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Booklet Serial No. 809365

Test Booklet Series

JUNIOR ENGINEER - ELECTRICAL
OMR Examination - 2025

A

Time Allowed: 120 Minutes *Maximum Marks: 120*

INSTRUCTIONS

1. IMMEDIATELY AFTER THE COMMENCEMENT OF THE EXAMINATION, YOU SHOULD CHECK THAT THIS TEST BOOKLET ***DOES NOT*** HAVE ANY UNPRINTED OR TORN OR MISSING PAGES OR ITEMS, ETC. IF SO, GET IT REPLACED BY A COMPLETE TEST BOOKLET.
2. **Please note that it is the candidate's responsibility to encode and fill in the Roll Number, Booklet Serial No. and Test Booklet Series Code A, B, C or D carefully and without any omission or discrepancy at the appropriate places in the OMR Answer /Response Sheet. Any omission/discrepancy will render the Response Sheet liable for rejection.**
3. You have to enter your Roll Number on the Test Booklet in the Box provided alongside. ***DO NOT*** **write** ***anything else*** on the Test Booklet.

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4. This Test booklet contains **120** items (questions). Each item comprises of four responses (answers). You will select the response which you want to mark on the Answer Sheet/Response Sheet. In case you feel that there is more than one correct response, mark the response which you consider the appropriate. In any case, choose ***ONLY ONE*** response for each item.
5. You have to mark all your responses ***ONLY*** on the separate Answer /Response Sheet provided. *See directions in the Response Sheet.*
6. ***All*** items carry equal marks.
7. After you have completed filling in all your responses on the Response Sheet and the examination has concluded, you should hand over to the Invigilator ***only the Answer /Response Sheet.*** You are permitted to take away with you the Test Booklet and ***Candidate's Copy of the Response Sheet*** .
8. Sheets for rough work are appended in the Test Booklet at the end.
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10. **Penalty for wrong answers:**

    THERE WILL BE PENALTY FOR WRONG ANSWERS MARKED BY THE CANDIDATE IN THE WRITTEN TEST (OBJECTIVE TYPE QUESTIONS PAPERS).

    (i) There are four alternatives for the answer to every question. For each question for which a wrong answer has been given by the candidate, **(¼)** of the marks assigned to that question will be deducted as penalty.

    (ii) If a candidate gives more than one answer, it will be treated as a **wrong answer** even if one of the given answers happens to be correct and there will be same penalty as above for that question.

    (iii) If a question is left blank, i.e., no answer is given by the candidate, there will be **no penalty** for that question.

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(Set - A)

1. The voltage 2,000,000 V can be expressed in powers of 10 as:
   A) 2 mV
   B) 2 kV
   C) 2 MV
   D) 2 GV

2. A network has 12 branches and 8 independent loops. How many nodes are there in the network?
   A) 19
   B) 5
   C) 17
   D) 4

3. The reciprocal of resistance is:
   A) Voltage
   B) Current
   C) Conductance
   D) Coulombs

4. What is the basic unit of Luminous intensity?
   A) Candela
   B) Kelvin
   C) Conductance
   D) Coulombs

5. Kirchhoff's current law KCL states that :
   A) The total voltage around a closed loop is always zero.
   B) The resistance in a circuit remains constant.
   C) The sum of power across all elements in a circuit
   D) The algebraic sum of currents entering a node or a closed boundary is zero.

6. The divergence of a constant vector field is:
   A) Zero
   B) Infinite
   C) Equal to the field itself
   D) One

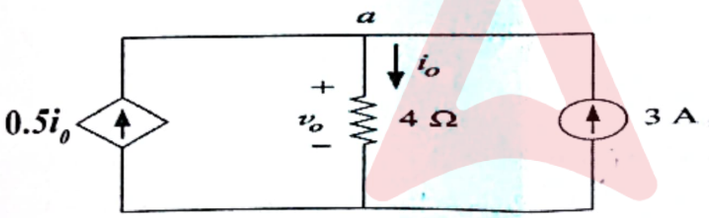
7. Thevenin's theorem replaces a linear circuit with:
   A) A current source and capacitor
   B) A voltage source and series resistance
   C) An inductor and resistor
   D) A current source and parallel resistance

8. If a conductor is placed in an electrostatic field, the field inside the conductor is:
A) Equal to the external field
B) Infinite
C) Zero
D) Non-zero and uniform

9. In a purely inductive AC circuit, the current:
A) Leads the voltage
B) Lags the voltage by 90°
C) Is in phase with voltage
D) Is zero

10. Which of the following statements is false regarding electric field lines?
A) Field lines never intersect
B) Field lines originate on positive charges and terminate on negative
C) The number of lines is proportional to magnitude
D) Field lines form closed loops

11. Find current i_0 and voltage v_0 in the circuit shown in Figure below. Dependent Current Source provides a current of $0.5i_0$ and Independent Current Source provides a 3A.

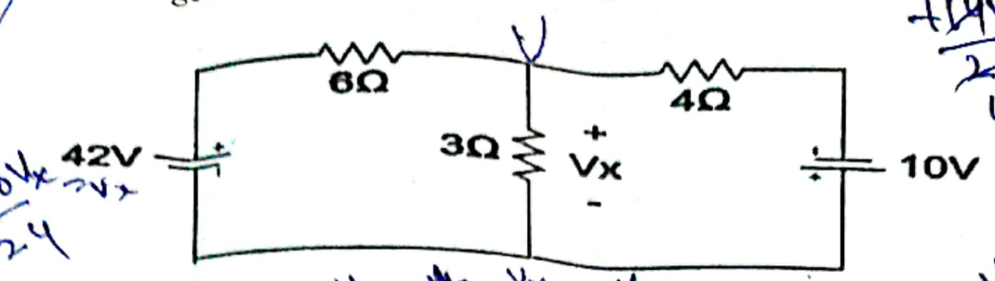


A) 12A and 48V
B) 6A and 24V
C) 18A and 30V
D) 24A and 42V

12. A dielectric is inserted between capacitor plates while the capacitor remains connected to a battery. What happens to the electric field inside?
A) Increases
B) Remains unchanged
C) Infinity
D) Becomes Zero

13. Which theorem requires that linearity is strictly followed, but bilateral nature is not mandatory?
A) Thevenin's Theorem
B) Biot-Savart Law
C) Maximum Power Transfer
D) Reciprocity Theorem

14. Find voltage Vx using superposition theorem:



A) 12V
B) 6V
C) 9V
D) 22V

15. In a resistive circuit, a voltage source is defined as $V = 4i$ where i is the current through a 2Ω resistor. If the power supplied by the source is 32W, what is the value of i?

A) 2 A
B) $2\sqrt{2}$ A
C) 8 A
D) 16 A

16. Which one of the following is open loop?

A) The respiratory system of man
B) A system for controlling the movement of the slide of a copying milling machine
C) A thermostatic control
D) Traffic light control

17. Feedback control systems are

A) Insensitive to both forward-and feedback-path parameter changes
B) Less sensitive to feedback-path parameter changes than to forward-path parameter changes
C) Less sensitive to forward-path parameter changes than to feedback-path parameter changes.
D) Equally sensitive to forward and feedback-path parameter changes.

18. Consider the system shown in figure I and figure II. If the forward path gain is reduced by 10% in each system, then the variation in C1 and C2 will be respectively

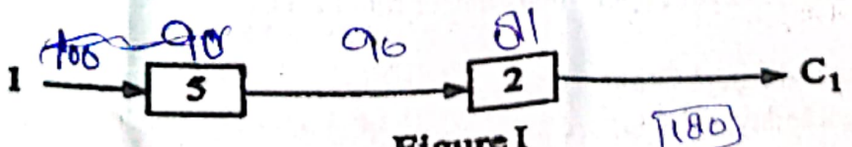


Figure I

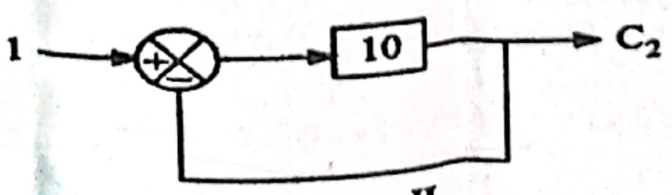


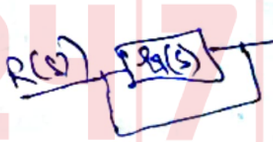
Figure II

A) 10% and 10%
B) 2% and 10%
C) 5% and 1%
D) 10% and 1%

19. Which of the following are the characteristics of closed-loop systems?
I. It does not compensate for disturbances.
II. It reduces the sensitivity of plant-parameter variations.
III. It does not involve output measurements.
IV. It has the ability to control the system transient response.
Select the Answer using the codes given below:
A) I and IV
B) II and IV
C) I and III
D) II and III

20. Which of the following is NOT valid in case of signal flow graph?
A) in signal flow graph signals travel along branches only in the marked direction
B) nodes are arranged from right to left in a sequence
C) signal flow graph is applicable to linear systems only
D) for signal flow graph, the algebraic equations must be in the form of cause-and-effect relationship.

21. Consider the following statements regarding the advantages of closed-loop negative feedback control-systems over open-loop systems:
I. The overall reliability of the closed-loop systems is more than that of open-loop system.
II. The transient response in the closed-loop system decays more quickly than in open loop system.
III. In an open-loop system, closing of the loop increases the overall gain of the system.
IV. In the closed-loop system, the effect of variation of component parameters on its performance is reduced.
Of these statements:
A) I and III are correct
B) I and II are correct
C) II and IV are correct
D) III and IV are correct



22. A unity feedback system has open-loop transfer function G(s). The steady-state error is zero for
A) step input and type-1 G(s).
B) ramp input and type-1 G(s).
C) step input and type-0 G(s).
D) ramp input and type-0 G(s).

23. The steady state error due to a ramp input for a type two system is equal to
A) zero
B) infinite
C) non-zero number
D) constant

24. For making an unstable system stable
A) gain of the system should be increased
B) gain of the system should be decreased
C) the number of zeros in the loop transfer function should be increased
D) the number of poles in the loop transfer function should be increased.

25. Which one of the following compensations is adopted for improving transient response of a negative unity feedback system?
A) Phase lead compensation
B) Phase lag compensation
C) Gain compensation
D) Both phase lag compensation and gain compensation

26. Why does a moving iron meter require more power to operate than a PMMC meter? Is it due to the high magnetic circuit _____.
A) Resistance
B) Retentivity
C) Reluctance
D) Resilience

27. Which of the following materials is used in the fabrication of the swamping resistance of a PMMC instrument?
A) Copper
B) Tungsten
C) Aluminium
D) Manganin

28. Match the two lists and choose the correct answer from the code given below:

List-I (Instrument)	List-II (Error)
(w) PMMC voltmeter	(i) Eddy current error
(x) AC ammeter	(ii) Phase angle error
(y) Current transformer	(iii) Braking system error
(z) Energy meter	(iv) Temperature error

Choose the correct option
A) (w)-(iv), (x)-(iii), (y)-(ii), (z)-(i)
B) (w)-(iv), (x)-(i), (y)-(ii), (z)-(iii)
C) (w)-(iv), (x)-(iii), (y)-(i), (z)-(ii)
D) (w)-(ii), (x)-(iv), (y)-(i), (z)-(iii)

29. When a steady current is passed through a ballistic galvanometer, then the deflection will be
A) Zero
B) The current passing through it
C) Twice the normal value as it depends on Hibbert's magnetic standard
D) None of the above

30. What is the multiplying power of a shunt resistance of 200 Ω when used with a galvanometer of 1000 Ω resistance?

A) 4
B) 3
C) 9
D) 6

31. Which one of the following instruments is used for the standardisation of a Drysdale A.C. potentiometer?

A) Rectifier type ammeter
B) PMMC ammeter
C) Precision type electrodynamometer
D) Thermocouple ammeter

32. Match the two lists and choose the correct answer from the code given below:

List-I	List-II
(w) Digital Counter	(i) Measurement of harmonics
(x) Schering bridge	(ii) Measurement of frequency
(y) Megger	(iii) Measurement of loss angle in a dielectric
(z) Spectrum Analyzer	(iv) Measurement of insulation resistance

Choose the correct option

A) (w)-(iv), (x)-(iii), (y)-(ii), (z)-(i)
B) (w)-(ii), (x)-(iii), (y)-(iv), (z)-(i)
C) (w)-(iv), (x)-(i), (y)-(ii), (z)-(iii)
D) (w)-(ii), (x)-(iii), (y)-(i), (z)-(iv)

33. The bridges suitable for the measurement of an unknown inductance in terms of a known capacitance are:

A) Maxwell and Schering
B) Hay and Schering
C) Maxwell and Hay
D) Maxwell, Hay and Schering

34. What is the most important characteristic of a null detector used in bridge measurements?

I. Accuracy
II. Precision
III. Sensitivity

Select the correct answer using the code given below:

A) Only III
B) Only II and III
C) Only I and III
D) Only II

35. In the De Sauty bridge (unmodified form), it is possible to obtain a balance ____.
A) Only if both the capacitors are perfect (lossless)
B) Even if both the capacitors are imperfect (lossy)
C) If one of the capacitors is perfect (lossless)
D) All of the above

36. In a balanced 3-phase 200 V circuit, the line current is 115.5 A. When the power is measured by the two wattmeter methods, one of the wattmeters reads 20 kW and the other one reads zero. What is the power factor of the load?
A) 0.4
B) 0.7
C) 0.8
D) 0.5

37. In an induction-type energy meter, the steady speed attained by the rotating disc is
I. Proportional to the deflection torque
II. Proportional to the resistance of the path of eddy currents
III. Inversely proportional to the effective radius of the disc from its axis
IV. Inversely proportional to the square of brake magnet flux
Which of the above is/are correct?
A) I, II and III only
B) I, II, III and IV
C) I, II and IV only
D) II, III and IV only

38. An electronic voltmeter gives more accurate readings in high resistance circuits as compared to a non-electronic voltmeter because of its _____
A) Low meter resistance
B) High V/kΩ rating
C) High kΩ/V rating
D) High resolution

39. A Lissajous pattern on an oscilloscope has 5 horizontal tangencies and 2 vertical tangencies. The frequency of the horizontal input is 1000 Hz. What is the frequency of the vertical input?
A) 2500 Hz
B) 1400 Hz
C) 1050 Hz
D) 5000 Hz

40. Match the two lists and choose the correct answer from the code given below:

List-I (Parameter)	List-II (Transducer)
(w) Pressure	(i) Thermistor
(x) Temperature	(ii) Piezoelectric crystal
(y) Displacement	(iii) Capacitance transducer
(z) Stress	(iv) Resistances strain gauge

Choose the correct option

A) (w)-(ii), (x)-(i), (y)-(iii), (z)-(iv)
B) (w)-(iv), (x)-(iii), (y)-(ii), (z)-(i)
C) (w)-(i), (x)-(iii), (y)-(ii), (z)-(iv)
D) (w)-(iv), (x)-(ii), (y)-(iii), (z)-(i)

41. Match the two lists and choose the correct answer from the code given below:

List-I (Device)	List-II (Usage)
(w) Zener diode	(i) High-speed switching
(x) Tunnel diode.	(ii) Multivibrator circuit
(y) Gunn diode	(iii) Voltage stabilizer
(z) PIN diode	(iv) Microwave oscillator

Choose the correct option

A) (w)-(i), (x)-(ii), (y)-(iv), (z)-(iii)
B) (w)-(ii), (x)-(i), (y)-(iii), (z)-(iv)
C) (w)-(iv), (x)-(iii), (y)-(ii), (z)-(i)
D) (w)-(iii), (x)-(i), (y)-(iv), (z)-(ii)

42. The junction capacitance of a p-n junction depends on
A) Doping concentration only
B) Applied voltage only
C) Barrier Potential only
D) Both doping concentration and applied voltage

43. A transistor has a current gain of 0.99 in the common base mode. Its current gain in the common collector mode is
A) 99
B) 100
C) 0.99
D) 49

44. Consider the following statements related to JFET.
I. Its operation depends on the flow of minority carriers only
II. It is less noisy than BJT
III. It has poor thermal stability
IV. It is relatively immune to radiation

The correct statements is/are:
A) All statements are correct
B) I and II only
C) II and IV only
D) III and IV only

45. Consider the following devices:
I. BJT in CB mode
II. BJT in CE mode
III. JFET
IV. MOSFET
The correct sequence of these devices in increasing order of their input impedance is
A) I, II, III, IV
B) I, III, II, IV
C) IV, I, III, II
D) III, II, IV, I

46. In an inverting amplifier, the two input terminals of an ideal Op-amp are at the same potential because
A) The two input terminals are directly shorted internally
B) CMRR is infinite
C) The input impedance of the Op-amp is infinite
D) The open-loop gain of the Op-amp is infinite

47. The 'h' parameter equivalent circuit of a junction transistor is valid for
A) High frequency, large signal operation
B) High frequency, small signal operation
C) Low frequency, small signal operation
D) Low frequency, large signal operation

48. The overall bandwidth of two identical voltage amplifiers connected in cascade will
A) Remain the same as that of a single-stage amplifier
B) Be worse than that of a single-stage amplifier
C) Be better than that of a single-stage amplifier
D) Be better if the single-stage gain is low and worse if the single-stage gain is high

49. Consider the following statements regarding an RC phase-shift oscillator and specify which of the following statements is/are correct.
I. The amplifier gain is positive
II. The amplifier gain is negative
III. The phase shift introduced by the feedback network is 180-degree
IV. The phase shift introduced by the feedback network is 360-degree
Which statement is/are correct
A) II and III
B) I and III
C) II and IV
D) I and IV

50. An amplifier without feedback has a gain of 1000. What is the gain with a negative feedback factor of 0.009?

A) 900
B) 100
C) 1009
D) 100.9

51. What is the hexadecimal representation of $(657)_8$?

A) D78
B) D71
C) 32F
D) 1AF

52. What is the simplified form of the Boolean expression T = (X+Y)(X+Y')(X'+Y)?

A) XY'
B) XY
C) XY
D) XY'

53. Any combinational circuit can be built using only

I. NAND gates
II. NOR gates
III. XOR gates
IV. Multiplexers

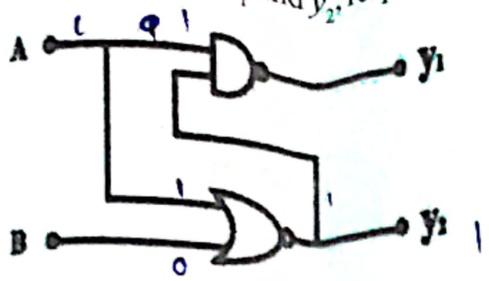
Which of these is/are correct?

A) I, II and IV
B) I and II
C) I, III and IV
D) II, III and IV

54. The decimal equivalent of the hexadecimal number 2A0F is

A) 10767
B) 17607
C) 17067
D) 10677

55. Two logic gates are connected as shown in the figure. If the inputs are A = 1 and B = 0, then the values of y_1 and y_2, respectively are



A) 1, 1
B) 1, 0
C) 0, 1
D) 0, 0

56. A D-flip-flop can be made from a J-K flip-flop by ensuring:
A) J = K
B) J = K = 1
C) J = 0, K = 1
D) J = K'

57. A J-K flip-flop can be made from an S-R flip-flop by using two additional
A) OR gates
B) NOR gates
C) AND gates
D) NOT gates

58. Consider the following statements with respect to the ECL gate.
I. Its switching speed is high
II. It provides OR and NOR logic operations
III. Its power dissipation is small compared to other logic gates
IV. Its logic levels are compatible with other logic family gates

Which of the above statements is/are correct?
A) II and III
B) I and II
C) I, II and III
D) III and IV

59. A ROM has 4 address input lines and produces 8 output bits per address. What is the total memory capacity of the ROM chip?
A) 128 bits
B) 64 bits
C) 32 bits
D) 12 bits

60. Which of the following is a 16-bit register in an 8085 microprocessor?
A) Register C
B) Register B
C) Accumulator
D) Stack Pointer

61. Which device serves as the solid-state equivalent of a thyratron tube?
A) Diac
B) Triac
C) UJT
D) SCR

62. The correct sequence of the given devices in the decreasing order of their speed of operation is
A) Power BJT, Power MOSFET, IGBT, SCR
B) IGBT, Power MOSFET, Power BJT, SCR
C) Power MOSFET, IGBT, Power BJT, SCR
D) SCR, Power BJT, IGBT, Power MOSFET

63. Which factor is most important in determining the steady-state behaviour of a MOSFET?
A) Current gain
B) Transconductance
C) Output resistance
D) Drain-source voltage

64. Which of the following devices is a unipolar device?
A) MOSFET
B) GTO
C) IGBT
D) BJT

65. What is the ripple frequency of the output voltage in a 3-phase (50Hz) full converter?
A) 300 Hz
B) 50 Hz
C) 100 Hz
D) 150 Hz

66. Match the two lists and choose the correct answer from the code given below

List-I	List-II
(w) Discontinuous conduction in converter	(i) Additional reactive power loading
(x) Source inductance of converter	(ii) Better displacement factor
(y) Use of free-wheeling diode	(iii) Poor power factor
(z) Symmetrical angle control	(iv) Unity displacement factor

Choose the correct option
A) (w)-(i), (x)-(ii), (y)-(iv), (z)-(iii)
B) (w)-(ii), (x)-(i), (y)-(iii), (z)-(iv)
C) (w)-(iv), (x)-(iii), (y)-(ii), (z)-(i)
D) (w)-(iii), (x)-(i), (y)-(ii), (z)-(iv)

67. When the firing angle of a single phase fully controlled rectifier feeding constant d.c. current into the load is 30 degrees, what is the displacement factor of the rectifier?
A) 1
B) $\frac{\sqrt{3}}{2}$
C) $\sqrt{3}$
D) 0.5

68. A half-wave rectifier circuit using an ideal diode has an input voltage of $20\sin\omega t$ Volt. The average and rms values of output voltage are, respectively:
A) $\frac{10}{\pi}$ V and 5 V
B) $\frac{20}{\pi}$ V and 5 V
C) $\frac{20}{\pi}$ V and 10 V
D) $\frac{10}{\pi}$ V and 10 V

69. A boost regulator has an input voltage of 5 V and an average output voltage of 15 V. The duty cycle is
A) 2/3
B) 3/2
C) 5/2
D) 2/5

70. What is the shape of the output voltage waveform across a capacitive load when a single-phase current source inverter supplies a constant current?
A) Sine wave
B) Triangular wave
C) Square wave
D) Step function

71. In a transformer supplied by a sinusoidal voltage source, what is the primary cause of harmonic generation?
A) Overload
B) Poor insulation
C) Iron loss
D) Saturation of core

72. The inductive reactance of a transformer depends on
A) Leakage flux
B) Magnetomotive force
C) Magnetic flux
D) Electromotive force

73. A 25 MVA, 33 kV transformer has a per-unit impedance of 0.9. What will be its per-unit impedance when referred to a new base of 50 MVA and 11 kV?
A) 10.4
B) 12.2
C) 16.2
D) 14.4

74. An autotransformer with a transformation ratio of 0.8 delivers a load of 10 kW. How much of this power is transferred inductively from the primary to the secondary?
A) 10 kW
B) 2 kW
C) 0 kW
D) 8 kW

75. Consider the following statements relating to constructional features of a large power transformer:
I. Conservator tank is used to maintain the level of oil in the transformer tank
II. Bushing is used to protect transformer insulation against lightning overvoltages
III. Buchholz relay is an over-current relay
IV. Silica gel is used to absorb moisture
Which of the above statements is/are correct?
A) I, II, III and IV
B) I and III
C) I, II and IV
D) I and IV

76. The voltage regulation of a transformer having 2% resistance and 5% reactance, at full load, 0.8 power factor (lagging) is:
A) 4.6%
B) −4.6%
C) −1.4%
D) 6.4%

77. The type of DC generator used for welding purposes is a
A) Series generator
B) Differentially compounded generator
C) Cumulatively compounded generator
D) Shunt generator

78. A 220 V DC machine has an armature resistance of 1 Ω and operates at a full-load current of 20 A. What is the difference in the induced EMF when the machine functions as a motor compared to when it operates as a generator?
A) 50 V
B) 20 V
C) 40 V
D) 0 V

79. The current drawn by a 120 V DC motor with back e.m.f. of 110 V and armature resistance of 0.4 ohm is
A) 25 A
B) 10 A
C) 15 A
D) 3.5 A

80. Match the two lists and choose the correct answer from the code given below

List-I (Types of motors)
(w) DC series motor
(x) DC shunt motor
(y) 3-phase induction
(z) Synchronous

List-II (Characteristics)
(i) Constant speed
(ii) High starting torque
(iii) Low starting motor torque
(iv) Poor stability motor

Choose the correct option
A) (w)-(i), (x)-(ii), (y)-(iv), (z)-(iii)
B) (w)-(ii), (x)-(i), (y)-(iii), (z)-(iv)
C) (w)-(iv), (x)-(iii), (y)-(ii), (z)-(i)
D) (w)-(iii), (x)-(i), (y)-(ii), (z)-(iv)

81. Calculate the magnetic flux per pole of a 6-pole DC generator with 240 wave-connected armature conductors, generating an open-circuit voltage of 500 volts while operating at 1000 rpm.
A) 0.128 Wb
B) 0.21 Wb
C) 0.21 mWb
D) 0.041 Wb

82. In the case of a DC motor, maximum mechanical power is developed when back emf equals
A) The applied voltage
B) One-third of the applied voltage
C) Half the applied voltage
D) Double the applied voltage

83. Match the two lists and choose the correct answer from the code given below:

List -I (Machine)
(w) DC motor
(x) Single-phase transformer
(y) 3-phase induction motors
(z) Salient pole Alternators

List-II (Test)
(i) Slip test
(ii) Block rotor test
(iii) Swinburne's test
(iv) Sumpner's test

Choose the correct option
A) (w)-(i), (x)-(ii), (y)-(iv), (z)-(iii)
B) (w)-(iii), (x)-(iv), (y)-(ii), (z)-(i)
C) (w)-(iv), (x)-(iii), (y)-(ii), (z)-(i)
D) (w)-(iii), (x)-(i), (y)-(ii), (z)-(iv)

84. In a synchronous generator, a divided winding rotor is preferable to a conventional winding rotor because of
A) Better damping
B) Higher efficiency
C) Higher short-circuit ratio
D) Increased speed limit

85. During the slip test conducted on a salient pole machine, the following data were recorded for determining X_d and X_q (in ohms):
$I_{d\,max} = 10A$, $I_{d\,min} = 6.5A$, $V_{d\,max} = 30V$, $V_{d\,min} = 25V$,
Which one of the following is correct?
A) $X_d = 4.615\,\Omega$, $X_q = 2.5\,\Omega$
B) $X_d = 3\,\Omega$, $X_q = 3.86\,\Omega$
C) $X_d = 3\,\Omega$, $X_q = 2.5\,\Omega$
D) $X_d = 4.61\,\Omega$, $X_q = 3.86\,\Omega$

86. Consider the following statements: EMF induced per phase in an alternator depends on
I. Frequency
II. Number of turns per phase
III. Pitch factor
IV. Distribution factor
Which of the above statements is/are correct?
A) I only
B) II and III only
C) III and IV only
D) I, II, III and IV

87. A 500 MW, 13.8 KV star-connected synchronous generator at 0.8 PF will deliver a full load current of
A) 12.10 kA
B) 21.10 kA
C) 36.15 kA
D) 26.15 kA

88. In a shaded pole motor, shading coils are used to
A) Reduce windage losses
B) Produce rotating magnetic field
C) Reduce friction losses
D) To protect against sparking

89. Which of the following devices can be used as a phase advancer?
A) 3-phase induction motor squirrel cage type
B) 3-phase induction motor slip-ring type
C) Synchronous motor working at a leading power factor
D) Synchronous motor working at a lagging power factor

90. The rotor power output of a 3-phase induction motor is 15 kW. The rotor copper losses at a slip of 4% is:
A) 600 W
B) 550 W
C) 625 W
D) 587 W

91. An induction motor having 8 poles runs at 727.5 rpm. If the supply frequency is 50 Hz, the e.m.f. in the rotor will have a frequency of _____.
A) 45.3 Hz
B) 51.5 Hz
C) 50 Hz
D) 1.5 Hz

92. 'Crawling' in an induction motor is due to
A) Space harmonics produced by winding currents
B) Slip ring rotor
C) Time harmonics in supply
D) Insufficient starting torque

93. Consider the following types of single-phase motors:
I. Capacitor start and run induction motor
II. Permanent split capacitor motor
III. Shaded pole motor
The correct sequence of these in the ascending order of the magnitude of starting torque is:
A) I, II, III
B) III, II, I
C) II, I, III
D) II, III, I

94. In a transformer, zero voltage regulation at full load is:
A) Not possible
B) Possible at leading power factor load
C) Possible at lagging power factor load
D) Possible at unity power factor load

95. Consider the following tests:
I. Swinburne's test
II. Short circuit test
III. Open circuit test
IV. Retardation test
Which of the above tests are to be conducted for the determination of voltage regulation of a transformer?
A) I only
B) II only
C) III and IV
D) II and III

96. Consider the following materials for line conductors:
I. Hard drawn copper
II. Cadmium copper
III. Galvanised steel
IV. Aluminium

The correct sequence of the descending order of their electrical conductivities is

A) I, II, IV, III
B) II, I, IV, III
C) II, I, III, IV
D) I, II, III, IV

97. Where is the drift tube, an airtight pipe, located in a hydropower station?
A) Near the surge tank
B) In between the penstock and the runner
C) In between the runner exhaust and the tailrace
D) At the beginning of penstock

98. The term 'Surge Tank' is associated with which type of power plant?
A) Low head hydro
B) High head hydro
C) Medium head hydro
D) Thermal

99. A quarter wave line will behave as a/an _____.
A) Rectifier
B) Amplifier
C) Transformer
D) Variable capacitance

100. Hollow conductors are used in transmission lines to
A) Reduce corona
B) Improve stability
C) Reduce power consumption
D) Increase power transmission capacity

101. The surge impedance of a 3-phase, 400 kV transmission line is 400Ω. The surge impedance loading is _____.
A) 250 MW
B) 100 MW
C) 400 MW
D) 1600 MW

102. A cable has an inductance of 0.22 mH per km and a capacitance of 0.202 μF per km. The characteristic impedance of the cable is _____.
A) 28Ω
B) 33Ω
C) 43Ω
D) 34Ω

103. When is the Ferranti effect on long overhead lines experienced?
A) Power factor is unity
B) The line is heavily loaded
C) Power factor is lagging
D) The line is lightly loaded

104. The time interval needed for a surge to travel to the end of a 600 km long overhead transmission line is
A) 6 s
B) 2 ms
C) 20 ms
D) 15 s

105. Which type of insulators are used when conductors are terminated or the direction of the transmission line changes?
A) Pin type
B) Suspension type
C) Strain type
D) Shackle type

106. Load frequency control is achieved by properly matching the individual machine's _____
A) Turbine inputs
B) Generated voltages
C) Reactive power
D) Turbine and generator ratings

107. Load frequency controllers are carried out with:
A) P controllers only
B) I controllers only
C) D controllers only
D) PID controllers

108. What is the peak (maximum) power demand of a thermal power plant that generates 720 MWh of energy in a day and operates at a load factor of 0.6?
A) 35 MW
B) 72 MW
C) 720 MW
D) 50 MW

109. A power station has a peak demand of 2500 kW and generates approximately 4.5×10^6 kWh annually. What is the estimated load factor of the station?
A) 10.25%
B) 20.50%
C) 41.00%
D) 82.00%

110. Which of the following are the advantages of interconnected operation of power systems?
I. Less reserve capacity requirement
II. More reliability
III. High power factor
IV. Reduction in short-circuit level
Select the correct answer.
A) III and IV
B) II and III
C) I and II
D) I and IV

111. What is the efficiency of an alternator if the output is 25 kW and the loss is 2 kW?
A) 80.18%
B) 65.75%
C) 92.59%
D) 75.75%

112. The per-phase impedance of a 3-phase transmission line is 2 per unit (pu) on a base of 100 MVA and 100 kV. What will be the corresponding impedance value on a new base of 400 MVA and 400 kV?
A) 0.50 pu
B) 0.25 pu
C) 1.0 pu
D) 1.50 pu

113. If a line-to-ground fault results in a fault current of 100 A in the affected phase, what will be the corresponding zero-sequence current?
A) 0A
B) 33.3 A
C) 66.6 A
D) 100 A

114. An element in a power system has positive, negative, and zero sequence reactances of 0.5, 0.3, and 0.9, respectively. This element is most likely to be a:
A) Synchronous generator
B) Transmission line
C) Static load
D) Synchronous motor

115. In which of the following 3-phase transformer connection configurations will zero-sequence currents not flow through the transformer windings?
A) Primary in star, neutral not grounded; secondary in delta
B) Primary in star, neutral grounded; secondary in delta
C) Primary in star, neutral not grounded; secondary in star, neutral grounded
D) Primary in star, neutral grounded; secondary in star, neutral not grounded

116. Match the two lists and choose the correct answer from the code given below:

List-I (Phenomenon)	**List-II (Dominant features)**
(w) Voltage stability	(i) Power system stabilizer
(x) Transient stability	(ii) Damping power
(y) Oscillatory instability	(iii) 'Angle' stability
(z) Steady-state dynamics	(iv) Reactive power

Choose the correct option
A) (w)-(i), (x)-(ii), (y)-(iv), (z)-(iii)
B) (w)-(iii), (x)-(iv), (y)-(ii), (z)-(i)
C) (w)-(iii), (x)-(i), (y)-(ii), (z)-(iv)
D) (w)-(iv), (x)-(iii), (y)-(ii), (z)-(i)

117. The making current of a 3-phase circuit breaker rated at 2000 MVA and 33 kV will be approximately:
A) 35 kA
B) 59 kA
C) 89 kA
D) 69 kA

118. Mho relay is usually employed for the protection of:
A) Short transmission lines only
B) Long transmission lines only
C) Medium transmission lines only
D) Any transmission line

119. Impulse ratios of insulators and lightning arresters should be
A) High and low, respectively
B) Both low
C) Low and high, respectively
D) Both high

120. Which lamp has the best Colour Rendering Index (CRI)?
A) LED
B) Fluorescent
C) Incandescent
D) High-pressure sodium vapour