READ INSTRUCTIONS BEFORE FILLING ANY DETAILS OR ATTEMPTING TO ANSWER THE QUESTIONS.

**Booklet Sr. No.**

| Question Booklet Set |
|---|
| **C** |

**Candidate's Name** _____

**Father's Name** _____

**Date of Birth :** | | | | | | | | |

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**OMR Response Sheet No.** _____ **Roll No.** _____

**Candidate's Signature** : *(Please sign in the box)*

Total Questions : **120**]
Time Allowed : **2** Hours]

## INSTRUCTIONS

1. The candidate shall NOT open this booklet till the time he/she is told to do so by the Invigilation Staff. However, in the meantime, the candidate can read these instructions carefully and subsequently fill the appropriate columns given above in CAPITAL letters. The candidate may also fill the relevant boxes out of 1 to 9 of the Optical Mark Reader (OMR) response sheet, supplied separately.
2. Use only blue or black ball point pen to fill the relevant columns on this page as well as in the OMR sheet. Use of ink pen or any other pen is not allowed.
3. The candidate shall be liable for any adverse effect if the information given above is wrong or illegible or incomplete.
4. Each candidate is required to attempt 120 questions in 120 minutes, except for orthopedically/visually impaired candidates, who would be given 40 extra minutes, by marking correct responses on the OMR sheet.
5. The candidates, when allowed to open the question paper booklet, must first check the entire booklet to confirm that the booklet has complete number of pages, the pages printed correctly and there are no blank pages. In case there is any such error in the question paper booklet then the candidate should IMMEDIATELY bring this fact to the notice of the Invigilation Staff and obtain a new booklet of the same series as given earlier.
6. The serial number of the new Question booklet if issued for some reason should be entered in the relevant column of the OMR. The Invigilation Staff must make necessary corrections in their record regarding the change in the serial no. of Question booklet.
7. The question paper booklet has **20** pages.
8. The paper consists of total 300 marks. Each question shall carry 2·5 marks. There are four options for each question and the candidate has to mark the MOST APPROPRIATE answer on the OMR response sheet.
9. There is negative marking (0·5 marks for each question) for questions wrongly answered by the candidate.
10. The candidate **MUST READ INSTRUCTIONS BEHIND THE OMR SHEET** before they start answering the questions and check that two carbon copies attached to the OMR sheet are intact.

## SECTION A

**1.** In a constant voltage transformer (CVT), the output voltage remains constant due to

(a) capacitor.

(b) input inductor.

(c) saturation.

(d) tapped windings.

**2.** Keeping in view the cost and overall effectiveness, the following circuit breaker is best suited for capacitor bank switching :

(a) Vacuum

(b) Air Blast

(c) $SF_6$

(d) Oil

**3.** A self-excited DC shunt generator, driven by its prime-mover at rated speed fails to build up voltage across its terminal at no load. What reason can be assigned for this ?

(a) The field circuit resistance is higher than the critical resistance.

(b) The initial shunt field MMF does not assist the residual magnetism.

(c) One of the inter-pole connections is reversed.

(d) The brush axis shifts slightly from the geometrical neutral axis of the machine.

**4.** A 240 V DC shunt motor with an armature resistance of 0·5 Ω has a full load current of 40 A. Find the ratio of the stalling torque to full load torque when a resistance of 1 Ω is connected in series with the armature.

(a) 4

(b) 12

(c) 6

(d) None of the above

**5.** The internal characteristics of DC generator is plotted between the

(a) Armature current and voltage generated after armature reaction.

(b) Field current and voltage generated at no load.

(c) Field current and voltage generated on load.

(d) Armature current and voltage generated at output terminal.

**6.** A single-phase transformer rated for 220 V/440 V, 50 Hz operates at no load at 220 V, 40 Hz. This frequency operation at rated voltage results in which of the following ?

(a) Increase of both eddy-current and hysteresis losses

(b) Reduction of both eddy-current and hysteresis losses

(c) Reduction of hysteresis loss and increase in eddy-current loss

(d) Increase of hysteresis loss and no change in eddy-current loss

**7.** In an induction motor, when number of stator slots is equal to an integral multiple of rotor slots

(a) there may be discontinuity in torque-slip characteristics.

(b) a high starting torque will be available.

(c) the maximum torque will be high.

(d) the machine may fail to start.

**8.** When applied rated voltage per phase is reduced to one-half, the starting torque of three-phase squirrel cage induction motor becomes

(a) $\frac{1}{2}$ of the initial value.

(b) $\frac{1}{4}$ of the initial value.

(c) twice of the initial value.

(d) 4 times of the initial value.

**9.** For given voltage, four heating coils will produce maximum heat, when connected

(a) all in parallel.

(b) all in series.

(c) with two in parallel pairs in series.

(d) one pair in parallel with the other two in series.

**10.** Given two coupled inductors, $L_1$ and $L_2$, their mutual inductance M satisfies

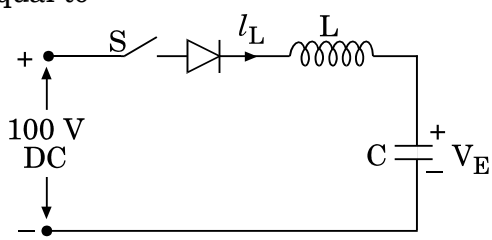
(a) $M = \sqrt[2]{L_1^2 + L_2^2}$

(b) $M > \frac{(L_1 + L_2)}{2}$

(c) $M > \sqrt{L_1 L_2}$

(d) $M \leq \sqrt{L_1 L_2}$

**11.** In the circuit of the figure, the switch S is closed at $t = 0$ with $I_L(0) = 0$ and $V_c(0) = 0$. In the steady state, $V_c$ is equal to




(a) 200 V

(b) 100 V

(c) 0 V

(d) – 100 V

**12.** Two incandescent light bulbs of 40 W and 60 W rating are connected in series across the mains. Then

(a) the bulbs together consume 100 W.

(b) the bulbs together consume 50 W.

(c) the 60 W bulb glows brighter.

(d) the 40 W bulb glows brighter.

**13.** How many 200 W/220 V incandescent lamps connected in series would consume the same total power as a single 100 W/220 V incandescent lamp ?

(a) Not possible

(b) 4

(c) 3

(d) 2

**14.** A source of angular frequency 1 rad/s has a source impedance consisting of 1 Ω resistance in series with 1 H inductance. The load that will obtain the maximum power transfer is

(a) 1 Ω resistance.

(b) 1 Ω resistance in parallel with 1 H inductance.

(c) 1 Ω resistance in series with 1 F capacitor.

(d) 1 Ω resistance in parallel with 1 F capacitor.

**15.** In a moving iron meter, the deflection torque is proportional to

(a) square of the current through the coil.

(b) current through the coil.

(c) sine of the measurand.

(d) square root of the measurand.

**16.** If the secondary burden of a current transformer is 15 VA and secondary current is 5 A, then the impedance of the connected load will be

(a) 0·6 Ω

(b) 5 Ω

(c) 6 Ω

(d) 10 Ω

**17.** The current coil of a wattmeter is connected to the CT R phase. The potential coil is connected across Y and B phase. The wattmeter measures

(a) Active power in R phase.

(b) Active power in Y phase.

(c) Reactive power in R phase.

(d) Power proportional to 3-phase power, if the load is balanced.

**18.** The instrument used normally to check the insulation resistance is

(a) Multimeter

(b) Ohm meter

(c) Tong tester

(d) Megger

**19.** Two 100 V full scale PMMC type DC voltmeters having Figure of Merits (FOM) of 10 kΩ/V and 20 kΩ/V are connected in series. The series combination can be used to measure a maximum DC voltage of

(a) 200 V

(b) 100 V

(c) 150 V

(d) 300 V

**20.** Chopper control for DC motor provides variation in

(a) Input voltage

(b) Frequency

(c) Both (a) and (b)

(d) None of the above

**21.** The feedback diodes in a DC to AC thyristor inverter

(a) freewheel the load current.

(b) provide reverse bias effectively to the thyristor for turn off.

(c) improve the switching properties of the inverter.

(d) improve the harmonic distortion for the inverter output current.

**22.** The frequency of ripple in the output voltage of a three-phase half controlled bridge rectifier depends on

(a) Firing angle.

(b) Load inductance.

(c) Load resistance.

(d) Supply frequency.

**23.** The MOSFET switch in its ON-state may be considered equivalent to

(a) Resistor

(b) Inductor

(c) Capacitor

(d) Battery

**24.** A three-phase diode bridge rectifier is fed from a 400 V RMS, 50 Hz, three-phase AC source. If the load is purely resistive, the peak instantaneous output voltage is equal to

(a) 400 V

(b) $400\ \sqrt{2}$ V

(c) $400\ \sqrt{\frac{2}{3}}$ V

(d) $\frac{400}{\sqrt{3}}$ V

**25.** To convert a full adder into full subtractor

(a) Cannot be converted.

(b) One input to carry is to be complemented.

(c) Carry is to be complemented.

(d) Sum is to be complemented.

**26.** A 10 bit A/D converter is used to digitize an analog signal in the 0 to 5 V range. The maximum peak-to-peak ripple voltage that can be allowed in the DC supply voltage is

(a) Nearly 100 mV.

(b) Nearly 5 mV.

(c) Nearly 25 mV.

(d) Nearly 50 mV.

**27.** On which one of the following cycles does a modern steam plant work ?

(a) Carnot cycle

(b) Rankine cycle

(c) Otto cycle

(d) Bell-Coleman cycle

**28.** For variable heads of near-about but less than 30 m, which type of turbines are used in hydro power stations ?

(a) Pelton

(b) Kaplan

(c) Francis

(d) None of the above

**29.** The diagonal elements of a nodal admittance matrix are strengthened by adding

(a) Shunt inductance.

(b) Shunt capacitors.

(c) Loads.

(d) None of the above

**30.** Series compensation on EHV lines is resorted to

(a) improve the stability.

(b) reduce the fault level.

(c) improve the voltage profile.

(d) as a substitute for synchronous phase modifier.

**31.** The rate of rise of restriking voltage depends upon

(a) the type of circuit breaker.

(b) the inductance of the system only.

(c) the capacitance of the system only.

(d) the inductance and capacitance of the system.

**32.** As the load on transformer is increased, the core losses

(a) decrease slightly.

(b) increase slightly.

(c) remain constant.

(d) may decrease or increase slightly depending upon the nature of the load.

**33.** If a 230 V DC series motor is connected to a 230 V AC supply, then the motor will

(a) vibrate violently.

(b) run with less efficiency and more sparking.

(c) not run.

(d) None of the above

**34.** The main advantage of using fractional-pitch winding is to reduce

(a) amount of copper in the winding.

(b) size of the machine.

(c) harmonic in the generated emf.

(d) cost of the machine.

**35.** The starting capacitor of a single-phase motor is

(a) Electrolytic capacitor.

(b) Ceramic capacitor.

(c) Paper capacitor.

(d) None of the above

**36.** Two transformers of identical voltage but of different capacities are operating in parallel. For satisfactory load sharing

(a) Impedance must be equal.

(b) Per unit impedance on their own rating must be equal.

(c) Per unit impedance and X/R ratios must be equal.

(d) Impedance and X/R ratios must be equal.

**37.** It is desired to measure parameters of 230 V/115 V, 2 KVA, single-phase transformer. The following wattmeters are available in a laboratory :

$W_1$ : 250 V, 10 A, low power factor

$W_2$ : 250 V, 5 A, low power factor

$W_3$ : 150 V, 10 A, high power factor

$W_4$ : 150 V, 5 A, high power factor

The wattmeter used in open-circuit test and short-circuit test of a transformer will respectively be

(a) $W_1$ and $W_2$

(b) $W_2$ and $W_4$

(c) $W_1$ and $W_4$

(d) $W_2$ and $W_3$

**38.** The compensating winding in a DC machine is located

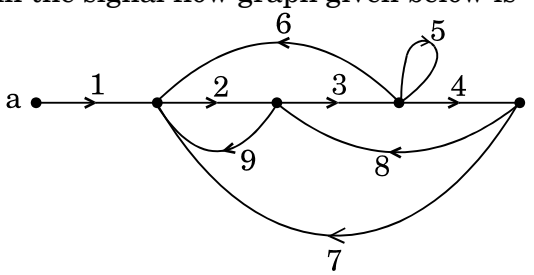
(a) in armature slots for compensation of the armature reaction.

(b) on commutating poles for improving the commutating.

(c) on pole shoes for avoiding the flashover at the commutator surface.

(d) on pole shoes to avoid the sparking at the brushes.

**39.** Number of non-touching loops present in the signal flow graph given below is



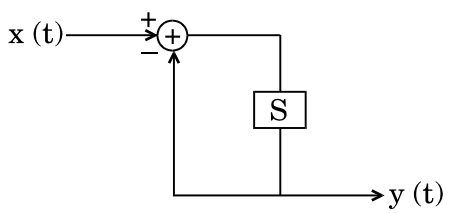

(a) 0

(b) 1

(c) 2

(d) 3

**40.** Consider a CT system shown in figure below. The system is




(a) Causal, BIBO-unstable

(b) Causal, BIBO-stable

(c) Non-Causal, BIBO-stable

(d) Non-Causal, BIBO-unstable

**41.** Which of the following is ***not*** true for an electrical circuit while transferring maximum power to the load ?

(a) The electrical network is linear and bilateral.

(b) The equivalent resistance from the source and the load resistance are equal.

(c) The source delivers 50% power to the load.

(d) The equivalent resistance from the source and the load resistance are not equal.

**42.** Three 5 ohm resistors are connected in delta fashion. What is its equivalent star representation ?

(a) $\frac{5}{3}$ ohm

(b) $\frac{3}{5}$ ohm

(c) 15 ohm

(d) 3 ohm

**43.** To solve an electrical network by the Norton's theorem, the network is represented by

(a) a current source in series with an equivalent Thevenin's resistance.

(b) a voltage source in parallel with an equivalent Thevenin's resistance.

(c) a current source in parallel with an equivalent Thevenin's resistance.

(d) a voltage source in series with an equivalent Thevenin's resistance.

**44.** A 100 V 50 Hz supply is connected to a series R-L-C circuit such that $R = X_L = X_C = 5$ ohm. What is the current supplied to this circuit ?

(a) 5 A

(b) 10 A

(c) 20 A

(d) 100 A

**45.** A Fourier transform of a unit step function is given as

(a) $F(j\omega) = 1/j\omega$

(b) $F(j\omega) = j\omega$

(c) $F(j\omega) = j/\omega$

(d) $F(j\omega) = \omega/j$

**46.** Which of the following circuit elements opposes sudden change in current ?

(a) Resistance

(b) Inductance

(c) Capacitance

(d) Diode

**47.** Two continuous time signals are given as $x(t) = e^{-t}$ and $y(t) = e^{-2t}$ for $t > 0$. What is the convolution of these two signals ?

(a) $e^{-t} + e^{-2t}$

(b) $e^{-t} - e^{-2t}$

(c) $e^{t}$

(d) $e^{-2t}$

**48.** Which of the following is connected in shunt in a band-stop filter ?

(a) Inductor

(b) Capacitor

(c) Inductor and capacitor in parallel

(d) Inductor and capacitor in series

**49.** The Hall-effect transducers are used for measuring

(a) humidity.

(b) magnetic field.

(c) atmospheric pressure.

(d) temperature.

**50.** Which of the following is the resolution of a 3-digit 0-1 V digital meter ?

(a) 100 mV

(b) 1 V

(c) 1 mV

(d) 10 V

**51.** The Miller sweep circuit used in a CRO is generally

(a) a voltage to current converter circuit.

(b) a current to voltage converter circuit.

(c) a differentiator circuit.

(d) an integrator circuit.

**52.** A 20 kVA, 400/200 V, 50 Hz single-phase transformer is connected as an autotransformer to work at 600/200 V. What is the kVA rating of the autotransformer ?

(a) 20

(b) 30

(c) 10

(d) 50

**53.** In an underground cable, the maximum and minimum stresses in the dielectric of a single-core cable are 40 kV/cm and 10 kV/cm, respectively. What is the insulation thickness if the conductor diameter is 2 cm ?

(a) 2 cm

(b) 3 cm

(c) 4 cm

(d) 8 cm

**54.** A 1-phase transmission line has two parallel conductors 3 m apart and the radius of each conductor is 1 cm. What is the capacitance of the line per km ?

(a) 0·4875 μF

(b) 0·009750 μF

(c) 0·004875 μF

(d) 0·9750 μF

**55.** A 3-phase 100 km long line delivers 20 MW power to a load at 0·9 power factor lagging. The line is represented with π-model and the line resistance is 0·1 ohm/km/phase. What is the efficiency of the line if the resistance carries a current of 188 A ?

(a) 90·23%

(b) 96·94%

(c) 92·00%

(d) 94·96%

**56.** A 3-phase, 50 Hz, 500 kV transmission line length is 300 km. The line inductance is 0·97 mH/km and its capacitance is 0·0115 μF/km. What is the characteristic impedance of the line ?

(a) 29·043 ohm

(b) 91·42 ohm

(c) 922·64 ohm

(d) 290·43 ohm

**57.** Which of the following is true for very long transmission line power capability ?

(a) Thermal limit > theoretical stability limit > practical load-ability

(b) Thermal limit < theoretical stability limit < practical load-ability

(c) Thermal limit = theoretical stability limit = practical load-ability

(d) Thermal limit + theoretical stability limit = practical load-ability

**58.** Which of the following methods is ***not*** used for the load flow analysis in the 3-phase power systems ?

(a) Newton-Raphson method

(b) Gauss-Seidel method

(c) Fast Decoupled method

(d) Equal-Area Criterion method

**59.** A transmission line delivers very light load during the monsoon season in India. What could be the line compensation to control the receiving end voltage of the line ?

(a) A series capacitor is connected with the line.

(b) The connected load should be removed.

(c) A shunt reactor is connected at the receiving end.

(d) A capacitive reactor is connected at the receiving end.

**60.** When the roots of a characteristic equation of a system are real negative, the system is said to be

(a) marginally stable.

(b) absolutely unstable.

(c) absolutely stable.

(d) sometimes stable and sometimes unstable.

**61.** The velocity error constant in case of the steady-state error of a closed-loop system is associated with

(a) a step input.

(b) a ramp input.

(c) a parabolic input.

(d) an impulse input.

**62.** A system is described by a differential equation $y'' + 2y' + 5y = 0$. What is the A matrix if the system is defined by $X' = AX$ ?

(a) [1 0; −2 −1]

(b) [1 0; −1 −2]

(c) [0 1; −2 −1]

(d) [0 1; −5 −2]

**63.** A controller transfer function is given by $C(s) = (2s + 1)/(0{\cdot}2s + 1)$. What is the nature of the controller and its parameter ?

(a) Lag controller with $\alpha = 10$.

(b) Lead controller with $\beta = 0{\cdot}1$.

(c) Lag controller with $\alpha = 2$.

(d) Lead controller with $\beta = 0{\cdot}2$.

**64.** The factor $1/(j\omega)^3$ has a phase angle of

(a) $-90°$

(b) $-270°$

(c) $270°$

(d) $180°$

**65.** In steady-state condition, a boost converter operates with input 150 V and output 450 V. What is the duty cycle of the gate pulse applied to the converter switch ?

(a) 0·3333

(b) 0·6666

(c) 0·2222

(d) 0·5555

**66.** In a single-phase half-wave diode rectifier connected to $200 \sin \omega t$ feeds a load R = 4·5 ohm. What is the average voltage appearing across the load ?

(a) $200/\pi$

(b) $200/\sqrt{2}\,\pi$

(c) $400/\pi$

(d) $200/2\pi$

**67.** In a thyristor controlled reactor, the current through the inductor can be controlled when the firing angle of the thyristor lies between

(a) $0°$ and $90°$.

(b) $90°$ and $180°$.

(c) $45°$ and $90°$.

(d) None of the above

**68.** A voltage source with a large inductor in series behaves as a

(a) current source.

(b) voltage source.

(c) impedance source.

(d) None of the above

**69.** In a single-pulse modulation of a PWM inverter has the pulse width = $72°$. Which of the following harmonics is eliminated ?

(a) Seventh

(b) Third

(c) Fifth

(d) Ninth

**70.** In the diode rectifier, the ratio of the RMS value of the fundamental component of the input current to the RMS value of input current from the supply is defined as

(a) input displacement factor.

(b) input current harmonic factor.

(c) input current distortion factor.

(d) crest factor.

**71.** A Zener diode used for voltage regulation is designed to operate in

(a) breakdown region.

(b) saturation region.

(c) space-charge region.

(d) high resistance region.

**72.** In a phase shift oscillator, the voltage gain of an amplifier is

(a) greater than 19.

(b) less than 19.

(c) less than 29.

(d) greater than 29.

**73.** A triangular waveform appears at the input side of a differentiator, the output is

(a) a constant DC level.

(b) an inverted triangular waveform.

(c) a square waveform.

(d) a saw-tooth waveform.

**74.** Which of the following is/are correct for a ripple counter ?

(a) The Q output of each stage feeds the clock input of the next stage.

(b) It consists of the J-K flip-flops.

(c) Both (a) and (b)

(d) None of the above

**75.** Which of the following DAC has the resolution of approximately 0·4% of its full scale range ?

(a) 8-bit

(b) 12-bit

(c) 16-bit

(d) 10-bit

**76.** Which of the following is correct for a multiplexer logic circuit ?

(a) At a time it accepts several inputs and allows all inputs to output.

(b) At a time it accepts several inputs and allows only one output.

(c) At a time it accepts one input and allows only one output.

(d) None of the above

**77.** The totem pole output stage in a standard TTL gate is used to

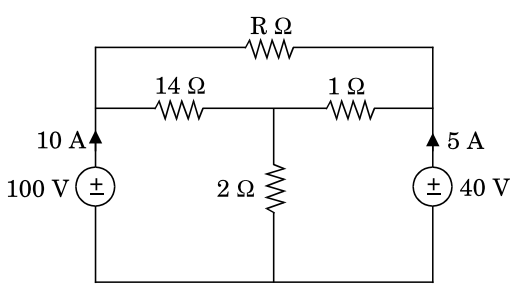
(a) decrease the output switching delay.

(b) increase the noise margin of the gate.

(c) facilitate a wired OR logic connection.

(d) increase the output impedance of the circuit.

**78.** In the following figure, the value of R is



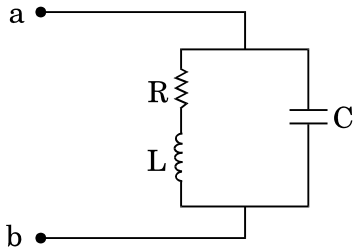

(a) 10 Ω

(b) 18 Ω

(c) 24 Ω

(d) 12 Ω

**79.** At resonance, the given parallel circuit constituted by an iron-cored coil and a capacitor behaves like




(a) an open-circuit.

(b) a short-circuit.

(c) a pure resistor of value R.

(d) a pure resistor of value much higher than R.

**80.** In a series RLC circuit at resonance, the magnitude of the voltage developed across the capacitor

(a) is always zero.

(b) can never be greater than the input voltage.

(c) can be greater than the input voltage, however, it is 90 degrees out of phase with the input voltage.

(d) can be greater than the input voltage, and is in phase with the input voltage.

**81.** Energy stored in a capacitor over a period of cycle when excited by an AC source is

(a) the same as that due to a DC source of equivalent magnitude.

(b) half of that due to a DC source of equivalent magnitude.

(c) zero.

(d) None of the above

**82.** The impulse response of a continuous system is given by $h(t) = \delta(t - 1) + \delta(t - 3)$. The value of step response at $t = 2$ is

(a) 0

(b) 1

(c) 2

(d) 3

**83.** Let x(t) be a periodic signal with time period T. Let $y(t) = x(t - t_0) + x(t + t_0)$ for some $t_0$. The Fourier series coefficients of y(t) are denoted by $b_k$. If $b_k = 0$ for all odd k, then $t_0$ can be equal to

(a) T/8

(b) T/4

(c) T/2

(d) 2T

**84.** A rectangular current pulse of duration T and magnitude 1 has the Laplace transform as

(a) 1/s

(b) $e^{-Ts}/s$

(c) $e^{Ts}/s$

(d) $(1 - e^{-Ts})/s$

**85.** The number of roots on the equation $2s^4 + s^3 + 3s^2 + 5s + 7 = 0$ that lie in the right half of s-plane is

(a) Zero

(b) One

(c) Two

(d) Three

**86.** The phase lead compensations are used to

(a) increase rise time and decrease overshoot.

(b) decrease both rise time and overshoot.

(c) increase both rise time and overshoot.

(d) decrease rise time and increase overshoot.

**87.** The transfer functions of two compensators are given below :

$$C_1 = \frac{10(s+1)}{(s+10)}, \; C_2 = \frac{(s+10)}{10(s+1)}$$

Which one of the following statements is correct ?

(a) $C_1$ is lead compensator and $C_2$ is lag compensator

(b) $C_1$ is lag compensator and $C_2$ is lead compensator

(c) Both $C_1$ and $C_2$ are lead compensators

(d) Both $C_1$ and $C_2$ are lag compensators

**88.** A 3-phase, fully controlled converter is feeding power into a DC load at a constant current of 200 A. The RMS current through each thyristor of the converter is

(a) 50 A

(b) 100 A

(c) $\frac{200\sqrt{2}}{\sqrt{3}}$ A

(d) $\frac{200}{\sqrt{3}}$ A

**89.** A PWM switching scheme is used with a three-phase inverter to

(a) reduce the total harmonic distortion with modes filtering.

(b) minimize the load on the DC side.

(c) increase the life of the batteries.

(d) reduce low order harmonics and increase high order harmonics.

**90.** A three-phase diode bridge rectifier is fed from a 400 V RMS, 50 Hz, three-phase AC source. If the load is purely resistive, then peak instantaneous output voltage is equal to

(a) 400

(b) $400\sqrt{2}$

(c) $400\sqrt{\frac{2}{3}}$

(d) $\frac{400}{\sqrt{3}}$

**91.** A single-phase diode bridge rectifier supplies a highly inductive load. The load current can be assumed to be ripple free. The AC supply side current waveforms will be

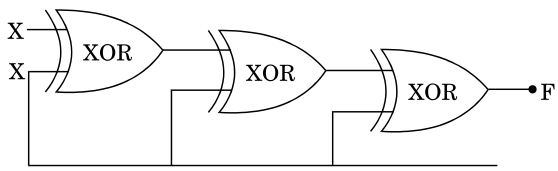
(a) sinusoidal.

(b) constant DC.

(c) square.

(d) triangular.

**92.** For the circuit shown in the figure below, the output F will be




(a) 1

(b) zero

(c) X

(d) $\overline{X}$

**93.** Which of the following counter results in least delay ?

(a) Ring counter

(b) Ripple counter

(c) Synchronous counter

(d) Asynchronous counter

**94.** As temperature is increased, the voltage across a diode carrying a constant current

(a) increases.

(b) decreases.

(c) remains constant.

(d) may increase or decrease depending upon the doping levels in the junction.

**95.** A J-K flip-flop can be made from an S-R flip-flop by using two additional

(a) AND gates.

(b) OR gates.

(c) NOT gates.

(d) NOR gates.

**96.** The number of output pins of a 8085 micro-processor are

(a) 40

(b) 27

(c) 21

(d) 19

**97.** A current of 10 mA is flowing through a resistance of 820 Ω having tolerance of ±10%. The current was measured by an analog ammeter on a 25 mA range with an accuracy of ±2% of full scale. What is the range of error in the measurement of dissipated power ?

(a) ±15%

(b) ±5%

(c) ±14%

(d) ±20%

**98.** The total current $I = I_1 + I_2$ in a circuit is measured as $I_1 = 150 \pm 1$ A, $I_2 = 250 \pm 2$ A, where the limits of error are given as standard deviations. I is measured as

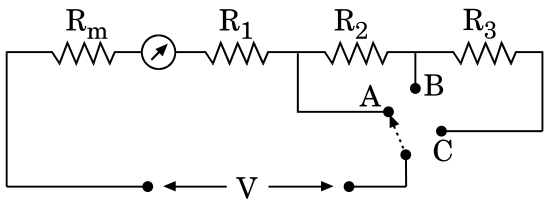
(a) (400 ± 3) A

(b) (400 ± 2·24) A

(c) $(400 \pm \frac{1}{5})$ A

(d) (400 ± 1) A

**99.** A PMMC instrument with an FSD current of 70 μA and meter resistance $R_m = 1500\ \Omega$ is to be converted as a voltmeter with ranges of 20 V, 60 V, 120 V. When the switch is connected to A, B and C respectively as shown in the figure, what are the values of multiplier resistance $R_1$, $R_2$ and $R_3$ ?




(a) 180·2 kΩ, 300·5 kΩ, 450·7 kΩ

(b) 200·2 kΩ, 400·5 kΩ, 600·5 kΩ

(c) 350·2 kΩ, 610·5 kΩ, 920·4 kΩ

(d) 284·2 kΩ, 571·5 kΩ, 857·2 kΩ

**100.** The induction type energy meter can run fast by

(a) changing the load from lagging to leading.

(b) changing the load from leading to lagging.

(c) placing the braking magnet away from the centre of the disc.

(d) placing the braking magnet closer to the centre of the disc.

## SECTION B

**101.** Who among the following is the Chief Justice of India ?

(a) Justice S.A. Bobde

(b) Justice N.V. Ramana

(c) Justice Sanjiv Khanna

(d) Justice Ranjan Gogoi

**102.** Who among the following wrote 'Ajj Aakhaan Waris Shah Nu' ?

(a) Amrita Pritam

(b) Nanak Singh

(c) Shiv Kumar Batalvi

(d) Dalip Kaur Tiwana

**103.** Consider the following pairs :

| *Protected areas* | | *Well known for* |
|---|---|---|
| 1. Manas | : | One-horned Rhinoceros |
| 2. Ranthambore | : | Tiger |
| 3. Periyar | : | Elephant |

Which of the above pairs is/are correctly matched ?

(a) Only 1

(b) Only 2 and 3

(c) Only 1 and 3

(d) 1, 2 and 3

**104.** Hybridoma technology is a new biotechnological approach for commercial production of

(a) Monoclonal antibodies.

(b) Interferon.

(c) Antibiotics.

(d) Alcohol.

**105.** Which of the following Schedules of the Constitution of India contains provision regarding Anti Defection Act ?

(a) $10^{th}$ Schedule

(b) $11^{th}$ Schedule

(c) $12^{th}$ Schedule

(d) $9^{th}$ Schedule

**106.** Consider the following pairs :

| *Pair* | *Rivers* | *Dams* |
|---|---|---|
| 1. | Sutlej | : Bhakra Dam |
| 2. | Beas | : Pond Dam |
| 3. | Ravi | : Ranjit Sagar Dam |

Which of the pairs given above are correctly matched ?

(a) Only 1 and 2

(b) Only 2 and 3

(c) Only 1 and 3

(d) 1, 2 and 3

**107.** In a class of 45 students, a boy is ranked $20^{th}$. When two boys joined, his rank was dropped by one. What is his new rank from the end ?

(a) $24^{th}$

(b) $25^{th}$

(c) $27^{th}$

(d) $29^{th}$

**108.** The four children in the Baxi family are Reena, Ramesh, Shagun, and Sahana. The ages of the two teenagers are 13 and 15. The ages of the younger children are 5 and 7. From the following clues, determine the age of Reena.

1. Reena is older than Ramesh.
2. Sahana is younger than Shagun.
3. Sahana is 2 years older than Ramesh.
4. Shagun is older than Reena.

(a) 5

(b) 7

(c) 13

(d) 15

***Directions :*** *(Questions no. 109 to 113) : Read the following information and answer the questions using this information.*

In a conference room, six employees of a company are attending a meeting in a circular sitting arrangement. All employees are facing the centre of the circle.

- Purnima is sitting between Sahil and Manoj.
- Sahil and Kabir are sitting opposite to each other.
- Sneha is sitting between Kabir and Raman.

**109.** Who is just right to Manoj ?

(a) Sahil

(b) Kabir

(c) Purnima

(d) Raman

**110.** Who are neighbours of Kabir ?

(a) Sneha and Manoj

(b) Sneha and Sahil

(c) Purnima and Sahil

(d) Raman and Manoj

**111.** Who is sitting just right to Sahil ?

(a) Manoj

(b) Sneha

(c) Kabir

(d) Raman

**112.** Who is sitting opposite to Raman ?

(a) Sahil

(b) Manoj

(c) Purnima

(d) Kabir

**113.** Which two employees are sitting next to each other ?

(a) Sahil and Manoj

(b) Purnima and Sneha

(c) Manoj and Raman

(d) Sahil and Raman

**114.** Which two words given below are the most opposite in meaning ?

wealth, equity, revenue, bias, empathy, profit

(a) wealth and equity

(b) equity and bias

(c) revenue and profit

(d) empathy and bias

**115.** Blueberries cost more than strawberries. Blueberries cost less than raspberries. Raspberries cost more than strawberries and blueberries. If the first two statements are true, the third statement is

(a) true.

(b) false.

(c) uncertain.

(d) not clear.

**116.** Four friends studying in an Engineering College are from different cities and they are in one of the two departments — Electronics and Civil. Tinku is from Kolkata. One of the Electronics students is from Bhopal. Pinku belongs to Electronics but is not from Hyderabad. Chinku is not from Chennai and is not in Electronics. Minku and Tinku belong to the same Department. If Pinku is not from Bhopal, then which of the following is true ?

(a) Pinku is from Chennai.

(b) Chinku is from Hyderabad.

(c) Minku is from Bhopal.

(d) All of the above

**117.** The Senkaku Islands dispute or the Diaoyu Islands dispute is a territorial dispute over a group of uninhabited islands between which of the following Asian countries ?

(a) China and Vietnam

(b) China and Myanmar

(c) China and Cambodia

(d) China and Japan

**118.** Which of the following traditional songs of Punjab is ***not*** related to Marriage ?

(a) Suhaag

(b) Alhanian

(c) Ghorian

(d) Sithanian

**119.** The following have served as Chief Ministers of the State of Punjab after independence. Arrange them in a chronological order :

1. Pratap Singh Kairon
2. Bhim Sen Sachar
3. Gopi Chand Bhargava
4. Beant Singh

(a) 3, 2, 1, 4

(b) 1, 2, 3, 4

(c) 2, 3, 4, 1

(d) 4, 1, 2, 3

**120.** Which one of the following islands is ***not*** a part of Andaman and Nicobar Islands ?

(a) Long Island

(b) Narcondam

(c) Kavaratti

(d) Havelock

## SPACE FOR ROUGH WORK

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