# ELECTRICAL ENGINEERING

## PAPER–II

1. A d.c. series motor is accidentally connected to single- phase a.c. supply. The torque produced will be
   a. of zero average value
   b. oscillating
   c. steady and undirectional
   d. pulsating and unidirectional

2. The 'synchronous - impedance method' of finding the voltage regulation by a cylindrical rotor alternator is generally considered
   a. a pessimistic method because saturation is not considered V
   b. an optimistic method because saturation is not considered
   c. a fairly accurate method even if power factor is not taken into account while determining synchronous impedance
   d. a fairly accurate method when power factor is taken into account while determining synchronous impedance

3. Generally the no-load losses of an electrical machine is represented in its equivalent circuit by a
   a. parallel resistance with a low value
   b. series resistance with a low value
   c. parallel resistance with a high value
   d. series resistance with a high value

4. The power factor of a synchronous motor
   a. improves with increase in excitation and may even become leading at higher excitations
   b. decreases with increase in excitation
   c. is independent of its excitation
   d. increases with loading for a given excitation

5. When the excitation of normally operating unloaded salient-pole synchronous motor suddenly gets disconnected, it continues to run as a
   a. Schrage motor
   b. Spherical motor
   c. Switched- reluctance motor
   d. Variable - reluctance motor

6. A 6-pole, 3-phase alternator running at 1000 rpm supplies to an 8-pole, 3-phase induction motor which has a rotor current of frequency 2 Hz. The speed at which the motor operates is
   a. 1000 rpm
   b. 960 rpm
   c. 750 rpm
   d. 720 rpm

7. For maximum current during 'Slip Test' on a synchronous machine, the armature and fields along
   a. d-axis
   b. q-axis
   c. 45° to d-axis
   d. 45° to q-axis

8. Match List I with List II and select the correct answer:

   List I (Name of test)
   A. Open circuit and short circuit tests
   B. Open circuit and zero power factor tests
   C. Slip test
   D. Maximum lagging current test

   List II (Result)
   1. Leakage reactance
   2. Direct axis synchronous reactance
   3. Quadrature axis synchronous reactance
   4. Ratio, of direct axis synchronous reactance to quadrature axis synchronous reactance

   Codes;

| | A | B | C | D |
|---|---|---|---|---|
| a. | 1 | 2 | 4 | 3 |
| b. | 1 | 2 | 3 | 4 |
| c. | 2 | 1 | 4 | 3 |
| d. | 2 | 1 | 3 | 4 |

9. A 3-phase 50 MVA 10 kV generator has a reactance of 0.2 ohm per phase. Hence the per-unit value of the reactance on a base of 100 MVA 25 kV will be

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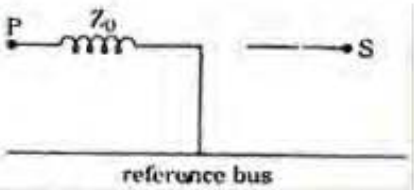
a. 1.25
b. 0.625
c. 0.032
d. 0.32

10. The results of a 'Slip Test' for determining direct-axis ($X_d$) and quadrature-axis ($X_q$) reactance's of a star-connected salient - pole alternator are given below
phase values: $V_{max} = 108V$; $V_{min} = 96V$, $I_{max} = 12A$, $I_{min} = 10A$. Hence the two reactance will be
a. $X_d = 10.8$ ohms and $X_q = 8$ ohms
b. $X_d = 9$ ohms and $X_q = 9.6$ ohms
c. $X_d = 9.6$ ohms and $X_q = 9$ ohms
d. $X_d = 8$ ohms and $X_q = 10.8$ ohms

11. Stepper motors are widely used because of
a. wide speed range
b. large rating
c. no need for field control
d. compatibility with digital systems

12.




A 3-phase transformer having zero sequence impedance Z0 has zero-sequence network as represented in the figure. The connections of its windings are
a. star with isolated neutral - delta
b. star with grounded neutral delta
c. delta- star with grounded neutral
d. delta-delta

13. A 2-phase servomotor in control system
a. uses drag cup rotor
b. has cylindrical rotor without slots or windings
c. ordinary squirrel - cage rotor
d. slip - ring rotor with inherent low rotor resistance

14. Capacitor in a single-phase induction motor is used for
a. improving the power factor
b. improving the starting torque
c. starting the motor
d. reducing the harmonics

15. Match List I with List II and select the correct answer:

List I (Transformer)
A. Power transformer
B. Auto transformer
C. Welding transformer
D. Isolation transformer

List II (Voltage ratio)
1. 230 V / 230 V
2. 220 V / 240V
3. 400 V / 100V
4. 132 k V / 11 kV

Codes;

| | A | B | C | D |
|---|---|---|---|---|
| a. | 4 | 2 | 3 | 1 |
| b. | 4 | 2 | 1 | 3 |
| c. | 2 | 4 | 1 | 3 |
| d. | 2 | 4 | 3 | 1 |

16. A two-winding transformer is used as an auto transformer. The kVA rating of the auto transformer compared to the two-winding transformer will be
a. 2 times
b. 1 times
c. 1.5 times
d. same

17. A 20 kVA, 2000/200 V, 1-phase transformer has nameplate leakage impedance of 8% Voltage required to be applied on the high - voltage side to circulate full - load current with the low-voltage winding short-circuited will be
a. 16 V
b. 56.56 V
c. 160 V
d. 568.68 V

18. The full-load copper-Loss and iron-loss of a transformer are 6400 W and 5000 W respectively. The copper-loss and iron-loss at half load will be, respectively
a. 3200 W and 2500 W
b. 3200 W and 5200 W
c. 16O0 W and 1250 W
d. 1600 W and 5000 W

19. In a 100 kVA, 1100/220 V, 50 Hz single - phase trans former with 2000 turns on the high -voltage side, the open- circuit test result gives 220 V, 91 A, 5 kW on low voltage side. The core-loss component of current is, approximately
a. 9.1 A

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b. 22.7 A
c. 45.0 A
d. 91 A

20. Match List I with List II and select the correct answer:
List I (Types of electrical loads)
A. Hoist
B. Fans
C. Machine Tools (Lathe, Milling machine etc.)
D. Loads with fluid friction
List II (Torque-speed characteristics)
1. Torque $\propto$ (speed)$^2$
2. Torque $\propto$ (speed)
3. Constant Torque
4. Torque $\propto$ 1/ (speed)
Codes:

| | A | B | C | D |
|---|---|---|---|---|
| a. | 1 | 3 | 2 | 4 |
| b. | 1 | 3 | 4 | 2 |
| c. | 3 | 1 | 4 | 2 |
| d. | 3 | 1 | 2 | 4 |

21. For a given torque, reducing the diverter-resistance of a d.c. series motor
a. increases its speed but armature current remains the same
b. increases its speed demanding more armature current
c. decreases its speed demanding less armature current
d. decreases its speed but armature current remains the same

22. Match List I with list II and select the correct answer:
A. List I (Types of motors)
B. d.c. series motor
C. d.c. shunt motor
D. 3-phase induction motor
E. Synchronous motor
List II (Characteristics)
1. Constant speed
2. High starting torque
3. Low starting torque
4. Poor stability

| | A | B | C | D |
|---|---|---|---|---|
| a. | 2 | 4 | 3 | 1 |
| b. | 3 | 1 | 2 | 4 |
| c. | 2 | 1 | 3 | 4 |
| d. | 3 | 4 | 2 | 1 |

23. Match List I with list II and select the correct answer:
List I
A. Commutation
B. V-curves
C. Free wheeling diode
D. Overlap
List II
1. Inductive load
2. Capacitive load
3. Interpole
4. Source inductance
5. Synchronous motor
Codes:

| | A | B | C | D |
|---|---|---|---|---|
| a. | 3 | 5 | 1 | 4 |
| b. | 2 | 4 | 3 | 5 |
| c. | 3 | 4 | 1 | 5 |
| d. | 2 | 5 | 3 | 4 |

24. Possible three -to - three phase transformer connection for parallel operation is
a. $\Delta$ - Y to $\Delta$ - Y
b. $\Delta$ - $\Delta$ to $\Delta$ - Y
c. Y – Y to $\Delta$ - Y
d. $\Delta$ - Y to Y - $\Delta$

25. Match list I with list II and select the correct answer:
List I
A. Silica Gel
B. Porcelain
C. Mercury
D. Fins
List II
1. Bushing
2. Buccholz relay
3. Tank
4. Breather
Codes:

| | A | B | C | D |
|---|---|---|---|---|
| a. | 2 | 1 | 4 | 3 |
| b. | 4 | 3 | 2 | 1 |
| c. | 2 | 3 | 4 | 1 |
| d. | 4 | 1 | 2 | 3 |

26. A 4 kVA, 400/200 V single-phase transformer has resistance of 0.02 p.u. and reactance of 0.06 p.u. Its actual resistance

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and reactance referred to h.v. side, are, respectively

a. 0.2 ohm and 0.6. ohm
b. 0.8 ohm and 2.4 ohm
c. 0.08 ohm and 0.24 ohm
d. 2 ohm and 6 ohm

27. A certain R - L series combination is connected across a 50 Hz single-phase a.c. supply. If the instantaneous power drawn was found to be negative for 2 milliseconds in one cycle, the 'power factor angle' of the current must be

a. 9°
b. 18°
c. 36°
d. 45°

28. Stepper motors are mostly used for

a. high power requirements
b. control system applications
c. very high speed of operation
d. very low speed of operation.

29. A delta/star transformer has a phase-to-phase voltage transformation ratio of K

$$\left(K = \frac{\text{delta phase voltage}}{\text{star phase voltage}}\right)$$

The line -to - line voltage ratio of star/delta connection is given by

a. $K/\sqrt{3}$
b. K
c. $K\sqrt{3}$
d. $\sqrt{3}/K$

30. Two 10 kV/440 V, 1-phase transformers of ratings 600 kVA and 350 kVA are connected in parallel to share a load of 800 kVA. The resistances of the transformers, referred to the secondary side are 0.0198 Ω and 0.0504 Ω respectively (resistances negligible). The load shared by the two transformers will, be, respectively

a. 484.5 kVA and 315.5 kVA
b. 315.5 kVA and 484.5 kVA
c. 533 kVA and 267 kVA
d. 267 kVA and 533 kVA

31. Two transformers, with equal voltage ratio and negligible excitation current, connected in parallel, share load in the ratio of their kVA rating only, if their p.u. impedances (based on their own kVA) are

a. equal
b. in the inverse ratio of their ratings
c. in the direct ratio of their ratings
d. purely reactive

32. The per-unit impedance of a circuit element is 0.15. lithe base kV and base MVA are halved, then the new value of the per-unit impedance of the circuit element will be

a. 0.075
b. 0.15
c. 0.30
d. 0.60

33. The per-unit impedance of an alternator corresponding to base values 13.2 kV and 30 MVA is 0.2 p.u. The p.u. value of the impedance for base values 13.8 kV and 50 MVA in p.u. will be

a. 0.131
b. 0.226
c. 0.305
d. 0.364

34. Match List I with List II and select the correct answer:

List I (Phenomenon)

A. Voltage stability
B. Transient stability
C. Oscillatory instability
D. Steady-state Dynamics

List II (Dominant features)

1. Power system stabilizer
2. Damping power
3. 'Angle' stability
4. Reactive power

Codes;

| | A | B | C | D |
|---|---|---|---|---|
| a. | 1 | 3 | 2 | 4 |
| b. | 4 | 2 | 3 | 1 |
| c. | 1 | 2 | 3 | 4 |
| d. | 4 | 3 | 2 | 1 |

35. For transmission line which one of the following relations is true?

a. AD - BC = 1
b. AD - BC = 1
c. AD - BC = - 1
d. AD - BC = 0

36. For a given base voltage and base volt-amp, the per-unit impedance value of an element is X. What will be the per-unit impedance value of this element when the

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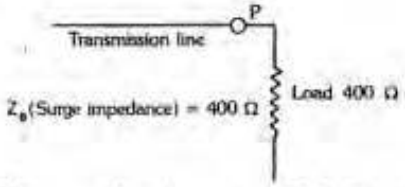
voltage and volt-amp bases are both doubled?

a. 4X
b. 2X
c. X
d. 0.5 X

37.




The reflection coefficient for the transmission line shown in figure at point P is

a. +1
b. 0.5
c. 0
d. -1

38. A 3-phase transmission line has its conductors at the corners of an equilateral triangle with side 3 m. The diameter of each conductor is 1.63 cm. The inductance of the fine per phase per km is

a. 1.232 mH
b. 1.182 mH
c. 1.093 mH
d. 1.043 mH

39. Match List I with List II and select the correct answer:

List I (Design parameter)

A. Number of suspension insulator discs
B. Permissible sag of transmission line conductor for a given tower
C. Corona charge
D. Inductance of transmission line conductor

List II (Factor(s) on which they depend)

1. Voltage and Tower footing resistance
2. Voltage
3. Voltage and conductor configuration
4. Conductor configuration and Tower configuration

Codes;

| | A | B | C | D |
|---|---|---|---|---|
| a. | 1 | 2 | 3 | 4 |
| b. | 4 | 3 | 2 | 1 |
| c. | 1 | 3 | 2 | 4 |
| d. | 4 | 2 | 3 | 1 |

40. A cable has inductance of 0.22 mH per km and capacitance of 0.202 μF per km. The surge impedance of the cable is

a. 28 Ω
b. 33 Ω
c. 42 Ω
d. 50 Ω

41. For some given transmission line the expression for voltage regulation is given by $\frac{|V_s|-|V_R|}{|V_R|}\times 100\%$. Hence,

a. this must be a 'short' line
b. this may either be a 'medium line' or a 'short line'
c. this expression is true for any line
d. this may either be a 'medium line' or a 'long line'

42. The capacitance of an overhead transmission line increases with

1. increase in mutual geometrical mean distance
2. increase in height of conductors above ground

Select the correct answer from the following

a. Both 1 and 2 are true
b. Both 1 and. 2 are false
c. Only 1 is true
d. Only 2 is true

43. Consider the following statements:

Addition of lumped capacitances in parallel to a loss-free transmission line increases

1. characteristic impedance
2. Propagation constant
3. system stability
4. charging current

Which of these statements are correct?

a. 1 and 3
b. 2 and 4
c. 2, 3 and 4
d. 1, 2 and 4

44. In a certain single-phase a.c. circuit the instantaneous voltage is given by $v = V \sin(\omega t + 30^\circ)$ p.u. and the instantaneous current is given, by $i = I \sin(\omega t - 300)$ p.u. Hence the per-unit value of reactive power is

a. 1/4

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b. 1/2
c. $\sqrt{3}/4$
d. $\sqrt{3}/2$

45. In a multimachine interconnected system, subsequent to a 3- phase fault, the transient stability is examined by
a. equal -area criterion
b. solution of wing equation
c. either by equal - area criterion or by solution of swing equation
d. combination of equal - area criterion and solution of swing equation

46. The electrical stiffness of a synchronous generator connected to a very large rid can be increased by
a. increasing the excitation or the power angle of the machine
b. reducing the excitation or the synchronous reactance of the machine
c. increasing the synchronous reactance of the machine
d. Operating the generator at a much lower MW level compared to the steady -state limit

47. A. surge of 100 kV travels along a overhead line towards it junction with cable. The surge impedance f the overhead line and cable are 400 o ms a 50 ohms respectively. The m gnitu e o the surge transmitted throug th cable is
a. 11.11 kV
b. 22.22 kV
c. 12.50 kV
d. 82.89 kV

48. A surge volt rising at 100 kV/μs travels along Loss less open-circuited transmi ion . It takes 10 μs to reach the nd. The reflected wave from the en nd, will be rising at
a. 100 kV/μs
b. 200 kV/μs
c. 1000 kV/μs
d. 2000 kV/μs

49. The $Y_{BUS}$ matrix of a 100-bus interconnected system is 90% sparse. Hence the number of transmission lines in the system must be
a. 450
b. 500
c. 900
d. 1000

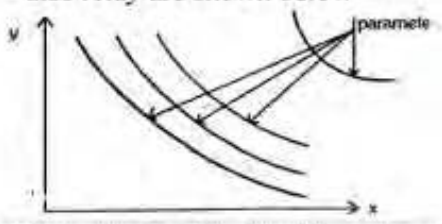
50. Match list I with list II and select the correct answer:
List I (Load flow methods)
A. Gauss-Siedel load flow
B. Newton-Raphson load flow
C. Fast decoupled load flow
D. Real time load flow
List II (System environment)
1. Gauss –Elimination
2. L — U factors
3. Contingency stu es
4. Off-line solutio
Codes;

| | A | B | C | D |
|---|---|---|---|---|
| a. | 4 | 3 | 2 | 1 |
| b. | 2 | 1 | 4 | 3 |
| c. | 4 | 1 | 2 | 3 |
| d. | 2 | 3 | 4 | 1 |

51. Mat List I with list II and select the rect answer:
List I (Types of relays)
A. Negative –sequence relay
B. Harmonic - restraint differential relay
C. Over-current relay with time - delay
D. Mho relay
List II (Protective schemes)
1. Distribution feeder protection
2. Long h.t. lines protection
3. Transformer protection
4. Rotor protection of alternators
Codes;

| | A | B | C | D |
|---|---|---|---|---|
| a. | 4 | 3 | 1 | 2 |
| b. | 1 | 2 | 4 | 3 |
| c. | 4 | 2 | 1 | 3 |
| d. | 1 | 3 | 4 | 2 |

52. The inverse characteristics of an induction – disc relay are shown below




Match list I with list II and select the correct answer

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List I (x, y co-ordinates and parameter)

A. x — co-ordinate

B. y — co-ordinate

C. Parameter

List II (Variables)

1. Plug settling voltage
2. Current as multiplier of plug setting
3. Operating time
4. Time multiplier setting
5. Power factor

Codes;

| | A | B | C |
|---|---|---|---|
| a. | 5 | 4 | 1 |
| b. | 2 | 3 | 4 |
| c. | 5 | 3 | 4 |
| d. | 2 | 4 | 1 |

53. Two generators rated 200 MW and 400 MW having governor droop characteristics of 4% and 5% respectively are operating in parallel. If the generators operate on no load at 50 Hz, the frequency at which they would operate with a total load of 600 MW is

a. 48.50 Hz
b. 47.69 Hz
c. 46.82 Hz
d. 49.04 Hz

54. The bonding forces in c9mpound semiconductors, such as GaAs, arise [illegible]

a. ionic bonding
b. metallic bonding
c. covalent bonding
d. combination of ionic and covalent bonding

55. Consider the following statements in connection with the biasing of semiconductor diodes ;

1. LEDs are used. Sunder forward - bias condition
2. Photodiodes are used under forward-bias condition
3. Zener diodes are used under reverse-bias condition
4. Variable capacitance diodes are used under reverse-bias condition

Which of these statements are correct?

a. 1, 2 and 3
b. 1, 2 and 4
c. 2, 3 and 4
d. 1, 3 and 4

56. The junction capacitance of a linearly graded junction varies with the applied reverse bias $V_r$ as

a. $V_r^{-1}$
b. $V_r^{-1/2}$
c. $V_r^{-1/3}$
d. $V_r^{1/2}$

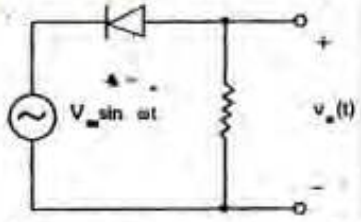
57. The diffusion capacitance of a forward biased $p^+$ - n junction diode with a steady current I depends on

a. width of the depletion region
b. mean lifetime of the holes
c. mean lifetime of the electrons
d. junction area

58. The modified work function of an n-channel MOSFET is — 0.85 V. If the interface charge is $3 \times 10^{-4}$ C/m$^2$ and the oxide capacitance is 300 μF/m$^2$, the flat band voltage .is

a. - 1.85 V
b. - 0.15 V
c. + 0.15 V
d. + 1.85 V

59. In the circuit shown below,




the average value of $v_o(t)$ will be

a. 0
b. $-V_m / \pi$
c. $-V_m / \sqrt{2}$
d. $-V_m$

60. Match list I with List II and select the correct answer:

List I (Amplifier's mode of operation)

A. Class A
B. Class B
C. Class C
D. Class D

List II (Properties/characteristics)

1. Clips off half. a cycle
2. Leads to most stable biasing circuit
3. Transistor acts as switch

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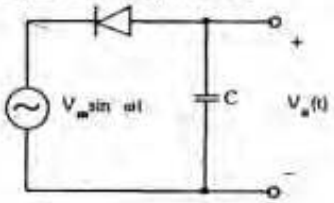
4. Amplification of the resonant frequency only

Codes:

| | A | B | C | D |
|---|---|---|---|---|
| a. | 1 | 2 | 3 | 4 |
| b. | 2 | 1 | 4 | 3 |
| c. | 1 | 2 | 4 | 3 |
| d. | 2 | 1 | 3 | 4 |

61. Early effectin BJT refers to
   a. avalanche breakdown
   b. thermal runaway
   c. base narrowing
   d. Zener breakdown

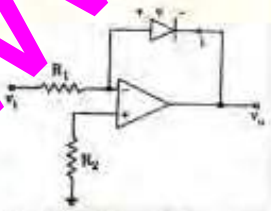
62. In the circuit shown below, the average value of $V_o(t)$ will be



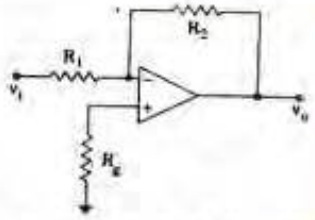

   a. 0
   b. $-V_m / \pi$
   c. $-V_m / \sqrt{2}$
   d. $-V_m$

63. The Darlington pair is mainly used f
   a. impedance matching
   b. wideband voltage amplifica on
   c. power amplification
   d. reducing distortion

64. In the op-amp circuit s o n b low, $v_i > 0$ and $i = I_o e^{\alpha v}$. The tput $v_o$ will be proportiona to
   a. $\sqrt{v_i}$
   b. $v_i$
   c.
   d. $\ln(kv_i)$

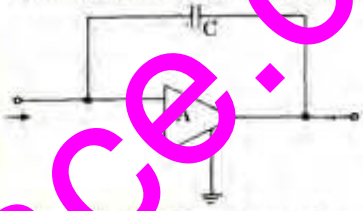



65. In the inverting op-amp circuit shown below,




the resistance $R_g$ is chosen as $R_1 \| R_2$ in order to
   a. increase gain
   b. reduce offset voltage
   c. reduce offset current
   d. increase CMRR

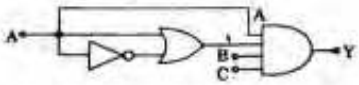
66. An amplifier of gai bri ged by a capacitance C as sh wn be w.




Th effective input capacitance is
   c. C(1 - A)
   c. C (1 + A)
   d. CA

67. The resolution of a 12 bit Analog to Digital converter in per cent is
   a. 0.01220
   b. 0.02441
   c. 0.04882
   d. 0.09760

68.




The Boolean expression for the output Y in the logic circuit in
   a. $A\,\overline{B}\,C$
   b. $A\,B\,C$
   c. $\overline{A}\,B\,C$
   d. $\overline{A}\,\overline{B}\,\overline{C}$

69. To add two M-bit numbers, the required number of half adders is
   a. 2m — 1
   b. $2^m$ — 1
   c. 2m + 1
   d. 2m

70. Consider the following

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Any combinational circuit can be built using

1. NAND gates
2. NOR gates
3. DC - OR gates
4. Multiplexeis

Which of these are correct?

a. 1, 2 and 3
b. 1, 3 and 4
c. 2, 3 and 4
d. 1, 2 and 4

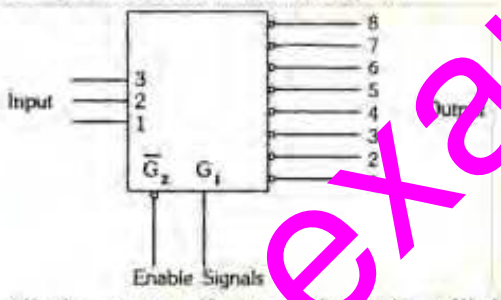
71. The decimal equivalent of hexadecimal number 2 A OF is

a. 17670
b. 17607
c. 17067
d. 10767

72. The binary equivalent of hexadecimal number 4 F 2 D is

a. 0101 1111 0010 1100
b. 0100 1111 0010 1100
c. 0100 1110 0010 1101
d. 0100 1111 0010 1101

73. A 3-to-8 decoder is shown below:




All the output lines of the chip will be high, when all the input 1, 2 and 3

a. are high; and $G_2$ are low
b. are high; and $G_1$ is high, $G_2$ is high
c. are high; and $G_1$ is low, $G_2$ is high
d. are high; and $G_1$ is high, $G_2$ is low

74. Which logical operation is performed by ALU of 8085 to complement a number?

a. AND
b. NOT
c. OR
d. EXCLUSIVE OR

75. The number of output pins of a 8085 microprocessor are

a. 40
b. 27
c. 21
d. 19

76. Consider the execution of the following instructions by a 8085 microprocessor

LXI H, $01FF_H$

SHLD $2050_H$

After execution the contents of memory locations $2050_H$ and $2051_H$ and the registers H and L, will be

a. $2050_H \rightarrow FF; 2051_H \rightarrow 01; H \rightarrow FF; L \rightarrow 01$
b. $2050_H \rightarrow 01; 2051_H \rightarrow FF; H \rightarrow FF; L \rightarrow 01$
c. $2050_H \rightarrow FF; 2051_H \rightarrow 01; H \rightarrow 01; L \rightarrow FF$
d. $2050_H \rightarrow FF; 2051_H \rightarrow 01; H \rightarrow 01; L \rightarrow 00$

77. Which one of the following functions is performed by the 8085 instruction MOV H, C?

a. Moves the contents of H register to C register
b. Moves the contents of C register to H register
c. Moves the contents of C register to H pair
d. Moves the contents of HL pair to C register

78. For 8085 microprocessor; the instruction RST.6 restarts subroutine at address

a. 00H
b. 03H
c. 30H
d. 33H

79. Memory-mapped I/O-scheme for the allocation of address to memories and I/O devices, is used for

a. small systems
b. large systems
c. both large and small systems
d. very large systems

80. The interfacing device used for the generator of accurate time delay in a microcomputer system is

a. Intel — 8251
b. Intel — 8257
c. Intel — 8253
d. Intel — 8259

81. Let x(t) be a real signal with the Fourier transform X(f). Let X*(f) denote the complex conjugate of X(f). Then

a. $X(-f) = X^*(f)$
b. $X(-f) = X(f)$
c. $X(-f) = -X(f)$

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d. $X(-f) = -X^*(f)$

82. Let the transfer function of a network be $H(f) = |H(f)|e^{j\theta(f)} = 2e^{-j4\pi f}$ If a signal x(t) is applied to such a network, the output y(t) is given by
a. 2x(t)
b. x(t - 2)
c. 2x(t - 2)
d. 2x(t - 4π)

83. The maximum number of quantized amplitude levels, than a 3-digit ternary PCM system can be used to represent is
a. 8
b. 9
c. 27
d. 81

84. The waveform $A\cos(\omega_1 t + k\cos\omega_2 t)$ is
a. amplitude modulated
b. frequency modulated
c. phase modulated
d. frequency as well as phase modulated

85. Let x(t) = 5 cos (50t + sin 5t). Its instantaneous frequency (in rad/s) at t = 0 has the value
a. 5
b. 50
c. 55
d. 250

86. The performance of the DPCM coder improves as the
a. input probability density becomes more and more Gaussian
b. input power spectral density tends to be white
c. input dynamic range increases
d. sample-to-sample correlation of the input increases

87. An FM wave uses a 2-5V, 500 Hz modulating frequency and has a modulation index of 50. The deviation is
a. 500 Hz
b. 1000 Hz
c. 1250 Hz
d. 25000 Hz

88. Match List I with List II and select the correct answer:
List I (Modulation / reception techniques)
A. Super heterodyne receiver
B. FM
C. PCM
D. Delta modulation
List II (Disadvantages)
1. Threshold effect
2. Granular noise
3. Image frequency interference
4. Quantization noise
Codes;

| | A | B | C | D |
|---|---|---|---|---|
| a. | 1 | 3 | 4 | 2 |
| b. | 3 | 1 | 4 | 2 |
| c. | 1 | 3 | 2 | 4 |
| d. | 3 | 1 | 2 | 4 |

89. Consider a binary Hamming code of block length 31 and code rate equal to (26/31). Its minimum distance is
a. 3
b. 5
c. 26
d. 31

90. A satellite channel can be fairly accurately modelled as a
a. random delay channel
b. panic button channel
c. additive white Gaussian noise channel
d. fading channel

91. One, disadvantage of adaptive delta modulation over linear delta modulation is that it
a. requires more bandwidth
b. is more vulnerable to channel errors
c. requires a large number of comparators in the encoder
d. is not suitable for signals with periodic components

92. An MTI radar is operating at the wavelength of $5 \times 10^{-2}$ m and the pulse repetition frequency (PRF) is 1000. Then the first blind speed (in m/s) occurs at
a. 25
b. 50
c. 500
d. 1000

93. Consider the following statements:
If the maximum range of a radar has to be doubled,
1. the peak transmitted power may be increased 16 fold

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2. the antenna diameter may be doubled
3. the sensitivity of the receiver may be doubled
4. the transmitted pulse width may be doubled

Which of these statements are correct?

a. 1 and 2
b. 2 and 3
c. 3 and 4
d. 1 and 4

94. With reference to a pulsed radar match List I (Problem) with List II (Causes) and select the correct answer:

List I (Problem)

A. Second time around echo
B. Blind speeds
C. Inadequate range resolution
D. False –alarms

List II (Causes)

1. Broad transmitted pulse
2. Inadequate detection threshold
3. MTI filter
4. Inadequate Inter Pulse period

Codes:

| | A | B | C | D |
|---|---|---|---|---|
| a. | 4 | 3 | 1 | 2 |
| b. | 1 | 2 | 4 | 3 |
| c. | 4 | 2 | 1 | 3 |
| d. | 1 | 3 | 4 | 2 |

95. When cathode of a thyristor is made more positive than its anode

a. all the junctions are reverse biased
b. outer junctions are reverse biased and central one is forward biased
c. outer junctions are forward biased and central one is reverse biased
d. all the junctions are forward biased

96. The sharing of the voltages between thyristors operating in series is influenced by the

a. di/dt capabilities
b. dv/dt capabilities
c. junction temperatures
d. static v - i characteristics and leakage currents

97. R - C snubber is used in parallel with the thyristor to

a. reduce dv/dt across it
b. reduce di/dt through it
c. limit current through the thyristor
d. ensure its conduction after gate signal is removed

98. For a step up d.c. - d.c. chopper with an input d.c. voltage of 220 volts, if the output voltage required is 330 volts and the non-conducting time of thyristor is 100 μs the ON time of thyristor would be

a. 66.6 μs
b. 100 μs
c. 150 μs
d. 200 μs

99. A thyristor controlled reactor is used to get

a. variable resistance
b. variable capacitance
c. variable inductance
d. improved reactor power factor

100. A single-phase full-bridge converter with a free wheeling diode feeds an inductive load. The load resistance is 15.53Ω and it has a large inductance providing constant and ripple free d.c. current. Input to converter is from an ideal 230 V, 50 Hz single phase source. For a firing delay angle of 60°, the average value of diode current is

a. 10 A
b. 8.165 A
c. 5.774 A
d. 3.33 A

101. The operation of an inverter fed induction motor can be shifted from motoring to regenerative braking by

a. reversing phase sequence
b. reducing inverter voltage
c. decreasing inverter frequency
d. increasing inverter frequency

102. In a three-phase full wave a.c. to d.c. converter, the ratio of output ripple-frequency to the supply-voltage frequency is

a. 2
b. 3
c. 6
d. 12

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103. A 6-phase bridge-converter feeds a purely resistive load. The delay angle $\alpha$ is measured from the point of natural-commutation. The effective control of voltage can be obtained when a lies in the range
   a. $0 \le \alpha \le 105°$
   b. $0 \le \alpha \le 120°$
   c. $0 \le \alpha \le 150°$
   d. $0 \le \alpha \le 180°$

104. a.c. voltage regulators are widely used in
   a. traction drives
   b. fan drives
   c. synchronous motor drives
   d. slip power recovery scheme of slip-ring induction motor

105. When fed from a fully controlled rectifier, a d.c. motor, driving an active load, can operate in
   a. forward motoring and reverse braking mode
   b. forward motoring and forward braking mode
   c. reverse motoring and reverse braking mode
   d. reverse motoring and forward braking mode

106. Compared to a single - phase half-bridge inverter, the output power of a single-phase full-bridge inverter is higher by a factor of
   a. 12
   b. 8
   c. 4
   d. 2

107. In a switched-mode power supply (SMPS), after conversion of a.c. supply to a highly filtered d.c. voltage, a switching transistor is switched ON and OFF at a very high speed by a pulse width modulator (PWM) which generates very-high frequency square pulses. The frequency of the pulses is typically in the range of
   a. 100 Hz - 200 Hz
   b. 500 Hz – 1 kHz
   c. 2 kHz – 5 kHz
   d. 20 kHz - 50 kHz

108. How many switches are used to construct a three-phase cycloconverter?
   a. 3
   b. 6
   c. 12
   d. 18

109. A 3-phase cycloconverter is used to obtain a variable- frequency single-phase a.c. output. The single phase a.c. load is 220 V, 60 A at a power factor of 0.6 lagging. The rms value of input voltage per phase required is
   a. 376.2 V
   b. 311.12 V
   c. 266 V
   d. 220 V

110. Assertion (A): Even at no load a large three – phase squirrel- cage. Induction motor is started at reduced voltage.
   Reason (R): If a large three – phase squirrel -cage induction motor with no load is started at full voltage, it is damaged.
   a. Both A and R are true and R is the correct explanation of A
   b. Both A and R are true but R is NOT the correct explanation of A
   c. A is true but R is false
   d. A is false but R is true

111. Assertion (A): A single-phase induction motor is not self-starting.
   Reason (R): A three-phase induction motor is self-starting.
   a. Both A and R are true and R is the correct explanation of A
   b. Both A and R are true but R is NOT the correct explanation of A
   c. A is true but R is false
   d. A is false but R is true

112. Assertion (A): The distribution transformers are designed for minimum core losses.
   Reason (R): Primary windings of distribution transformers are energized throughout the day.
   a. Both A and R are true and R is the correct explanation of A
   b. Both A and R are true but R is NOT the correct explanation of A

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c. A is true but R is false

d. A is false but R is true

113. Assertion (A): The maximum operating temperature of overhead Line conductors made of aluminum or copper is restricted to 75°C.

Reason (R): Conductor temperature beyond 75°C may shatter porcelain insulators.

a. Both A and R are true and R is the correct explanation of A

b. Both A and R are true but R is NOT the correct explanation of A

c. A is true but R is false

d. A is false but R is true

114. Assertion (A): In the modeling of medium and long transmission lines the nominal-it and T circuits are not equivalent to each other.

Reason (R): A star-delta transformation can be used to derive the one circuit from the other.

a. Both A and R are true and R is the correct explanation of A

b. Both A and R are true but R is NOT the correct explanation of A

c. A is true but R is false

d. A is false but R is true

115. Assertion (A): When a Line -to-Line (L-L) faults takes place at the terminals of an open-circuited generator, phase voltages are sometimes 'indeterminate' though line -to- line voltages are always determinable.

Reason (R): During a line-to-line fault, zero-sequence voltage is always indeterminate.

a. Both A and R are true and R is the correct explanation of A

b. Both A and R are true but R is NOT the correct explanation of A

c. A is true but R is false

d. A is false but R is true

116. Assertion (A): In L. P. S. (Longitudinal Power Supply) system, the voltage regulation is generally poor?

Reason (R): L. P. S. system has low level of short-circuit M. V.A.

a. Both A and R are true and R is the correct explanation of A

b. Both A and R are true but R is NOT the correct explanation of A

c. A is true but R is false

d. A is false but R is true

117. Assertion (A): A tunnel diode can be used as an oscillator.

Reason (R): Voltage controlled negative resistance is exhibited by a tunnel diode.

a. Both A and R are true and R is the correct explanation of A

b. Both A and R are true but R is NOT the correct explanation of A

c. A is true but R is false

d. A is false but R is true

118. Assertion (A): The intrinsic carrier concentration of Si at room temperature is more than that of GaAs.

Reason (R): Si is an indirect bandgap semiconductor while GaAs is a direct bandgap semiconductor.

a. Both A and R are true and R is the correct explanation of A

b. Both A and R are true but R is NOT the correct explanation of A

c. A is true but R is false

d. A is false but R is true

119. Assertion (A): Slope overload is a problem in D.P.C.M.

Reason (R): D. P.C. M. makes use of adjacent sample correlations.

a. Both A and R are true and R is the correct explanation of A

b. Both A and R are true but R is NOT the correct explanation of A

c. A is true but R is false

d. A is false but R is true

120. Assertion (A): Thermal noise in metallic resistors can be characterized by Gaussian probability density function.

Reason (R) Power spectral density of thermal noise is essentially constant for a very large frequency range.

a. Both A and R are true and R is the correct explanation of A

b. Both A and R are true but R is NOT the correct explanation of A

c. A is true but R is false

d. A is false but R is true

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