FINAL ANSWER KEY

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Question1:-For a 4×4 matrix A with the matrix multiplication operator ×. If $A^n = A \times A \times \ldots \times A$ (n times) then which of the following are correct?

i. $A^3 = A^2 \times A$

ii. $A^3 = A \times A^2$

A:-Only (i) is correct

B:-Only (ii) is correct

C:-Both (i) and (ii) are correct

D:-None of (i) and (ii) are correct

Correct Answer:- Option-C

Question2:-Which of the following is a particular integral of the differential equation $\frac{d^2y}{dx^2} - \frac{dy}{dx} = 2$?

A:-$y_p = 2e^x$

B:-$y_p = 0^x$

C:-$y_p = 2$

D:-$y_p = -2x$

Correct Answer:- Option-D

Question3:-$\int_0^\infty \int_x^\infty \frac{e^{-y}}{y} dy dx =$?

A:-Cannot be evaluated

B:-1

C:-∞

D:-$-\infty$

Correct Answer:- Option-B

Question4:-If C is a circle $|z| = 2$. What is the value of the integral $\int_c \frac{z+1}{(z-3)(z-1)} dz$?

A:-$-2\pi i$

B:-$2\pi i$

C:-$4\pi i$

D:-$-4\pi i$

Correct Answer:- Option-A

Question5:-If the mean and variance of a binomial distribution is 3.5 and 1.05 respectively, then what is the probability of atleast two success correct to 3 decimal points.

A:-0.7

B:-0.28

C:-0.969

D:-0.03

Correct Answer:- Option-C

Question6:-A wire 2.5m long is bent to a square. If the current flowing through the wire is 100A, the magnetising force at the centre of the square is:

A:-144 AT/m

B:-100 AT/m

C:-250 AT/m

D:-Zero AT/m

Correct Answer:- Option-A

Question7:-Current carried by each of the two long parallel conductors is doubled. If their separation is also doubled, force between them would

A:-remain the same

B:-increase two fold

C:-increase four fold

D:-become half

Correct Answer:- Option-B

Question8:-The force experienced by a current carrying conductor lying parallel to a magnetic field is

A:-BIL

B:-BIL sinθ

C:-½ BIL sinθ

D:-zero

Correct Answer:- Option-D

Question9:-Two coils A and B are wound side by side on a paper tube former. An emf of 0.25V is induced in coil A when the flux linking with it changes at the rate of 10^3 Wb/s. A current of 2A in coil B causes a flux of $_{10^{-3}}$ Wb to link coil A. The mutual inductance between the coils will be:

A:-2.5 mH

B:-0.25 mH

C:-1.25 mH

D:-5 mH

Correct Answer:- Option-C

Question10:-Higher the self inductance of a coil,

A:-Lower the emf induced in it

B:-Longer the delay in reaching steady current flow through it

C:-Greater the flux produced by it

D:-Lesser its weber-turns

Correct Answer:-Question Cancelled

Question11:-A 12 volt source with an internal resistance of 1.2 ohms is connected across a wire wound resistor. maximum power will be dissipated in the resistor when its resistance is equal to:

A:-zero

B:-1.2 ohm

C:-12 ohm

D:-infinity

Correct Answer:- Option-B

Question12:-The Superposition theorem is essentially based on the concept of:

A:-duality

B:-linearity

C:-reciprocity

D:-non-linearity

Correct Answer:- Option-B

Question13:-A cable is 300 km long and has a conductor of 0.5 cm in diameter with an insulation covering of 0.4 cm thickness. The relative permittivity of insulation in 4.5, then the total capacitance of the cable is:

A:-39 μF

B:-78 μF

C:-150 μF

D:-300 μF

Correct Answer:- Option-B

Question14:-In a cable capacitor, the voltage gradient is maximum at the surface of the:

A:-Sheath

B:-Conductor

C:-Insulator

D:-Earth

Correct Answer:- Option-B

Question15:-In an RC circuit connected across a dc voltage source, which of the following is zero at the beginning of the transient state?

A:-drop across R

B:-charging current

C:-Capacitor voltage

D:-None of the above

Correct Answer:- Option-C

Question16:-The rms value of a half-wave rectified current is 10A, its value for full wave rectification would be

A:-20A

B:-14.14A

C:-20/∏

D:-40/∏

Correct Answer:- Option-B

Question17:-A sine wave has a frequency of 50Hz. Its angular frequency is

A:-50/∏

B:-25/∏

C:-50∏

D:-100∏

Correct Answer:- Option-D

Question18:-If power factor of a circuit is unity, its reactive power will be

A:-maximum

B:-I^2R

C:-zero

D:-negative

Correct Answer:- Option-C

Question19:-A transformer with R=0.06 ohms, X = 0.19 ohms, I = 50 Amperes, V = 200 volts at 0.8 power factor lag has an approximate voltage regulation of

A:-1%

B:-2%

C:-3%

D:-4%

Correct Answer:- Option-D

Question20:-In a three phase induction motor, the maximum torque is independent of

A:-Rotor resistance

B:-Supply voltage

C:-Rotor reactance

D:-Rotor current

Correct Answer:- Option-A

Question21:-The group delay is defined as:

A:-Derivative of magnitude with respect to frequency

B:-Inverse of phase delay

C:-Derivative of phase with respect to frequency with negative sign

D:-Constant delay for all frequencies

Correct Answer:- Option-C

Question22:-If the impulse response for a continuous-time LTI system is $h(t) = e^{-3t}\sin(5t)u(t)$, the system function $H(S)$ has :

A:-A real pole at $s = -3$ and imaginary poles at $s = \pm 5$

B:-Complex conjugate poles at s = −3 ±5

C:-Poles at $s = \pm 5$ only

D:-Single real pole at $s = -5$

Correct Answer:- Option-B

Question23:-The convolution operation is:

A:-Commutative, associative and distributive

B:-Only commutative

C:-Only associative

D:-Nonlinear operation

Correct Answer:- Option-A

Question24:-The DTFT of a discrete sequence is {x[n]} periodic in:

A:-Time domain with period 1

B:-Frequency with period (2∏)

C:-Frequency with period (1/2∏)

D:-Time with period (2∏)

Correct Answer:- Option-B

Question25:-For a real odd periodic signal, the Fourier series coefficients are:

A:-Purely real

B:-Zero for all harmonics

C:-Unrelated to signal symmetry

D:-Purely imaginary

Correct Answer:- Option-D

Question26:-The impulse response of a real-coefficient FIR filter with linear phase, must be:

A:-Random

B:-Minimum phase

C:-Anti-symmetric or symmetric around midpoint

D:-Non-causal only

Correct Answer:- Option-C

Question27:-The ROC of two-sided z-transform lies:

A:-Outside all poles

B:-Inside all poles

C:-On the unit circle only

D:-A ring between the inner and outer poles

Correct Answer:- Option-D

Question28:-What is the result of the continuous convolution of two bandlimited signals?

A:-A signal with bandwidth equal to sum of their bandwidths

B:-Bandwidth equal to difference always

C:-Bandwidth unchanged

D:-Always infinite bandwidth

Correct Answer:- Option-A

Question29:-For the continuous time system (y"(t)+5y'(t)+6y(t)=x(t) with zero initial conditions, the Laplace transform Y(s)/X(s) is :

A:-(s^2+5s+6)

B:-(1/(s^2+5S+6))

C:-1/(s^3+5s^2+6S)

D:-(s+2)(s+3)

Correct Answer:- Option-B

Question30:-The convolution theorem is applicable to:

A:-Laplace transform and Z transform only

B:-Z transform only

C:-Fourier transforms and z transform only

D:-Fourier transforms, Laplace transform and Z transform

Correct Answer:- Option-D

Question31:-For a unity feedback control system, internal stability requires that all closed-loop transfer functions-from every exogenous input (e.g., disturbance, noise) to every internal signal - must be stable. Which condition is sufficient to guarantee the internal stability of the system?

A:-The controller C(s) is strictly proper

B:-The product G(s)C(s) has all its poles in the LHP

C:-The plant G(s) is minimum phase and there must be no unstable pole-zero cancellations between the plant G(s) and the controller C(s)

D:-The characteristic equation 1 + G(s) = 0 has all its roots in the Left Half

Plane (LHP) and there must be no unstable pole-zero cancellations between the plant G(s) and the controller C(s)

Correct Answer:- Option-D

Question32:-For a mass-damper-spring mechanical system with parameters, m=1kg, B=5N.s/m and k= 100 N/m. What is the series RLC Q-factor at resonance, considering the Force−Voltage (F−V) analogy?

A:-0.02

B:-0.2

C:-2

D:-50

Correct Answer:- Option-C

Question33:-For a standard second order system with characteristic equation $s^2+2\zeta w_n s+w_n^2=0, \zeta=0.5$ and $w_n=20$. Then the real part of the dominant poles is

A:-−5

B:-−10

C:-20

D:-−20

Correct Answer:- Option-B

Question34:-Given the block diagram with two feedback loops - inner loop H_1 , outer loop H_2 and forward gain G. The equivalent transfer function is:

A:-$\frac{G}{1+GH_1H2}$

B:-$\frac{GH_1}{1+G^2H_1H_2}$

C:-$\frac{G}{1+GH_1+GH_2}$

D:-$\frac{G}{(1+GH_1)H_2}$

Correct Answer:- Option-C

Question35:-For a unity feedback control system, the open-loop transfer function is $G=\frac{K}{s(s+a)}$. The system must satisfy the following performance specifications:
(i) maximum overshoot $M_p=16.3\%$
(ii) Setting time $t_s=2$ seconds (using the 2% tolerance)
Given that the damping ratio (ζ)required to achieve 16.3% overshoot is 0.5, determine the approximate values of the system parameters K and a needed to satisfy these specifications.

A:-a=2, k=4

B:-a=4, k=4

C:-a=5, k=8

D:-a=4, k=16

Correct Answer:- Option-D

Question36:-The characteristic equation of a unity feedback system is given by

$s^4+2s^3+3s^2+4s+k=0$

Determine the range of k that guarantees system stability

A:-k>2

B:-0<k<2

C:-0<k<8

D:-k>8

Correct Answer:- Option-B

Question37:-If the open-loop transfer function of a system has poles at 0, −2, −5 and −10 and one open-loop zero at −1, what is the number of branches of the Root Locus that extend to infinity?

A:-4

B:-3

C:-2

D:-1

Correct Answer:- Option-B

Question38:-The transfer function of a lag compensator that provides a maximum phase of −30° is:

A:-$\frac{1+2s}{3+4s}$

B:-$\frac{1+s}{1+4s}$

C:-$\frac{1+2s}{1+3s}$

D:-$\frac{1+s}{1+3s}$

Correct Answer:- Option-D

Question39:-The solution of a system described by $\dot{x}=Ax$ is $x(t)=e^{At}$. If A has eigen values (−2, −3) then e^{At} has eigen value:

A:-(−2, −3)

B:-(e^{-2},e^{-3})

C:-(e^{2},e^{3})

D:-(e^{-2t},e^{-3t})

Correct Answer:- Option-D

Question40:-If the state matrix of a system is:

$A=\begin{bmatrix}0 & 1\\ 0 & 0\end{bmatrix}$ then the state transition matrix is

A:-$\begin{bmatrix}1 & t\\ 0 & 1\end{bmatrix}$

B:-$\begin{bmatrix}e & e^{-1}\\ 0 & e^{-2}\end{bmatrix}$

C:-$\begin{bmatrix}e^{t} & e^{-t}\\ 0 & e^{-2t}\end{bmatrix}$

D:-None

Correct Answer:- Option-A

Question41:-Adding a dead band (neutral zone) in an ON-OFF controller:

A:-Increases switching frequency

B:-Eliminates Rapid Cycling

C:-Increases overshoot

D:-Decreases stability

Correct Answer:- Option-B

Question42:-In the Zeigler Nichols tuning method, the ultimate gain Ku is :

A:-Gain at which oscillation just starts

B:-The maximum stable gain found before the step response exhibits its first overshoot

C:-Maximum gain before saturation

D:-The proportional gain that results in a steady-state error of exactly 50%

Correct Answer:- Option-A

Question43:-Hydraulic actuators are known for having high power density because :

A:-They utilize low-viscosity oils which minimize frictional losses at high speeds

B:-They employ mechanical gears, which allows for speed reduction and torque multiplication in a small space

C:-They operate with incompressible fluids at extremely high pressures, generating massive force from a compact actuator volume

D:-Liquids are compressible

Correct Answer:- Option-C

Question44:-The degree of interaction between loops in a multivariable process can be quantified by :

A:-The Root Locus Method

B:-The Routh-Hurwitz Stability Criterion

C:-The Relative Gain Array (RGA)

D:-Transfer Function Ratio

Correct Answer:- Option-C

Question45:-Which controller architecture is best suited for handling the high-speed safety interlocks while maintaining regulatory control?

A:-A Distributed Control System (DCS) platform, due to its centralized database and superior graphical interface

B:-A standard Programmable Logic Controller (PLC) using its normal, non-deterministic scan cycle

C:-A Supervisory Control and Data Acquisition (SCADA) system executing the interlocks within its scripting engine

D:-A Safety PLC (SIL/PL rated) with a dedicated, deterministic, high-priority task assigned only to the safety I/O.

Correct Answer:- Option-D

Question46:-The forward voltage drop of a silicon diode under normal conduction is approximately :

A:-0.3 V

B:-0.7 V

C:-1.1 V

D:-1.5 V

Correct Answer:- Option-B

Question47:-The Zener diode is used primarily for

A:-Frequency control

B:-Voltage regulation

C:-Current amplification

D:-Rectification

Correct Answer:- Option-B

Question48:-In BJT, the small-signal resistance r_e is approximately

A:-1/Ic

B:-V_T / I_C

C:-$\beta V_T / I_C$

D:-I_C / V_T

Correct Answer:- Option-B

Question49:-The Miller effect causes which of the following in amplifiers?

A:-Reduction in input capacitance

B:-Increase in input capacitance

C:-Decrease in bandwidth

D:-Both (2) and (3)

Correct Answer:- Option-D

Question50:-The integrator op-amp circuit output for a constant input voltage is :

A:-Constant

B:-Linearly increasing

C:-Exponentially increasing

D:-Sinusoidal

Correct Answer:- Option-B

Question51:-Slew rate of op-amp limits :

A:-DC gain

B:-Maximum rate of output voltage change

C:-Phase margin

D:-Bandwidth

Correct Answer:- Option-B

Question52:-The gain of a feedback amplifier with large loop gain Aβ is

approximately :

A:-1/β

B:-A

C:-Aβ

D:-βA

Correct Answer:- Option-A

Question53:-If the emitter resistance in a common-emitter voltage amplifier is not by passed, it will :

A:-reduce both the voltage gain and the input impedance

B:-reduce the voltage gain and increase the input impedance

C:-increase the voltage gain and reduce the input impedance

D:-Increase both the voltage gain and the input impedance

Correct Answer:- Option-B

Question54:-For a MOSFET based in saturation, doubling $V_{GS}-V_{th}$ approximately causes drain current to :

A:-Double

B:-Increase four times

C:-Halve

D:-Remain unchanged

Correct Answer:- Option-B

Question55:-In a practical sinusoidal oscillator :

A:-the magnitude of the loop gain is slightly greater than 1 and the amplitude of the oscillation is limited by circuit parameters

B:-the phase shift of the loop gain is less than 360º and the oscillation frequency is variable with temperature

C:-the magnitude of the loop gain is 1 and the phase shift is 180°

D:-the magnitude of the loop gain is slightly greater than 1 and the phase shift is 180°

Correct Answer:- Option-A

Question56:-A Wien bridge oscillator requires amplifier gain of :

A:-1

B:-2

C:-3

D:-10

Correct Answer:- Option-C

Question57:-In a common-source MOSFET amplifier, the dominant low-frequency pole (that sets lower cut-off frequency) is usually caused by :

A:-Gate oxide capacitance

B:-Coupling and bypass capacitors interacting with resistances

C:-Gate-to-drain Miller effect only

D:-Channel length modulation

Correct Answer:- Option-B

Question58:-A combinational circuit is built to compute the function F(A, B, C, D) = $\sum^{m}$ (0, 2, 5, 7, 8, 10, 13, 15)+d(1, 4, 14) where d(.) are don't care conditions. The circuit is implemented using two-level logic (SOP) with NAND-NAND structure, assuming all inputs are available in both true and complemented form.
After implementation, a timing analysis is done assuming:
(1) Each NAND gate has a propagation dealy of tpd
(2) Varaibles and their complements arrive at time 00. Except $\bar{c}$ which arrives at t=tpd due to an inverter delay.
What is the worst-case propagation delay from any primary input change to the output F being valid?

A:-2tpd

B:-3tpd

C:-4tpd

D:-Cannot be determined

Correct Answer:- Option-A

Question59:-A quadratic equation $x^2-px+q=0$ has coefficients 'p' and 'q' expressed in base r, where $p = {}_{15_r}$ and $q = {}_{44_r}$. If one root of this equation is x=9 (in decimal). Determine the value of the base r.

A:-7

B:-8

C:-9

D:-10

Correct Answer:- Option-B

Question60:-The 2's complement representation of −37 in 8-bit is:

A:-11011011

B:-11011100

C:-11011010

D:-11011101

Correct Answer:- Option-A

Question61:-A 4-bit carry look-ahead adder (CLA) has generate/propagate delays of 0.5 ns per bit and carry generation delay of 1 as per level. What is the total delay for the 4-bit addition, compared to a 4-bit ripple carry adder with 1 ns full-adder delay?

A:-CLA: 2.4 ns, Ripple: 4 ns

B:-CLA: 3 ns, Ripple: 4 ns

C:-CLA: 2 ns, Ripple: 4 ns

D:-CLA: 3.5 ns, Ripple: 4 ns

Correct Answer:- Option-B

Question62:-The SNR of an ideal ADC with a full-scale sine wave input is measured as 49.8 dB. What is its resolution in bits?

A:-8 bits

B:-9 bits

C:-10 bits

D:-12 bits

Correct Answer:- Option-A

Question63:-Two 4:1 MUXes with symmetric pattern:

MUX1: ; $I_0=0, I_1=1, I_2=1, I_3=0$ Select: $S_1=A, S_0=B$

MUX2: ; $I_0=1, I_1=0, I_1=0, I_3=1$ Select: $S_1=Y, S_0=C$

The output F(A, B, C) is:

A:-$(A \oplus B) \oplus C$

B:-$(A \oplus B) \odot C$

C:-$A'B'C' + ABC$

D:-Σm(0, 3, 4, 6)

Correct Answer:- Option-B

Question64:-The minimal Product-of-Sums expression for F(A,B,C,D)=∏M(0,1,2,3,8,9,10) is :

A:-(A+B)(A'+C)(B'+C')

B:-(A+C')(A'+B')(B+C)

C:-(B+C)(A+B)(B+D)

D:-(B'+D')(B'+C')(A'+B')

Correct Answer:- Option-C

Question65:-A CMOS Schmitt trigger inverter is designated with V_{T+} = 3.5V and V_T =1.5V when VDD=5V. If VDD is reduced to 4V, the new hysteresis voltage will be approximately:

A:-1.6V

B:-2.0V

C:-1.2V

D:-2.4V

Correct Answer:- Option-A

Question66:-A Johnson counter with 5 flip-flops starts at 00000. After 7 clock pulses, the rate is:

A:-11100

B:-11110

C:-01111

D:-00111

Correct Answer:- Option-D

Question67:-In a flash ADC with 5-bit resolution, the number of comparators required is :

A:-5

B:-10

C:-31

D:-32

Correct Answer:- Option-C

Question68:-In an 8086 system, if Code Segment = 1000h and instruction Pointer = 2000h, the physical address is 12000h. After a far jump to 3000h:2000h, the new physical address is :

A:-32000h

B:-5000h

C:-22000h

D:-14000h

Correct Answer:- Option-A

Question69:-A 8051 instruction that uses indexed addressing is :

A:-MOVX A.@DPTR

B:-MOVC A.@A+PC

C:-MOV A.@R0

D:-MOV A.40h

Correct Answer:- Option-B

Question70:-In an 8085 microprocessor, a program begins with the instruction LXI SP, 3FFEh at address 0FFDh, followed by CALL 2050h at address 1000h. After executing both instruction, what is the final 8-bit value stored at memory location 3FFCh?

A:-00h

B:-10h

C:-03h

D:-02h

Correct Answer:- Option-C

Question71:-Comparison of specific values of the input and output of an instrument with a corresponding reference standard is called :

A:-Normalization

B:-Standardization

C:-Calibration

D:-Linearization

Correct Answer:- Option-C

Question72:-Hay bridge and Maxwells bridge are preferred for measuring unknown inductance with :

A:-Low and High Q-values respectively

B:-High Q-Values

C:-Low Q-Values

D:-High and Low Q-values respectively

Correct Answer:- Option-D

Question73:-Linear ramp technique used in DVMs is essentially a conversion from :

A:-Voltage to current

B:-Current to voltage

C:-Frequency to time

D:-Voltage to time

Correct Answer:- Option-D

Question74:-In a CRT, focussing of electron beam is done by :

A:-Electrostatic system

B:-Deflection coils

C:-Electrostatic and Electromagnetic system

D:-Electromagnetic system

Correct Answer:- Option-A

Question75:-The best method to avoid the problem of capacitive coupling in measurement systems is

A:-Use of twisted pair cables

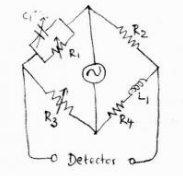
B:-Enclosing in an earthed metal shield

C:-Use of differential amplifiers

D:-Filtering

Correct Answer:- Option-B

Question76:-



For the bridge circuit shown, the unknown inductance L_1 is given by :

A:-$R_2R_3C_1$

B:-$R_1R_3C_1$

C:-R_2R_3/C_1

D:-R_4R_3/C_1

Correct Answer:- Option-A

Question77:-Which of the following is not a component of a true rms meter?

A:-Heater element

B:-Measuring Thermo Couple

C:-Balancing Thermo Couple

D:-RTD

Correct Answer:- Option-D

Question78:-The reason why it is important to take measurements as close to full scale as possible is because of the effect of :

A:-Random errors

B:-Limiting error

C:-Systematic errors

D:-None of the above

Correct Answer:- Option-B

Question79:-The reason why average responding type ac voltmeters fail to read true rms of complex ac signal is :

A:-Non linearity of sensor in the meter

B:-Presence of harmonics in complex wave

C:-Average of complex ac is non zero

D:-Meter is calibrated in terms of sine wave

Correct Answer:- Option-D

Question80:-A 0-100v voltmeter has an accuracy of 1% of full scale reading. The voltage measured by this meter is 50V. What is the limiting error in percentage?

A:-1%

B:-1.5%

C:-2%

D:-2.5%

Correct Answer:- Option-C

Question81:-A modulating signal consists of a symmetrical triangular wave having zero dc component and peak to peak voltage of 10V. It is used to amplitude modulate a carrier of peak voltage 10V. What is the modulation index?

A:-0.2

B:-0.3

C:-0.4

D:-0.5

Correct Answer:- Option-D

Question82:-Which of the following is not a feature of FM compared to AM?

A:-Increased S/N ratio

B:-Increased bandwidth

C:-Large amount of modulating power

D:-Modulation done at low level power stage

Correct Answer:- Option-C

Question83:-A telephone signal with a cutoff frequency of 5 KHz is digitized into 16 bit samples of Nyquist rate. Assuming raised-cosine filtering is used with a roll-off factor of unity, what is the transmission bandwidth required?

A:-160 KHz

B:-32 KHz

C:-80 KHz

D:-10 KHz

Correct Answer:- Option-A

Question84:-What is the power coupled into a step-index multimode fiber whose numerical aperture is 0.2, if the SLED radiates 100 μW, assuming the radiation pattern of SLED is Lambertian?

A:-4μW

B:-8μW

C:-20μW

D:-16μW

Correct Answer:- Option-A

Question85:-The lasing action is more efficient in which type of Laser Diode?

A:-Broad area type

B:-Gain-guided type

C:-Quantum well type

D:-Ridge-wave guide type

Correct Answer:- Option-C

Question86:-
Assertion (A) : In a transformer iron losses do not vary with the load current.
Reason (R) : The core area is constant

A:-Both (A) and (R) are individually true, but (R) is not the correct explanation of A

B:-Both (A) and (R) are true and (R) is the correct explanation of A

C:-(A) is true, (R) is false

D:-(A) is false, (R) is true

Correct Answer:- Option-A

Question87:-In an ac circuit, the active power is half the value of apparent power. Then the power factor of the circuit is :

A:-1

B:-0.8

C:-0.5

D:-0

Correct Answer:- Option-C

Question88:-A series RLC circuit consists of R=10Ω, x_L=20Ω, x_C =20Ω is connected across an ac supply of 200 V. The magnitude and phase angle of voltage across the inductive coil are respectively :

A:-200V, 90°

B:-200V, −90°

C:-400V, −90°

D:-400V, 90°

Correct Answer:- Option-D

Question89:-A sinusoidal source of voltage 10V and frequency 50 Hz is connected to a series circuit of variable resistance R and a fixed reactance, −j0.1Ω. The locus of the tip of the current phasor, I as R is varied from zero to infinity is :

A:-A semicircle with a diameter of j100

B:-a semicircle of diameter of j50

C:-a straight-line inclined at an angle

D:-a straight line parallel to the X axis

Correct Answer:- Option-A

Question90:-The combined generator and line impedance is (4+j5)Ω. The value of load impedance for a maximum power transfer to a load from a generator of constant generated voltage is :

A:-(4+j5)Ω

B:-(4−j5)Ω

C:-(4+j4)Ω

D:-4Ω

Correct Answer:- Option-B

Question91:-Assertion (A) : In a parallel RLC network, the forced resonant frequency is slightly lower than natural resonant frequency.
Reason (R) : The lowest current from the source occurs at the forced resonance.

A:-Both (A) and (R) are individually true, but (R) is not the correct explanation of (A)

B:-Both (A) and (R) are true and (R) is the correct explanation of (A)

C:-(A) is true, (R) is false

D:-(A) is false, (R) is true

Correct Answer:- Option-A

Question92:-Which of the following statements are associated with Thevenin's Theorem?
1. It is possible to simplify any linear circuit containing independent and dependent voltage and current sources.
2. The network is replaced by a voltage source and a series impedance remains after removing the load impedance.
3. Impedance through which current required is removed and open circuit voltage is found.

A:-(1) and (2) only

B:-(1) and (3) only

C:-(2) and (3) only

D:-(1), (2) and (3)

Correct Answer:- Option-D

Question93:-Assertion (A) : Squirrel cage induction motor when connected to supply mains sometimes exhibit a tendency to run at a speed which is nearly one seventh of the synchronous speed.
Reason (R) : Time harmonics in the supply.

A:-Both (A) and (R) are individually true, but (R) is not the correct explanation of (A)

B:-Both (A) and (R) are true and (R) is the correct explanation of (A)

C:-(A) is true, (R) is false

D:-(A) is false, (R) is true

Correct Answer:- Option-A

Question94:-At t=0 suddenly a dc voltage of 36 V is applied to a series RL, circuit having R=12Ω and L = 8H. The initial rate of change of current is :

A:-3 A/s

B:-1.8 A/s

C:-3.6 A/s

D:-4.5 A/s

Correct Answer:- Option-D

Question95:-Match the similarly between magnetic and electric circuits:

Column A Method of speed control	Column B Performance action
(a) Stator voltage control	(I) Starting torque decrease
(b) Rotor resistance control	(II) Both speed and power factor can be controlled
(c) Injection of voltage in rotor circuit	(III) Maximum torque remains constant
(d) Constant Volts/Hz control	(IV) Starting torque increases

A:-(a)-(III), (b)-(I), (c)-(II), (d)-(IV)

B:-(a)-(IV), (b)-(II), (c)-(III), (d)-(I)

C:-(a)-(I), (b)-(IV), (c)-(II), (d)-(III)

D:-(a)-(IV), (b)-(I), (c)-(II), (d)-(III)

Correct Answer:- Option-C

Question96:-Assertion (A) : As isolating conducting sphere of charge Q and radius r is connected to a similar sphere, which is kept at a larger distance using a high resistance wire. After long time there will be heat loss.

Reason (R) : They are similar sphere with same Q charge.

A:-Both (A) and (R) are individually true, but (R) is not the correct explanation of (A)

B:-Both (A) and (R) are true and (R) is the correct explanation of (A)

C:-(A) is true, (R) is false

D:-(A) is false, (R) is true

Correct Answer:- Option-C

Question97:-A long straight conductor of radius 3 mm carries a steady current uniformly distributed over its cross-section. Which of the following correctly describes the magnetic field at points 1 mm and 5 mm from the center of the conductor?

A:-magnetic field decreases with distance at both 1 mm and beyond 3 mm

B:-magnetic field increases with distance at 1 mm and decreases with distance beyond 3 mm

C:-magnetic field remains constant at 1 mm but decreases beyond 3 mm

D:-magnetic field is zero at 1 mm and maximum at 5 mm

Correct Answer:- Option-B

Question98:-A uniformly charged, non-conducting solid sphere contains a small cavity whose center coincides with the center of the sphere. A small test charge is released from rest inside the cavity. What will be the motion of the charger?

A:-it will remain at rest everywhere inside the cavity

B:-it will accelerate uniformly in a straight line

C:-It will move with constant velocity

D:-It will oscillate about the centre of the cavity

Correct Answer:- Option-A

Question99:-A rectangular and circular loop are moving out of a uniform magnetic field to a field free region with the constant velocity v, field is normal to loop which of the following statements are correct :

A:-in both the cases, the induced emf is constant

B:-induced emf is constant in case of rectangle and not a constant in case of circle

C:-induced emf is constant in case of circle and not in case of rectangle

D:-induced emf becomes zero as it comes out

Correct Answer:- Option-B

Question100:-Assertion (A) : Self-inductance is related to inertia in mechanics
Reason (R) : Electronics have mass and when the current changes they accelerate. Their mechanical inertia resists their acceleration.

A:-Both (A) and (R) are individually true, but (R) is not the correct explanation of (A)

B:-Both (A) and (R) are true and (R) is the correct explanation of (A)

C:-(A) is true, (R) is false

D:-(A) is false, (R) is true

Correct Answer:- Option-C