

ELECTRICAL ENGINEERING

PAPER-II

1. A coil of 1000 turns is wound on a core. A current of 1 A flowing through the coil creates a core flux of 1 mWb. What is the energy stored in the magnetic field?

- a. $\frac{1}{4}$ J
- b. $\frac{1}{2}$ J
- c. 1 J
- d. 2 J

2. Match List I (Type of Coil) with List II (Use of Coil) and select the correct answer using the code given below the lists;

List I

- A. Sandwich coils
- B. Disc coils
- C. Cross-over coils
- D. Spiral type

List II

1. Low voltage coils for currents above 100 A
2. High voltage windings of small transformers
3. Cooling oil is in contact with each turn of the winding
4. Shell-type transformer core

Codes;

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

3. Match List I (Test) with List II (Quantities) and select the correct answer using the code given below the lists;

List I

- A. O C Test
- B. S C Test

C. Sumpner's Test

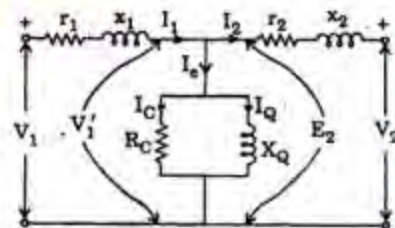
D. Load Test

List II

1. Copper loss and iron loss
2. Total losses
3. Iron loss
4. Copper loss

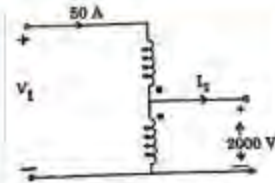
Codes;

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



The exact equivalent circuit of a two-winding transformer is given in the figure given above. For affecting simplification, the parallel magnetising branch, consisting of R_c and X_c is shifted to the left of the primary leakage impedance ($r_1 + jx_1$). This simplification introduces the inaccuracy, in the neglect of:

- a. Voltage-drop in the primary impedance due to the secondary current
- b. Voltage-drop in the primary impedance due to the exciting current
- c. Voltage-drop in the secondary impedance due to the exciting current
- d. Reduction in values of R_c and X_c of the exciting circuit



A single-phase, 10 kVA, 2000/200 V, 50 Hz transformer is connected to form an auto transformer as shown in the figure given above. What are the values of V_1 and I_2 respectively?

- 2200 V, 55 A
- 2200 V, 45 A
- 2000 V, 45 A
- 1800 V, 45 A

6. Three single phase 11000/220 V transformers are connected to form 3-phase transformer bank. High voltage side is connected in star, and low voltage side is in delta. What are the voltage ratings and turn ratio of 3-phase transformer?

- 19052/220V, 50
- 19052/220V, $50\sqrt{3}$
- 11000/381 V, $50\sqrt{3}$
- 11000/220 V, 50

7. If the wave form of the voltage impressed on the primary of a Y — Δ bank contains 5th harmonics, what are the wave forms of the resultant voltages of the primary and the secondary?

Primary	Secondary
a. Peaked	Peaked
b. Peaked	Flat-topped
c. Flat-topped	Peaked
d. Flat-topped	Flat-topped

8. Match List I (Machine) with List II (Test) and select the correct answer using the code given below the lists:

List I

- DC Motors
- Single phase transformers
- 3-phase induction motors
- Salient pole alternators

List II

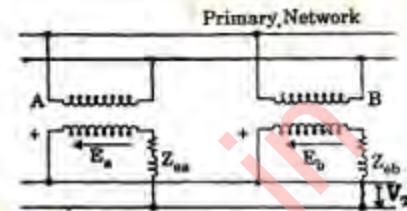
- Slip test
- Blocked rotor test
- Swinburne's test

4. Sumpner's test

Codes;

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

9.



Two single phase transformers A and B are connected in parallel, observing all requirements of a parallel operation, except that the induced voltage E_a is slightly greater than E_b ; Z_{ea} and Z_{eb} being the equivalent impedances of A and B, both referred to the secondary side.

Under this operating condition with the primary bus-bars being energized, a circulating current will flow:

- Only in the secondary windings of A and B
- In both the primary and the secondary windings of A and B
- In both the primary and the secondary windings of A and B, as well as in the primary side network
- In the primary and the secondary windings of A and B, and boost the voltages on the secondary side of both A and B

10. The armature resistance of a 6-pole lap wound d.c. machine is 0.05Ω . If the armature is rewound as a wave-winding, what is the armature resistance?

- 0.45Ω
- 0.30Ω
- 0.15Ω
- 0.10Ω

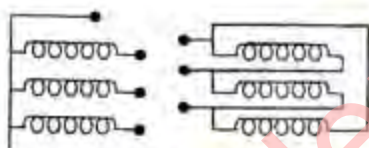
11. In a d.c. compound generator, "flat-compound" characteristic, required for certain applications, may be obtained by connecting a variable resistance:

- a. Across the series field
b. In series with the series field
c. In parallel with the shunt field
d. In series with the shunt field
12. A 6-pole lap wound d.c. machine armature has 720 conductors and it draws 50 A from supply mains. What is the flux distribution produced by the armature reaction per pole?
- a. Rectangular in wave shape with a peak of 500 AT
b. Rectangular in wave shape with a peak of 100 AT
c. Triangular in wave shape with a peak of 500 AT
d. Triangular in wave shape with a peak of 1000 AT
13. Match List I with List II and select the correct answer using the code given below the lists:
- List I (DC Motor)
- A. Cumulatively compound motor
B. Differentially compound motor
C. Series motor
D. Shunt motor
- List II (Characteristic)
1. Fairly constant speed irrespective of the load
2. It may start in reverse direction
3. Definite no-load speed
4. Is never started without load
- Codes:
- | | A | B | C | D |
|----|---|---|---|---|
| a. | 4 | 1 | 3 | 2 |
| b. | 3 | 2 | 4 | 1 |
| c. | 4 | 2 | 3 | 1 |
| d. | 3 | 1 | 4 | 2 |
14. A synchronous motor is operated from a bus voltage of 1.0 pu and is drawing 1.0 pu zero power factor leading current. Its synchronous reactance is 0.5 pu. What is the excitation emf of the motor?
- a. 2.0
b. 1.5
c. 1.0
d. 0.5
15. In the measurement of X_d , X_q (in ohms), following data are obtained by the slip test on a salient pole machine:
- $I_d \text{ max} = 10 \text{ A}$ $I_d \text{ min} = 6.5 \text{ A}$
 $V_d \text{ max} = 30 \text{ V}$ $V_d \text{ min} = 25 \text{ V}$
- Which one of the following is correct?
- a. $X_d = 3$, $X_q = 3.86$
b. $X_d = 4.615$, $X_q = 2.5$
c. $X_d = 3$, $X_q = 2.5$
d. $X_d = 4.61$, $X_q = 3.86$
16. What are the conditions to be satisfied for alternator to be synchronized with an incoming supply?
1. Equal voltage
2. Equal frequency
3. Same power rating
4. Same phase sequence
- Select the correct answer using the code given below:
- a. 2, 3 and 4
b. 3 and 4
c. 1, 2 and 3
d. 1, 2 and 4
17. The stator and the rotor of a 3-phase, 4-pole wound-rotor induction motor are excited, respectively, from a 50 Hz and a 30 Hz source of appropriate voltage. Neglecting all losses, what is/are the possible no-load speed/speeds at which the motor would run?
- a. 1500 rpm and 900 rpm
b. 2400 rpm and 600 rpm
c. 2400 rpm only
d. 600 rpm only
18. A starting torque of 80 Nm is developed in an induction motor by an auto-transformer starter with a tapping of 30%. If the tapping of auto-transformer starter is 60%, then what is the starting torque?
- a. 40 Nm
b. 160 Nm
c. 240 Nm
d. 320 Nm
19. Which of the following methods are suitable for the speed control of squirrel cage induction motors?

1. Voltage control
2. Rotor resistance control
3. Frequency control
4. Pole changing method

Select the correct answer using the codes given below:

- a. 2, 3 and 4
 - b. 1, 3 and 4
 - c. 1, 2 and 3
 - d. 2 and 4
20. A capacitor-start single-phase inductor motor is used for:
- a. Easy to start loads
 - b. Medium start loads
 - c. Hard to start loads
 - d. Any type of start loads
21. In hand-tool applications, which one of the following single phase motors is used?
- a. Shaded pole motor
 - b. Capacitor start motor
 - c. Capacitor run motor
 - d. AC series motor
- 22.



What is the phase displacement between primary and secondary voltages for a star-delta, 3-phase transformer connection shown above?

- a. 30° lagging
 - b. 30° leading
 - c. 0°
 - d. 180°
23. What is the shunt resistance component in equivalent circuit obtained by no load test of an induction motor representative of?
- a. Windage and frictional losses only
 - b. Core losses only
 - c. Core, windage and frictional losses
 - d. Copper losses
24. A 400 V D.C. shunt motor takes 5 A at no-load. $R_a = 0.5$ ohms, $R_f = 200$ ohms. What is the ratio of speed from full load to no-

load, when the D.C. shunt motor takes 50 A on full load?

- a. 0.94
 - b. 0.8
 - c. 0.6
 - d. 0.4
25. A linear ac servomotor must have:
- a. High rotor resistance
 - b. High rotor reactance
 - c. A large air gap
 - d. Both high rotor resistance and reactance
26. A wound rotor induction motor runs with a slip of 0.03 when developing full load torque. Its rotor resistance is 0.25 ohm per phase. If an external resistance of 0.50 ohm per phase is connected across the slip rings, what is the slip for full torque?
- a. 0.03
 - b. 0.06
 - c. 0.09
 - d. 0.1
27. Match List I (Characteristics) with List II (Relation) and select the correct answer using the code given below the lists
- List I
- A. Open circuit characteristics
 - B. Internal characteristics
 - C. External characteristics
 - D. Load saturation curve
- List II
1. V v. I_f
 2. E_0 v. I_f
 3. E v. I_a
 4. V v. I
- 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 |
28. In the block diagram of a separately excited dc motor, how does the armature induced emf appear as?
- a. Positive feedback

- b. Negative feedback
- c. Disturbance input
- d. Output

29. A Buchholz relay is used for:
- a. Protection of a transformer against all internal faults
 - b. Protection of a transformer against external faults
 - c. Protection of a transformer against both internal and external faults
 - d. Protection of induction motors

30. On what basis is the insulation level of a 400 kV, EHV overhead transmission line decided?

- a. Lightning over voltage
- b. Corona inception voltage
- c. Switching over voltage
- d. Radio and TV interference

31. On which one of the following cycles does a modern steam power plant work?

- a. Carnot cycle
- b. Rankine cycle
- c. Otto cycle
- d. Bell-Coleman cycle

32. Match List I (Classification of Head) with List II (Type of Turbines) and select the correct answer using the code given below the lists:

List I

- A. Low head, 2 – 15 m
- B. Medium head, 15 – 70 m
- C. High head, 70 – 500 m
- D. Very high head > 500 m

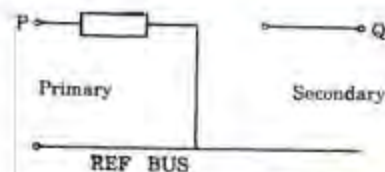
List II

- 1. Propeller or Kaplan
- 2. Kaplan or Francis
- 3. Pelton
- 4. Francis or Pelton

Codes:

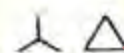
- | | A | B | C | D |
|----|---|---|---|---|
| a. | 1 | 3 | 4 | 2 |
| b. | 4 | 2 | 1 | 3 |
| c. | 1 | 2 | 4 | 3 |
| d. | 4 | 3 | 1 | 2 |

33.



A zero-sequence network of a 3-phase transformer is given above. Z_0 is the zero-sequence impedance of the transformer. What is the type of transformer connections?

a.



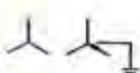
b.



c.



d.



34. The charging reactance of 50 km length of the line is 1500Ω . What is the charging reactance for 100 km length of the line?

- a. 1500Ω
- b. 3000Ω
- c. 750Ω
- d. 600Ω

35. Equivalent π model is quite suitable for analyzing the performance of transmission line of

- a. 50 km length
- b. 150 km length
- c. 250 km length
- d. All of the above lengths

36. Consider the following statements in respect of load flow studies in power systems:

- 1. Bus admittance matrix is a sparse matrix.
- 2. Gauss-Seidel method is preferred over Newton-Raphson method for load flow studies.

3. One of the buses is taken as slack bus in load flow studies.

Which of the statements given above are correct?

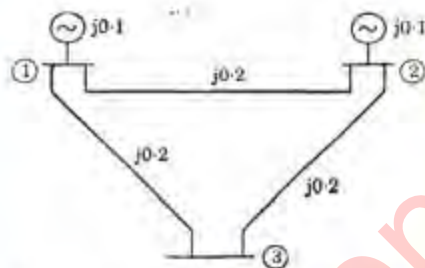
- a. 1, 2 and 3
- b. 1 and 2
- c. 1 and 3
- d. 2 and 3

37. Buses for load flow studies are classified as: (i) Load bus (ii) PV bus (iii) Slack Bus

Which one of the following is the correct combination of the pair of quantities specified having their usual meaning for different buses?

Load bus	PV bus	Slack bus
a. $P, v $	P, Q	P, δ
b. P, Q	$P, v $	$ v , \delta$
c. $ v , Q$	P, δ	P, Q
d. P, δ	$Q, v $	Q, δ

38.



A sample power system network is shown in the figure given above. The reactances marked are in pu. What is the pu value of Y_{22} of the Bus Admittance Matrix (Y_{BUS})?

- a. $j 10.0$
- b. $j 0.4$
- c. $-j 0.1$
- d. $-j 20.0$

39. The direct axis reactance X_d of a synchronous generator is given as 0.4 Pu based on the generator's name plate rating of 10 kV, 75 MVA. The base for calculation is 11 kV, 100 MVA. What is the pu value of X_d on the new base?

- a. 0.279
- b. 0.578
- c. 0.412
- d. 0.44

40. A fault occurring at the terminals of an unloaded synchronous generator operating at its rated voltage has resulted in the following values of currents and voltages:

$$I_{a0} = j 2.37 \text{ pu,}$$

$$I_{a1} = -j 3.05 \text{ pu, } I_{a2} = j = 0.68 \text{ pu,}$$

$$V_{a0} = V_{a1} = V_{a2} = 0.237 \text{ pu}$$

Which one of the following faults has occurred?

- a. L - L fault
- b. L - G fault
- c. L - L - G fault
- d. L - L - L fault

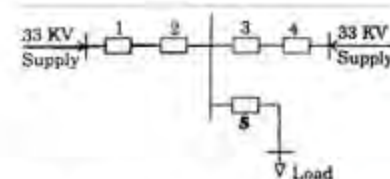
41. For 800 MJ stored energy in the rotor at synchronous speed, what is the inertia constant H for a 50 Hz, four pole turbo-generator rated 100 MVA, 11kV?

- a. 2.0 MJ/MVA
- b. 4.0 MJ/MVA
- c. 6.0 MJ/MVA
- d. 8.0 MJ/MVA

42. A 50 Hz, 17.32 kV generators is connected to a power system. The system reactance and capacitance per phase are 10 mH and 0.02 mF, respectively. What is the maximum voltage across the contents of the circuit breaker at an instant when it passes through zero?

- a. 28.28 kV
- b. 29.28 kV
- c. 30.28 kV
- d. 31.28 kV

43.



The distribution system shown in figure given above is to be protected by over current system of protection.

At which locations are directional over current relays required for proper fault discrimination?

- a. 1 and 4
- b. 2 and 3

c. 1, 4 and 5

d. 2, 3 and 5

44. Match List I (Relay) with List II (Protected Power system Component) and select the correct answer using the code given below the lists:

List I

- A. Distance relay
B. Under frequency relay
C. Differential relay
D. Buchholz relay

List II

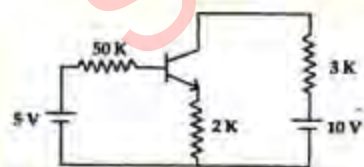
1. Transformers
2. Turbines
3. Busbars
4. Shunt capacitors
5. Alternators
6. Transmission lines

Codes;

	A	B	C	D
a.	6	5	3	1
b.	3	1	4	2
c.	6	1	3	2
d.	3	5	4	1

45. Which type of connection is employed for current transformers for the protection of star-delta connected 3-phase transformer?
- a. Delta-delta
b. Star-star
c. Star-delta
d. Delta star

46.



For the circuit shown in figure given above, assume $\beta = h_{FE} = 100$. The transistor is in

- a. Active region and $V_{CE} = 5\text{ V}$
b. Saturation region
c. Active region and $V_{CE} = 1.42\text{ V}$
d. Cut-off region

47. Two p-n junction diodes are connected back to back to make a transistor. Which one of the following is correct?

- a. The current gain of such a transistor will be high
b. The current gain of such a transistor will be moderate
c. It cannot be used as a transistor due to large base width
d. It can be used only for pnp transistor

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

List I

- A. Modified during fetch phase
B. Holds subscripts of arrays
C. Needed by the DEBUG program
D. Calculates addresses of data in data-segment

List II

1. DI
2. DS
3. IP
4. TF

Codes;

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

49. Consider the following statements about register indirect addressing:

1. It helps in writing code that executes faster.
2. It helps in writing compact code.
3. It allows reuse of memory CPU data transfer instruction.
4. It is essential for stack operations.

Which of the statements given above are correct?

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

50. Which of the following does not take place when 8085 processor is reset?

- a. 8055 gives reset out signal to reset external hardware
- b. 8085 resets program counter to FFFFH
- c. The interrupt system is disabled
- d. The busses are tristated

51. Memory chips of four different sizes as below are available:

- 1. $32\text{ k} \times 4$
- 2. $32\text{ k} \times 16$
- 3. $8\text{ k} \times 8$
- 4. $16\text{ k} \times 4$

All the memory chips as mentioned in the above list are Read/Write memory. What minimal combination of chips or chip alone can map full address space of 8085 microprocessor?

- a. 1 and 2
- b. 1 only
- c. 2 only
- d. 4 only

52. A good assembly language programmer should use general purpose registers rather than memory in maximum possible ways for data processing. This is because:

- a. Data processing with registers is easier than with memory
- b. Data processing with memory requires more instructions in the program than that with registers
- c. Of limited set of instructions for data processing with memory
- d. Data processing with registers takes fewer cycles than that with memory.

53. Which of the following notations have two representations of zero?

- 1. 1's complement with radix of number being 2
- 2. 7's complement with radix of number being 8
- 3. 9's complement with radix of number being 10
- 4. 10's complement with radix of number being 10

Select the correct answer using the code given below:

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

54. Consider the following 8085 instructions:

ANA A, ORA A, XRA A, SUB A, CMP A.

Now, consider the following statements:

- 1. All are arithmetic and logic instructions.
- 2. All cause the accumulator to be cleared irrespective of its original contents.
- 3. All reset the carry flag.
- 4. All of them are 1-byte instructions.

Which of the statements given above is/are correct?

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

55. INR instruction of 8085 does not affect carry flag. Which of the following is correct about INR instruction?

- a. Overflow cannot be detected
- b. Overflow can be detected
- c. If a programme requires overflow to be detected, ADD instruction should be used instead of INR
- d. It can be used to increase the contents of the BC register pair

56. Which of the following is not correct?

- a. Bus is a group of wires
- b. Bootstrap is a technique or device for loading first instruction
- c. An instruction is a set of bits that defines a computer operation
- d. An interrupt signal is required at the start of every program

57. The interrupt vector table IVT of 8086 contains

- a. The contents of CS and IP of the main program address to which the interrupt has occurred
- b. The contents of CS and IP of the main program address to which the control has to come back after the service routine

- c. The starting CS and IP values of the interrupt service routine.
 d. The starting address of the IVT
58. Consider the following statements:
 1. A total of about one million bytes can be directly addressed by the 8086 microprocessor.
 2. 8086 has thirteen 16-bit registers.
 3. 8086 has eight flags. V
 4. Compared to 8086, the 80286 provides a higher degree of memory protection.
 Which one of the statements given above is correct?
 a. 2, 3 and 4
 b. 1, 3 and 4
 c. 1, 2 and 4
 d. 1, 2 and 3
59. The following sequences of instructions are executed by an 8085 microprocessor:
 1000 LXI SP, 27FF
 1003 CALL 1006
 1006 POPH
 What are the contents of the stack pointer (SP) and the HL register pair on completion of execution of these instructions?
 a. SP = 27 FF, HL = 1003
 b. SP = 27 FD, HL = 1003
 c. SP = 27 FF, HL = 1006
 d. SP = 27 FD, HL = 1006
60. Consider the program given below, which transfers a block of data from one place in memory to another:
 MVIC OBH
 LXIH 2400
 LXID 3400
 LI:MOV AM
 STAX D
 INR L
 INRE
 DCRC
 JNZ LI
 What is the total number of memory accesses (including instruction fetches) carried out
 a. 118
 b. 140
 c. 98
 d. 108
61. When an 8086 executes an INT type instruction, it:
 a. Resets both IF and TF flags
 b. Resets all flags
 c. Sets both IF and TF
 d. Resets the CF and TF
62. An AM voltage signal $s(t)$, with a carrier frequency of 1.15 GHz has a complex envelope $g(t) = A_c [1 + m(t)]$, $A_c = 500$ V, and the modulation is a 1 kHz sinusoidal test tone described by
 $m(t) = 0.8 \sin(2\pi \cdot 10^3 t)$,
 appears across a 50Ω resistive load. What is the actual power dissipated in the load?
 a. 165 kW
 b. 82.5 kW
 c. 3.3 kW
 d. 6.6 kW
63. A broadcast AM radio transmitter radiates 125 kW when the modulation percentage is 70. How much of this is carrier power?
 a. ≈ 25 kW
 b. ≈ 50 kW
 c. ≈ 75 kW
 d. ≈ 100 kW
64. When a radio receiver is tuned to 555 kHz, its local oscillator provides the mixer with an input at 1010 kHz. At the output, another signal is also received along with the desired signal. What is the frequency of the other station?
 a. 910 kHz
 b. 355 kHz
 c. 455 kHz
 d. 1465 kHz
65. Which of the following is not a component of PLL?
 a. Frequency multiplier
 b. Phase detector
 c. VXD
 d. Loop filter

66. Which of the following modulated signals can be detected by an envelope detector?

- DSB-suppressed carrier
- DSB-full carrier
- Frequency modulated signal
- SSB-suppressed carrier

67. A given AM broadcast station transmits an average carrier power output of 40 kW and uses a modulation index of 0.707 for sine wave modulation. What is the maximum (peak) amplitude of the output if the antenna is represented by a 50Ω resistive load?

- 50 V
- 50 kV
- 3.414 kV
- 28.28 kV

68. A microphone with inbuilt amplifier has an output noise level in a very quiet room of about $30 \mu\text{V rms}$. The maximum output level is about 300 mV rms before severe distortion occurs. What dynamic range does this represent in dB?

- 4dB
- 36dB
- 40dB
- 80dB

69. Which one of the following statements is correct?

Noise has the greatest effect in a communication system when it interferes with the signal

- in the transmitter
- in the channel
- in the receiver
- in the transducer

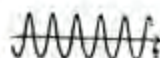
70. Match List I (Signal) with List II (Spectrum) and select the correct answer using the code given below the lists:

List I

A.

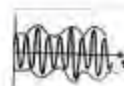


B.



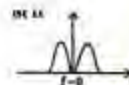
C. Speech Signal

D.

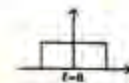


List II

1.



2.



3.



4.



Codes:

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

71. A converter which can operate both in 3-pulse and 6-pulse modes is a

- 1-phase full converter
- 3-phase half-wave converter
- 3-phase semi converter
- 3-phase full converter

72. Analog data having highest harmonic at 30 kHz generated by a sensor has been digitized using 6-level PCM. What will be the rate of digital signal generated?

- 120 kbps
- 200 kbps
- 240 kbps
- 180 kbps

73. The channel capacity of a noiseless channel is equal to

- Rate at which information is transmitted
- Signaling speed
- Bandwidth

74. Match List I (Coding Technique in Digital Communication Systems) with List II (Purpose) and select the correct answer using the code given below the lists:

List I

- A. Huffman code
- B. Error correcting code
- C. NRZ-coding
- D. Delta modulation

List II

- 1. Elimination of redundancy
- 2. Reduces bit rate
- 3. Adapts the transmitted signal to the line
- 4. Channel coding

Codes;

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

75. To overcome slope overload problem, which type of the integrator is used in delta modulation?

- a. Fixed slope integrator
- b. Variable slope integrator
- c. Linear slope integrator
- d. Bipolar integrator

76. Quantization noise occurs in

- a. Pulse amplitude modulation
- b. Pulse width modulation
- c. Pulse code modulation
- d. Pulse position modulation

77. A gate turn off (GTO) thyristor has capacity to

- a. Amplify the gate-current
- b. Turn-off when positive current pulse is given at the gate
- c. Turn-off when a gate-pulse is given at the gate even though it is reverse biased
- d. Turn-off when a negative current pulse is given at the gate

78. Power electronic device with poor turn-off gain is

- a. A symmetrical thyristor
- b. A conventional thyristor
- c. Power bipolar junction transistor
- d. Gate turn-off thyristor

79. Match List I (Limiting Factor) with List II (Safe Operating Area Portion) and select the correct answer using the code given below the lists:

List I

- A. The peak voltage limit
- B. Secondary breakdown limit.
- C. Power dissipation limit.
- D. Peak Current limit.

List II

- 1. PQ
- 2. QR
- 3. RS
- 4. ST

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



80. Which one of the following statements is not correct?

- a. Power MOSFETs are so constructed as to avoid punch through
- b. In a power MOSFET, the channel length is relatively large and channel width is relatively small
- c. Power MOSFETs do not experience any minority carrier storage
- d. Power MOSFETs can be put in parallel to handle larger currents

81. Carrier frequency gate drive is used for turn-on of a thyristor to reduce

- a. di/dt
- b. Turn-on time
- c. dv/dt
- d. Size of pulse transformer

82. In a thyristor, di/dt protection is achieved by the use of

- a. An inductance L in series with the thyristor
 b. A resistor in series with the thyristor
 c. RC in series with the thyristor
 d. RL in series with the thyristor
83. The circulating current inductor is required in a dual converter to
 a. Improve the p.f.
 b. Smoothen the waveform of circulating current
 c. Limit the circulating current
 d. Increase the circulating current
84. In a single-phase semi converter, with discontinuous conduction and extinction angle $\beta < \pi$, freewheeling action takes place for
 a. α
 b. $\pi - \beta$
 c. $\beta - \pi$
 d. Zero degree
85. A three pulse converter is feeding a purely resistive load. What is the value of firing delay angle α , which dictates the boundary between continuous and discontinuous mode of current conduction?
 a. $\alpha = 0^\circ$
 b. $\alpha = 30^\circ$
 c. $\alpha = 60^\circ$
 d. $\alpha = 150^\circ$
86. For a single phase a.c. voltage controller feeding a resistive load, what is the power factor?
 (where α is firing angle measured from voltage zero.)
 a. Unity for all values of firing angle
 b. $\left[\frac{1}{\pi} \left((\pi - \alpha) + \frac{1}{2} \sin 2\alpha \right) \right]^{1/2}$
 c. $\left[\frac{1}{\pi} \left((\pi + \alpha) + \frac{1}{2} \sin 2\alpha \right) \right]^{1/2}$
 d. $\left[\frac{1}{\pi} \left((\pi + \alpha) - \frac{1}{2} \sin 2\alpha \right) \right]^{1/2}$
87. Triacs cannot be used in AC voltage regulator for a
 a. Resistive load
 b. Back emf load
 c. Inductive load
 d. Resistive inductive load
88. A motor armature supplied through phase controlled SCRs receives a smoother voltage shape at
 a. High motor speed
 b. Low motor speed
 c. Rated motor speed
 d. None of the above
89. Which one of the following statements is correct? A voltage source inverter is normally employed
 a. when the source has low impedance and load has high reactance.
 b. when the source has high impedance and load has low reactance.
 c. when both the source and load have high values of impedance and reactance respectively.
 d. when both the source and load have high values of impedance and reactance respectively.
90. The corona loss on a particular system at 50 Hz is 1 kW/km per phase. What is the corona loss at 60 Hz in kW/km per phase?
 a. 0.83
 b. 1.0
 c. 1.13
 d. 1.2
91. Consider the following statements:
 In memories,
 1. ROMs are used for temporary program and data storage.
 2. Dynamic RAM is less expensive than static RAM.
 3. MASK ROM is used in high volume microprocessor based system.
 Which of the statements given above is/are correct?
 a. 1 only
 b. 1 and 2
 c. 2 and 3
 d. 1, 2 and 3
92. In a p-type silicon sample, the hole concentration is $2.25 \times 10^{15}/\text{cc}$. If the

intrinsic carrier concentration is $1.5 \times 10^{10}/\text{cc}$, what is the electron concentration in the p-type silicon sample?

- zero
- $10^{10}/\text{cc}$
- $10^5/\text{cc}$
- $1.5 \times 10^{25}/\text{cc}$

93. What is the reverse recovery time of a diode when switched from forward bias V_F to reverse bias V_R ?

- Time taken to remove the stored minority carriers
- Time taken by the diode voltage to attain zero value
- Time to remove stored minority carriers plus the time to bring the diode voltage to reverse bias V_R
- Time taken by the diode current to reverse

94. Which one of the following statements is correct? In a transistor,

- I_{CBO} is greater than I_{CEO} , and does not depend upon temperature
- I_{CBO} is greater than I_{CO} , and doubles for every ten degrees rise in temperature
- I_{CBO} is equal to I_{CO} , and double for every ten degrees rise in temperature
- I_{CBO} is equal to I_{CO} and doubles for every ten degrees rise in temperature

95. Consider following statements:

- BJT is a current controlled device with high input impedance and high gain bandwidth.
- FET is a voltage controlled device with high input impedance and low gain bandwidth.
- UJT is a negative resistance device and can be used as an oscillator.
- BJT, FET and UJT can all be used for amplification.

Which of the statements given above are correct?

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

96. The dynamic transfer characteristics of a transistor is represented by

$$i_c = A_1 i_b + A_2 i_b^2$$

Where A_1 and A_2 are constants. If input signal $i_b = I_1 \cos \omega_1 t + I_2 \cos \omega_2 t$ the output will contain

- $\omega_1, \omega_2, 2\omega_1, 2\omega_2$
- dc term, $\omega_1, \omega_2, \omega_1 + \omega_2, \omega_1 - \omega_2$
- dc term, $\omega_1, \omega_2, 2\omega_1, 2\omega_2, 2\omega_1 + 2\omega_2, 2\omega_1 - 2\omega_2$
- dc term, $\omega_1, \omega_2, 2\omega_1, 2\omega_2, \omega_1 + \omega_2, \omega_1 - \omega_2$

97. Find the break region (voltage range) over which the dynamic resistance of a diode is multiplied by a factor of 1000. Let this region be contained between v_1 and v_2 , then is $|v_1 - v_2|$ given by

- $\log_e (1000 V_T)$
- $1000 V_T$
- $(\log_e 10^3) V_T$
- The value cannot be computed with the given data

98. An emitter in a bipolar junction transistor is doped much more heavily than the base as it increases the

- Emitter efficiency
- Base transport factor
- Forward current gain
- All the three given above

99. Match List I (Type of Device) with List II (Characteristics/Application) and select the correct answer using the code given below the lists:

List I

- Zener diode
- Tunnel diode
- Schottky diode
- Photo diode

List II

- Display panel
- Voltage reference
- Light detection
- Negative resistance
- High frequency switching

Codes;

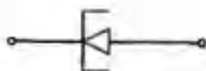
- | | | | |
|---|---|---|---|
| A | B | C | D |
|---|---|---|---|

- a. 3 4 5 2
 b. 2 5 1 3
 c. 3 5 1 2
 d. 2 4 5 3

100. Match List I (Circuit Symbol) with List II (Device) and select the correct answer using the code given below the lists:

List I

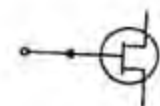
A.



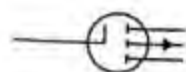
B.



C.



D.



List II

1. N-channel FET
2. Varactor
3. Tunnel diode
4. P channel MOSFET

Codes:

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

101. Match List I (Device) with List II (Application) and select the correct answer using the code given below the lists:

List I

- A. p-n junction diode
- B. tunnel diode
- C. WET
- D. Schottky barrier diode

List II

1. Microwave generator
2. Low frequency rectifier
3. High frequency rectifier

4. Voltage variable resistor

Codes:

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

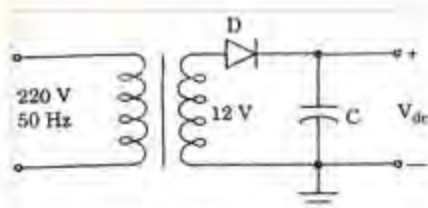
102. Consider the following statements:

1. A Hartley oscillator circuit uses a tapped inductor for inductive feedback.
2. Oscillator circuit can be operated in class A condition for better wave shape.
3. Frequency stabilization is obtained by use of automatic biasing.

Which of the statements given above are correct?

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

103.



In the rectifier circuit shown above, what should be minimum peak-inverse-voltage (PIV) rating of the diode?

- a. 12 V
- b. $12\sqrt{2}$ V
- c. 24 V
- d. $24\sqrt{2}$ V

104. Which one of the following statements is correct? In the case of load regulation

- a. when the temperature changes, the output voltage remains constant
- b. when the input voltage changes, the load current remains constant
- c. when the load changes, the load current remains constant
- d. when the load changes, the output voltage remains

105. In a centre tap full wave rectifier, 100 V is the peak voltage between the centre tap and one end of the secondary. What is the maximum voltage across the reverse biased diode?

a. 200 V
b. 141 V
c. 100 V
d. 86 V

106. Match List I (Type of Logic) with List II (Characteristics/ Application) and select the correct answer using the code given below the lists:

List I

A. Direct coupled logic
B. Diode transistor logic
C. Emitter coupled logic
D. Resistor transistor logic

List II

1. Good for monolithic I.C.
2. Slow speed of operation
3. Very fast speed of operation
4. Current hogging

Codes:

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

107. Which of the following statements is not correct?

a. $X + \overline{XY} = X$
b. $X(\overline{X} + Y) = XY$
c. $X + X\overline{Y} = X$
d. $ZX + Z\overline{XY} = ZX + Z\overline{Y}$

108. The Boolean expression $\overline{YZ} + \overline{XZ} + \overline{XY}$ is logically equivalent to

a. $YZ + \overline{X}$
b. $YZX + \overline{XYZ}$
c. $YX + XZ + XY$
d. $X\overline{YZ} + \overline{X}YZ + \overline{XY}Z + \overline{XYZ}$

109. Which one of the following statements is correct?

Removing the small resistance ($\sim 100\Omega$) in the collector lead of the pull-up transistor of a totem pole output gate, will result in

a. reduced switching time from $V_{out}(1)$ to $V_{out}(0)$
b. incorrect operation of the gate
c. lower power dissipation
d. more noise generation in the power supply distribution at high frequencies

110. In a ripple counter, the stage whose output has a frequency equal to $1/8^{\text{th}}$ that of the clock signal applied to the first stage also has an output periodicity equal to $1/8^{\text{th}}$ that of the output signal obtained from the last stage. The counter is

a. Modulo-8
b. Modulo-6
c. Modulo-64
d. Modulo-16

111. Consider the following statements:

In amplifiers,

1. a complementary symmetry amplifier has 1 PNP and 1 NPN transistor.
2. a boot strap incorporates emitter follower.
3. the main function of transformer used in the output of a power amplifier is to increase its voltage gain.
4. the harmonic distortion of the signal produced in a RC coupled transistor amplifier is due to transformer itself.

Which of the statements given above are correct?

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

112. In a single stage RC-coupled amplifier stage, what are the phase shifts introduced at lower and upper 3-dB frequencies, respectively?

a. 45° , 225°
b. 45° , 135°
c. 90° , 180°
d. 45° , 180°

113. Which one of the following statements is correct? A Darlington amplifier has a

- a. large current gain and high input resistance
b. large voltage gain and low output resistance
c. small voltage gain and low input resistance
d. small current gain and high output resistance
114. The gain of a bipolar transistor drops at high frequencies. This is because of the
a. Coupling and bypass capacitors
b. Early effect
c. Inter-electrode transistor capacitances
d. Coupling and bypass capacitors, and inter-electrode transistor capacitances
115. Assertion (A): Emitter coupled oscillator is capable of high frequency operation.
Reason (R): It consists of saturating NPN BJTs.
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
116. Assertion (A): A pumped storage plant is very suitable for supplying peak loads. During off peak period, water is pumped back from tail race pond to head water pond.
Reason (R): The starting time of pumped storage plant is very short.
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
117. Assertion (A): For obtaining improved magnetic properties, the transformer magnetic core is assembled using cold-rolled silicon-steel sheets.
Reason (R): The laminations for the core could be cut out of the cold-rolled silicon steel sheets, cutting either in the direction of rolling or transverse thereof, without affecting the magnetic properties in any way.
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
118. Assertion (A): In a d.c. generator, even though the armature magnetic field is in quadrature with the main magnetic field, each considered alone, the resultant magnetic field due to interaction of both the fields is shifted backwards by certain angle from the geometrical neutral axis depending upon the load.
Reason (R): In a d.c. generator, the trailing pole-tips get magnetically saturated as the load reaches its rated value.
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
119. Assertion (A): Vestigial Side Band (VSB) modulation is used for TV broadcasting.
Reason (R): Video signals have negligible power at low frequencies.
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
120. Assertion (A): An FET operated crystal oscillator operates on the concept of feedback.
Reason (R): The feedback is provided by the drain-to-gate capacitance C_{dg}
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