Teachingninja.in

⭐ **Latest Govt Job updates**

⭐ **Private Job updates**

⭐ **Free Mock tests available**

Visit - teachingninja.in

Teachingninja.in

TNMAWS AE/JE

103 - ELECTRICAL ENGINEERING (DEGREE STANDARD)

Questions: 1 – 200   **Total Marks: 300**

1. A circuit contains three unknown currents (I_1, I_2, I_3) flowing through independent loops. Which of the following statements is always true when applying mesh analysis to this circuit?

(a) The sum of the currents around any closed loop in the circuit is zero.

(b) Not all elements in a loop have the same current.

(c) Not all elements will have the same voltage drop.

(d) **The number of equations formed depends on the number of independent loops.**

(e) Answer not known

2. You are analyzing a circuit with a combination of resistors and capacitors. Mesh analysis is well-suited for circuits with independent voltage sources, but what is the primary limitation of using mesh analysis for circuits containing capacitors?

(a) Mesh analysis cannot handle circuits with any reactive elements

(b) Mesh analysis requires writing KCL equations for each node, which becomes complex with capacitors.

(c) **The mesh current equations become time-dependent due to the reactive nature of capacitors.**

(d) Mesh analysis cannot account for the phase differences introduced by capacitors.

(e) Answer not known

3. Consider an RLC circuit with a step voltage input. Which of the following statements about the transient response is most accurate?

(a) **The response oscillates with a natural frequency determined by L and C**

(b) The voltage across the capacitor reaches its final value immediately.

(c) The current reaches its steady-state value instantaneously.

(d) The transient response depends only on the resistance R.

(e) Answer not known

4. A designer wants to minimize the ringing (oscillations) in the transient response of an RLC circuit. Which of the following modifications will be most effective?

(a) Increase the inductance (L).

(b) Decrease the capacitance (C).

(c) **Increase the resistance (R).**   (d) Apply a DC voltage source.

(e) Answer not known

5. A student accidentally swaps the inductor and capacitor in an RLC circuit. How will this change the transient response when a step voltage is applied?

(a) The time constant for reaching the steady-state value will remain the same.   (b) The circuit will become critically damped regardless of component values.

(c) The circuit will become over damped regardless of component values.   (d) **The settling time to reach the steady-state value will significantly increase.**

(e) Answer not known

6. When applying Norton's Theorem, the Norton current (I_n) is found by calculating the

(a) Open-circuit voltage across the terminals of interest.   (b) **Short-circuit current flowing through the terminals of interest.**

(c) Thevenin voltage across the terminals of interest.   (d) Thevenin resistance of the circuit.

(e) Answer not known

7. Norton's Theorem and Thevenin's Theorem provide equivalent circuits for linear circuits. When would you choose Norton's Theorem over Thevenin's Theorem for analysis?

(a) When the circuit has a high open-circuit voltage.   (b) **When the circuit has a low source impedance.**

(c) When the circuit contains nonlinear loads.   (d) when the circuit has active loads.

(e) Answer not known

8. In a two-phase AC system, the phase will differ by an angle of

(a) 80^0 (b) 180^0

(c) **90^0**   (d) 0^0

(e) Answer not known

9. The number of independent equations to solve a network is equal to

(a) the number branches

(b) **the number of chords**

(c) the number of nodes

(d) the number of nodes minus the number of branches

(e) Answer not known

10. The power delivered to a three-phase delta connected load will be

(a) $V_L I_L$

(b) **$\sqrt{3}\, V_L I_L \cos\phi$**

(c) $3\, V_L I_L \cos\phi$

(d) $V_L I_L \cos\phi$

(e) Answer not known

11. For a circuit having impedance $Z = (3 + j4)\,\Omega$, the voltage applied is $100 \angle 30^0$. The power factor will be

(a) 0.3 lagging

(b) **0.6 lagging**

(c) 0.8 lagging

(d) 0.8 leading

(e) Answer not known

12. All the nodes and branches of a oriented (directed) graph is known as

(a) Cut-set matrix

(b) Admittance matrix

(c) **Incidence matrix**

(d) Voltage matrix

(e) Answer not known

13. The examples for two port networks are

(a) filters

(b) transformers

(c) power transmission lines

(d) **All of the above**

(e) Answer not known

14. To obtain a largest possible amount of power from a source, the magnitude of the load impedance must be equal to the source impedance. This adjustment is called

(a) Impedance balancing
(b) Impedance neutralisation

(c) **Impedance matching**
(d) None of the above

(e) Answer not known

15. In the circuit shown in the given figure the current I in the 2Ω resistor is
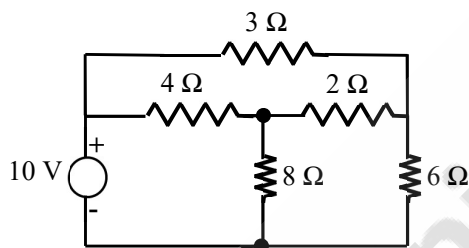

(a) **0 A**
(b) –2 A

(c) 2 A
(d) 1 A

(e) Answer not known

16. In a series RLC circuit excited by a voltage, $e = E \sin \omega t$, where $LC < \dfrac{1}{\omega^2}$

(a) current lags the applied voltage
(b) **current leads the applied voltage**

(c) current is in phase with the applied voltage
(d) voltages across L and C are equal.

(e) Answer not known

17. The current $i(t) = (3 + 2\sqrt{2}\cos(t + 45^o) + 2\sqrt{2}\cos(t - 45^o))$A is flowing through a 2Ω resistor. The average power dissipated by the resistor is

(a) 8.5W
(b) 17W

(c) **34W**
(d) 68W

(e) Answer not known

18. For the circuit shown in the figure, the switch is closed for a long time, and it is opened at t = 0. The current through the 50Ω resistor is
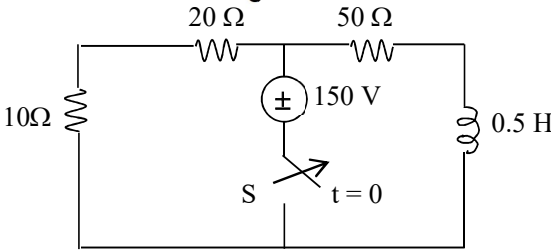

(a) $3\,e^{(-t/160)}$

(b) $3\,e^{(-t/100)}$

(c) $3e^{(-100\,t)}$

(d) $3e^{(-160\,t)}$

(e) Answer not known

19. In the balanced three-phase, 50 Hz, circuit shown below, the value of inductance (L) is 10 mH. What will be the value of capacitance (C) for which all the line currents are zero?
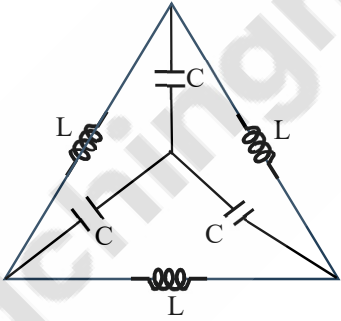
(a) 10 mF

(b) 3.03 mF

(c) 1.01 mF

(d) 3.03 μF

(e) Answer not known

20. The circuit shown in the figure is powered by a balanced three-phase voltage source and the ratios of the currents $I_A : I_B : I_C$ is
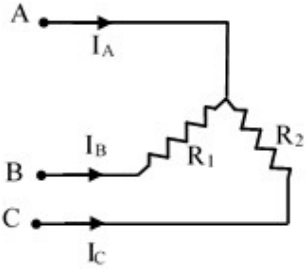
(a)   1 : √3 : 1   (b)   **√3 : 1 : 1**

(c)   2 : 1 : 1   (d)   0 : 1 : 1

(e)   Answer not known

21.   Two identical positive charges are placed a distance 'd' apart. If a third negative charge is placed at a point exactly between the two positive charges, what will happen to the repulsive force between the positive charges?

(a)   It will remain the same.   (b)   It will increase.

(c)   The signs of the forces will change.   (d)   **It will decrease**

(d)   Answer not known

22.   A uniformly charged infinite sheet has a surface charge density σ (C/m^2). A point P is located a distance d above the sheet. The electric field at point P

(a)   **Points directly away from the sheet and has a magnitude proportional to σ and d.**   (b)   Points directly away from the sheet and has a magnitude independent of σ and d.

(c)   Points directly towards the sheet and has a magnitude proportional to σ and d.   (d)   Points directly towards the sheet and has a magnitude independent of σ and d.

(e)   Answer not known

23.   A parallel-plate capacitor with air (dielectric constant = 1) as the dielectric medium has a capacitance of 10 pF. If a dielectric material with a dielectric constant of 5 is inserted completely between the plates, the new capacitance will be

(a)   2 pF   (b)   5 pF

(c)   10 pF   (d)   **50 pF**

(e)   Answer not known

24.   A long, straight wire carries a current I. The magnetic field intensity (H) at a distance (d) from the wire is proportional to

(a)   **$\dfrac{I}{d}$**   (b)   I only

(c) $I^2 d$ (d) $\dfrac{I}{d^2}$

(e) Answer not known

25. A point charge Q is placed inside a hollow conducting sphere. The electric field intensity (E) inside the annulus part of the sphere is

(a) E = 0

(b) E depends on the position of the charge

(c) E depends on the material of the sphere

(d) E has a constant value

(e) Answer not known

26. A moving charged particle experiences a force due to an electric field and a magnetic field. If the particle's velocity is perpendicular to both the electric and magnetic fields, what will be the path of the particle?

(a) Straight line

(b) Circular path

(c) Elliptical path

(d) Unpredictable path

(e) Answer not known

27. A parallel plate capacitor has an electrode area of 100 mm^2, with a spacing of 0.1 mm between the electrodes. The dielectric between the plates is air with a permittivity of 8.85 x 10^{-12} F/m. The charge on the capacitor is 100 V. The stored energy in the capacitor is _____.

(a) 8.85 pJ

(b) 440 pJ

(c) 22.1 pJ

(d) 44.3 nJ

(e) Answer not known

28. A long hollow cylindrical conductor has an inner radius of a = 0.05 m and outer radius of b = 0.10 m. The conductor carries a uniform current of I = 20 A. Calculate the magnetic field at distance r = 0.08 m from the center of radius.

(a) 50 μT

(b) 40 μT

(c) 160 μT

(d) 320 μT

(e) Answer not known

29. A square loop of wire with side length L = 0.4 m is oriented perpendicular to a magnetic field. The magnetic field changes according to the function B (t) = 0.3 sin(2πt) T, where t is time in second. Calculate the maximum induced emf in the loop.

(a) 0.1 V   (b) 0.15 V

(c) 0.3 V   (d) 0.6 V

(e) Answer not known

30. Two coils, A and B, are placed near each other. A current flowing through coil A induces an EMF (electromotive force) of 2 mV in coil B. If the distance between the coils is doubled while keeping the current in coil A constant, the induced EMF in coil B will be

(a) Doubled   (b) Reduced by half

(c) Reduced to a quarter   (d) Remain the same

(e) Answer not known

31. Static electric and magnetic fields are used in

(a) Electrical Machines   (b) Cathode Ray Oscilloscope

(c) Lightning Arrestor   (d) All of the above

(e) Answer not known

32. Two parallel conductors carry current in opposite directions as shown in the Figure. One conductor carries a current of 20 A. Point C is a distance d/2 to the right of a 30 A current. If d = 18 cm and i is adjusted so that the magnetic field at C is zero, the value of the current is_____.
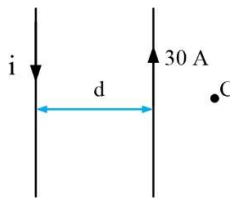
(a) 120 A   (b) 90 A

(c) 100 A   (d) 86 A

(e) Answer not known

33. The electric filed intensity at a point 'P' due to a uniform line charge with charge density λ C/m and located 'x' distance from the point 'P' in free space is _____.

(a) $E_P = \dfrac{\lambda}{2\pi\varepsilon_0 x}$

(b) $E_P = \dfrac{\lambda}{2\pi\varepsilon_0 x^2}$

(c) $E_P = \dfrac{\lambda}{2\pi\varepsilon_0}$

(d) $E_P = \dfrac{\lambda x}{2\pi\varepsilon_0}$

(e) Answer not known

34. Gilbert is the unit of

(a) conductance

(b) permittivity

(c) electromotive force

(d) magneto motive force

(e) Answer not known

35. Permeance is to reluctance as conductance is to

(a) inductance

(b) resistance

(c) capacitance

(d) ampere turns

(e) Answer not known

36. A long solenoid with 2000 turns is 0.8m long. What is the magnetising force in the centre of this solenoid, if the exciting current is 2A?

(a) 4000AT/m

(b) 3000AT/m

(c) 2000AT/m

(d) 5000AT/m

(e) Answer not known

37. The magnetic field due to a conductor carrying DC current is

(a) present only inside the conductor

(b) present only outside the conductor

(c) present both inside and outside the conductor

(d) present neither inside nor outside the conductor

(e) Answer not known

38. Self-inductance of a coil is given by

(a) $N\emptyset$

(b) $\dfrac{N\emptyset}{I}$

(c) $\dfrac{NI}{\emptyset}$

(d) NI

(e) Answer not known

39. The coefficient of coupling between the two air core coils depends on

(a) mutual inductance between two coils only

(b) self-inductance between the two coils only

(c) mutual inductance and self-inductance of the two coils

(d) none of the above

(e) Answer not known

40. A keeper is used to

(a) amplify the flux

(b) restore the last flux

(c) provide a closed path for flux

(d) change the direction of magnetic flux

(e) Answer not known

41. _____ can be solved by using mathematical tool statistics like arithmetic mean, mode and standard deviation

(a) Parallax error

(b) Random errors

(c) Observational error

(d) Systematic error

(e) Answer not known

42. _____ damping is provided in permanent magnet moving coil (PMMC) instruments.

(a) Air friction

(b) Eddy current

(c) Coupled

(d) Air core

(e) Answer not known

43. _____ is used to measure effective resistance and self-inductance of an iron-cored coil.

(a) Schering's bridge

(b) Wheatstone bridge

(c) Wien's bridge

(d) **Hay's bridge**

(e) Answer not known

44. By adding $\frac{1}{2}$ digit with a 3 digit digital voltmeter, the 1V range will be extended to _____V.

(a) 0.5 V

(b) 1 V

(c) **2 V**

(d) 1.5 V

(e) Answer not known

45. Which one of the following is a demerit of LED's?

(a) Brightness depends on current flow through LED

(b) Not affected by temperature

(c) **Luminous efficiency is low**

(d) Consumes less power

(e) Answer not known

46. Transient signals can be observed using

(a) **Storage oscilloscope**

(b) Sampling oscilloscope

(c) Wave analyzer

(d) Spectrum analyzer

(e) Answer not known

47. Bourdon tube acts as a _____ transducer and it is used to measure _____.

(a) Secondary, displacement

(b) **Primary, Pressure**

(c) Secondary, Pressure

(d) Primary, displacement

(e) Answer not known

48. A single-phase AC circuit with a power factor of 0.8 needs its energy consumption monitored. Which type of meter is most suitable for this application?

(a) Dynamometer

(b) Moving iron meter

(c) **Induction wattmeter**

(d) Electrolytic meter

(e) Answer not known

49. A Wheatstone bridge is balanced when:

(a) **The voltage across the detector is zero.**

(b) The inductor in all four arms are equal.

(c) The current through the detector is minimum.

(d) The power dissipated in the bridge is maximum.

(e) Answer not known

50. When measuring the inductance of a coil using an ac bridge, the following quantity needs to be minimized:

(a) **The voltage across the detector.**

(b) The impedance of the source.

(c) The current through the reference resistor.

(d) The frequency of the applied voltage.

(e) Answer not known

51. A Schering bridge is used to measure an unknown capacitance (C_x). The bridge is balanced when the following component values are used:

- Standard capacitor (C_s) = 100 pF
- Standard resistor (R_s) = 10 kΩ
- Detector resistance (R_d) = 10 kΩ

What is the value of the unknown capacitance (C_x)?

(a) 20 pF

(b) **50 pF**

(c) 100 pF

(d) 200 pF

(e) Answer not known

52. An instrument transformer is used in conjunction with a measuring instrument primarily to:

(a) Increase the measurement range

(b) **Isolate the measuring instrument from the high voltage**

(c) Improve the accuracy of the measurement

(d) Reduce the power consumption of the instrument

(e) Answer not known

53. A current transformer with a primary to secondary turns ratio of 100:1 is used with an ammeter that reads 2 A on the secondary side. The actual current in the primary circuit is:

(a) 0.02 A

(b) 20 A

(c) 100 A

(d) **200 A**

(e) Answer not known

54. You need to measure the voltage across a device that might have significant harmonic content. Which of the following instruments would be MOST appropriate?

(a) Analog voltmeter

(b) **Spectrum analyzer**

(c) Digital frequency meter

(d) Multi-meter with AC voltage measurement

(e) Answer not known

55. The measuring instrument, which is used to measure electric power signals to arrive the ability of loads to function properly with the supplied power, is

(a) X-Y recorder

(b) **power quality analyser**

(c) smart meter

(d) All of the above

(e) Answer not known

56. Typical power factor meter has

(a) Tesla coil

(b) Only voltage coil

(c) **Only current coil**

(d) Both voltage coil and current coil

(e) Answer not known

57. The instrument, which consists of a pair of servosystems

(a) **X-Y recorder**
(b) True RMS meter

(c) Magnetic recorder
(d) None of the above

(e) Answer not known

58. A two-way communication, in which only one party can transmit the data at a time is

(a) Simplex
(b) Full duplex

(c) Multiplex
(d) **Half duplex**

(e) Answer not known

59. Neper is

(a) **larger than a decibel**
(b) smaller than a decibel

(c) same as decibel
(d) half of a decibel

(e) Answer not known

60. A synchro is

(a) **angular position transducer**
(b) linear movement transducer

(c) variable capacitance transducer
(d) Synchronous speed transducer

(e) Answer not known

61. Consider a second-order system with a time constant of 2 seconds and a damping ratio of 0.5. The system will be

(a) Overdamped
(b) Critically damped

(c) **Underdamped**
(d) Cannot be determined without the natural frequency

(e) Answer not known

62. If all the entries in a row in the Routh table are zero, then the system is

(a) absolutely stable

(b) **Unstable**

(c) marginally stable

(d) Stable

(e) Answer not known

63. Among (i) Nyquist criterion, (ii) Bode plot, (iii) Root Locus plot and (iv) Routh Hurwitz criterion, which are in time domain?

(a) (i) and (ii)

(b) **(iii) and (iv)**

(c) (i) and (iii)

(d) (ii) and (iv)

(e) Answer not known

64. A linear time invariant system initially at rest, when subjected to a unit step input, gives a response $y(t) = te^{-t}$, $t > 0$. Then transfer function of the system is

(a) $\dfrac{1}{(s+1)^2}$

(b) $\dfrac{1}{s(s+1)^2}$

(c) $\dfrac{s}{(s+1)^2}$

(d) $\dfrac{1}{s(s+2)}$

(e) Answer not known

65. Zero initial condition means that the system is

(a) working with zero stored energy

(b) working with zero reference signal

(c) **at rest and no energy is stored in any of its components**

(d) none of the above

(e) Answer not known

66. How many feedback paths can be identified in the given signal flow graph?
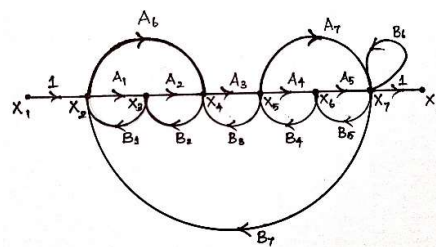
(a) 6   (b) 8

(c) 10   (d) <mark>12</mark>

(e) Answer not known

67. Root locus diagrams exhibit which one of the following?

(a) The response of a system to a step   (b) The frequency response of a
    input   system

(c) <mark>The poles of the transfer function for</mark>   (d) The bandwidth of the system
    <mark>changes in open loop gain (K)</mark>

(e) Answer not known

68. A control system needs to be designed with a bandwidth of 10 kHz and a phase margin of 45 degrees. Which of the following compensator types would be most suitable?

(a) <mark>Lead compensator</mark>   (b) Lag compensator

(c) Proportional gain (Kp) only   (d) Integral gain (Ki) only

(e) Answer not known

69. While analyzing a system in the frequency domain, you notice a large time constant in the bode plot. How will this time constant affect the system's performance in the time domain?

(a) The system will have a faster rise time.   (b) <mark>The system will have a slower</mark>
                                                   <mark>rise time.</mark>

(c) The system will have a higher steady-   (d) The system will be more oscillatory.
   state error.

(e) Answer not known

70. In the analysis of a feedback control system, the root locus technique is used to determine the

(a) Steady-state error of the system   (b) <mark>Stability of the closed-loop</mark>
                                              <mark>system</mark>

(c) Gain of the controller   (d) Bandwidth of the system

(e) Answer not known

71. Consider a second order system with a closed-loop transfer function of T(s) = Y(s)/U(s). The damping ratio (ζ) of the system's response to a step input affects the

(a) Rise time only

(b) **Settling time and overshoot**

(c) Steady-state value only

(d) Peak time only

(e) Answer not known

72. Consider a system with a block diagram of Block 1 -> Block 2 -> Output. If the transfer functions of Block 1 and Block 2 are G1(s) and G2(s) respectively, the overall system transfer function (Output/Input) is

(a) **G1(s) * G2(s)**

(b) G1(s) + G2(s)

(c) $\dfrac{1}{\left(G1(s) \ * \ G2(s)\right)}$

(d) The answer depends on the specific functions G1(s) and G2(s).

(e) Answer not known

73. A unity feedback system has a characteristic equation $s^3 + 2s^2 + 5s + 10 = 0$. Determine the number of unstable poles using the Routh-Hurwitz criterion.

(a) **0**

(b) 1

(c) 2

(d) 3

(d) Answer not known

74. A closed-loop control system with open-loop transfer function G(s) has a gain margin of 6 dB and a phase margin of 45 degrees. How does varying the gain (K) of G(s) affect the system's stability?

(a) Increasing K will always improve stability.

(b) Decreasing K will always reduce stability.

(c) **Increasing K can lead to instability if the phase margin becomes negative.**

(d) Decreasing K can lead to instability if the gain margin becomes less than 0 dB.

(e) Answer not known

75. The state transition matrix for the system $\dot{X}$=AX with initial state X(0) is

(a) (sI-A)⁻¹

(b) e^At X(0)

(c) **Laplace inverse of [(sI-A)⁻¹]**

(d) Laplace inverse of [(sI-A)⁻¹)X(0)] always stable.

(e) Answer not known

76. Natural frequency of a unity feedback control system of transfer function $G(s) = \frac{10}{s(s+1)}$ is

(a) **3.16 rad/sec**

(b) 0.5 rad/sec

(c) 4.6 rad/sec

(d) 1 rad/sec

(e) Answer not known

77. For a stable system

(a) **Gain margin (GM) and phase margin (PM) are positive**

(b) GM and PM are negative

(c) GM is positive PM is negative

(d) GM is negative PM is positive

(e) Answer not known

78. The transfer function of a lead compensator is $G_c = \frac{1+0.12s}{1+0.04s}$. The maximum phase shift that can be obtained from this compensator is

(a) 60°

(b) 45°

(c) **30°**

(d) 15°

(e) Answer not known

79. The value of 'A' matrix in $\dot{x} = Ax$ for the system described by the differential equation $\ddot{y} + 2\dot{y} + 3y = 0$ is

(a) $\begin{bmatrix} 1 & 0 \\ -2 & -1 \end{bmatrix}$

(b) $\begin{bmatrix} 1 & 0 \\ -2 & -3 \end{bmatrix}$

(c) $\begin{bmatrix} 0 & 1 \\ -2 & -1 \end{bmatrix}$

(d) $\begin{bmatrix} 0 & 1 \\ -3 & -2 \end{bmatrix}$

(e) Answer not known

80. The polar plot of a type-1,3-pole, open loop system is shown in figure below. The closed loop system is
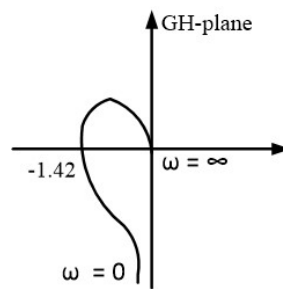
(a) always stable

(b) marginally stable

(c) unstable with one pole on the right half s-plane

(d) **unstable with two poles on the right half s-plane**

(e) Answer not known

81. A DC motor with a separately excited field winding has a constant field current. If the armature resistance (Ra) is neglected, then an increase in armature voltage will cause the motor to

(a) Maintain constant speed

(b) Decrease speed

(c) **Increase speed**

(d) Become unstable

(e) Answer not known

82. In a DC generator, if the field current is accidentally reversed, the generated voltage will

(a) Remain the same

(b) Increase in magnitude

(c) **Decrease in magnitude**

(d) Become zero

(e) Answer not known

83. A DC motor is controlled using a field weakening technique. What is the primary effect of this technique on the motor's speed?

(a) Speed decreases significantly.

(b) **Speed increases significantly.**

(c) Speed remains constant.

(d) Speed fluctuates unpredictably.

(e) Answer not known

84. A DC motor with interpoles experiences a reduction in sparking at the brushes compared to a motor without interpoles because interpoles

(a) Increase the brush contact area
(b) Reduce the armature leakage flux

(c) **Provide a path for commutation current**
(d) Enhance the main field flux density

(e) Answer not known

85. A 3-phase induction motor operates at a slip of 4%. If the rotor speed is 1440 rpm, what is the synchronous speed of the motor?

(a) 1497.6 rpm
(b) **1500 rpm**

(c) 1512 rpm
(d) 1536 rpm

(e) Answer not known

86. The critical slip of an induction motor refers to the slip value at which the motor develops

(a) **Maximum torque**
(b) Minimum torque

(c) Zero torque
(d) Highest efficiency

(e) Answer not known

87. During a blocked-rotor test on an induction motor, the following quantity is NOT measured

(a) Rotor copper loss
(b) Stator copper loss

(c) **Motor torque**
(d) Input power

(e) Answer not known

88. The copper loss of a transformer at 75% of full load is 900W. Its full-load copper loss would be

(a) 900W
(b) 600 W

(c) 450 W
(d) **1200 W**

(e) Answer not known

89. The all-day efficiency of a distribution transformer mainly depends on

(a) Copper loss
(b) Core loss
(c) Reactive power delivered and losses
(d) **the load and its duration**

(e) Answer not known

90. If K is the phase-to-phase voltage ratio, then the line-to-line voltage ration in a Δ-Δ transformer is

(a) **K**
(b) $\sqrt{3}/K$
(c) $\sqrt{3}$ K
(d) $\sqrt{K}$

(e) Answer not known

91. Slip rings of three-phase induction motors are made up of

(a) **Phosphor bronze**
(b) Copper
(c) Carbon
(d) Aluminium

(e) Answer not known

92. If R_2 is the rotor circuit resistance per phase, I_2 is the rotor circuit current per phase and S is the slip of 3-phase induction motor, then the equation for power input to the rotor is

(a) $3I^2R_2$
(b) $3I^2R_2(S-1)/S$
(c) $3I^2R_2(1-S)/S$
(d) **$3I^2R_2/S$**

(e) Answer not known

93. The type of single-phase induction motor used in ceiling fan is

(a) Capacitor start motor
(b) **Capacitor start and run motor**
(c) Split phase motor
(d) shaded pole motor

(e) Answer not known

94. In an Induction motor if the air gap is increased

(a) speed reduces
(b) efficiency improves

(c) power factor gets reduced
(d) breakdown torque gets reduced

(e) Answer not known

95. A three phase alternator is used to start a three phase induction motor. Comment on the types of the armature reaction experienced during starting of the motor and running on variable loads.

(a) Demagnetization and Cross magnetization
(b) Magnetization and Cross Magnetization

(c) Demagnetization on both cases
(d) Cross Magnetization on both cases

(e) Answer not known

96. When a three phase alternator driven by a DC shunt motor is synchronized to grid, how is it possible to exchange real power between the grid and the machine?

(a) By adjusting the field of the alternator
(b) By adjusting the field of the prime mover

(c) By adjusting the phase sequence of the grid
(d) By adjusting the phase sequence of the alternator

(e) Answer not known

97. A synchronous motor connected to an infinite bus, takes power at a lagging power factor. If its excitation is increased

(a) the terminal voltage increases
(b) the load angle increases

(c) the power factor of the motor increases
(d) the power factor of the motor decreases

(e) Answer not known

98. When does a three phase synchronous motor supply reactive power to be used for compensation?

(a) Under excitation
(b) Over excitation

(c) Minimum stator current
(d) UPF operation

(e) Answer not known

99. When a three phase synchronous motor is running at synchronous speed, the damper winding produces

(a) damping torque

(b) eddy current torques

(c) **no torque**

(d) torques aiding developed torque

(e) Answer not known

100. If the excitation of the synchronous generator fails, it acts as a

(a) Synchronous motor

(b) Synchronous generator

(c) Induction motor

(d) **Induction generator**

(e) Answer not known

101. A 100km long 3-phase transmission line is loaded at 110 kV. If the loss of line is 15 MW and the load is 150 MVA, the per phase resistance of the line is _____.

(a) **8.06 ohm**

(b) 0.806 ohm

(c) 0.0806 ohm

(d) 80.6 ohm

(e) Answer not known

102. The surge impedance of a 3-phase, 400 kV transmission line is 400Ω. The surge impedance loading (SIL) is

(a) **400 MW**

(b) 100 MW

(c) 1600 MW

(d) 200 MW

(e) Answer not known

103. A 3-phase delta connected symmetrical load consumes P watt of power from a balanced supply. If the same load is connected in star to the same supply then what is the power consumption?

(a) 2P

(b) $\dfrac{P}{3}$

(c) 3P

(d) 6P

(e) Answer not known

104. The zero sequence current of a generator for line to ground fault is j 2.4 p.u. Then the current through the neutral during the fault is

(a) j 2.4 p.u.

(b) j 0.8 p.u.

(c) **j 7.2 p.u.**

(d) j 0.24 p.u.

(e) Answer not known

105. Above what voltage level, the underground systems are not preferred?

(a) 440 V

(b) 11 kV

(c) 33 kV

(d) **66 kV**

(e) Answer not known

106. What is the load factor of a system having connected load of 100 kW, peak load of 80 kW, base load of 20 kW and average load of 40 kW?

(a) 40%

(b) **50%**

(c) 60%

(d) 80%

(e) Answer not known

107. The self inductance of a long cylindrical conductor due to its internal flux linkages is 1.0 mH/km. If the diameter of the conductor is doubled, then the self inductance of the conductor due to its internal flux linkages would be

(a) 0.5 mH/km

(b) **1.0 mH/km**

(c) 2.0 mH/km

(d) 4.0 mH/km

(e) Answer not known

108. Pulverised coal is a

(a) coal which is free from ash

(b) coal which does not produce smoke

(c) coal which burns for long time

(d) **coal broken into fine particle**
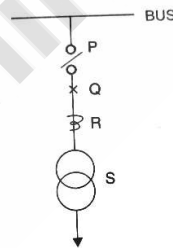
(e) Answer not known

109. When two conductors each of radius *r* are at a distance D, the capacitance between the two will be proportional to

(a) $\log_e\left(\dfrac{r}{d}\right)$

(b) $\log_e\left(\dfrac{D}{r}\right)$

(c) $\dfrac{1}{\log_e\left(\dfrac{D}{r}\right)}$

(d) $\dfrac{1}{\log_e\left(\dfrac{r}{D}\right)}$

(e) Answer not known

110. Suspension type insulators are preferred for voltage values above

(a) 33kV

(b) 11kV

(c) 132kV

(d) 66kV

(e) Answer not known

111. A part of key diagram for a substation is represented in figure. In this diagram P represents

(a) double pole double throw switch

(b) relay

(c) isolator

(d) circuit breaker

(e) Answer not known

112. The reflection co-efficient for the voltage wave in case of over-headlines is given by

(a) $\dfrac{R_L - R_o}{R_L + R_o}$

(b) $\dfrac{R_L + R_o}{R_L - R_o}$

(c) $\dfrac{R_L + R_o}{R_L R_o}$

(d) $\dfrac{R_L R_o}{R_L - R_o}$

(e) Answer not known

113. Which of the following factors does not significantly affect the fault current magnitude during a short circuit analysis?

(a) The type of fault (single-line-to-ground, line-to-line, etc.)

(b) The system impedance (source and line reactance)

(c) The pre-fault voltage at the fault location

(d) The fault-clearing time

(e) Answer not known

114. A 3-phase, 12.47 kV feeder is protected by a circuit breaker with a rating of 1250 A. A fault on one phase results in a fault current of 8 kA. What is the minimum interrupting rating required for the circuit breaker to safely interrupt the fault?

(a) 6.3 kA

(b) 7.8 kA

(c) 10 kA

(d) 7.5 kA

(e) Answer not known

115. A solid-state relay is preferred over an electromechanical relay for controlling a sensitive load due to

(a) Higher power handling capacity

(b) Lower cost

(c) Faster switching speed

(d) Ability to isolate high voltages

(e) Answer not known

116. A 3-phase, 50 Hz AC distribution system has a line voltage of 11 kV. The phase voltage (in kV) is

(a) 11

(b) $11\sqrt{3}$

(c) $\dfrac{11}{\sqrt{3}}$

(d) 5.5

(e) Answer not known

117. A distribution system experiences a voltage sag of 10% during peak load. To improve voltage regulation, which of the following actions would be most effective?

(a) Increasing the size of the conductor throughout the system.

(b) Installing a voltage regulator closer to the area experiencing the voltage sag.

(c)   Reducing the overall system load by 10%.

(d)   Installing distributed generation (DG) at a substation far away from the load.

(e)   Answer not known

118.   When compared to an AC distribution system, which of the following challenges are more prominent in DC distribution?

(a)   Power factor correction

(b)   Safety aspects

(c)   Reactive power management

(d)   Transformer losses

(e)   Answer not known

119.   A power system study indicates potential voltage instability issues under certain load conditions in a deregulated market. Which of the following actions would be MOST effective in mitigating this issue?

(a)   Implementing stricter environmental regulations on generators

(b)   Encouraging long-term power purchase agreements between utilities

(c)   Installing additional reactive power compensation equipment

(d)   Increasing the capacity of existing transmission lines

(e)   Answer not known

120.   A community is implementing a smart grid system with features like automated meter reading and dynamic pricing. How can this approach contribute to energy conservation efforts?

(a)   Provides real-time data for targeted energy efficiency programs.

(b)   Creates a more complex and expensive infrastructure.

(c)   Reduces the reliability and stability of the power grid.

(d)   Eliminates the need for physical maintenance of power lines.

(e)   Answer not known

121.   A silicon NPN BJT transistor in active mode has a collector current (Ic) of 1 mA and a base current (Ib) of 10 μA. What is the approximate value of the beta (β) of the transistor?

(a)   100

(b)   20

(c)   5

(d)   0.1

(e) Answer not known

122. A voltage regulator circuit utilizes a Zener diode to maintain a constant output voltage. How does the Zener diode function differently from a standard PN junction diode in this application?

(a) Zener diodes have a lower forward voltage drop.

(b) **Zener diodes operate primarily in reverse bias with a controlled breakdown voltage.**

(c) Zener diodes offer a higher current capacity.

(d) Standard diodes cannot regulate voltage.

(e) Answer not known

123. In a full-wave bridge rectifier circuit, the number of diodes used is

(a) 1

(b) 2

(c) 3

(d) **4**

(e) Answer not known

124. The transconductance (gm) of a Field Effect Transistor (FET) in a small signal model depends on

(a) Drain current only

(b) Gate-to-source voltage only

(c) **Both drain current and gate-to-source voltage**

(d) FET type (JFET or MOSFET) only

(e) Answer not known

125. In a common-emitter (CE) amplifier circuit, the input signal is applied to the

(a) **Base**

(b) Collector

(c) Emitter and Collector

(d) Emitter only

(e) Answer not known

126. In a negative feedback amplifier, if the open-loop gain decreases by 20%, the closed-loop gain will

(a) Increase by 20%

(b) Decrease by more than 20%

(c) **Decrease by less than 20%**   (d) Remain unchanged

(e) Answer not known

127. A voltage follower circuit utilizes an op-amp with negative feedback. This feedback configuration results in

(a) High voltage gain   (b) High input impedance

(c) **Unity voltage gain (gain of 1)**   (d) Low output impedance

(e) Answer not known

128. The transconductance g_m of the transistor shown in figure is 10 ms. The value of the resistance R_{in} is

(a) 10 kΩ   (b) 8.3 kΩ

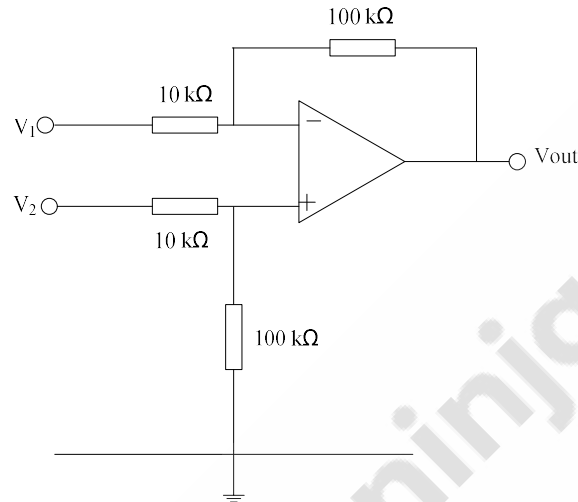(c) 5 kΩ   (d) **2.5 kΩ**
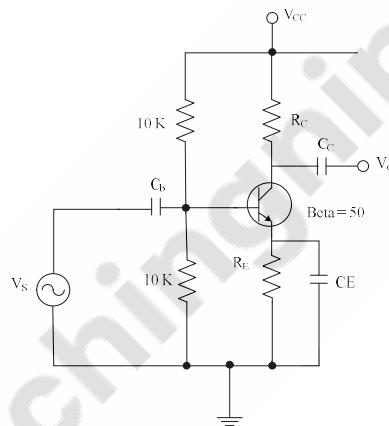
(e) Answer not known

129. For the circuit shown below, taking the opamp as ideal, the output voltage V_{out} in terms of the input voltages V_1, V_2 and V_3 is
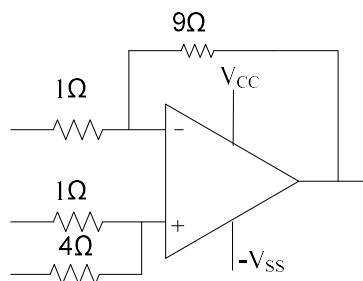
(a) $1.8V_1 + 7.2V_2 - V_3$ (b) $2V_1 + 8V_2 - 9V_3$

(c)　7.2 V_1+1.8 V_2-V_3　　　　　　　(d)　**8V_1+2V_2-9V_3**

(e)　Answer not known

130.　In the circuit below, the operational amplifier is ideal. If V_1=10 mV and V_2=50 mV, the output voltage (V_{out}) is

(a)　500 mV　　　　　　　　　　　　(b)　600 mV

(c)　**400 mV**　　　　　　　　　　　(d)　100 mV

(e)　Answer not known

131.　Consider the following to derive product sum expression $F = A.(A+B+C)$. The POS expression is

(a)　$F = (A+\bar{B}+\bar{C})(\bar{A}+B+\bar{C})(\bar{A}+B+\bar{C})$

(b)　$F = (\bar{A}+B+C)(A+\bar{B}+C)(A+\bar{B}+C)(\bar{A}+\bar{B}+\bar{C})$

(c)　$F = (A+B+C)(\bar{A}+\bar{B}+C)(A+\bar{B}+C)(\bar{A}+B+C)$

(d)　**$F = (A+B+C)(A+\bar{B}+C)(A+B+\bar{C})(A+\bar{B}+\bar{C})$**

(e)　Answer not known

132.　The Boolean expression AB+AC'+BC simplifies to

(a)　**BC+AC'**　　　　　　　　　　(b)　AB+AC'+B

(c)　AB+AC'　　　　　　　　　　　(d)　AB+BC

(e)   Answer not known

133.   The output expression for the Karnaugh map shown below is

BC

A

1	0	0	1
1	1	1	1

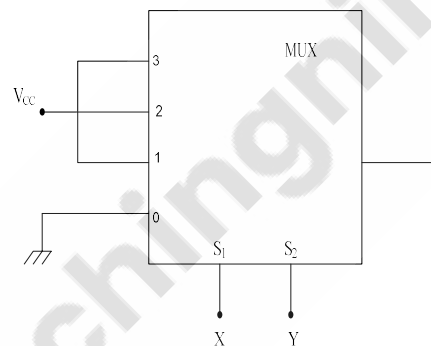(a)   A+B'   (b)   A+C'

(c)   A'+C'   (d)   A'+C

(e)   Answer not known

134.   The output f of the 4:1 MUX shown in figure is

(a)   (xy)'+x   (b)   x+y

(c)   x'+y'   (d)   xy+x'

(e)   Answer not known

135.   The expression $(A\bar{B} + \bar{A}B + A\bar{C})\,(\bar{A}\,\bar{B} + A\bar{B} + A\bar{C})$ may be simplified as TTL

(a) $A\bar{B}\bar{C} + ABC$ (b) $\bar{A}BC + AB\bar{C}$

(c) $\bar{A}BC + \bar{B}\bar{C}$ (d) $\bar{A}\bar{B}\bar{C} + AB\bar{C}$

(e)   Answer not known

136.   Which family of logic circuits uses field effects transistors?

(a)   TTL   (b)   CMOS

(c)   both (a) and (b)   (d)   neither (a) nor (b)

(e)   Answer not known

137.   The binary logic levels of a gate circuit are 1=+12V and 0=0V. what type of logic is used?

(a)   **Voltage mode, positive logic**   (b)   Current mode, positive logic

(c)   Current mode, negative logic   (d)   Voltage mode, negative logic
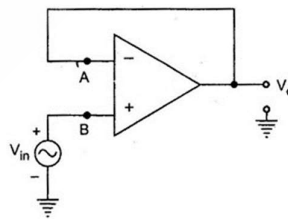
(e)   Answer not known

138.   The components of configurable logic blocks (CLBs)

(a)   **flip-flops and lookup tables**   (b)   PLD and RAM

(c)   Logic gates and PLAs   (d)   None of the above

(e)   Answer not known

139.   Regardless of the input waveform, the output of a Schmitt trigger is

(a)   Sinusoidal   (b)   Trapezoidal

(c)   **Rectangular**   (d)   Triangular

(e)   Answer not known

140.   The circuit represented in Figure is

(a)   adder   (b)   clamper

(c)   Non-inverting amplifier   (d)   **Voltage follower**

(e)   Answer not known

141.   The reverse recovery charge (Q_R) of a power diode having recovery time of t_{rr} seconds, peak reverse current I_{RM} Amperes, and softness factor, S will be

(a) $I_{RM} \, t_{rr}$ (b) $4 I_{RM} t_{rr}$

(c) $\frac{1}{2} I_{RM} t_{rr}$

(d) $I_{RM}^2 \ t_{rr}$

(e) Answer not known

142. Match the power devices with their appropriate symbols

	Power Device		Symbol
(i)	IGBT	(A)	
(ii)	MOSFET	(B)	
(iii)	GTO	(C)	
(iv)	SCR	(D)	

(a) **(i)-(C), (ii)-(D), (iii)-(A), (iv)-(B)**

(b) (i)-(A), (ii)-(B), (iii)-(D), (iv)-(C)

(c) (i)-(D), (ii)-(C), (iii)-(B), (iv)-(A)

(d) (i)-(A), (ii)-(C), (iii)-(D), (iv)-(B)

(e) Answer not known

143. The hard drive conditions of the power BJT in terms of base current is defined as

(a) Reverse blocking safe operating area

(b) Unsafe operating area

(c) Current gain

(d) **Overdrive factor**

(e) Answer not known

144. The pulse number of the phase-controlled rectifiers is defined as

(a) Number of distinct gate pulses supplied per input cycle

(b) Number of pulsations in the DC output per input cycle

(c) **Both (a) and (b)**

(d) Neither (a) or (b)

(e) Answer not known

145. Single phase full converter fed from 220V, 50Hz supply gives an output voltage of 180V at no-load. When loaded with a constant output current of 10A, the overlap angle due to source inductance is found to be 6^0. The value of source inductance will be

(a) 3.1214mH

(b) **4.8084mH**

(c) 3.1214H

(d) 1mH

(e) Answer not known

146. The output voltage relation of the three-phase full converter working at the firing angle as α, whose load current is continuous with ripple and fed from a three-phase source having peak line voltage, V_{ml} will be

(a) $\dfrac{2V_{ml}}{\pi}\cos\alpha$

(b) $\dfrac{3V_{ml}}{\pi}(1+\cos\alpha)$

(c) $\dfrac{3V_{ml}}{2\pi}(1+\cos\alpha)$

(d) $\dfrac{3V_{ml}}{\pi}\cos\alpha$

(e) Answer not known

147. A buck converter has an input of 18V. The required average output is 6V and the peak-to-peak output ripple voltage is 30mV. The chopper frequency is 20kHz. If the peak-to-peak ripple current of inductor is assumed as 1A, what will be the value of filter inductance

(a) $6.62\mu H$

(b) $66.67\mu H$

(c) $6.62mH$

(d) $66.67mH$

(e) Answer not known

148. A single-phase inverter is designed to deliver 1 kW of power to a resistive load at an output voltage of 200 V (RMS). Assuming ideal operation, what is the minimum required DC input voltage for this inverter?

(a) 100 V

(b) 141 V

(c) 200 V

(d) 283 V

(e) Answer not known

149. A buck converter is designed to step down a 12V DC input to a 5V DC output. The duty cycle of the converter is increased. What will happen to the output voltage and ripple current?

(a) Output voltage increases, ripple current increases

(b) Output voltage increases, ripple current decreases

(c) Output voltage decreases, ripple current increases

(d) Output voltage decreases, ripple current decreases

(e) Answer not known

150. A DC-DC converter is needed to step down a 12V battery source to power a 3.3V microcontroller. Which type of DC-DC converter topology would be most suitable?

(a) **Buck converter**

(b) Boost converter

(c) Buck-boost converter

(d) It depends on the specific microcontroller model

(e) Answer not known

151. A single-phase full-wave bridge rectifier with a resistive load has a peak voltage of 100 V on the DC side. What is the RMS voltage across the load?

(a) 100 V

(b) **70.7 V**

(c) 50 V

(d) 35.4 V

(e) Answer not known

152. A solar panel produces a variable DC voltage. Which of the following power electronics circuit can convert this voltage to a regulated 12 V DC output suitable for battery charging.

(a) A voltage divider circuit.

(b) A Zener diode voltage regulator.

(c) **A buck converter.**

(d) A passive filter.

(e) Answer not known

153. An AC motor requires a variable speed control. Describe a basic power electronics method to achieve this.

(a) Using a variable resistor in series with the motor.

(b) **Implementing a TRIAC for phase control.**

(c) Connecting the motor directly to a DC source.

(d) Using a passive filter to control the motor speed.

(e) Answer not known

154. A UPS utilizes pulse-width modulation (PWM) control in its inverter stage. What is the PRIMARY benefit of PWM control in this application?

(a) To completely isolate the input and output power

(b) **To regulate the output voltage by adjusting pulse frequency**

(c) To limit the inrush current drawn by the inverter from the battery

(d) To synchronize the output voltage waveform with the grid

(e)   Answer not known

155. An AC voltage controller supplies power to a resistive load of a 10 Ω and is fed from 220 V, 50Hz source. The thyristors are switched ON for 30 cycles and OFF for 70 cycles. The average value of thyristor current is

(a)   30 A   (b)   6.6 A

(c)   8.5 A   (d)   **3.0 A**

(e)   Answer not known

156. A step down DC chopper with an input voltage of 220 V feeding a resistive load of 20 Ω. When the chopper remains ON, it's voltage drop is 1.5 V and chopping frequency is 10 kHz. The efficiency of the chopper is

(a)   **99.3%**   (b)   89%

(c)   99%   (d)   98.3%

(e)   Answer not known

157. A three-phase voltage source inverter with ideal devices operating in 180° conduction mode is feeding a balanced star-connected resistive load. The DC voltage input is V_{dc}. The peak of the fundamental component of the phase voltage is

(a) $\dfrac{V_{dc}}{\pi}$ (b)   **$\dfrac{2V_{dc}}{\pi}$**

(c) $\dfrac{3V_{dc}}{\pi}$ (d) $\dfrac{4V_{dc}}{\pi}$

(e)   Answer not known

158. Which one of the following methods of speed control is impossible in a three-phase squirrel-cage induction motor drive?

(a)   stator voltage control   (b)   (v/f) control

(c)   Start-delta switching shunt motor drive   (d)   **rotor emf injection**

(e)   Answer not known

159. Besides a constant speed operation the synchronous motor drives possess which one of the following advantages?

(a) lower cost

(b) Better efficiency

(c) **High power factor**

(d) Better starting torque

(e) Answer not known

160. Which one of the following applications, the drive needs to possess a property of higher acceleration?

(a) oil expeller

(b) flour mills

(c) **lifts and hoists**

(d) centrifugal pumps

(e) Answer not known

161. The 8085 microprocessor features a 16-bit address bus but can only directly address 65,536 memory locations. How does the 8085 achieve this addressing limitation with a seemingly wider address capability?

(a) It employs segmented memory architecture

(b) It utilizes memory banking techniques

(c) **The upper 8 address lines are decoded for I/O operations**

(d) The address bus is multiplexed with the data bus

(e) Answer not known

162. The 8086 microprocessor offers a pipelined architecture for improved performance. If the fetch stage of an instruction takes 5 clock cycles and the decode/execute stage takes 8 clock cycles, what is the minimum number of clock cycles required to execute two consecutive instructions, assuming no stalls or dependencies?

(a) 8 cycles

(b) 10 cycles

(c) **13 cycles**

(d) 16 cycles

(e) Answer not known

163. The 8051 microcontroller boasts a dedicated 16-bit accumulator for arithmetic and logical operations. How does this design choice potentially impact its performance compared to a more general-purpose register file approach?

(a) **It simplifies instruction design but may limit flexibility**

(b) It increases register count, leading to higher complexity

(c) It offers no significant performance difference

(d) It reduces clock cycles for accumulator-based operations

(e) Answer not known

164. The 8085 microprocessor employs a stack for subroutine calls and temporary data storage. During a subroutine call, what happens to the Program Counter (PC) value?

(a) It remains unchanged.

(b) **It is loaded with the return address.**

(c) It is incremented to point to the next instruction.

(d) It is overwritten with the subroutine's starting address.

(e) Answer not known

165. The 8086 microprocessor supports memory protection mechanisms. If a program attempts to access a memory location outside its designated segment, what might be the consequence?

(a) The instruction executes normally.

(b) **An interrupt is generated, signaling a protection violation.**

(c) The data at that location is corrupted.

(d) The program crashes immediately.

(e) Answer not known

166. The 8085 microprocessor instruction MOV A, MVI B, 10H uses which addressing modes for the operands A and B, respectively?

(a) Direct, Immediate

(b) Register, Direct

(c) **Register, Immediate**

(d) Indirect, Register

(e) Answer not known

167. An 8086 program fetches an instruction that takes 5 clock cycles to execute. If the processor has a clock speed of 4 MHz, what is the total time taken to fetch and execute this instruction?

(a) 1 microsecond

(b) **1.25 microseconds**

(c) 2.5 microseconds

(d) 5 microseconds

(e) Answer not known

168. The 8051-instruction used to convert the binary sum obtained after adding two BCD numbers into a BCD number.

(a) **DAA**

(b) ADD

(c) DA

(d) SETB

(e) Answer not known

169. In 8086 processor, what is an extra segment?

(a) It is combination of code segment and stack segment used by some string instructions

(b) It is segment contains the data for programs

(c) It contains the instructions of a program

(d) **It is an additional segment used by some string instructions**

(e) Answer not known

170. In 8086, the *inter-segment jump*

(a) **means far jump**

(b) means short jump

(c) is not a related phrase

(d) near jump

(e) Answer not known

171. An efficient algorithm for computing N-point DFT of an N-point sequence is

(a) IDFT

(b) DTFT

(c) **Radix-2 FFT**

(d) None of the above

(e) Answer not known

172. The condition(s) for circular convolution is (are)

(a) One of the sequences should be periodic

(b) Both the sequences must consist of same number of samples

(c) Either (a) or (b)

(d) **Both (a) and (b)**

(e) Answer not known

173. Zero padding

(a) adds of dummy samples   (b) increases the number of samples

(c) **Both (a) and (b)**   (d) None of the above

(e) Answer not known

174. Identify the basic continuous time signal shown in figure.
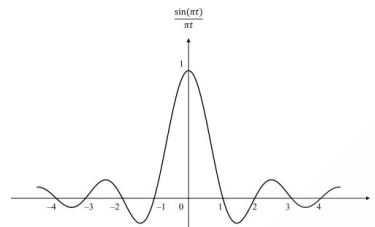
(a) Unit parabolic function   (b) Unit signum function

(c) **Unit Sinc function**   (d) Sinusoidal signal

(e) Answer not known

175. The different channels in TDM receiver are separated by

(a) Integration   (b) Differentiation

(c) **Use of AND gate**   (d) Use of OR gate

(e) Answer not known

176. Quantization noise of PCM depends on

(a) Number of quantization levels   (b) Step size

(c) **Both number of quantization levels and step size**   (d) Sampling rate

(e) Answer not known

177. In delta modulation, slope overhead distortion can be minimized by

(a) Decreasing the step size   (b) Keeping the step size constant

(c) Keeping the step size zero   (d) **Increasing the step size**

(e) Answer not known

178. The address resolution protocol (ARP) is used for

(a) Finding the IP address from the DNS

(b) Finding the IP address of the default gateway

(c) Finding the IP address that corresponds to the MAC address

(d) **Finding the MAC address that corresponds to the IP address**

(e) Answer not known

179. The protocol data unit (PDU) for the application layer in the Internet stack is

(a) Segment

(b) Datagram

(c) **Message**

(d) Frame

(e) Answer not known

180. Which one of the following is not a client-server application?

(a) Internet chat

(b) Web browsing

(c) E-mail

(d) **Ping**

(e) Answer not known

181. The actual output of the plant over a given period divided by the maximum possible output is

(a) Utilisation factor

(b) All time efficiency

(c) **Capacity factor**

(d) All of the above

(e) Answer not known

182. Total installed Renewable Energy Capacity of India in GW (excluding hydro-power)

(a) **145**

(b) 418

(c) 98

(d) 50

(e) Answer not known

183. One *sun* means

(a) **Solar radiation of power density 1kW/m^2**

(b) Solar radiation of power density 1W/m^2

(c) Solar radiation of power density 1kW/km^2

(d) Solar radiation of power density 1MW/m^2

(e) Answer not known

184. The measurement and mapping of solar energy resources over the earth can be done using

(a) **Pyranometer**

(b) Anemometer

(c) Tide gauge

(d) All of the above

(e) Answer not known

185. Larger autonomy of the standalone Solar energy conversion system results in

(a) higher average daily depth of discharge (DoD)

(b) no change in average daily depth of discharge (DoD)

(c) **lower average daily depth of discharge (DoD)**

(d) None of the above

(e) Answer not known

186. The principle of moving the operating point of a solar PV system in the direction in which the power increases is called as

(a) Maximum power transfer

(b) **Hill-climbing**

(c) Maximum energy harvest

(d) Valley falling

(e) Answer not known

187. A standalone solar power system uses a boost converter as part of the MPPT control. How does the boost converter contribute to achieving maximum power output?

(a) It reduces the voltage from the solar panel to match the battery voltage.

(b) **It increases the voltage from the solar panel to operate closer to the MPP.**

(c) It converts DC power from the panel to AC power.

(d) It stores excess solar energy in a battery.

(e) Answer not known

188. Battery degradation in electric vehicles (EVs) is primarily caused by

(a) High discharge currents only
(b) High charge currents only
(c) **Both high charge and discharge currents**
(d) Depth of discharge (DoD) only

(e) Answer not known

189. A vehicle-to-grid (V2G) system allows for

(a) **Two-way power flow between the EV and the grid**
(b) One-way charging of the EV from the grid
(c) Faster charging of the EV compared to standard charging
(d) Wireless charging of the EV

(e) Answer not known

190. An electric vehicle with a 60 kWh battery pack consumes 20 kWh of energy during a trip. If the round-trip charging efficiency is 85%, calculate the total energy required from the grid to recharge the battery after the trip.

(a) 17.6 kWh
(b) **23.5 kWh**
(c) 30.0 kWh
(d) 51.0 kWh

(e) Answer not known

191. A lithium-ion battery pack is designed to deliver a peak power of 10 kW. The nominal voltage of the pack is 48V. What is the minimum required current rating for the battery management system (BMS) to handle the peak power?

(a) 108 A
(b) 408 A
(c) 308 A
(d) **208 A**

(e) Answer not known

192. A 10 F supercapacitor is charged to a voltage of 25 V. The energy stored in the capacitor is

(a) 250 Wh
(b) **3125 J**

(c)   125 J

(d)   0.25 kJ

(e)   Answer not known

193.   Compared to batteries, supercapacitors in electric vehicles offer

(a)   Higher energy density but lower power density

(b)   **Lower energy density but higher power density**

(c)   Similar energy and power densities

(d)   Cannot be used in electric vehicles due to safety concerns

(e)   Answer not known

194.   Which of the following is suitable for low temperature operation in a Fuel Cell?

(a)   Lithium Ion

(b)   Molten Carbonate

(c)   **Hydrogen**

(d)   All the above

(e)   Answer not known

195.   Which of the following machine is suitable for a variable speed wind turbine machine?

(a)   **Doubly fed Induction Machine**

(b)   DC shunt machine

(c)   Squirrel Cage Induction Machine

(d)   DC Series Machine

(e)   Answer not known

196.   The cut in and cut out speeds of wind turbine ranges between

(a)   **3m/s and 25 m/s respectively**

(b)   3 m/s and 12 m/s respectively

(c)   Less than 10 m/s

(d)   10 m/s and 35 m/s respectively

(e)   Answer not known

197.   The rotor side converter in a DFIG machine interface used in Wind Energy Conversion Systems, operates as _____ when the operating wind speed is more than reference speed.

(a)   Inverter

(b)   **Rectifier**

(c) Neither Rectifier nor Invertor

(d) Removed from the electrical connection

(e) Answer not known

198. Which of the following is true in a Super Capacitor?

(a) **Capacitance value is high and voltage limits are lower**

(b) Capacitance value is high and voltage limits are higher

(c) Capacitance value and voltage limits are equal to that of normal capacitor

(d) Capacitance value and voltage limits are lower

(e) Answer not known

199. Which of the following stores kinetic energy?

(a) Fuel Cells

(b) Pumped Storage Power Plant

(c) **Fly wheels**

(d) Air compressor

(e) Answer not known

200. If an Electric Vehicle has a SoC of 90% and a domestic load is operated at peak demand, which of the following modes of operation is to be recommended?

(a) Grid to Vehicle

(b) Off Grid mode

(c) Vehicle to Grid

(d) **Vehicle to Home**

(e) Answer not known

****