capacitance of a parallel plate capacitor having two plates of area A = 200 cm^2 and separated by distance **d** = 10 cm is given by _____ ,if the permittivity of medium is 8.854 × 10^{-12} F/m
(A) 17.7 × 10^{-7} µF
(B) 17.7 F
(C) 17.7 PF
(D) 17.7 µF

Q60 Power factor of an IM is low at _____.
(A) Half load   (B) Full load
(C) Quarter load   (D) No load

Q61 Which of the following information is NOT present on the name-plate of a transformer?

(A) Insulation class
(B) Rated frequency
(C) Frame size
(D) kVA or MVA rating

Q62 In the application of electrical circuits, the nichrome that is used to make the heating element in an electric cooker has _____.
(A) 80% nickel and 20% chromium
(B) 40% nickel and 60% chromium
(C) 20% nickel and 80% chromium
(D) 50% nickel and 50% chromium

Q63 The standard voltage between any two phases in three-phase four-wire secondary distribution system have _____.
(A) 11 kV   (B) 400 V
(C) 33 kV   (D) 230 V

Q64 Three identical coils connected in delta to a 415 V, 3-phase supply take a total power of 50 kW and line currents of 70 A. Determine the total KVA taken by the coils.
(A) 9.68 kVA
(B) 23.24 kVA
(C) 16.77 kVA
(D) 50.32 kVA

Q65 Which of the following lamps is used for the determination of the polarity of DC mains?
(A) Mercury vapor lamp
(B) Carbon arc lamp
(C) Neon discharge lamp
(D) Sodium vapor lamp

Q66 Which of the following is NOT a type of Field Effect Transistor?
(A) JFET
(B) Thyristor
(C) Enhancement MOSFET
(D) Depletion MOSFET

Q67 What is the charging current per phase of a three-core underground cable connected to a 22 kV, 50 Hz three-phase supply? Given that

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the capacitance of each phase to neutral is 18 μF. (Given the connection is star connected.)
(A) 71.82 A   (B) 82.13 A
(C) 84.45 A   (D) 50 A

Q68 Which sort of contract requires contractors to provide individual price quotes for all work to be performed?
(A) Lump sum contract
(B) Percentage rate contract
(C) Schedule rate contract
(D) Item rate contract

Q69 In the case of magnetic circuits, the product of the number of turns on a coil and the current flowing through the coil is called _____.
(A) MMF
(B) EMF
(C) Absolute permeability
(D) Relative permeability

Q70 In a metal filament bulb, the filament used as a heating coil is tungsten due to its _____.
(A) High melting point and low resistivity
(B) High melting point and high resistivity
(C) Low melting point and low resistivity
(D) Low melting point and high resistivity

Q71 Find the value of the equivalent inductance as seen from the open terminal for the diagram shown below:
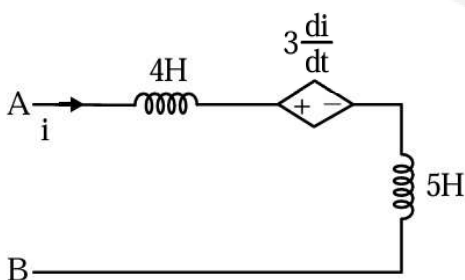
(A) 12 H   (B) 10 H
(C) 24 H   (D) 9 H

Q72 If a current varies periodically from zero to maximum, back to zero and then repeats, the signal is a:
(A) Direct signal
(B) Sinusoidal signal

(C) Constant signal
(D) Pulsating signal

Q73 The shaded-pole induction motors have _____ compared with other motor types and may not be suitable for applications with _____ or where precise speed control is necessary.
(A) High efficiency; light loads
(B) High efficiency; heavy loads
(C) Lower efficiency; heavy loads
(D) Lower efficiency; light loads

Q74 How does the input impedance of a CRO affect its deflection sensitivity?
(A) It is directly proportional at low input impedance and inversely proportional at high input impedance
(B) The input impedance does not affect deflection sensitivity
(C) Higher input impedance leads to higher deflection sensitivity
(D) Lower input impedance leads to higher deflection sensitivity

Q75 Which of the following expressions clearly indicates the determination of the diversity factor in a power system?
(A) $\dfrac{\text{Maximum demand}}{\text{Sum of individual maximum demand}}$
(B) $\dfrac{\text{Sum of individual maximum demand}}{\text{Maximum demand of the whole system}}$
(C) $\dfrac{\text{Average demand}}{\text{Maximum demand of the whole system}}$
(D) $\dfrac{\text{Maximum demand of the whole system}}{\text{Sum of individual maximum demand}}$

Q76 In Bipolar Junction Transistor, for amplification purposes, the emitter-base junction is ____ and the collector-base junction is _____ biased.
(A) Reverse; forward
(B) Forward; forward
(C) Forward; reverse
(D) Reverse; reverse

Q77 The total inductance of two coupled coils in the 'series aiding' and 'series opposing' connections are 4 H and 2 H, respectively. The value of mutual inductance will be _____.
(A) 0.5 H   (B) 0.75 H

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(C) 0.2 H   (D) 0.33 H

Q78 An overhead transmission line is supported by supports at equal levels. If the length of the conductor span is increased by two times, the sag will _____. (Given, weight per unit length and tension in the conductor are constant.)
(A) Decrease by two times
(B) Decrease by four times
(C) Increase by two times
(D) Increase by four times

Q79 To measure the frequency of a waveform, which of the following data is necessary from the CRO?
(A) Amplitude of the waveform
(B) Time period of the waveform
(C) Vertical scale setting
(D) Peak to peak value of the waveform

Q80 A coil having a resistance of 8 Ω and an inductance of 0.01911 Henry is connected across a 230 V, 50 Hz AC supply. The reactive power is equal to_____.
(A) 3.174 KVAR
(B) 4.496 KVAR
(C) 3.703 KVAR
(D) 4.232 KVAR

Q81 What is the apparent power of a 3-phase, star-connected system with a line voltage of 200 V and a line current of 20 A? The phase difference between the voltage and the current is 36.87°.
(A) 8.928 kVA
(B) 5.928 kVA
(C) 6.928 kVA
(D) 7.928 kVA

Q82 An electric kettle consumes 10 kW of electric power when operated at 200 V. A fuse wire of what rating must be used for it?
(A) 30 A   (B) 40 A
(C) 10 A   (D) 50 A

Q83 _____ is the money put down in addition to the tender.

(A) True money   (B) Earnest money
(C) Deposit money   (D) Exploit money

Q84 In the case of circuit laws, the currents flowing in various conductors in an electrical circuit are calculated by applying _____.
(A) The network reduction method
(B) Laplace's law
(C) Kirchhoff's law
(D) The direct method

Q85 An AC circuit contains a resistance and inductance connected in series. The active power consumed by the circuit is equal to 4800 W and the reactive power is 6400 VAR. Calculate the apparent power.
(A) 4233 VA   (B) 11200 VA
(C) 8000 VA   (D) 1058.3 VA

Q86 Which of the following measurement instruments consumes the least amount of energy?
(A) PMMC type
(B) Induction type
(C) Dynamometer type
(D) Moving iron type

Q87 A 3-phase star-connected alternator is rated at 1.3 MVA, 11 KV. The armature effective resistance and synchronous reactance are 1.3 Ω and 20 Ω, respectively. Calculate voltage drop due to synchronous reactance.
(A) 842.24 V   (B) 2363 V
(C) 1364.6 V   (D) 930.77 V

Q88 Select the correct statement(s) with respect to the Francis turbine:
(A) It is used in medium heads and for moderate discharges.
(B) It is an axial-in radial-out type of turbine.
(C) It is an example of a mixed-flow turbine.
(A) B and C   (B) A and B
(C) A and C   (D) Only A

Q89 As the leading power factor of the load of an alternator decreases, the magnitude of

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generated voltage required to give rated terminal voltage _____.
(A) Decreases
(B) First increases and then decreases
(C) Remains unchanged
(D) Increases

Q90 A 230 V, 3-phase voltage is applied to a balanced delta-connected 3-phase load of phase impedance $(15 + j\ 20)\ \Omega$. What is the power consumed per phase?
(A) 1161.6 W   (B) 2198.3 W
(C) 3807.6 W   (D) 1269.6 W

Q91 Which of the following types of cooling is more economical for very large transformers of rating 100 MVA?
(A) Oil natural air natural
(B) Oil natural air forced
(C) Oil forced air forced
(D) Oil-forced water forced

Q92 The main reason to amplify the input signals by using vertical amplifier is:
(A) The input impedance is low
(B) They provide attenuation
(C) They provide low stability
(D) They are not strong to provide deflection that can be measured

Q93 The type of armature winding used in large high-voltage alternators is:
(A) Two-layer winding
(B) Concentric winding
(C) Lap winding
(D) Wave winding

Q94 Which of the following is NOT a desirable criterion for an underground cable?
(A) Proper insulation thickness should be taken care of in order to provide a greater degree of safety
(B) Conductors should be used such that heating loss is minimum
(C) Mechanical protection is not required in any underground cable

(D) Conductors used in the cable should be stranded

Q95 In the spilt-phase induction motor, maximum torque is about _____ the full load torque at about 75%of the synchronous speed.
(A) 2.5 times   (B) 250 times
(C) 25 times   (D) 0.25 times

Q96 What kind of error does it constitute if only one of the parties to a contract misunderstands its terms or scope?
(A) Mutual mistake
(B) Multilateral mistake
(C) Unilateral mistake
(D) Bilateral mistake

Q97 Which option among the following is correctly associated with the 'Auxiliary motor starting'?
(A) A damper winding is used for the starting purpose of the starting of the synchronous motor.
(B) ADC supply and DC compound motor is used for the starting purpose of the starting of the synchronous motor.
(C) A squirrel cage winding is used for the starting purpose of the starting of the synchronous motor.
(D) A small direct-coupled induction motor, called pony motor, is used for the starting purpose of the synchronous motor.

Q98 If 15 A current is flowing through a solenoid of inductance 4 H, find the magnetic energy stored in the solenoid.
(A) 540 J   (B) 450 J
(C) 1000 J   (D) 100 J

Q99 In the case of electromagnetic induction, two coils are arranged in such a way that a change in one coil causes an EMF to be induced in the other coil. This is called _____.
(A) Self-inductance
(B) Series inductance
(C) Parallel inductance
(D) Mutual inductance

Q100 What is the purpose of interleaving the windings in a transformer?
(A) To reduce the efficiency of the transformer
(B) To increase the leakage flux
(C) To increase the inductance of the transformer
(D) To reduce the leakage flux

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Answer Key

Q1	(B)		Q31	(C)
Q2	(C)		Q32	(A)
Q3	(D)		Q33	(B)
Q4	(C)		Q34	(A)
Q5	(A)		Q35	(A)
Q6	(D)		Q36	(D)
Q7	(B)		Q37	(B)
Q8	(B)		Q38	(C)
Q9	(C)		Q39	(D)
Q10	(C)		Q40	(C)
Q11	(A)		Q41	(C)
Q12	(B)		Q42	(B)
Q13	(C)		Q43	(A)
Q14	(B)		Q44	(A)
Q15	(B)		Q45	(A)
Q16	(A)		Q46	(B)
Q17	(D)		Q47	(A)
Q18	(A)		Q48	(D)
Q19	(D)		Q49	(D)
Q20	(C)		Q50	(B)
Q21	(B)		Q51	(C)
Q22	(B)		Q52	(A)
Q23	(A)		Q53	(B)
Q24	(C)		Q54	(C)
Q25	(C)		Q55	(A)
Q26	(B)		Q56	(A)
Q27	(D)		Q57	(A)
Q28	(B)		Q58	(C)
Q29	(D)		Q59	(A)
Q30	(A)		Q60	(D)

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Q61	(C)		Q81	(C)
Q62	(A)		Q82	(D)
Q63	(B)		Q83	(B)
Q64	(D)		Q84	(C)
Q65	(C)		Q85	(C)
Q66	(B)		Q86	(A)
Q67	(A)		Q87	(C)
Q68	(D)		Q88	(C)
Q69	(A)		Q89	(D)
Q70	(B)		Q90	(D)
Q71	(A)		Q91	(D)
Q72	(D)		Q92	(D)
Q73	(C)		Q93	(B)
Q74	(C)		Q94	(C)
Q75	(B)		Q95	(A)
Q76	(C)		Q96	(C)
Q77	(A)		Q97	(D)
Q78	(D)		Q98	(B)
Q79	(B)		Q99	(D)
Q80	(A)		Q100	(D)

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Hints & Solutions

Q1 **Text Solution:**

Magnetizing current: It is also called an excitation current. It is the current that flows in the primary winding of the transformer when the secondary is on an open circuit and flows because of the core losses and the finite permeability of the core.
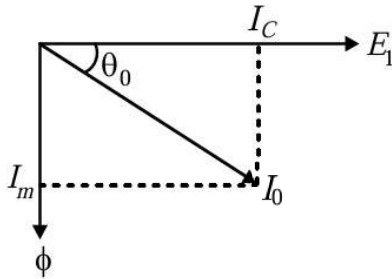
Excitation current, $\vec{I}_0 = \vec{I}_m + \vec{I}_c$

I_m = Magnetization current (required to produce flux in core)

I_c = Core-loss current (required to cater core losses)

Q2 **Text Solution:**

Disadvantages of shaded pole induction motor:

It has very low starting torque, low power factor, High losses and less efficiency.

Application:

Shaded pole induction motor is used in small devices due to its low cost such as in Relays, Fans, Hairdryers, Exhaust fans, Refrigerators etc.

Q3 **Text Solution:**

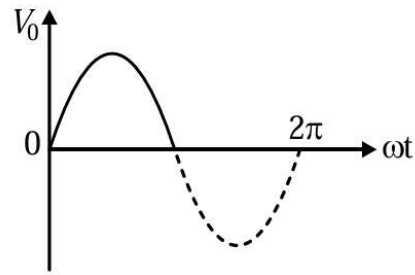Continuous bus bar wire typically consists of copper or aluminium.

Usually aluminium is preferred because of

• Cost-effectiveness
• Light weight
• Good conductivity
• Low maintenance requirements

Q4 **Text Solution:**

Ripple frequency = **m** × input frequency

m = number of pulses in one cycle of the output waveform

For HWR: m = 1
Ripple frequency = 1 × 50 = 50 Hz

Q5 **Text Solution:**

Given: **I** = 100 A

Energy stored in an inductor $\left(E_L\right) = \frac{1}{2}LI^2$

E_L = 2 kWh = 2 × 1000 × 3600 J = 7200000 J

$L = \frac{2 \times 7200000}{100 \times 100} = 1440$ H

Q6 **Text Solution:**

Diode current is given by: $I = I_0 \left[e^{\frac{qV}{\eta kT}} - 1\right]$,

I_0 = Reverse saturation current in amperes.

q = Charge in coulombs

V = Applied voltage in volts

η = Ideality factor (typically between 1 and 2)

k = Boltzmann constant in joules per kelvin

T = Temperature in kelvin

Q7 **Text Solution:**

Apply KCL at point **b**, We have,

I = 11 − 7 = 4 A

Now,

V_{ab} = − 4 × 10 = − 40 V

A negative sign shows that current flows from **b** to **a**.

Q8 **Text Solution:**

If the controlling torque in a PMMC instrument is too high, it will have a negative impact on the accuracy of the instrument as the controlling torque opposes the deflecting torque, which is the torque that causes the pointer to move. So, if the controlling torque is high, it will be difficult

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for the deflecting torque to move the pointer. The instrument will not be able to accurately measure the current or voltage.

Q9   **Text Solution:**
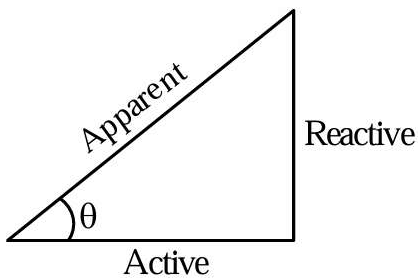
From the power triangle, $\tan\theta = \frac{\text{Reactive}}{\text{Active}}$

Reactive power = Active power × tan θ

$\qquad\qquad$ ≈ 600 × tan 60° = 1039 VAR

lagging

Q10 **Text Solution:**

Retentivity: It is the amount of magnetization that remains in a ferromagnetic material after the external magnetic field has been removed. It is also called residual magnetism.

On the BH curve, retentivity is represented by the point at which the B-axis intersects the curve after the H-axis has crossed zero. In the above diagram, the retentivity is represented by the point 2.

Q11 **Text Solution:**

The correct proportion of helium and neon gases in the mixture of helium-neon laser is 90% and 10%.

i.e., 90% helium and 10% neon.

Q12 **Text Solution:**

Various parts of brushless DC motor are:

- Stator (fixed armature)
- Rotor (permanent magnet)
- Shaft
- Bearings
- End caps
- Electronic controller

Q13 **Text Solution:**

FET has three modes of operation:

- Cut-off mode: FET works as off switch.
- Linear mode: FET works as amplifier.

- Saturation mode: FET works as on switch.

Q14 **Text Solution:**

Squirrel cage induction generators are typically less expensive than wound-rotor induction generators because they have a simpler design and are easier to manufacture.

Q15 **Text Solution:**

The permanent magnet synchronous motor has a configuration almost identical to the conventional synchronous machine with the absence of slip rings and field winding.

Q16 **Text Solution:**

Among the given options sodium vapor light is most suitable for highway lighting as they are:

- Energy efficient
- Bright
- Long-lasting
- Directional

Note: The most suitable lamp for highway lighting is LED.

Q17 **Text Solution:**

From the reciprocity theorem, the ratio of response and excitation in any branch of a network remains constant if the position of response and excitation is interchanged.

$$\frac{100}{10} = \frac{100}{I_2}$$

$$\boxed{I_2 = 10\,\text{A}}$$

Q18 **Text Solution:**

In a radial distribution system, a separate feeder radiates from a single substation and feeds the distributors at only one end.

Q19 **Text Solution:**

At leading power factors, the armature reaction flux is magnetizing in nature. This means that it strengthens the main field flux.

A stronger main field flux produces a higher induced voltage in the armature winding.

Therefore, the voltage drop due to the armature reaction decreases with an increase in power factor.

Q20 **Text Solution:**

Universal motors are used in applications such as drink and food mixers and sewing machines because they are:

- Small and light-weight
- High speed
- Reversible
- Variable speed

Q21 Text Solution:
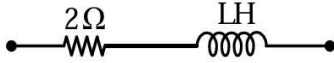
Impedance (Z) will be: $\boxed{Z = \sqrt{R^2 + X_L^2}}$

Q22 Text Solution:

Three-point starters are used with DC shunt motors and DC compound motors. They are not used with DC series motors as DC series motors have high starting torque and can start without a starter.

However, if a starter is used, it should be a four-point starter.

Q23 Text Solution:

Synchronous motors are will suited for blowers because of their high efficiency and high speed.

Q24 Text Solution:

Given:

Number of turns (**N**) = 1000

Length per turns = 40 cm

Total length (**l**) = 40 × 1000 × 0.01 = 400 m

Area (**A**) = 0.4 mm^2

Resistivity (**ρ**) = 0.02 μ Ω-cm

$R = \frac{\rho l}{A} = \frac{0.02 \times 10^{-6} \times 400}{0.4 \times 0.001 \times 0.001} = 20 \ \Omega$

$\boxed{R = 20 \ \Omega}$

Q25 Text Solution:

The direction of the deflecting torque in a moving iron instrument does not change if the direction of current in the coil is reversed at the same magnitude. This is because the magnetic field produced by the coil is also reversed and the force on the moving iron element is still in the same direction.

Q26 Text Solution:

All-day efficiency is a measure of the transformer's performance over a 24-hour period, taking into account both the iron losses and the copper losses. The iron losses are constant, regardless of the load, while the copper losses increase with the load. Therefore, the all-day efficiency is primarily dependent on the duration of load and the amount of load.

All-day efficiency of a transformer can be improved by reducing the iron losses.

Commercial efficiency is the measure of the transformer's performance at a specific load.

Q27 Text Solution:

Given:

Rotor diameter = 60 m

Wind speed (v) = 4 m/s

Air density (ρ) = 1.5 kg/m^3

$Wind\,power = 0.5 \ \times \ \rho \ \times \ A \ \times \ v^3$

$\frac{Wind\,power}{Area} = 0.5 \ \times \ 1.5 \ \times \ 4^3 = 48 \ W/_{m^2}$

Q28 Text Solution:

Tungsten is a metal with a very high melting point and a high electrical resistance. This makes it ideal for use as a filament in infrared lamps, as it can withstand the high temperatures required to produce infrared radiation.

Q29 Text Solution:

Joule: A joule is the SI unit of energy. It is defined as the amount of work done by the force of one Newton acting through a distance of one meter. In electrical terms, one joule is equal to one watt-second or the energy consumed by a one-watt device in one second.

Q30 Text Solution:

Core-stepping in core-type transformers is a technique used to reduce the length of the mean turn of the windings. This is done by stepping the core limbs, so that the windings are not wound around a rectangular core, but rather around a core with a stepped cross-section.

Q31 Text Solution:

Excessive voltage drop in an electric distribution system can cause a number of problems, including:

- Lights to burn dimly.
- Lights to flicker.
- Motors to run hotter than normal.
- Motors to run slower than normal.
- Equipment to overheat.
- Equipment may get damaged.

Excessive voltage drop will not cause electric motors to run colder than normal.

Q32   Text Solution:

When two or more sinusoidal waves are in phase, their crests and troughs line up. This means that they reach their maximum and minimum values at the same time. So, they are said to be in phase.

Q33   Text Solution:

In a split-phase induction motor, the starting torque of the resistance start motor is about 1.5 times the full load torque.

The below table shows the starting torque of different types of split-phase induction motors

Motor type	Starting torque	Full load torque
Resistance start	1.5	1
Capacitor start	2.5	1
Shaded pole	1	1

Q34   Text Solution:

Total resistance of the circuit :
$$R_{eq} = \left(3\|7\right) + 2 = \frac{41}{10} \; \Omega$$
Voltage (**V**) = 82 V
Total current (**I**) = $\frac{82}{41} \times 10 \, \text{A} = 20 \, \text{A}$
By current division rule (CDR):
Current through 7Ω resistor will be:
$$I_{7\Omega} = 20 \times \frac{3}{10} = 6 \, \text{A}$$

Q35   Text Solution:

Shaded pole induction motors are the simplest and least expensive type of induction motors. They are well suited for applications where low cost and torque are more important than speed or efficiency.

Q36   Text Solution:

Soft magnetic materials are easily magnetized and demagnetized. This makes them ideal for use in electromagnets.

Q37   Text Solution:

The reason for providing corrugated or radiators on the sides of transformer tanks is to provide sufficient cooling area.

As transformer generates heat during operation. This heat needs to be dissipated to prevent the transformer from overheating and failing.

Q38   Text Solution:

DC servomotors are typically required to have the following characteristics:

- High accuracy
- High efficiency
- Linear torque-speed characteristics

- Good overload capacity
- Good precision
- Fast response time
- Wide operating speed range

Q39   Text Solution:

The back-to-back converter connected to the rotor of a DFIG has two main functions:

- To feed the rotor currents of varying frequency in order to achieve various ranges of speed.
- To control the active and reactive power output of the DFIG.

Q40   Text Solution:

The laminated core is used in transformers in order to minimize the eddy current losses.

Q41   Text Solution:

When a p-n junction is reverse-biased, a depletion layer forms on either side of the

junction. The depletion layer acts like an insulator, and the p–side and n–side regions act like two parallel plates. This creates a capacitor which is known as the depletion layer capacitance.

Q42 **Text Solution:**

The effective voltage is given by the V_{rms}

$$V_{rms} = \frac{V_{peak}}{\sqrt{2}} = \frac{388}{\sqrt{2}} = 274.36 \text{ V} \cong 275 \text{ V}$$

Q43 **Text Solution:**

A repulsion start induction run single phase motor runs as an IM only when the commutator segments are short-circuited.

Q44 **Text Solution:**

Arc lamps are very bright and can produce a beam of light that can be seen for miles. This makes them ideal for use in search lights.

Lamp	Application
• Arc lamp	Search lights, projection lighting
• Neon lamp	Signs, decorative lighting
• Fluorescent lamp	Office lighting, store, lighting
• Sodium vapor lamp	Street lighting, highway lighting

Q45 **Text Solution:**
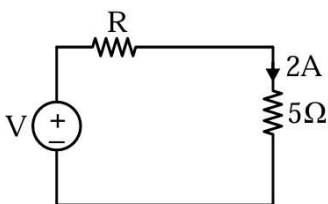
Maximum electric field is given by:

$$E_{\max} = \frac{-2(V_{bi}+V_R)}{W} = \frac{-2(3+4)}{7 \times 10^{-2}} = -200 \text{ V/m}$$

Q46 **Text Solution:**

Let us first find the internal resistance of the voltage source (Let R Ω)
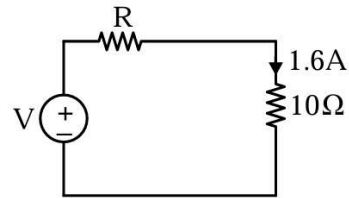
Case 1: Load = 5 Ω, current = 2 A,

V = 2 R + 10   .... (1)

Case 2: Load = 10 Ω, current = 1.6 A,

V = 1.6 R + 16   .... (2)

Solving equations (1) and (2), $\boxed{R = 15 \ \Omega}$

Now, the load is 15 Ω and the internal resistance of the source is also 15 Ω, so by maximum power transfer theorem power transfer efficiency will be 50%.

Q47 **Text Solution:**

DC compound motors have both series and shunt windings on the field poles. This gives them the advantages of both series and shunt motors. Compound motors have higher starting torque, good speed regulation and wide speed range. These characteristics make them ideal for shears and passes, which require high starting torque and variable speed control.

Q48 **Text Solution:**
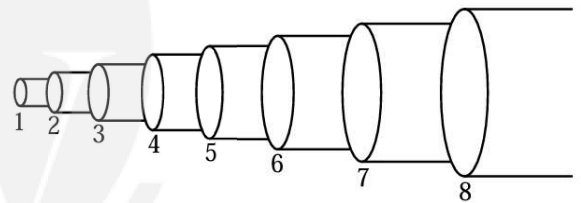
Serving is the outermost layer of an underground cable.

1. Stranded conductor
2. Conductor screen
3. Insulation
4. Insulation screen
5. Metallic sheath
6. Bedding
7. Armouring
8. Serving

Q49 **Text Solution:**

For the RLC series circuit to be critically damped:

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$$\left(\frac{R}{2L}\right)^2 = \frac{1}{LC}$$

$$\frac{R^2}{4L^2} = \frac{1}{LC}$$

$$C = \frac{4L}{R^2} = \frac{4 \times 1}{5 \times 5} = \frac{4}{25} = 0.16 \text{ F}$$

Q50 **Text Solution:**

Electrodynamometers are used as transfer instruments.

Q51 **Text Solution:**

Given:

Voltage drop = 3 V,

Current = 36 mA

Supply voltage = 12 V,

Limiting resistor = ?

By ohms law:

V = IR

V = 12 − 3 = 9 V

$$R = \frac{9}{I} = \frac{9}{36 \times 10^{-3}} = 250 \ \Omega$$

Q52 **Text Solution:**

Given: ***R*** = 64 kΩ = 64 × 10³ Ω

$P_{\max}$ = 1000 W

$$P_{\max} = I_{\max}^2 \cdot R$$

$$I_{\max} = \sqrt{\frac{P_{\max}}{R}} = \sqrt{\frac{1000}{64 \times 10^3}} = \frac{1}{8} \text{ A}$$

Q53 **Text Solution:**

The most important considerations when making a detailed estimate is quantity, transportation and availability of materials.

Q54 **Text Solution:**

Load factor: The load factor is a measure of how efficiently an electrical load is using power. It is calculated by dividing the average load over a period of time by the peak load during that period of time.

From load curve, it is given by the ratio of the area under the load curve to the total area under the rectangle in which it is contained.

Q55 **Text Solution:**

Given:

Constant voltage source (***V***)

Length (l_1) = l_1,

Radius = constant

Length (l_2) = 2l_1

Rate of heat developed = $P \times t = \frac{V^2}{R} \times t$

Now, $R_1 = \frac{\rho l_1}{a}$

$$R_2 = \frac{\rho(2l_1)}{a} = \frac{2 \cdot \rho l_1}{a}$$

$$P_1 = \frac{V^2}{\frac{\rho l_1}{a}}$$

$$P_2 = \frac{V^2}{\frac{2\rho l_1}{a}} = \frac{P_1}{2}$$

The heat developed will be halved.

Q56 **Text Solution:**

Given:

R = 50 Ω

Supply voltage = 250 V, 50 Hz

L = 0.25 H

Net impedance (***Z***) = 93.07 Ω

$$X_L = \sqrt{|Z|^2 - R^2} = \sqrt{(93.07)^2 - (50)^2}$$

$$= 78.49 \ \Omega$$

Reactive power

$$\left(Q\right) = \frac{V^2}{|Z|} \cdot \frac{X_L}{|Z|} = \frac{250 \times 250}{93.07} \times \frac{78.49}{93.07}$$

$$= 566.33 \text{ VAR} \approx 567.59 \text{ VAR}$$

Q57 **Text Solution:**

In electromagnetism, the pattern of the magnetic field in a solenoid is of parallel straight lines. Inside the solenoid, the magnetic field lines are parallel straight lines.

Q58 **Text Solution:**

- In a phasing-out test, a voltmeter connected to the winding shows defection when the supply is given, this will indicate that this winding is secondary winding only.

- If the voltmeter does not show a deflection when the primary or secondary winding is energized, then the windings are out of phase.

Q59 **Text Solution:**

Given:

Area (***A***) = 200 cm²

d = 10 cm,

ε = 8.854 × 10⁻¹² F/m

Capacitance (***c***) =

$$\frac{\varepsilon A}{d} = \frac{8.854 \times 10^{-12} \times 200 \times 10^{-2} \times 10^{-2}}{10 \times 10^{-2}} = 17.7$$

$$\times 10^{-7} \ \mu\text{F}$$

Q60 Text Solution:

The power factor of an induction motor is low at no load.

At no load, the induction motor draws a large current to maintain the magnetic field in the motor. however, this current is not used to do any work.

so the power factor of the motor is low.

Q61 Text Solution:

The transformer name-plate includes:

- Manufacturer information
- Transformer model number
- Serial number
- Rated voltage
- Rated current
- Rated power (kVA or MVA)
- Rated frequency
- Impedance
- Insulation class
- Cooling class
- Weight

Q62 Text Solution:

The nichrome that is used to make the heating element in an electric cooker has 80% nickel and 20% chromium.

Q63 Text Solution:

The standard voltage between any two phases in three three-phase four-wire secondary distribution system is 400V.

Q64 Text Solution:

Given:

Total power (**P**) = 50 kW

Line voltage (**V_L**) = 415 V

I_L = I_{Ph} = 70A   [Δ-connection]

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

$VA = \frac{P}{\cos\phi} = \frac{P}{P} \times \sqrt{3}\, V_L\, I_L = \sqrt{3} \times 415 \times 70$

= 50.32 kVA

Q65 Text Solution:

Neon discharge lamps are used for the determination of the polarity of DC mains.

Q66 Text Solution:

Among the given options we can see that only thyristor does not belong to FET family.

Q67 Text Solution:

Given:

Voltage (**V**) = 22 kV

Frequency (**f**) = 50 Hz

Phase to neutral capacitance star connection = 18 μF

Charging current will be given by:

$I_C = \omega \; V_{ph} \; C$

$I_C = 2\,\pi\, f \cdot \frac{V}{\sqrt{3}} \cdot C$

$I_C = 2\pi \times 50 \times \frac{22 \times 10^3}{\sqrt{3}} \times 18 \times 10^{-6}$

    = 71.82 A

Q68 Text Solution:

An item rate contract requires contractors to provide individual price quotes for all work to be performed.

Q69 Text Solution:

In the case of magnetic circuits:

MMF = Number of turns in a coil   × current flowing through the coil.

$MMF = N.I$

Q70 Text Solution:

Tungsten is used as a bulb filament because of its high melting point and high resistivity.

Q71 Text Solution:

By applying kVL in a given circuit we have,

$V_{AB} = 4\,\frac{di}{dt} + 3\,\frac{di}{dt} + 5\,\frac{di}{dt} = 12\,\frac{di}{dt}$

$\boxed{L_{eq} = 12\ \text{H}}$ $\boxed{\text{as } V = L\,\frac{di}{dt}}$

Q72 Text Solution:

A signal that varies periodically from zero to maximum, back to zero and then repeats is a pulsating signal.

A pulsating signal is a type of signal that has a constant average value, but its magnitude varies over time.

Q73 Text Solution:

Shaded pole induction motors are a type of single-phase induction motors that are simple to build and relatively inexpensive. They are

also very quiet and have low starting torque. However, shaded pole induction motors have low efficiency and are not suitable for heavy loads or applications where precise speed control is necessary.

Q74 Text Solution:

If the input impedance of CRO will be higher then it will have higher deflection sensitivity.

Q75 Text Solution:

The diversity factor is defined as the ratio of the sum of the individual maximum demands to the maximum demand of the whole system.

Q76 Text Solution:

When the Bipolar Junction Transistor works as an amplifier (active region), its emitter-base junction is forward-biased and the collector-base junction is reverse-biased.

Q77 Text Solution:

Given:

Total inductance in series aiding = 4 H

i.e., $L_1 + L_2 + 2M = 4$ ...(1)

[∵ M = Mutual inductance]

Total inductance in series opposition = 2 H

i.e., $L_1 + L_2 - 2M = 2$ ...(2)

Adding (1) and (2) we get,

4 M = 2

M = 0.5 H

Q78 Text Solution:

We have,

Sag (S) = $\frac{W L^2}{8 T}$,

Where,

S = Sag in meters

W = Weight per unit length of conductor in kg/m

L = Length of the conductor span is meters

T = Tension in the conductor in Newton

We can clearly see that,

Sag $\propto L^2$

So, if the length of the span is increased by two times, then the sag will become four times.

Q79 Text Solution:

In order to measure the frequency of a waveform from CRO, the time period of the waveform is necessary to be known.

Q80 Text Solution:

Given:

R = 8 Ω

L = 0.01911 H

Supply voltage = 230 V, 50 Hz

X_L = 2 π × 50 × 0.01911 = 6 Ω

$$Z = \sqrt{R^2 + X_L^2} = \sqrt{8^2 + 6^2} = 10 \; \Omega$$

$$\sin \theta = \frac{X_L}{|Z|} = \frac{6}{10}$$

Reactive power (Q) = $\frac{V^2}{|Z|} \; \sin \theta$

$= \frac{230 \times 230}{10} \times \frac{6}{10}$

= 3.174 kVAR

Q81 Text Solution:

Apparent power will be given by:

$$S = \sqrt{3} \; V_L \; I_L$$
$$= \sqrt{3} \times 200 \times 20 = 6.928 \; kVA$$

Q82 Text Solution:

Given:

Power (P) = 10 kW

Voltage = 200 V

Fuse rating = $\frac{\text{Power}}{\text{Voltage}} = \frac{10 \times 10^3}{200} = 50 \; A$
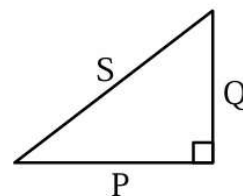
Q83 Text Solution:

Earnest money is the money put down in addition to the tender.

Earnest money is a sum of money that is deposited by a bidder to show that they are serious about their bid. It is usually a percentage of the total bid amount.

Q84 Text Solution:

In case of circuit laws, the currents flowing in various conductors in an electrical circuit are calculated by using Kirchhoff's laws.

Q85 Text Solution:

Given:

Active power (P) = 4800 watts

Reactive power (Q) = 6400 VAR

Apparent power (S) = $\sqrt{(6400)^2 + (4800)^2}$ = 8000 VA

Q86 Text Solution:

Permanent Magnet Moving Coil (PMMC) type instruments consume the least amount of energy from the given options.

Q87 Text Solution:

Given:

Power = 1.3 MVA = 1.3 × 10^6 VA

Voltage = 11 kV = 11 × 10^3 V

X_S = 20 Ω

Voltage drop = I × X_S

$$= \frac{1.3 \times 10^6}{\sqrt{3} \times 11 \times 10^3} \times 20 = 1364.64 \ \text{V}$$

Q88 Text Solution:

Important features of Francis turbine:

- It is a mixed-flow turbine, meaning that the water flows through the turbine in both a radial and axial direction.
- It has a spiral casing that directs the water into the runner at a constant velocity.
- It is used in medium heads and for moderate discharges.

Q89 Text Solution:

When the load of an alternator has a leading power factor, it supplies reactive power to the alternator. This reactive power causes the voltage at the alternator terminals to drop. To compensate for this voltage drop, the alternator needs to generate a higher voltage.

The amount of voltage increase required is proportional to the magnitude of the leading power factor, therefore as the leading power factor decreases, the magnitude of the generated voltage required to give rated terminal voltage increases.

Q90 Text Solution:

Given:

Supply voltage = 230 V

Impedance (Z) = 15 + j20, |Z| = 25 Ω

Power consumed per phase (P) = $\frac{V^2}{|Z|} \cdot \frac{R}{Z} = \frac{230 \times 230}{25} \times \frac{15}{25} = 1269.6 \ \text{Watts}$

Q91 Text Solution:

Oil Forced Water Forced (OFWF) cooling is the most economical type of cooling for very large transformers of ratings 100 MVA.

Advantages:

- It is more efficient than other types of cooling, such as ONAN and ONAF cooling.
- It is more economical than other types of cooling for very large transformers.
- It is well suited for hot environments.

Q92 Text Solution:

The main reason to amplify the input signals by using a vertical amplifier is to provide enough deflection on the CRT screen so that it can be measured as these are not strong enough to provide deflection that can be measured.

Q93 Text Solution:

The type of armature winding used in large high-voltage alternators is concentric winding.

Advantages of using concentric windings are:

- Higher voltage generation
- Reduced leakage flux
- Improved insulation
- Reduced vibrations
- Increased reliability

Q94 Text Solution:

Mechanical protection is required for underground cables to protect them from damage caused by excavation, soil movement, and other factors. The other three criteria are all desirable for underground cables.

(a)   Proper insulation thickness is important to provide a greater degree of safety and to prevent electrical breakdown of the cable.

(b)   Conductors with low resistance minimize heating losses and improve the efficiency of the cable.

(c)   Stranded conductors are more flexible and less likely to break than solid conductors.

Q95 Text Solution:

In a split-phase induction motor, the maximum torque is about 2.5 times the full load torque at about 75% of the synchronous speed.

Q96 Text Solution:

If only one of the parties to a contract does not understand its terms or scope it constitutes a unilateral mistake.

A unilateral mistake is a mistake of fact or law that is made by only one party to a contract. The other party to the contract is aware of the mistake, but does not disclose it.

Q97 Text Solution:

A pony motor is a small direct coupled induction motor that is used to start a synchronous motor. The pony motor is coupled to the shaft of the synchronous motor and is used to bring the synchronous motor up to speed. Once the synchronous motor is sped up the pony motor is disconnected.

Q98 Text Solution:

Given:

Current (I) = 15 A

Inductance (L) = 4 H

Energy   stored
$= \frac{1}{2} L I^2 = \frac{1}{2} \times 4 \times 15 \times 15 = 450 \text{ J}$

Q99 Text Solution:

Mutual Inductance: The phenomenon of electromagnetic induction where a change in one coil cause an EMF to be induced in the other coil is called mutual inductance.

Q100 Text Solution:

The purpose of interleaving the windings in a transformer is to reduce the leakage flux.

Interleaving the windings in a transformer helps to reduce leakage flux by bringing the primary and secondary windings closer together. This increases the coupling between the windings and reduces the amount of flux that leaks out.

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