

ELECTRICAL ENGINEERING

PAPER-II

1. Match List-I with List-II and select the correct answer using the code given below the list:

List -I

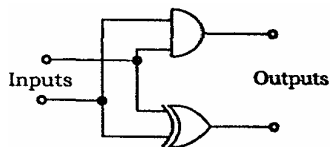
(Logic Circuit/function)

- A. D flip-flop
- B. T flip-flop
- C. Exclusive
- D. Half -adder

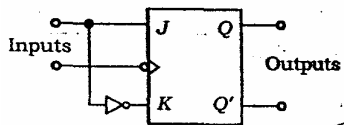
List II

(Circuit realization)

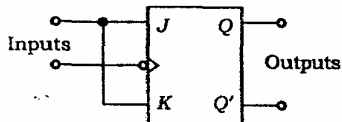
1.



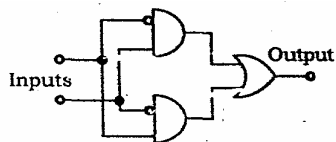
2.



3.



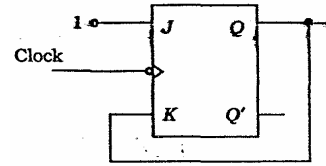
4.



Code:

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

2.



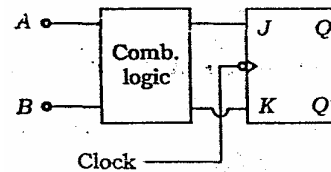
In the circuit given in the above figure, $Q = 0$ initially. What shall be the subsequent states of Q when clock pulses are given?

- a. 1, 0, 1, 0, ...
- b. 0, 0, 0, 0, ...
- c. 1, 1, 1, 1, ...
- d. 0, 1, 0, 1, ...

3.

The following truth table has to be realized with the circuit shown in the figure:

A	B	Q_{n+1}
0	0	Q'_n
0	1	1
1	0	Q_n
1	1	0



What is the output of the combinational logic circuit to the J input?

- a. \overline{AB}
- b. \overline{A}
- c. \overline{B}
- d. AB

4.

A J-K flip-flop can be made form an S-R flip-flop by using two additional

- a. NAND gates
- b. OR gates
- c. NOT gates
- d. NOR gates

5.

Three devices P, Q and R have to be connected to an 8085 microprocessor. Device P has the highest priority and device R has the lowest priority. In this

- context, which of the following is the correct assignment of interrupt inputs?
- P uses TRAP, Q uses RST 5.5 and R uses RST 6.5
 - P uses RST 5.5, Q uses RST 6.5 and R uses RST 7.5
 - P uses RST 7.5, Q uses RST 6.5 and R uses RST 5.5
 - P uses RST 5.5, Q uses RST 6.5 and R uses TRAP
6. The content of the program counter of an Intel 8085A microprocessor specifies which one of the following?
- The address of the instruction being executed
 - The address of the instruction executed earlier
 - The address of the next instruction to be executed
 - The number of instructions executed so far
7. Match List-I with List-II and select the correct answer using the code given below the lists:
- List-I
(Semiconductor technology)
- TTL
 - ECL
 - NMOS
 - CMOS
- List II
(Characteristic)
- Maximum power consumption
 - Highest packing density
 - Least power consumption
 - Saturated logic
- Code:
- | | A | B | C | D |
|----|---|---|---|---|
| a. | 1 | 4 | 2 | 3 |
| b. | 4 | 1 | 2 | 3 |
| c. | 1 | 4 | 3 | 2 |
| d. | 4 | 1 | 3 | 2 |
8. Both the ALU and control section of CPU employ which special purpose storage locations?
- Buffers
 - Decoders
 - Accumulators
 - Registers
9. In an Intel 8085 A, what is the content of the instruction register (IR)?
- Op-code for the instruction being executed
 - Operand for the instruction being executed
 - Op-code for the instruction to be executed next
 - Operand for the instruction to be executed next
10. In an Intel 8085A microprocessor, why is ready signal used?
- To indicate to user that the microprocessor is working and is ready for use
 - To provide proper WAIT states when the microprocessor is communicating with a slow peripheral device
 - To slow down a fast peripheral device so as to communicate at the microprocessor's speed
 - None of the above
11. In an Intel 8085A, which is always the first machine cycle of an instruction?
- An op-code fetch cycle
 - A memory read cycle
 - A memory write cycle
 - An I/O read cycle
12. The addressing mode used in the instruction JMP F 347H in case of an Intel 8085A microprocessor is which one of the following?
- Direct
 - Register-indirect
 - Implicit
 - Immediate
13. What is the number of machine cycles in the instruction LDA 2000 H that consists of thirteen states?
- 2
 - 3
 - 4
 - 5
14. Match list-I with list-II and select the correct answer using the code given below the lists:
- List-I
(Feature of Instruction)

- A. Maskable interrupt
- B. Signal
- C. Instruction
- D. Memory location 002C H

List-II

(Instruction)

1. RST 5.5
2. XTHL
3. SID
4. RST 6.5

Code:

	A	B	C	D
b.	4	1	2	3
c.	2	3	4	1
d.	4	3	2	1
e.	2	1	4	3

15. An Intel 8085A microprocessor is operated at a frequency of 2 MHz. If the instruction LXI H, E000 H that takes ten T states, is executed, then what is the instruction cycle time?

- a. 10 μ s
- b. 5 μ s
- c. 4 μ s
- d. 2.5 μ s

16. For a single-phase a.c. to d.c. controlled rectifier to operate in regenerative mode, which of the following conditions should be satisfied?

- a. Half -controlled bridge, $\alpha < 90^\circ$, source of e.m.f. in load
- b. Half-controlled bridge, $\alpha > 90^\circ$, source of e.m.f. in load
- c. Full-controlled bridge, $\alpha > 90^\circ$, source of e.m.f. in load
- d. Full-controlled bridge, $\alpha < 90^\circ$, source of e.m.f. in load

17. A half-controlled bridge converter is operating from an r.m.s. input voltage of 120V. neglecting the voltage drops, what are the mean load voltage at a firing delay angle of 0° and 180° , respectively?

- a. $\frac{120 \times 2\sqrt{2}}{\pi}$ V and 0
- b. 0 and $\frac{120 \times 2\sqrt{2}}{\pi}$ V

- c. $\frac{120\sqrt{2}}{\pi}$ V and 0
- d. 0 and $\frac{120\sqrt{2}}{\pi}$ V

18. For a step-down d.c. chopper operating with discontinuous load current, what is the expression for the load voltage? (K is duty ratio of chopper)

- a. $V_0 = V_{d.c} \times K$
- b. $V_0 = V_{d.c} / K$
- c. $V_0 = V_{d.c} / (1-K)$
- d. $V_0 = V_{d.c} (1-K)$

19. An ideal chopper is operating at a frequency of 500 Hz from a 60 V battery input. It is supplying a load having 3 Ω resistance and 9 mH inductance. Assuming the load is shunted by a perfect commutating diode and assuming battery is lossless, what is the mean load current at an on/off ratio of 1/1?

- a. 10 A
- b. 15 A
- c. 20 A
- d. None of the above

20. The maximum junction-temperature of a transistor is 150 $^\circ$ C and the ambient temperature is 25 $^\circ$ C. If the total thermal impedance is 1 $^\circ$ C/W, what is the maximum power dissipation?

- a. 1/175 W
- b. 175 W
- c. 125 W g
- d. 1/125 W

21. Match List-I with List-II and select the correct answer using the code given below the lists:

List-I

(Device)

- A. Triac
- B. Reverse conducting thyristor
- C. Diac

List-II

(Monolithic construction of)

1. Two thyristors in anti-parallel
2. A thyristor and a diode in anti-parallel
3. Two diodes in anti-parallel

Code:

A B C

- a. 1 2 3
 b. 3 2 1
 c. 2 3 1
 d. 3 1 2

22. Consider the following statements about analog communication and multiplexing:

- Noise problem for analog communication has the greatest effect on TDM system.
- Noise problem for analog communication has the least effect on SDM system.

Which of the statements given above is/are correct?

- a. 1 only
 b. 2 only
 c. Both 1 and 2
 d. Neither 1 nor 2

23. Consider the following statements:

- An active satellite is one carrying a receiver, a transmitter and power supplies.
- A passive satellite is simply a metalized sphere reflecting radio signals back to the earth.

Which of the statements given above is/are correct?

- a. 1 only
 b. 2 only
 c. Both 1 and 2
 d. Neither 1 nor 2

24. If the ASCII character H is sent and the character I is received, what type of error is represented?

- a. Single bit
 b. Multiple-bit
 c. Burst
 d. Recoverable

25. In coding theory, if

\bar{L} = average word length of the code word

\bar{L}_{\min} = minimum average word length of the code word

Then what is the efficiency of source-code (n)?

- a. $\sqrt{\frac{\bar{L}_{\min}}{L}}$

b. $\sqrt{\frac{\bar{L}}{\bar{L}_{\min}}}$

c. $\sqrt{\frac{\bar{L}_{\min}}{\bar{L}}}$

d. $\frac{\bar{L}}{\bar{L}_{\min}}$

26. With the increase in the transmission bandwidth, received signal-power in AM and FM will, respectively

- a. Increase, increase
 b. Remain same, increase
 c. Increase, remain same
 d. Remain same, remain same

27. Match list-I with List-II and select the correct answer using the code given below the lists:

List-I
(Modulation)

- A. PSK
 B. FM
 C. AM

List-II
(Detector/Filter)

- Square-law detector
- Ratio detector
- Matched filter

Code:

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

28. Match List-I with List-II and select the correct answer using the code given below the lists:

List-I
(Characteristic)

- A. Capture effect is a characteristic of
 B. Granular noise occurs in
 C. Guard band is required in

List-II
(Modulation)

- FDM
- PCM
- FM

Code:

- | | A | B | C | |
|--|------|---|---|---|
| | a. 3 | 2 | 1 | 35. When TRAP interrupt is triggered in an Intel 8085A, the program control is transferred to which one of the following? |
| | b. 3 | 1 | 2 | a. 0020 H |
| | c. 1 | 2 | 3 | b. 0024 H |
| | d. 1 | 3 | 2 | c. 00 28 H |
| 29. Which signaling scheme is most affected by noise? | | | | d. 00 2C H |
| a. ASK | | | | 36. The stack pointer of an 8085A microprocessor contains ABCD H. |
| b. FSK | | | | PUSH PSW |
| c. PSK | | | | XTHL |
| d. QAM | | | | PUSH D |
| 30. What are the three steps in generating PCM in the correct sequence? | | | | JMP EC 75 H |
| a. Sampling, quantizing and encoding | | | | At the end of the execution of the above instructions, what would be the content of the stack pointer? |
| b. Encoding sampling and quantizing | | | | a. ABCB H |
| c. Sampling encoding and quantizing | | | | b. ABCA H |
| d. Quantizing, sampling and encoding | | | | c. ABC9 H |
| 31. In an AM system, for satisfactory operation, carrier frequency must be n times the bandwidth of message-signal. What is the value of n? | | | | d. ABC8 H |
| a. > 2 | | | | 37. If the HLT instruction of an Intel 8085A microprocessor is executed |
| b. > 5 | | | | a. The microprocessor is disconnected from the system bys till the RESET us pressed |
| c. > 10 | | | | b. The microprocessor halts the execution of the program and returns to the monitor |
| d. > 50 | | | | c. The microprocessor enters into a HALT state and the buses are tri-stated |
| 32. For an AM signal, the bandwidth is 10 kHz and the highest frequency component present is 750 kHz. What is the carrier frequency used for this AM signal? | | | | d. The microprocessor reloads the program counter form the locations 0024 H and 0025 H |
| a. 675 kHz | | | | 38. Consider the following statements: |
| b. 700 kHz | | | | Skewing of rotor slots in a 3 phase induction motor (cage rotor) may |
| c. 705 kHz | | | | 1. Introduce additional leakage reactance |
| d. 710 kHz | | | | 2. Eliminate slot harmonics |
| 33. What is the main object of trellis coding? | | | | Which of the statements given above is/are correct? |
| a. To narrow the bandwidth | | | | a. 1 only |
| b. To simplify modulation | | | | b. 2 only |
| c. To increase the data rate | | | | c. Both 1 and 3 |
| d. To reduce the error rate | | | | d. Neither 1 nor 2 |
| 34. When zero mean Gaussian noise of variance N is applied to an ideal half-wave rectifier, what is the mean square value of the rectified noise? | | | | 39. In the equivalent circuit of a double cage induction motor, the two rotor cages can be considered |
| a. N/4 | | | | a. To be in parallel |
| b. N/2 | | | | b. To be in series-parallel |
| c. N | | | | |
| d. 2N | | | | |

- c. To be in series
d. To be in parallel with stator
40. A 3 phase squirrel-cage induction motor is started by means of a star/delta switch. What is the starting current of the motor?
- 3 times the current with direct on line starting
 - $\frac{1}{3}$ times the current with direct on line starting
 - $\frac{1}{\sqrt{3}}$ times the current with direct on line starting
 - $\sqrt{3}$ times the current with direct on line starting
41. Sludge formation in transformer oil is due to which one of the following?
- Ingress of dust particles and moisture in the oil.
 - Appearance of small fragments of paper, varnish, cotton and other organic materials in the oil
 - Chemical reaction of transformer oil with the insulating materials
 - Oxidation of transformer oil
42. A single-phase transformer rated for 220/440 V, 50 Hz. This frequency operation at rated voltage results in which one of the following?
- Increases of both eddy-current and hysteresis losses
 - Reduction of both eddy-current and hysteresis losses
 - Reduction of hysteresis loss and increase in eddy-current loss
 - Increase of hysteresis loss and no change in the eddy-current loss
43. What is the load at which maximum efficiency occurs in case of a 100 kVA transformer with iron loss of 1 kW and full-load copper loss of 2 kW?
- 100 kVA
 - 70.7 kVA
 - 50.5 kVA
 - 25.2 kVA
44. Match list-I with list-II and select the correct answer using the code given below the lists:
List-I
- (Method of speed control of 3 phase wound-type induction motor)
- Stator voltage control
 - Rotor resistance control
 - Constant volts/Hz control
 - Injection of voltage in rotor circuit
- List-II
(Performance achieved)
- Both speed and p.f. can be controlled
 - Maximum torque remains constant
 - Starting torque decreases
 - Starting torque increases
- Code:
- | | A | B | C | D |
|----|---|---|---|---|
| a. | 2 | 1 | 4 | 3 |
| b. | 4 | 3 | 2 | 1 |
| c. | 2 | 3 | 4 | 1 |
| d. | 4 | 1 | 2 | 3 |
45. Cores of large power transformers are made from which one of the following?
- Hot-rolled steel
 - Cold-rolled non-grain oriented steel
 - Cold-rolled grain oriented steel
 - Ferrite
46. A transformer has a percentage resistance of 2% and percentage reactance of 4%. What are its regulations at power factor 0.8 leading, respectively?
- 4% and - 0.8%
 - 3.2% and - 1.6%
 - 1.6% and - 3.2%
 - 4.8% and - 0.6%
47. The daily energy produced in a thermal power station is 720 MWh at a load factor of 0.6. What is the maximum demand of the station?
- 50 MW
 - 30 MW
 - 72 MW
 - 720 MW
48. Taking the density of water to be 1000 kg/m³, how much power would be developed by a hydroelectric generator unit, assuming 100% efficiency, with 1.0 m head and 1.0 m³/s discharge?
- 2.90 kW
 - 4.45 kW
 - 9.80 kW

- d. 19.60 kW
49. Consider the following statements regarding the nuclear power plans:
1. A thermal reactor needs a moderator material
 2. In a nuclear reactor, multiplication factor is kept almost equal to one.
 3. Nuclear power plants are used as peak load plants only.
- Which of the statement given above are correct?
- a. 1, 2 and 3
 - b. 1 and 2 only
 - c. 2 and 3 only
 - d. 1 and 3 only
50. The full-load copper loss and iron loss of a transformer are 6400 W and 5000 W, respectively. What are the above copper loss and iron loss, respectively at half-load?
- a. 3200 W, 2500W
 - b. 3200 W, 5000W
 - c. 1600 W, 1250 W
 - d. 1600 W, 5000 W
51. In a 3 phase, 5 kV, 5 MVA systems, what is the base impedance?
- a. 5 ohms
 - b. 50 ohms
 - c. 500 ohms
 - d. 0.5ohm
52. Match list-I with list-II and select the correct answer using the code given below the lists:
- List-I
- A. Transient stability improvement
 - B. Economic dispatch
 - C. Load frequency control
 - D. Dynamic stability
- List-II
1. Incremental transmission loss
 2. Area control error
 3. Power system stabilizers
 4. Turbine fast valving
- Code:
- | | A | B | C | D |
|----|---|---|---|---|
| a. | 2 | 3 | 4 | 1 |
| b. | 4 | 1 | 2 | 3 |
| c. | 2 | 1 | 4 | 3 |
- d. 4 3 2 1
53. Consider the following statements:
1. Equivalent- T circuit of a long line is preferred to equivalent - π circuit.
 2. The nature of reactive power compensation is different for peak load and off-peak load conditions.
 3. Ferranti effect is significant only on medium and long lines.
- Which of the statements given above are correct?
- a. 1 and 2 only
 - b. 1 and 3 only
 - c. 2 and 3 only
 - d. 1, 2 and 3
54. For an extra-high voltage overhead transmission line, four conductors are used per phase (in a bundle) at the corners of a square of sides meter. The GMR (geometric mean radius) of each conductor is r_m meter.
- What is the GMR of the bundle conductor?
- a. $(r_m^1 \times s^2 \times \sqrt{2s})^{1/4}$
 - b. $(r_m \times s^3)^{1/4}$
 - c. $(r_m \times 3s^3)^{1/4}$
 - d. $[r_m \times (\sqrt{2s})^3]^{1/4}$
55. When is the Ferranti effect on long overhead lines experienced?
- a. The line is lightly loaded
 - b. The line is heavily loaded
 - c. The line is fully loaded
 - d. The power factor is unity
56. What is the surge impedance loading of a lossless 400 kV, 3-phase, 50Hz overhead line of average of surge impedance of 400 ohms?
- a. 400 MW
 - b. $400\sqrt{3}$ MW
 - c. $400/\sqrt{3}$ MW
 - d. 400 kW
- 57.
-
- The diagram shows a transmission line circuit. On the left, there is a voltage source V and a series impedance. The current I flows through a series capacitor (CB) and a shunt reactor Z_r connected to ground. The line continues to a load Z and a fault F connected to ground. The fault is represented by a vertical line with a lightning bolt symbol.

The figure given above shows a schematic arrangement of a Distance Relay provided with a 'Replica Impedance' Z_r . The CT ratio = I/v and VT ratio = V/v . When a fault occurs on the line being protected, when would the relay operate?

- $Z_r > Z$
- $Z_r < Z$
- $Z_r > Z \cdot I/i$
- $Z_r > Z \cdot V/v$

58. A 50 Hz, 3-phase synchronous generator has inductance per phase of 15 mH. The capacitance of generator and circuit breaker is $0.002 \mu F$. What is its natural frequency of oscillation?

- 29 kHz
- 2.9 kHz
- 290 kHz
- 29 MHz

59. Consider the following statements regarding HVDC power transmission:

- The modern HVDC systems use 12-pulse converters.
- DC systems never use ground or sea return.
- Most of present-day d.c. schemes are two-terminal links.

Which of the statements given above is/are correct?

- 1, 2 and 3
- 1 only
- 2 and 3 only
- 1 and 3 only

60. Two generating stations connected to a load centre having capacity of 50 MVA and 75 MVA deliver 100 MW to the load. The incremental cost of plant 1 is $15 + 0.15P_1$ and that of the plant 2 is $18 + 0.15P_2$. What are the value of P_1 and P_2 , respectively?

- 60 MW and 40 MW
- 50 MW each
- 72 MW and 28 MW
- 30 MW and 70 MW

61. A two-quadrant d.c. to d.c. chopper can operate with which of the following load conditions?

- +ve voltage, +ve current
- ve voltage, +ve current

3. -ve voltage, -ve current

4. +ve voltage, -ve current

Select the correct answer using the code given below:

- 1 only
- 1 and 2 only
- 1 and 4 only
- 3 and 4 only

62.

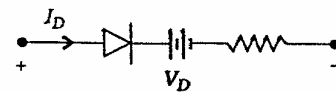


Fig. A

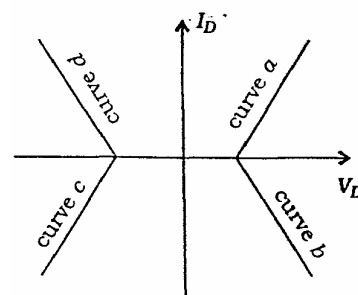


Fig. B

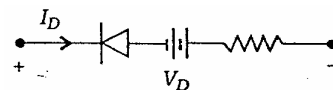


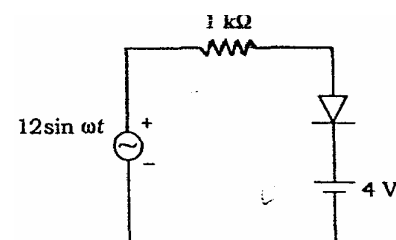
Fig. C

For the circuit shown in Fig. A, the V-I (voltage-current) characteristic of the circuit using ideal components is given by curve *a* in Fig. B.

Which curve in Fig. B represents the V-I characteristic for the circuit shown in Fig C?

- Curve *a*
- Curve *b*
- Curve *c*
- Curve *d*

63.



What is the peak current through the resistor in the circuit given above assuming the diode to be ideal?

- a. 4 mA
b. 8 mA
c. 12 mA
d. 16 mA
64. For a rectifier circuit, percentage voltage regulation is equal to which one of the following?
- a. $\frac{V_{no\ load} - V_{full\ load}}{V_{no\ load}} \times 100$
b. $\frac{V_{no\ load} - V_{full\ load}}{V_{full\ load}} \times 100$
c. $\frac{V_{no\ load} - V_{full\ load}}{V_{no\ load} + V_{full\ load}} \times 100$
d. $\frac{V_{full\ load}}{V_{no\ load}} \times 100$
65. A single-phase current source inverter is connected with capacitive load only. The waveform of the output voltage across the capacitor for constant source current will be
- a. Sine wave
b. Square wave
c. Triangular wave
d. Step function
66. A modern power semiconductor device that combines the characteristics of BJT and MOSFET is
- a. GTO
b. FCT
c. IGBT
d. MCT
67. A digital communication system uses 8-PSK modulation and transmits 3600 bps. What is the symbol rate?
- a. 10800 symbols/sec
b. 450 symbols/sec
c. 28800 symbols/sec
d. 1200 symbols/sec
68. If two resistors of values R_1 and R_2 (at temperatures T_1 and T_2) are connected in series to form a white noise source, the equivalent noise temperature is
- a. $\frac{R_1 T_1 + R_2 T_2}{R_1 + R_2}$
b. $\frac{R_1 T_1 - R_2 T_2}{R_1 + R_2}$
c. $T_1 + T_2$
d. $T_1 \cdot \frac{R_1}{R_2} + T_2 \cdot \frac{R_2}{R_1}$
69. The contents of Program Counter (PC), when the microprocessor is reading from 2FFF H memory location, will be
- a. 2FFE H
b. 2FFF H
c. 3000 H
d. 3001 H
70. Carry flag is not affected after the execution of
- a. ADD B
b. SBB B
c. INR B
d. ORA B
71. Which one is the indirect addressing mode in the following instructions?
- a. LXIH 2050 H
b. MOV A, B
c. LDAX B
d. LDA 2050 H
72. An 8254 programmable interval timer consists of independent 16-bit programmable counters. This number is
- a. 2
b. 3
c. 4
d. 5
73. What are the advantages of switching power supplies over linear power supplies?
1. The devices operate in linear/active region.
 2. The devices operate as switches.
 3. Power losses are less.
- Select the correct answer using the code given below:
- a. 1 and 3 only
b. 2 and 3 only
c. 1 and 2 only
d. 1, 2 and 3
74. Assertion (A): A d.c. motor draws high current at the time of starting.
Reason (R): While starting a d.c. motor, it takes some time to develop a non-zero value of back e.m.f.
- a. Both A and R are individually true and R is the correct explanation of A

- b. Both A and R are individually 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
75. Assertion (A): For a 3-phase alternator operating on leading p.f at full load, the terminal voltage may be more than the no-load induced e.m.f
 Reason (R): At leading power factor, the effect of armature reaction is demagnetizing.
 a. Both A and R are individually true and R is the correct explanation of A
 b. Both A and R are individually 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
76. Assertion (A): AC armature windings are short chording by selecting value of coil span more than the pole pitch.
 Reason (R): Short chording is done to eliminate harmonics in the induced e.m.f.
 a. Both A and R are individually true and R is the correct explanation of A
 b. Both A and R are individually 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
77. Assertion (A): The leakage reactance of a 3-phase induction motor should be small.
 Reason (R): A small value of leakage reactance will increase the maximum power output of motor.
 a. Both A and R are individually true and R is the correct explanation of A
 b. Both A and R are individually 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
78. Assertion (A): Both the efficiency and regulation of a 3-winding ideal transformer are 100%.
 Reason (R): The flux leakage and the magnetic reluctance of the magnetic core in an ideal transformer are zero. Moreover, losses are absent in ideal transformers.
 a. Both A and R are individually true and R is the correct explanation of A
 b. Both A and R are individually 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
79. Assertion (A): The 'short-circuit capacity' of a bus in a large power grid is defined as the product of the pre-fault voltage and the 3-phase fault current at a point very close to the bus.
 Reason (R): The larger the short-circuit capacity, the large would be the equivalent source impedance at the bus.
 a. Both A and R are individually true and R is the correct explanation of A
 b. Both A and R are individually 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
80. Assertion (A): It is not possible to design a current source using operational amplifier.
 Reason (R): Operational amplifier is a voltage controlled voltage source.
 a. Both A and R are individually true and R is the correct explanation of A
 b. Both A and R are individually 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
81. Assertion (A): Each memory cell of a DRAM requires refreshing every 2, 4 or 8 ms or its data will be lost.
 Reason (R): DRAM stores 1s and 0s as charges on a small MOS capacitor which has tendency to leak off charges after a period of time.
 a. Both A and R are individually true and R is the correct explanation of A
 b. Both A and R are individually 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
82. Assertion (A): Bandwidth of angle-modulated signal is infinite.
 Reason (R): Angle modulation of a carrier result in the generation of an infinite number of an infinite number of sidebands.
 a. Both A and R are individually true and R is the correct explanation of A
 b. Both A and R are individually 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

83. Assertion (A): In television transmission, interlaced scanning is used.

Reason (R): Interlaced scanning provides increased picture brightness.

- Both A and R are individually true and R is the correct explanation of A
- Both A and R are individually true but R is not the correct explanation of A
- A is true but R is false
- A is false but R is true

84. Consider the following statements in Johnson counter:

- A MOD-6 Johnson counter requires 3 FFs.
- Johnson counter requires decoding gates.
- To decode each count, one logic gate is used. Each gate requires only two inputs regardless of the number of FFs.

Which of the statements given above are correct?

- 1 and 2 only
- 2 and 3 only
- 1 and 3 only
- 1, 2 and 3

85. What is the simplified form of the Boolean expression $T = (X + Y)(X + Y)(X + Y)$?

- $\bar{X}\bar{Y}$
- $\bar{X}Y$
- XY
- $X\bar{Y}$

86. Match List-I with List-II and select the correct answer using the code given below the Lists:

List-I (Expression - I)

- $ABC + ABC\bar{C} + A\bar{B}C$
- $\bar{A}BC\bar{C} + ABC\bar{C} + BC\bar{C}$
- $\bar{A}BC + A\bar{B}C + ABC\bar{C} + ABC$
- $\bar{A}\bar{B} + \bar{A}B + ABC$

List-II (Expression - II)

- $\bar{A} + BC$
- $A(B + C)$
- $B\bar{C}$
- $AB + BC + AC$

Codes:

- A2, B1, C4, D3
- A4, B3, C2, D1

c. A2, B3, C4, D1

d. A4, B1, C2, D3

87. The AND function can be realized by using only n number of NOR gates. What in n equal to?

- 2
- 3
- 4
- 5

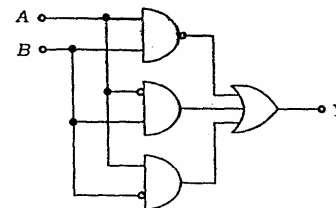
88. The Boolean expression $A.B + \bar{A}.\bar{B}$ is logically equivalent to which of the following?

- $(A + \bar{B}).(\bar{A} + B)$
- $(\bar{A} + \bar{B}).(A + B)$
- $\overline{(A.\bar{B} + \bar{A}.B)}$
- $\overline{(A.B).(\bar{A}.\bar{B})}$

Select the correct answer using the code given below:

- 1 and 2 only
- 2 and 3 only
- 1 and 3 only
- None of the above

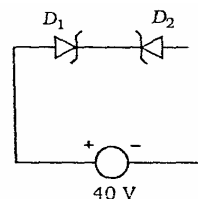
89.



In the given circuit, the output Y equals which one of the following?

- $A + B$
- $\bar{A}B + A\bar{B}$
- AB
- $\bar{A} + \bar{B}$

90.

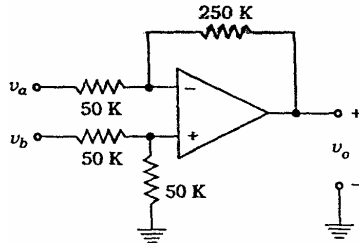


In the circuit given above, the Zener diode D1 has a reverse breakdown voltage of 100 V and reverse saturation current of 25 μA . The corresponding values for D2 are

50 V and $50 \mu A$. What is the current in the circuit?

- $25 \mu A$ anticlockwise
- $25 \mu A$ clockwise
- $50 \mu A$ anticlockwise
- $50 \mu A$ clockwise

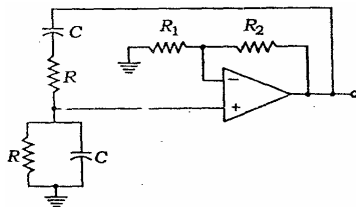
91.



What is the output voltage v_o of the given circuit?

- $-5v_a + 2.5v_b$
- $-5v_a + 3v_b$
- $-2.5v_a + 2.5v_b$
- $-2.5v_a + 3v_b$

92.



Consider the following statements in respect of the Wien bridge oscillator shown in the figure above:

- For $R = 1$ kilohm

$$C = \left(\frac{1}{2\pi} \right) \mu F, f = 1 kHz$$

- For $R = 3$ kilohms

$$C = \left(\frac{1}{18\pi} \right) \mu F, f = 3 kHz$$

Which of the statements given above is/are correct?

- 1 only
- 2 only
- Both 1 and 2
- Neither 1 nor 2

93. Consider the following statements:

- Wien bridge oscillator is suitable for generating 1 kHz.

- Colpitts oscillator is suitable for generating 1 MHz.

Which of the statements given above is/are correct?

- 1 only
- 2 only
- Both 1 and 2
- Neither 1 nor 2

94. A sinusoidal signal of 100 Hz is applied to an amplifier. The output current is $i_o = 20 \sin(628t) + 2 \sin(1256t) + 1 \sin(1256t)$

What is the approximate percentage increase in power due to distortion?

- 1.15
- 1.25
- 1.30
- 1.50

95. A resistance R_f is connected across the collector and base of a BJT amplifier of gain $-A (A > 0)$. The input impedance of the amplifier will consist of transistor internal resistance $r_{b'e}$ shunted by which one of the following?

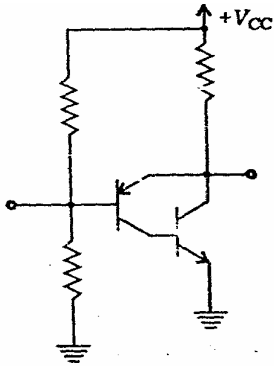
- $R_f(1+A)$
- $R_f(1-A)$
- $R_f/(1+A)$
- $R_f/(1-A)$

96. A negative feedback amplifier with open-loop gain $\frac{-A_0}{1 + j \frac{\omega}{\omega_0}}$ $A_0 > 0$ and feedback

factor $\beta (> 0)$ will have a 3 dB cut-off at what frequency?

- $\omega_0 A_0 \beta$
- $\omega_0 (1 + A_0 \beta)$
- $\omega_0 / (1 + A_0 \beta)$
- $\omega_0 / (1 - A_0 \beta)$

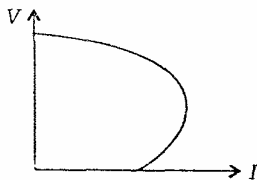
97.



What is the transistor combination shown in the figure given above?

- A Darlington pair
 - A complementary pair
 - It effectively acts as a single p-n-p transistor
 - It effectively acts as a single n-p-n transistor
98. What is the effect of cascading the amplifier stages?
- To increase the voltage gain and increase the bandwidth
 - To increase the voltage gain and reduce the bandwidth
 - To decrease the voltage gain and increase the bandwidth
 - To decrease the voltage gain and reduce the bandwidth

99.



The graph shown above represents which characteristic of a d.c. shunt generator?

- Internal characteristic
 - External characteristic
 - Open-circuit characteristic
 - Magnetic characteristic
100. When is the mechanical power developed by a d.c. motor maximum?
- Back e.m.f is equal to applied voltage
 - Back e.m.f is equal to zero
 - Back e.m.f is equal to half the applied voltage
 - None of the above

101. Match List-I with List-II and select the correct answer using the code given below the Lists:

List – I (DC machine quantity)

- Developed power
- Torque
- Generated e.m.f.
- Speed

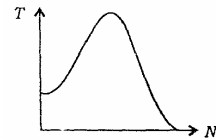
List – II (Relation)

- $\propto N\phi$
- $\propto E_b I_a$
- $\propto E_b / \phi$
- $\propto I_a \phi$

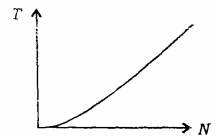
Codes:

- A2, B4, C1, D3
 - A3, B1, C4, D2
 - A2, B1, C4, D3
 - A3, B4, C1, D2
102. A shunt generator has a critical field resistance of 200Ω at a speed of 800 r.p.m. If the speed of the generator is increased to 1000 r.p.m., what is the change in the critical field resistance of the generator?
- Decreases to 160Ω
 - Remains the same at 200Ω
 - Increases to 250Ω
 - Increases to 312.5Ω
103. Which one of the following curves represents the speed-torque characteristic of a d.c. series motor?

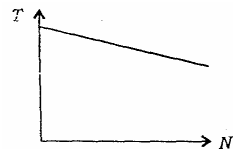
a.



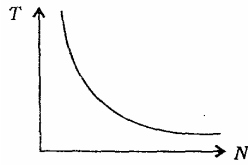
b.



c.



d.



104. Match List – I with List – II in respect of synchronous machines and select the correct answer using the code given below the List:

List-I (Machine characteristic)

- A. Open-circuit characteristic
- B. V-curve
- C. Internal Characteristic
- D. Inverted V-curve

List-II (Quantity)

- 1. p.f. vs. I_f
- 2. E_a vs. I_a
- 3. E_g vs. I_f
- 4. I_a vs. I_f

Code:

- a. A3, B1, C2, D4
- b. A2, B4, C3, D1
- c. A3, B4, C2, D1
- d. A2, B1, C3, D4

105. Which of the following conditions are to be satisfied for proper synchronization of alternators?

- 1. Equal terminal voltage
- 2. Same frequency
- 3. Same phase sequence
- 4. Same kVA rating
- 5. Same phase displacement

Select the correct answer using the code given below:

- a. 1, 3, and 4 only
- b. 1, 2, 4 and 5 only
- c. 2, 3, 4 and 5 only
- d. 1, 2, 3 and 5 only

106. If the excitation of a 3-phase alternator operating on infinite bus bars is changed, which one of the following shall alter?

- a. Active power of machine
- b. Reactive power of machine
- c. Terminal voltage of machine
- d. Frequency of machine

107. The stator of a 3-phase, 6-pole a.c. machine has 45 slots. The stator winding has 45 coils with a coil span of 6 slots.

What type of winding will be selected for this machine?

- a. Double-layer, fractional slot, short-pitched winding
- b. Single-layer, fractional slot, short-pitched winding
- c. Single-layer, integral slot, full-pitch winding
- d. Double-layer, fractional slot, full-pitch winding

108. When are eddy-current losses in a transformer reduced?

- a. If laminations are thick
- b. If the number of turns in primary winding is reduced
- c. If the number of turns in secondary winding is reduced
- d. If laminations are thin

109. Why is a centrifugal switch used in a single-phase induction motor?

- a. To protect the motor from overloading
- b. To improve the starting performance of the motor
- c. To cut off the starting winding at an appropriate instant
- d. To cut in the capacitor during running conditions

110. What is the operating slip of a 400 V, 50 Hz, 6-pole, 3-phase induction motor, while the speed is 936 r.p.m. with a 400 V, 45 Hz, 3-phase supply?

- a. 0.036
- b. 0.064
- c. 0.025
- d. 0.075

111. A 3-phase slip-ring induction motor having negligible stator impedance drives a constant torque load. If an additional resistance is included in the rotor circuit, what does the motor experience?

- a. Increase in both the stator current and the slip
- b. No change in the stator current and increase in the slip
- c. Increase in the stator current and no change in the slip
- d. Decrease in the stator current and increase in the slip

112. Breakdown torque in a 3-phase induction motor of negligible stator impedance is

- a. Directly proportional to rotor resistance
- b. Inversely proportional to rotor resistance
- c. Directly proportional to rotor leakage reactance
- d. Inversely proportional to rotor leakage reactance
113. Match List – I with List – II and select the correct answer using the code given below the Lists:
- List-I
(Controller)
- A. Chopper-controlled resistance in the rotor
- B. Sub-synchronous converter-cascade in the rotor circuit of an induction motor
- C. 3-phase a.c. voltage controller
- D. Cycloconverter
- List-II
(Type of load)
1. Very low speed, high-power reversible drive
2. Centrifuges in sugar industry
3. Blowers and compressors
4. Loads requiring good starting performance
- Code:
- a. A3, B4, C2, D1
- b. A3, B4, B1, D2
- c. A4, B3, C1, D2
- d. A4, B3, C2, D1
114. A cyclo-converter-fed induction motor drive is most suitable for which one of the following?
- a. Compressor drive
- b. Machine tool drive
- c. Paper mill drive
- d. Cement mill drive
115. A large d.c. motor is required to control the speed of blower from a 3-phase a.c. source. What is the most suitable a.c. to d.c. converter?
- a. 3-phase fully controlled bridge converter
- b. 3-phase fully controlled bridge converter with free wheeling diode
- c. 3-phase half-controlled bridge converter
- d. A pair of 3-phase converter in sequence control
116. A single-phase full-bridge inverter is connected to a load of 2.4Ω . The d.c. input voltage is 48 V. What is the r.m.s. output at fundamental frequency?
- a. $\frac{4 \times 48}{\sqrt{2\pi}}V$
- b. $\frac{2 \times 48}{\sqrt{2\pi}}V$
- c. $\frac{4 \times 48}{\pi}V$
- d. $\frac{2 \times 48}{\pi}V$
117. A buck regulator has an input voltage of 12 V and the required output voltage is 5 V. What is the duty cycle of the regulator?
- a. 5/12
- b. 12/5
- c. 5/2
- d. 6
118. A balanced 3-phase induction motor runs at slip S. If ω_s is its synchronous speed, what is the relative speed between the stator m.m.f. and rotor m.m.f.?
- a. $S\omega_s$
- b. $(1-S)\omega_s$
- c. ω_s
- d. Zero
119. Maximum efficiency of modern coal-fired steam-raising thermal power plants is restricted to about 0.35 (a low value), mainly because of
- a. Low alternator efficiency
- b. High energy loss in boilers
- c. Low steam turbine mechanical efficiency
- d. High energy loss from turbine exhaust to condenser
120. Mho relay is usually employed for the protection of
- a. Short lines only
- b. Medium lines only
- c. Long lines only
- d. Any line