Section 1 - Assistant Engineer Electrical

1) In case of 3-Ø induction motor the rotor power output is 30 kW. If the slip during operation is 4%, then total rotor copper loss will be

A) 1440W
B) 1250W
C) 1200 W
D) 1000 W

2) Assume that you have a binomial experiment with p = 0.5 and a sample size of 100. The expected value of this distribution is

A) 50
B) 0.30
C) 0.50
D) 100

3) The speed of dc shunt motor running on Load at rated speed can be reduced by

A) none of the other three
B) increasing the applied voltage
C) connecting an additional resistance in the armature circuit
D) connecting an additional resistance in the field circuit

4) A good way to figure out the relationship in a given question is to make up a sentence that describes the relationship between the first two words. Then, try to use the same sentence to find out which of the answer choices completes the same relationship with the third word. Odometer is to mileage as compass is to

A) Hiking
B) Speed
C) Needle
D) Direction

5) The flux in core of transformer depends on

A) output voltage and load
B) input voltage and frequency
C) output voltage and frequency
D) input voltage

6) The voltage applied to a circuit is 100 $\sqrt{2}$ cos (100πt) volts and the circuit draws a current of 10 $\sqrt{2}$ sin (100πt + π / 4) amperes. Taking the voltage as the reference phasor, the phasor representation of the current in amperes is

A) 10 ∠ − π / 4
B) 12∠ + π / 4

C) 10.14∠ − π / 4
D) 10 ∠ + π / 4

7) A numerical description of the outcome of an experiment is called a

A) descriptive statistic
B) random variable
C) probability function
D) variance

8) A three-phase, salient pole synchronous motor is connected to an infinite bus. Ig is operated at no load a normal excitation. The field excitation of the motor is first reduced to zero and then increased in reverse direction gradually. Then the armature current

A) Remains constant
B) First increases and then decreases steeply
C) First decreases and then increases steeply
D) Increases continuously

9) Which of the following polarization is strongly dependent on temperature?

A) None of the other three
B) Electronic Polarization
C) Orientational Polarization
D) Ionic Polarization

10) What is Electromagnetic radiation with maximum wavelength?

A) Radio Waves
B) Infrared
C) Micro Waves
D) Ultraviolet

11) The slip of induction motor normally does not depend on

A) Synchronous Speed
B) Shaft Torque
C) Rotor Speed
D) Core-loss component

12) An overcurrent relay having a current setting of 125% is connected to a supply circuit through a current transformer of 600/5 ratio. The pick up value is

A) 7.5 A
B) 5 A
C) 6.25 A
D) 10 A

13) Pick the wrong term in the series 3, 7, 9, 28, 27, 84, 81, 448, 243

A) 28
B) 7
C) 84
D) 81

14) If the periodic current $(2 + 6\sin\omega_0 t)$ A is applied to a 1 ohm resistor, then the power dissipated by the resistor is
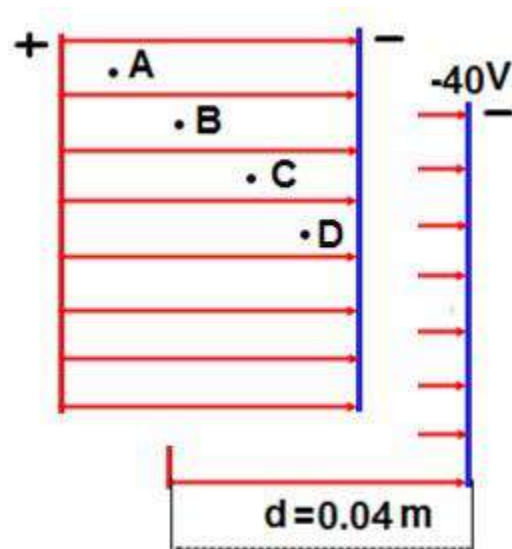
A) 18 W
B) 20 W
C) 24 W
D) 22 W

15) If 6p = 46656, What is the value of p-2?

A) 7774
B) 12966
C) 36666
D) 7776

16) Pick the wrong term in the series 6, 8, 9, 12, 14, 18, 22, 26, 30

A) 26
B) 12
C) 22
D) 30

17) An electric field is created by two parallel plates. At which of the following points is the electric field the strongest?

A) The electric field is the same at A and B points
B) The electric field is the same at C and D points
C) The electric field is GREATER at A than B
D) The electric field is the same at all points

18) A 4-point starter is used to start and control the speed of a

A) DC series motor
B) DC shunt motor with armature resistance control
C) DC compound motor
D) None of the other three

19) Which law directly explains the law of conservation of mass?

A) Newton's Law
B) Johnsons' Law
C) Avogadro's law
D) Kirchoff's Law

20) In an alternator the armature reaction is represented in equivalent circuit diagram as

A) impedance
B) resistance
C) reactance
D) admittance

21) Let y [n] denote the convolution of h [n] and g [n], where h [n] = $(1/2)^n$ u[n] and g [n] is causal sequence. If y [0] = 1 and y [1] = ½, then g [1] equals

A) 1
B) 0
C) 3/2
D) 1/4

22) Consider a matrix [A] = $\begin{bmatrix} a & 5 \\ -3 & b \end{bmatrix}$ If the eigen values of the given matrix are 1 and 3, then the no. of possible values that can be taken by "a" is.

A) 4
B) 2
C) 1
D) 3

23) $(ab)^{x-2}=(ba)^{x-7}$. What is the value of x?

A) 4.5
B) 3.5
C) 4
D) 3

24) Which of the following forms of two level minimization is degenerative in nature?

A) NAND - NOR
B) AND - NOR
C) NAND - NAND
D) NAND - AND

25) An hydrograph is an instrument indicating

A) the maximum and minimum run off during a period
B) all of the other options are correct
C) the average run off during the period
D) the discharge at any time during the period under consideration

26) Which of the following represents the electric field map due to a combination of two positive charges?

A)

B)

C)

D)
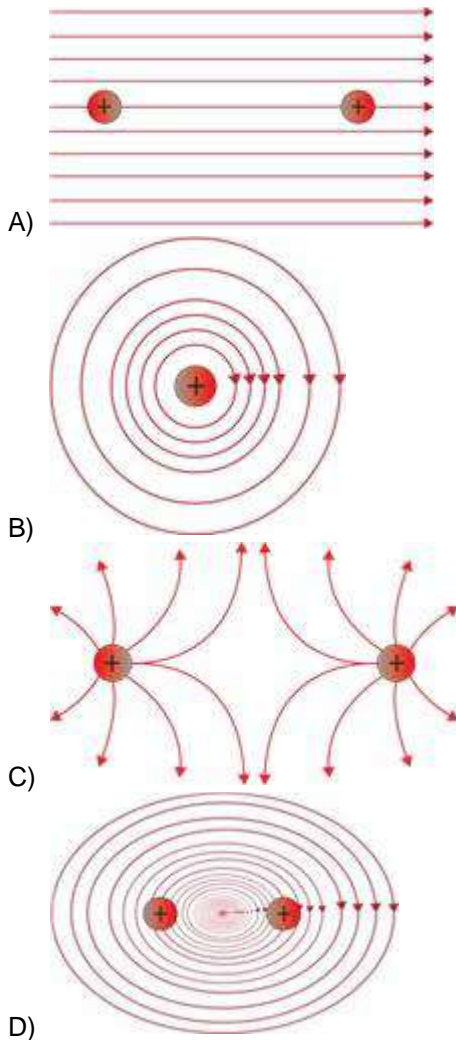
27) A man was engaged on a job for 30 days on the condition that he would get a wage of Rs.10 for the day he works, but he have to pay a fine of Rs.2 for each day of his absence. If he gets Rs.216 at the end, he was absent for work for _____ days

A) 5 days
B) 7 days
C) 8 days
D) 9 days

28) Let AX = B represents a system of equations where A is 2x3 real matrix. The system is known to be inconsistent. The highest possible rank of A is.

A) 2
B) 3
C) 1
D) Can't be determined

29) In a fitness certificate, by mistake a candidate gave his height as 25% more than normal. In the interview panel, he clarified that his height was 5 feet 5 inches. Find the percentage correction made by the candidate from his stated height to his actual height.

A) 27
B) 26
C) 25
D) 20

30) The fourier transform of a signal h(t) is

$H(j\omega) = (2Cos\omega)(Sin2\omega)/\omega$. The value of h(0) is:

A) 3/4
B) 1
C) 1/2
D) 2

31) The direct and quadrature axis reactance's of a salient pole alternator are 1.2 p.u and 1.0 p.u respectively. Assuming the armature resistance to be negligible, what will be its power angle if this alternator is delivering rated KVA at upf and at rated voltage.

A) 90 degrees
B) 60 degrees
C) 30 degrees
D) 45 degrees

32) Anjum is counting his last days, he keeps half his property for his wife and divides the rest equally among his three sons: Bimar, Cumar and Danger. Some years later, Bimar dies, leaving half his property to his widow and half to his brothers, Cumar and Danger together, sharing equally. When Cumar makes his will, he keeps half his property for

his widow and the rest he bequeaths to his younger brother Danger. When Danger dies some years later, he keeps half his property for his widow and the remaining for his mother. The mother now has Rs. 5,75,0000. What was the worth of the total property?

A) 3.9 crore
B) 2.9 crore
C) 2.8 crore
D) 2.4 crore

33) The average power delivered to an impedance $(4 - j3)\Omega$ by a current $5\cos(100\pi t + 100)$ A is _____.

A) 44 W
B) 48.5 W
C) 50 W
D) 65 W

34) What will be the input power factor of the converter if the input voltage is $v_i = 100(1.414)\sin(\pi t)$ V and the current drawn by the conductor i_i follows the following equation:

$i_i = 10(1.414)\sin(100\pi t - \pi/3) + 5(1.414)\sin(300\pi t + \pi/4) + 2(1.414)\sin(500\pi t - \pi/6)$ A

A) 0.1
B) 0.5
C) 0.2
D) 0.25

35) If two independent random variables are added, then the probability density function (PDF) of the resultant random variable is equal to

A) multiplication of PDFs of individual random variables
B) sum of PDFs of individual random variables
C) difference of PDFs of individual random variables
D) convolution of PDFs of individual random variables

36) Consider the following statements given as reason of application of short pitched coil compared to full pitch coil in stator of synchronous generator:

1. improved sinusoidal waveform of induced emf is obtained.
2. distortion harmonics are significantly reduce.
3. it increases over all induced emf.

Which statements among the above are correct?

A) 1 and 2 only
B) 1, 2 and 3
C) 2 and 3 only
D) 1 and 3 only

37) The isotopes of chlorine with mass number 35 and 37 exist in which ratio?

A) 3:1
B) 5:1
C) 4:1
D) 2:1

38) When an interrupt occurs, an operating system

A) may change the state of the interrupted process to "blocked" and schedules another process
B) ignores the interrupt
C) always resumes execution of the interrupted process after processing the interrupt
D) always changes the state of the interrupted process after processing the interrupt

39) In an ideal transformer, the no load current I_o

A) leads the applied voltage by 90 degree
B) in phase with applied voltage
C) none of the other three
D) lags the applied voltage by 90 degree

40) What is a relatively permanent change in behaviour that occurs as a result of experience?

A) Learning
B) Behaviour modification
C) Skills
D) Motivation

41) Firoz's monthly salary is A rupees. Of this, he spends X rupees. The next month he has an increase of C% in his salary and D% in his expenditure. The new amount saved is:

A) X(C – D. / 100
B) (A/100) (C – D. X (1 + D/100)
C) X(C + D) / 100
D) A(1 + C/100) – X(1 + D/100)

42) If the variance of the zero mean random variable "X" is 2, then the mean square value of the random variable Y = 4X + 3 will be

A) 41
B) 32
C) 17
D) 35

43) The power in a DC circuit is measured by measuring the current through a resistor. The current is measured with an accuracy of ±1.5% and the tolerance band of the resistor is ±0.5%. If the errors are limiting or guarantee errors, then the accuracy with which power is measured is

A) ±1.125 %
B) ±2.5%
C) ±3.5%
D) ±2%

44) Frequency warping is related to:

A) none of the other three
B) matched z-transform
C) bilinear transformation
D) impulse invariance method

45) The susceptibility of paramagnetic material $FeCl_3$ is 3.7 X 10^{-3} at 27 degree Celsius. The value of Curie constant is

A) 11.1 K
B) 0.95 K
C) 0.099 K
D) 1.11 K

46) A low – pass filter with a cut-off frequency of 30Hz is cascaded with a high-pass filter with a cut-off frequency of 20Hz. The resultant system of filters will function as

A) an all-pass filter
B) a band – pass filter
C) an all-stop filter
D) an band stop (band-reject) filter

47) If the armature current is leading the generated voltage by 90 degrees, the effect of armature reaction will be

A) magnetizing
B) none of the other three
C) no effect
D) demagnetizing

48) What is Extension of behaviour modification into organization called

A) Enhancement
B) OB Mod
C) Enrichment
D) Enlargement

49) The bridge most suited for measurement of a four terminal resistance in the range of 0.001Ω to 0.1Ω is

A) Kelvin's double bridge
B) Maxwell's bridge
C) Wien's bridge
D) Schering bridge

50) Copper has a much lower resistivity than aluminium SiO_2, has a dielectric constant of 3.9 and Xerogel has a dielectric constant of 2.1. In order to reduce the interconnect delay in VLSI circuits, what should be the best combination of metal and dielectric layer?

A) Copper with SiO
B) Copper with Xerogel
C) Aluminium with SiO
D) Aluminium with Xerogel

51) Circuit turn-off time of an SCR is defined as the time

A) required for the SCR current to become zero
B) for which the SCR is reverse biased to reduce its current below the holding current
C) taken by the SCR turn of
D) for which the SCR is reverse biased by the commutation circuit

52) Consider the deferential equation $\frac{d^2y}{dx^2} - \frac{2dy}{dx} + y = 0$, with initial conditions y (0) = 0 and y (1) = e. The value of y (2) is

A) 15.00(14.50 – 15.00)
B) 14.99 (14.50 – 15.00)
C) 14.77 (14.50 – 15.00)
D) 14.50(14.77-15.00)

53) Which of the following represents the electric field map due to a single positive charge?

A)

B)

C)

D)
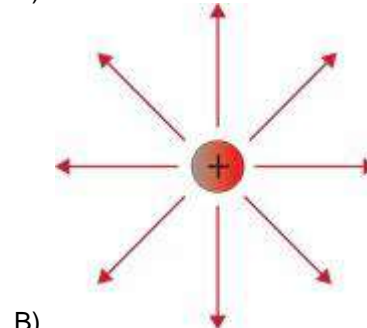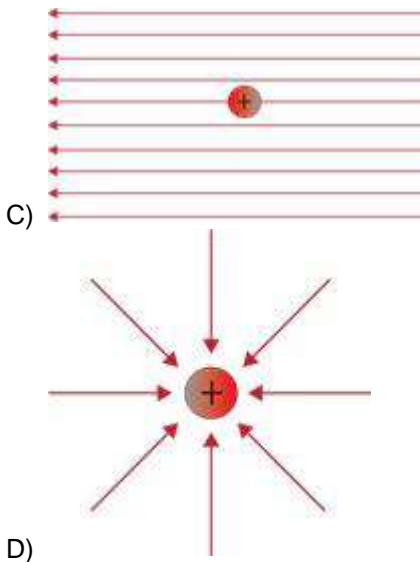
54) Which of the following materials are "Antiferro" magnetic materials?

1. Ferrous oxide (FeO)

2. Manganese oxide (MnO_4)

3. Chromium oxide (Cr_2O_3)

A) 2 and 3 only
B) 1 only
C) 2 only
D) 1, 2 and 3

55) $11+P(n−m) +11+P(m−n) =$?

A) 11+P
B) 2
C) 1
D) 1P

56) The full pitch coil in an alternator has a span of 18 slots. If it is desired to eliminate the third harmonic voltage, the coil span should be.

A) 18 slots
B) 15 slots
C) 12 slots
D) 9 slots

57) A function f(x) is given as

x	0	1	2	3	4
$f(x)$	1	0.5	0.2	0.1	0.058

The value of $\int_0^4 f(x)\, dx$ as evaluated by Simpson's 1/3 rule is.

A) 1.289(1.3 – 1.34)
B) 1.289(1.286 – 1.34)
C) 1.287(1.20 – 1.35)
D) 1.286(1.20 – 1.35)

58) The following question consists of two statements, one labelled as Assertion 'A' and the other labelled as Reason 'R' You are to examine these two statements carefully and select your answers to these items using the codes given below:

Assertion (A): Transformer oil works as an insulating material as well as cooling agent.

Reason (R): The transformer oil has high dielectric strength and low viscosity.

A) A is false but R is true
B) A is true but R is false
C) Both A and R are true but R is not a correct explanation of A
D) Both A and R are true and R is the correct explanation of A

59) In a double cage 3 phase induction motor

A) the inner cage has higher resistance as compared to the outer cage.
B) the inner cage has higher resistance and higher inductance as compared to the outer cage.
C) none of the other three.
D) the inner cage has lower resistance and higher inductance as compared to the outer cage.

60) If a 3x3 diagonal matrix 'A' has characteristic equation, $\lambda^3 − 6\lambda^2 − \lambda + 22 = 0$ then the determinant of the matrix 'A' is

A) 24
B) -24
C) -22
D) 22

61) Assuming both the voltage sources are in phase, the value of R for which maximum power is transferred from circuit A to circuit B is

A) 2 Ω
B) 1.8 Ω
C) 2.4 Ω
D) 0.8 Ω
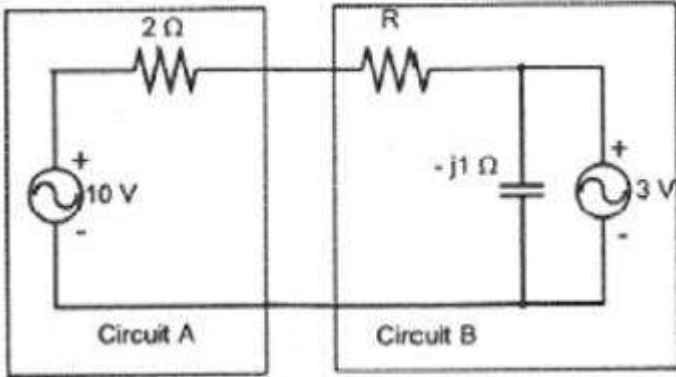
62) The function f(x) is defined as $(1 + Sinx)^{1/x}$. The value of f (0) is

A) e
B) 0
C) 1
D) 4

63) Two identical coupled inductors are connected in series. The measured inductances for the two possible series connections are 380 µH and 240 µH. Their mutual inductance in µH is _____

A) 35 µH
B) 45 µH
C) 40 µH
D) 37 µH

64) Among the following which one of the bridge method is commonly used for finding mutual inductance

A) Wein Bridge
B) Schering Bridge
C) De Sauty Bridge
D) Heaviside Campbell Bridge

65) In the textile industry, a manufacturer is interested in the number of blemishes or flaws occurring in each 100 feet of material. The probability distribution that has the greatest chance of applying to this situation is the

A) normal distribution
B) poisson distribution
C) binomial distribution
D) uniform distribution

66) In a dc series motor, the torque developed is

A) proportional to the square of armature current.
B) directly proportional to armature current.
C) inversely proportional to armature current.
D) proportional to the square root of armature current.

67) The maximum possible speed at which an alternator can run to generate 60 Hz, 2200 V output will be

A) 2700 rpm
B) 7200 rpm
C) 5400 rpm
D) 3600 rpm

68) Which of the following statements is/are correct?

S1: FET is a voltage controlled device.
S2: BJT is a current controlled device.

A) S2 only
B) None of the other three
C) S1 only
D) Both S1 and S2

69) The voltage gain Av of the circuit shown below is
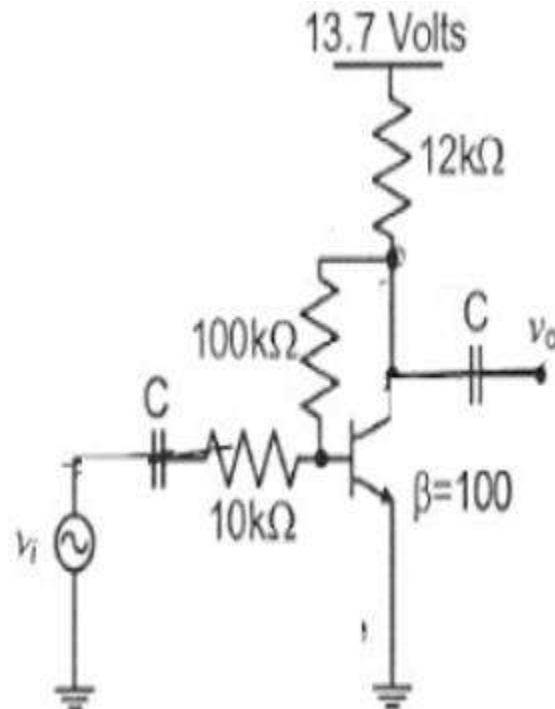

A) |Av| ≈100
B) |Av| ≈10
C) |Av| ≈250
D) |Av| ≈200

70) In which of the following magnetic materials the net magnetic moment is zero when no external magnetic field is applied?

A) Paramagnetic
B) Anti-ferromagnetic
C) Ferrimagnetic
D) Ferromagnetic

71) A current measuring instrument can be used to measure voltage by

A) Connecting a high resistance in series with the meter
B) Connecting a low resistance across the meter
C) None of the other three
D) Connecting a high resistance across the meter

72) A non-uniform electric field is represented by equipotential lines. A positive charge with a magnitude of 1 µC moves in the following path: A→B→C→D→E→ How much work is done by the electric field?
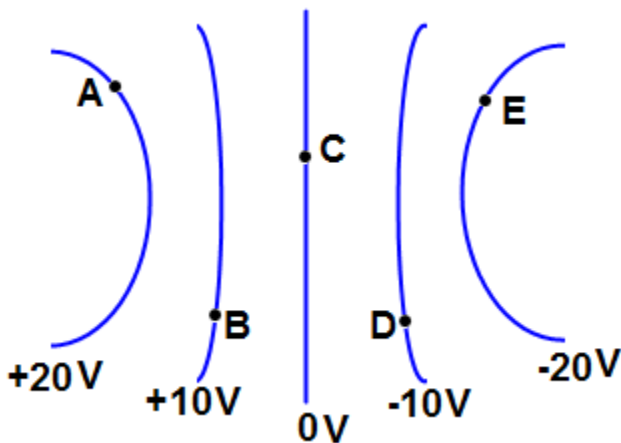
A) 40 µJ
B) 60 µJ
C) 20 µJ
D) 0 µJ

73)
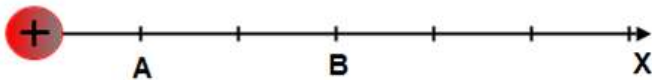
In the above diagram, the magnitude of the electric field at point A is E. What is the electric field at point B in terms of E?

A) 1/9 E
B) 9E
C) 1/3 E
D) 3E

74) A candidate takes a test and attempts all the 100 questions in it. While any correct answer fetches 1 mark, wrong answers are penalised as follows; one-tenth of the questions carry 1/10 negative mark each, one-fifth of the questions carry 1/5 negative marks each and the rest of the questions carry $1/2$ negative mark each. Unattempted questions carry no marks. What is the difference between the maximum and the minimum marks that he can score?

A) 140
B) 100
C) 120
D) 141

75) A dual trace oscilloscope is set to operate in the Alternate mode. The control input of multiplexer used in y-circuit is fed with a signal having frequency equal to

A) Twice the frequency of time base (sweep) oscillator
B) The highest frequency that the multiplexer can operate on
C) Half the frequency of time base (sweep) oscillator
D) The frequency of time base (sweep) oscillator

76) If $7^{(x-y)} = 343$ and $7^{(x+y)} = 16807$, what is the value of x?

A) 1
B) 3
C) 4
D) 2

77) For measurement of very small resistances _____ is commonly used

A) Schering Bridge
B) Anderson Bridge
C) Wheatstone Bridge
D) Kelvin double Bridge

78) The salient pole rotor are never used in high speed turbo alternator due to increased friction losses.

A) large windage loss and large stress on design due to centrifugal force make it impractical.
B) None of these
C) distribution of field winding is not possible.
D) uneven reluctance path offered due to saliency.

79) Which of the following assumptions are considered while deriving the Clausius-Mosotti relation?

1 The polarizability of molecules is isotropic.
2 The arrangement of molecules is isotropic.
3. Polarization of the molecules is by elastic displacement only.
4. Absence of short range (non-dipolar) interactions.

A) 1 and 3 only
B) 1, 2, 3 and 4
C) 2, 3 and 4 only
D) 2 and 4 only

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80) Animesh Dagga inaugurates his internet cafe on the 1st of January 2003. He invests in 10 computers @ Rs. 30,000 per computer. Besides, he also invests in the other infrastructure of the centre, a sum of Rs.1 lakh only. He charges his customers on the time spent on the internet a flat rate of Rs.50 per hour. His initial investment on computers has to be written off equally in 3 years (1 lakh per year) and the infrastructure has to be written off in 5 years (@ Rs. 20,000 per year). He has to pay a fixed rental of Rs.8000 per month for the space and also hires an assistant at Rs.2000 per month. For every hour that he is connected to the internet, he has to bear a telephone charge of Rs.20 irrespective of the number of machines operational on the internet at that time. On top of this, he also has to pay an electricity charge of Rs.5 per computer per hour. Assume that there are no other costs involved unless otherwise mentioned. The internet cafe is open 12 hours a day and is open on all 7 days of the week. (Assume that if a machine is not occupied, it is put off and hence consumes no electricity). Assuming a uniform 80% occupancy rate for the month of April 2003, find his profit or loss for the month.

A) Rs.1,20,733.33
B) Rs.1,23,600
C) Rs.1,02,400
D) Rs.1,22,400

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81) An ACSR is conductor having specification as 48/7. Which of the statements correctly specifies the conductor?

A) None of the other three
B) The conductor has 48 aluminum and 7 steel strands
C) The conductor has 48 steel and 7 aluminum strands
D) The conductor has 48 aluminum strands

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82) There are 500 seats in Hyatt conference hall, Mumbai, placed in similar rows. After the reconstruction of the hall, the total number of seats became 10% less. The number of rows was reduced by 5 but each row contained 5 seats more than before. How many rows and how many seats in a row were there initially in the hall?

A) 10 rows and 50 seats
B) 20 rows and 20 seats
C) 20 rows and 25 seats
D) 50 rows and 10 seats

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83) When 242 is divided by a certain divisor the remainder obtained is 8. When 698 is divided by the same divisor the remainder obtained is 9. When the sum of the two numbers 242 and 698 is divided by the divisor, the remainder obtained is 4. What is the value of the divisor?

A) 23
B) 11
C) 17
D) 13

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84) What is the most electropositive amongst the alkaline earth metals?

A) Berrylium
B) Calcium
C) Barium
D) Potassium

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85) The mean square value of the random variable, which is uniformly distributed in the interval [-2,4] is

A) 10
B) 3
C) 12
D) 4

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86) The condition for two events to be independent is

A) The sum of their probabilities must be equal to one
B) Their intersection must be zero
C) None of these alternatives is correct
D) They must be mutually exclusive

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87) Consider the statements regarding losses occurring in a dc machine.

1. Iron loss significantly depends on flux at the operating speed.
2. Iron loss is directly proportional to voltage, which is producing flux.
3. Copper loss vary as square of the current.

Which of the above statement are correct?

A) 1 and 3 only
B) 2 and 3 only
C) 1 and 2 only
D) 1, 2 and 3

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88) $(0.04)^{-2.5} =$?

A) 3125
B) 625
C) 25
D) 125

89) The following question consists of two statements, one labelled as Assertion 'A' and the other labelled as Reason 'R' You are to examine these two statements carefully and select your answers to these items using the codes given below:

Assertion (A): EMF generated in a thermocouple with junction at temperature t1 and t3 is equal to the sum of the emfs generated by similar thermocouples, one acting between temperature t1, and t2, and other between t2, and t3.

Reason (R): Thermocouple follow the law of intermediate temperature when t2, lies between t1, and t3.

A) Both A and R are true and R is the correct explanation of A
B) Both A and R are true but R is not a correct explanation of A
C) A is true but R is false
D) A is false but R is true

90) Among the following conditions the Isolator operates on _____

A) Full load condition
B) Fault Condition
C) No load condition
D) 50% load condition

91) Diffusion of impurities in a semiconductor is carried out in a furnace through which a steady stream of impurity atoms is passed during the entire diffusion process. What would be the type of the profile of the impurity atoms inside the semiconductor?

A) Linear
B) Complementary error function
C) Gaussian
D) Exponential

92) Pick the wrong term in the series 190, 94, 46, 22, 10, 4, 3

A) 22
B) 46
C) 94
D) 3

93) Find the sum of the series.

$1/(1 + 1^2 + 1^4) + 2/(1 + 2^2 + 2^4) + 3/(1 + 3^2 + 3^4)$ +……………till infinity

A) 2/3
B) 1/3
C) 1/2
D) 3/4

94) In case of three phase transformer, which configuration from given below will give maximum secondary voltage.

A) Primary in star, secondary in delta
B) Primary in star, secondary in star
C) Primary in delta, secondary in star
D) Primary in delta, secondary in delta

95) The current drawn from a two phase load is $i_1(t) = I_m Sin(\omega t - \theta_1)$, $i_2(t) = I_m Sin(\omega t - \theta_2)$. These two currents will be balanced if θ_1 is _____

A) θ_2
B) $\pi/2 + \theta_2$
C) $-\theta_2$
D) $\pi/2 - \theta_2$

96) A person crosses a 600 m long street in 5 minutes. What is his speed in km per hour?

A) 10
B) 3.6
C) 7.2
D) 8.4

97) $(132)^7 \times (132)^? = (132)^{11.5}$

A) 3.5
B) 4
C) 3
D) 4.5

98) Price of a commodity is first increased by $z\%$ and then decreased by $z\%$. If the new price is $K/100$, find the original price.

A) $(z - 100)100/K$
B) $(z^2 - 100^2)100/K$
C) $100K/ (100^2 – z^2)$
D) $(100 – z)100/K$

99) $(6)^{6.5} \times (36)^{4.5} \div (216)^{4.5} = (6)^?$

A) 1
B) 2
C) 6
D) 4

100) In a group of 60 people, 27 like cold drinks and 42 like hot drinks and each person likes at least one of the two drinks. How many like both coffee and tea?

A) 10
B) 9
C) 11
D) 12

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Answer Key

1. B	31. D	61. D	91. B
2. A	32. D	62. C	92. D
3. C	33. C	63. A	93. A
4. D	34. B	64. D	94. C
5. B	35. D	65. B	95. D
6. A	36. A	66. A	96. C
7. B	37. A	67. D	97. D
8. B	38. A	68. D	98. D
9. C	39. D	69. B	99. B
10. A	40. A	70. B	100. B
11. D	41. D	71. A	
12. C	42. A	72. D	
13. C	43. C	73. C	
14. D	44. C	74. A	
15. A	45. D	75. D	
16. C	46. A	76. C	
17. D	47. A	77. D	
18. B	48. B	78. D	
19. C	49. A	79. B	
20. C	50. B	80. C	
21. B	51. D	81. B	
22. B	52. C	82. C	
23. A	53. B	83. C	
24. A	54. D	84. C	
25. B	55. C	85. D	
26. C	56. C	86. B	
27. B	57. D	87. A	
28. C	58. D	88. A	
29. D	59. A	89. A	
30. B	60. C	90. C	