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Booklet Serial No.

001421

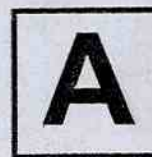
Test Booklet Series

TEST BOOKLET - 2022

ELECTRICAL ENGINEERING

LECTURER I

(10)



Time Allowed: Two Hours

Maximum Marks: 100

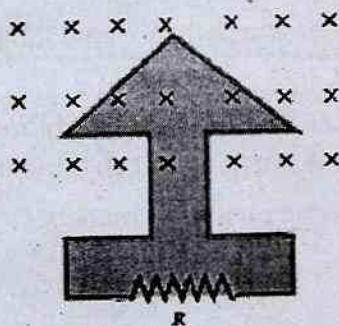
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1. IMMEDIATELY AFTER THE COMMENCEMENT OF THE EXAMINATION, YOU SHOULD CHECK THAT THIS TEST BOOKLET DOES **NOT** HAVE ANY UNPRINTED OR TORN OR MISSING PAGES OR ITEMS ETC. IF SO, GET IT REPLACED BY A COMPLETE TEST BOOKLET.
 2. Please note that it is the candidate's responsibility to encode and fill in the Roll Number and Test Booklet Series Code A, B, C or D carefully and without any omission or discrepancy at the appropriate places in the OMR Response Sheet. Any omission/discrepancy will render the Response Sheet liable for rejection.
 3. You have to enter your Roll Number on the Test Booklet in the Box provided alongside. **DO NOT** write anything else on the Test Booklet.
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4. This Test booklet contains **100** items (questions). Each item comprises of four responses (answers). You will select the response which you want to mark on the Response sheet. In case you feel that there is more than one correct response, mark the response which you consider the best. In any case, choose **ONLY ONE** response for each item.
 5. You have to mark all your responses **ONLY** on the separate Response Sheet provided. See directions in the Response Sheet.
 6. All items carry equal marks.
 7. Before you proceed to mark in the Response sheet the response to various items in the Test Booklet you have to fill in some particulars in the Response Sheet as per instructions sent to you with your Admission Certificate.
 8. After you have completed filling in all your responses on the Response Sheet and the examination has concluded, you should hand over to the Invigilator **only the Response Sheet**. You are permitted to take away with you the Test Booklet and Candidate's Copy of the Response Sheet.
 9. Sheets for rough work are appended in the Test Booklet at the end.
 10. **Penalty for wrong answers:**
THERE WILL BE PENALTY FOR WRONG ANSWERS MARKED BY THE CANDIDATE.
 - (i) There are four alternatives for the answer to every question. For each question for which a wrong answer has been given by the candidate, **0.25** of the marks assigned to that question will be deducted as penalty.
 - (ii) If a candidate gives more than one answer, it will be treated as a **wrong answer** even if one of the given answers happens to be correct and there will be same penalty as above for that question.
 - (iii) If a question is left blank, i.e., no answer is given by the candidate, there will be no **penalty** for that question.

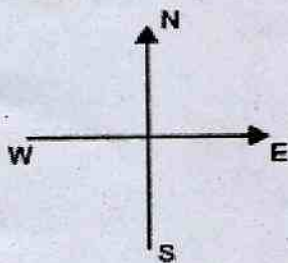
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SEAL

1. A circular antenna of an area of 3 m^2 is installed at a place in Mumbai. The plane of the antenna is inclined at 47° with the direction of Earth's magnetic field. If the magnitude of Earth's field at that place is 40773.9 nT , find the magnetic flux linked with the antenna.
- A) $\Phi_B = 89.47 \times 10^{-6} \text{ Wb}$
 B) $\Phi_B = 89.47 \times 10^{-12} \text{ Wb}$
 C) $\Phi_B = 89.47 \times 10^{-9} \text{ Wb}$
 D) $\Phi_B = 89.47 \times 10^{-16} \text{ Wb}$
2. The magnetic flux passes perpendicular to the plane of the circuit and is directed into the paper. If the magnetic flux varies with respect to time as per the following relation: $\Phi_B = (2t^3 + 3t^2 + 8t + 5) \text{ mWb}$, what is the magnitude of the induced emf in the loop when $t = 3 \text{ s}$? Find out the direction of current through the circuit.



- a) Current flow in a clockwise direction
 b) Current flow in an anti-clock-wise direction
 c) Current flow in both the direction
 A) b is the correct answer
 B) c is the correct answer
 C) a is the correct answer
 D) Both a and c correct answer
3. By using Fleming's left-Hand rule, determine the direction of the force acting on the proton if the proton moves towards the east by entering a uniform magnetic field in the downward direction.



- A) The direction of force is towards the north as the magnetic field is acting downwards.
 B) The direction of force is towards the south as the magnetic field is acting downwards.
 C) The direction of force is towards the east as the magnetic field is acting downwards.
 D) The direction of force is towards the west as the magnetic field is acting downwards.

4. Consider the following statements:

Assertion (A): The direction of induced EMF and current is shown by the second (middle) finger

Reason (R): Fleming's Right-hand rule is used for the generator.

The correct answer is

- A) A and Reason both correct and R is the correct explanation of A
- B) A and Reason both correct and R is NOT the correct explanation of A
- C) A is correct, but R is NOT correct
- D) A is Not correct but R is correct

5. Consider the following Coulomb's Law which one is not correct?

- 1. The law is applicable only for the point charges at rest.
- 2. Coulomb's Law can only be applied in those cases where the inverse square law is obeyed.
- 3. It is difficult to implement Coulomb's law where charges are in arbitrary shape because in such cases, we cannot determine the distance' between the charges.
- 4. The law can be used directly to calculate the charge on the big planets.

- A) 1 only
- B) 4 only
- C) 3 only
- D) 2 only

6. Match the network theorem with its equivalent definition:

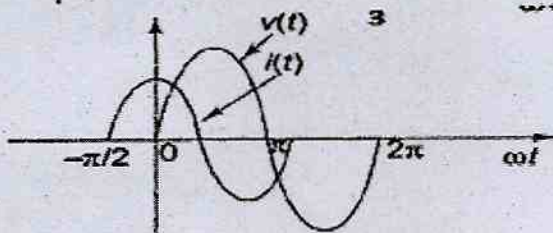
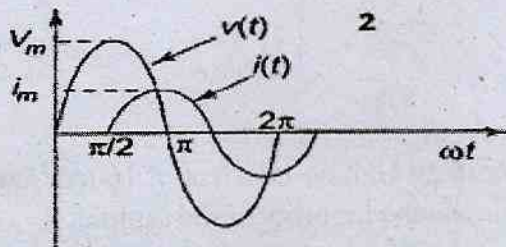
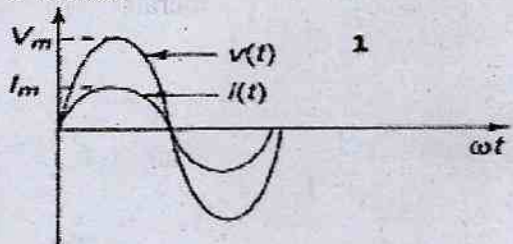
Network Theorem		Definition	
a.	Superposition Theorem	1.	Voltage source with series resistance
b.	Thevenin's Theorem	2.	A current source with parallel resistance
c.	Maximum Power Transfer Theorem	3.	Linear Circuit
d.	Norton's Theorem	4.	Load Resistance equal to Source Resistance

The correct match is

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

7. Identify the correct match.

- a) C-Circuit
- b) R-Circuit
- c) L-Circuit



The correct match is

	a	b	c
A	3	1	2
B	2	1	3
C	1	2	3
D	3	2	1

8. Consider the following statements:

Assertion (A): Ohm's Law does not apply to Non-Linear Circuit Elements.

Reason (R): Non-linear elements are those which do not have current exactly proportional to the applied voltage.

The correct answer is

- A) A and R are both correct and R is the correct explanation of A
- B) A and R are both correct and R is NOT the correct explanation of A
- C) A is correct, but R is NOT correct
- D) A is NOT correct, but R is correct

9. Consider the following statements on Star Configuration.

- 1. All Line & Phase Voltages are equal in magnitude.
- 2. Line Voltage leads the Phase Voltage by 30deg.

The correct statements are

- A) 1 only
- B) 2 only
- C) Both
- D) Neither

10. Identify the correct match.

Power - Unit

1. Real Power - Watts
2. Average Power - Watt hour
3. Reactive Power - VAR
4. Apparent Power - VA

How many match/es is/are correct?

- A) Only one match
- B) Only two matches
- C) Only three matches
- D) All the four matches

11. A sample of N-type semi-conductor has a Hall co-efficient of $160\text{cm}^3/\text{coulomb}$. If its resistivity is 0.16 ohm-cm , then estimate the mobility of the sample.

- A) $1000\text{cm}^2/\text{volt-sec}$
- B) $1200\text{cm}^2/\text{volt-sec}$
- C) $1100\text{cm}^2/\text{volt-sec}$
- D) $1300\text{cm}^2/\text{volt-sec}$

12. The common base DC gain of a transistor is 0.967. If the emitter current is 10mA , what is the value of the base current?

- A) 0.33mA
- B) 3.33mA
- C) 33.33mA
- D) 3.7mA

13. Consider the following statements:

Assertion (A): In JFET the drain current in the pinch-off region, depends upon the gate to source voltage.

Reason(R): The pinch-off region is the normal operating region of JFET when used as an amplifier

The correct answer is

- A) A and R are both correct and R is the correct explanation of A
- B) A and R are both correct and R is NOT the correct explanation of A
- C) A is correct, but R is NOT correct
- D) A is NOT correct, but R is correct

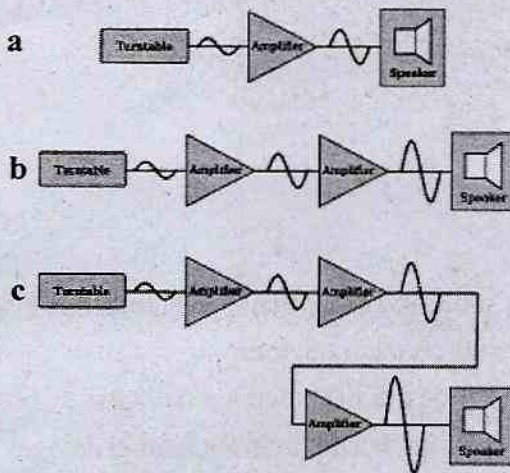
14. A common emitter amplifier has an input resistance of 2.5 kilo ohm and a voltage gain of 200. If the input signal voltage is 5mV, find the base current, the collector current, the power gain, and the dB power gain. Take $\beta = 50$

- a) $2\mu\text{A}$, $100\mu\text{A}$, 10000, 40dB
- b) $12\mu\text{A}$, $10\mu\text{A}$, 1000, 40dB
- c) $20\mu\text{A}$, $100\mu\text{A}$, 10000, 40dB
- d) $2\mu\text{A}$, $10\mu\text{A}$, 1000, 40dB

The correct answer is.

- A) c only
- B) d only
- C) a only
- D) b only

15.



The figure above shows the effect of adding stages of amplification. As stages of amplification are added, the signal _____ and the final output (from the speaker) _____.

- A) Increases, increases in c
- B) Decreases, increases in b
- C) Increases, increases in a
- D) Decreases, decreases in c

16. A crystal has the following parameters, inductance 0.33H, capacitance $C_1=0.065\text{pF}$, $C_2=1\text{pF}$ and $R=5.5\text{k}\Omega$. Find the series resonant frequency and Q-factor of the crystal.

- A) 1.09×10^6 Hz, 411
- B) 10.09×10^6 Hz, 4.11
- C) 11.09×10^6 Hz, 4.11
- D) 10.09×10^9 Hz, 411

17. Consider the following statements:

Assertion (A): The circuit with which the waveform is shaped by removing a certain portion of the input signal voltage above and below a certain level is called a clipping circuit.

Reason (R): A clipping circuit may also be used for getting the average signal.

The correct answer is

- A) A and R are both correct and R is the correct explanation of A
- B) A and R are both correct and R is NOT the correct explanation of A
- C) A is correct, but R is NOT correct
- D) A is NOT correct, but R is correct

18. The basic construction of a depletion type P-channel MOSFET is similar to that of an N-channel except that the conducting bar is _____ material and the substrate is _____ material.

- A) N-type, P-type
- B) P-type, P-type
- C) P-type, N-type
- D) N-type, N-type

19. The N-channel MOSFET devices are preferred more than P-Channel because

- A) N-channel devices are faster than P-channel devices
- B) N-channel devices consume less power than P-channel devices
- C) N-channel devices have higher packing density than P-channel devices
- D) Both (A) and (C)

20. What is the composition of constantan?

- A) 40% Cu and 60% Ni
- B) 60% Cu and 40% Ni
- C) 20% Ni and 80% Cu
- D) 80% Ni and 20% Cu

21. In which band the immovable electrons are largely present?

- 1. Core inner band
- 2. Valence band
- 3. Conduction band

Correct answer/s is/are

- A) 1 only
- B) 1 and 2 only
- C) 2 and 3 only
- D) 1, 2 and 3

22. Consider the following statements:

Assertion (A): In a superconducting state the flux of the magnetic lines are ejected out of the superconductor.

Reason (R): Super conductors are perfect diamagnets.

The correct answer is

- A) A and R are both correct and R is the correct explanation of A
- B) A and R are both correct and R is NOT the correct explanation of A
- C) A is correct, but R is NOT correct.
- D) A is NOT correct, but R is correct

23. Identify the correct statements

- 1. SQUID is a highly sensitive magnetometer
 - 2. Josepson junction act an interferometric device
 - 3. Ferromagnets are weak magnets
 - 4. Diamagnetic materials exhibit strong magnetism
- A) Both 1 & 2
 - B) Both 2 & 3
 - C) Both 3 & 4
 - D) Both 1 & 3

24. A 10,000 variable resistance has a linearity of 0.1 % and the movement of the contact arm is 320° . Determine the maximum position deviation in degrees and the resistance deviation in ohm.

- A) 0.320 , 10Ω
- B) 3.20, 10Ω
- C) 0.320 , 100Ω
- D) 0.420 , 10Ω

25. A test voltage is applied for several minutes between the conductor of a 400 meter length of cable and the earth. The galvanometer connected in series reads 250 divisions, the value of universal shunt being 2.5 with a standard resistance of 1 MQ in the circuit, the scale reading being 350, the value of shunt being 1000. Calculate the insulation resistance of the cable.

- A) Insulation resistance of 400 meter long cable is $560\ \Omega$
- B) Insulation resistance of 400 meter long cable is $660\ \Omega$
- C) Insulation resistance of 400 meter long cable is $760\ \Omega$
- D) Insulation resistance of 400 meter long cable is $860\ \Omega$

26. Match the following:

	Resistance	Bridge used
a.	Low Resistance	1. Wheatstone bridge
b.	High Resistance	2. Kelvin double bridge
c.	Medium Resistance	3. Megger

The correct match is

	a	b	c
A	1	2	3
B	1	3	2
C	2	1	3
D	2	3	1

27. Consider the following statements:

Assertion (A): The permanent magnet moving-coil type can be used for direct current measurements only and the induction type for alternating-current measurement only.

Reason (R): The other types can be used with either direct or alternating currents.

The correct answer is

- A) A and R are both correct and R is the correct explanation of A
- B) A and R are both correct and R is NOT the correct explanation of A
- C) A is correct, but R is NOT correct.
- D) A is NOT correct, but R is correct

28. Transformation ratio = _____ x nominal ratio

- A) Ratio correction factor
- B) Rated primary current
- C) Rated secondary current
- D) Rate Primary winding

29. In a 50kVA transformer, the iron loss is 500W and the full load copper loss is 800W. Find and Match the efficiency of the transformer at full load and half full load at 0.8 power factor lagging and 0.6 power factor halfload Lagging.

Load - Efficiency

- | | |
|--------------------------|-------------|
| a) 0.8 HalfLoad lagging | -1) 72.46% |
| b) 0.8 Full Load Lagging | -2) 96.6% |
| c) 0.6 HalfLoad Lagging. | - 3) 96.85% |

The correct match is

	a	b	c
A	1	2	3
B	1	3	2
C	2	1	3
D	2	3	1

30. A universal series motor has a resistance of 30 ohms and an inductance of 0.5, when connected to a 250V DC supply and loaded to take 0.8A, it runs at 2000RPM . Find the speed and power factor when connected 250V, 50Hz AC supply and loaded to take the same current.

- A) 1750 RPM, 0.765lag
 B) 1700 RPM, 0.866lag
 C) 1790 RPM, 0.99lag
 D) 1900 RPM, 0.66lag

31. A 440V, 3 phase, 50Hz, 4-pole Y-connected inductance motor has a full load speed of 1425rpm. The rotor has an impedance of $(0.4+j0.4)$ ohm per phase and a rotor/stator turns ratio of 0.8. Find the correct match.

- | | Output | Measurement |
|---|-----------------------------|-------------|
| a | Full load torque- | 620 |
| b | Rotor current - | 78.87 |
| c | Full load rotor coper loss- | 22.73 |

	a	b	c
A	1	2	3
B	1	3	2
C	2	1	3
D	2	3	1

32. Consider the following statements:

Assertion (A): The DC generators are not as common as they used to be because direct current when required is mainly produced by electronics rectifiers.

Reason (R): However, DC motors are widely used in industry due to easy speed regulation.

The correct answer is

- A) A and R are both correct and R is the correct explanation of A
- B) A and R are both correct and R is NOT the correct explanation of A
- C) A is correct, but R is NOT correct
- D) A is NOT correct, but R is correct

33. Identify the correct matches.

Generator – Field Winding

- 1. Compound Generator - two-Field Winding
- 2. Shunt Generators - one Field winding
- 3. Series Generator - two Field Winding
- 4. Short Shunt Generator - two Field Winding

How many match/es is/are correct?

- A) Only one match
- B) Only two matches
- C) Only three matches
- D) All the four matches

34. Consider the following statements

- 1. Fleming's left-hand rule was used to find the direction of the DC motor rotation.
 - 2. In DC generator Fleming's right-hand rule is used for the direction of the rotation.
- The correct statements are

- A) 1 only
- B) 2 only
- C) Both
- D) Neither

35. A 230 V motor has an armature circuit resistance of 0.6 Ohm. If the full load armature current is 30A and the no-load armature current is 4A, find the change in back EMF from no load to full load.

- A) 15.6V
- B) 156V
- C) 1560V
- D) 1.56kV

36. A 4 pole, 500V shunt motor has a total of 720 armature conductors which are wave connected. The full load armature current is 60A and the flux per pole is 0.03 Wb. The armature resistance is 0.2 Ohm. The voltage drop across a brush is 1V. Calculate the full speed of the motor.

- A) 675RPM
- B) 655RPM
- C) 685RPM
- D) 665RPM

37. A 220 V shunt motor has an armature resistance of 0.4 Ohm. The armature current at starting must not exceed 40A. If the number of sections is 6, calculate the values of resistor steps to be used in this starter. Find the first three section resistance values.

- A) 1.96 ohm , 1.258 ohm, 0.812 ohm
- B) 1.258 ohm, 0.812 ohm, 1.96ohm
- C) 0.812 ohm, 1.96ohm, 1.258 ohm
- D) 1.258 ohm, 1.96ohm, 0.812 ohm

38. Consider the following statements:

Assertion (A): The power required to carry out the Swinburne test is small because it is no load test.

Reason (R): This test is very convenient and more economical.

The correct answer is

- A) A and R are both correct and R is the correct explanation of A
- B) A and R are both correct and R is NOT the correct explanation of A
- C) A is correct, but R is NOT correct
- D) A is NOT correct, but R is correct

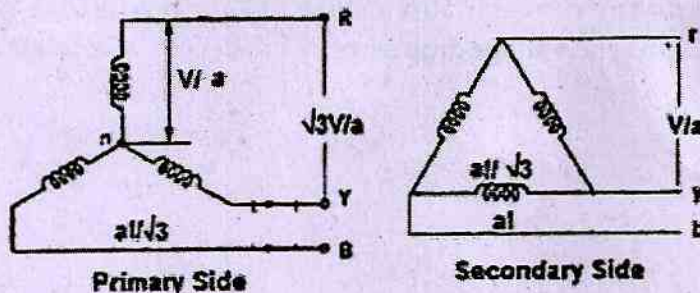
39. Consider the following statements of the ideal transformer

- 1. No winding resistance
- 2. No leakage fluxes
- 3. No iron losses

The correct statements are

- A) 1 only
- B) 2 only
- C) 1, 2 and 3
- D) 1 and 2 only

40. Consider the below three-phase transformer connection



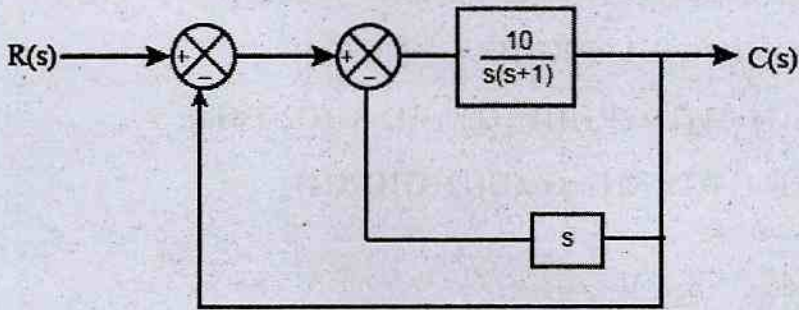
It is suitable for

- A) Moderate voltage
 - B) Stepping down voltage
 - C) Stepping Up voltage
 - D) All the above
41. A 2000V, 3-phase star-connected motor has resistance and synchronous reactance per phase of 0.2 ohms and 1.9 ohms respectively. Calculate the generated (back) emf per phase with an input 800kW at 0.8 lagging.
- A) 900V/Phase
 - B) 800V/Phase
 - C) 879V/Phase
 - D) 979V/Phase
42. The squirrel cage induction motor sometimes shows a tendency to run at speed as low as one _____ of their synchronous speed. This peculiar behavior of the cage motor at starting is known as _____ of an induction motor.
- A) Seventh, crawling
 - B) Eighth, crawling
 - C) Seventh, cogging
 - D) Eighth, cogging

43. 2000/200V, 20kVA transformer has 66 turns in the secondary. Calculate the number of primary turns in the transformer.

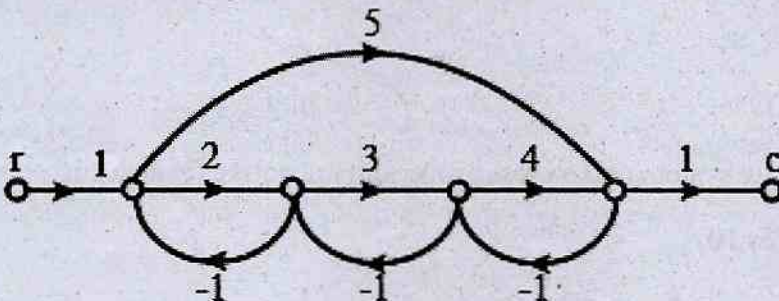
- A) 690 turns
- B) 660 turns
- C) 678 turns
- D) 640 turns

44. For the system shown in the figure the transfer function $C(s)/R(s)$ is equal to



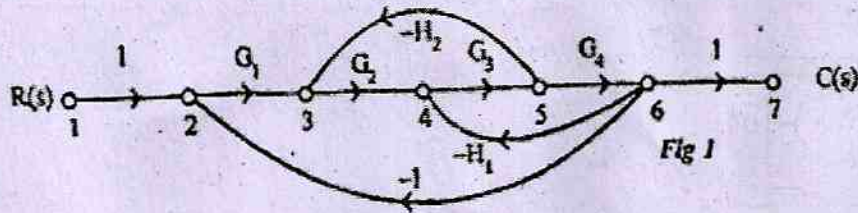
- A) $\frac{10}{s^2 + s + 10}$
- B) $\frac{10}{s^2 + 11s + 10}$
- C) $\frac{10}{s^2 + 9s + 10}$
- D) $\frac{10}{s^2 + 2s + 10}$

45. In the signal flow graph, the gain c/r will be



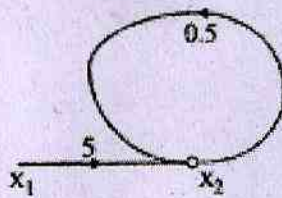
- A) 11/9
- B) 25/23
- C) 22/15
- D) 44/23

46. Find the transfer function T by using the mason gain formula



- A) $T = G_1 G_2 G_3 G_4 / (1 + G_3 G_4 H_1 + G_2 G_3 H_2 + G_1 G_2 G_3 G_4)$
 B) $T = G_1 G_2 G_3 G_4 / (G_3 G_4 H_1 + G_2 G_3 H_2 + G_1 G_2 G_3 G_4)$
 C) $T = (G_1 G_2 G_3 G_4 + 1) / (1 + G_3 G_4 H_1 + G_2 G_3 H_2 + G_1 G_2 G_3 G_4)$
 D) $T = G_1 G_2 G_3 G_4 / (1 + G_3 G_4 H_1 + G_2 G_3 H_2 + G_1 G_2 G_4)$

47. In the signal flow graph shown in figure $X_2 = TX_1$ where T , is equal to

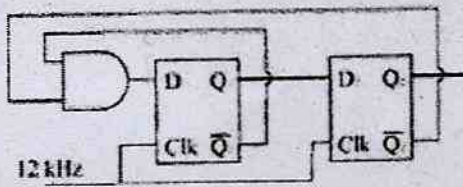


- A) 10
 B) 20
 C) 25
 D) 15
48. The gain margin of the system under closed loop unity negative feedback is

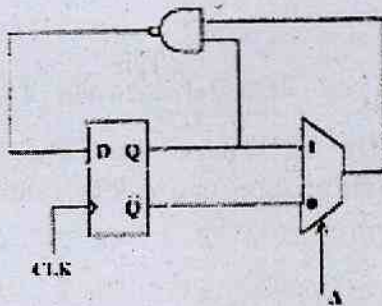
$$G(s)/H(s) = 100/S(S+10)^2$$

- A) 0dB
 B) 26dB
 C) 46dB
 D) 56dB

49. In the circuit showing the clock frequency that the frequency of the clock signal is 12kHz, and the frequency of the signal at Q2 is _____ kHz.



- A) 2.5
B) 10
C) 7.5
D) 4
50. The state transition diagram for the circuit shown is



- A)
- B)
- C)
- D)

51. Any set of Boolean operators that is sufficient to represent all Boolean expressions is said to be completed. Which of the following is not completed?
- A) AND,OR
 - B) AND,NOT
 - C) NOT,OR
 - D) NOR
52. The taxes and insurance charges may be taken as approximately _____ of the _____.
- A) 3%, total fixed cost
 - B) 5%, running cost
 - C) 10 %, running cost
 - D) 6%, capital cost
53. A plant cost Rs 80000 and has a useful life of 15 years. If the salvage value of the equipment is Rs 15000, determine the amount which should be saved annually to replace the equipment at the end of that time by straight-line method, and sinking fund method.
- A) Rs. 5000, Rs. 3475
 - B) Rs. 15000, Rs. 13475
 - C) Rs. 500, Rs. 13475
 - D) Rs. 2500, Rs. 13475
54. Consider the following statements:
- Assertion (A): The transmission and distribution cost of the steam plant is low.
- Reason (R): Compare to steam plants the cost of the transmission and distribution of gas is the lowest.
- The correct answer is
- A) A and R are both correct and R is the correct explanation of A
 - B) A and R are both correct and R is NOT the correct explanation of A
 - C) A is correct, but R is NOT correct.
 - D) A is NOT correct, but R is correct

55. Consider the following

	Power plant	Overall efficiency
a	Hydro plant	1) 25%
b	Steam plant	2) 85%
c	Gas plant	3) 40%

Which one is the correct match?

	a	b	c
A	1	2	3
B	1	3	2
C	2	1	3
D	2	3	1

56. _____ is used as a coolant as it has higher power density in nuclear power plant.

- A) Thorium
- B) Uranium
- C) Liquid Sodium
- D) Hydrochloride

57. Among the following which one is not considered for the installation of nuclear power plant:

- a) Proximity to the load center
- b) Availability of cooling Water
- c) Radioactive waste disposal

The correct answer is

- A) a only
- B) a and b
- C) b and c
- D) a, b and c

58. Which is not considered for parameter characterizing of solar concentrators

- A) The absorber area
- B) Geometrical concentration area
- C) The optical efficiency
- D) None of the above

59. The classification of Hydro power plants is based on the

- A) Micro hydel plant, high capacity plant, super capacity plant, super capacity plant
- B) Micro hydel plant, high capacity plant, super capacity plant
- C) Micro hydel plant, high capacity plant
- D) Micro hydel plant, high capacity plant, medium capacity plant

60. Consider the following

	Turbines	Discharge classification
a.	Pelton turbines	1) Low discharge
b.	Francis turbines	2) High Discharges
c.	Kaplan turbines	3) Medium Discharge

Which one is the correct match

	a	b	c
A	1	2	3
B	1	3	2
C	2	1	3
D	2	3	1

61. Tariff depends on

- a) Recovery cost of producing electrical energy at the power station
- b) Recovery cost on the capital investment in transmission and distribution systems
- c) Recovery cost of operation and maintenance
- d) Suitable profit on the capital investment
- A) a, band c
- B) a, c and d
- C) b, c and d
- D) a, b, c and d

62. In general, the insulating material used in cables should have the properties of

- A) High insulation resistance to avoid leakage current
- B) Low dielectric strength to avoid electrical breakdown of the cable
- C) Non-flammable
- D) Low cost to make the underground system a viable proposition

63. The most general method of classifying DC distributors is the way they are fed by the feeders. On this basis, DC distributors are classified as _____

- A) distributors fed at one end, distributors fed at two ends, distributors fed at the center, ring distributor
- B) distributors fed at two ends, distributors fed at the center, ring distributor
- C) distributors fed at one end, distributors fed at two ends
- D) distributors fed at the center, ring distributor

64. A Murray loop test is conducted on a 400m long faulty cable. At balance, the resistance connected to the faulty core was set to 40Ω and the resistance of the resistor connected to the sound core was 60Ω . What is the distance of the fault from the test end?
- A) 320Ω
 B) 120Ω
 C) 420Ω
 D) 620Ω
65. Three insulating materials with breakdown strengths of 250kV/cm , 200 kv/cm , 150kV/cm , and permittivity of 2.5, 3.0, and 3.5, are used in a single-core cable. If the factor of safety for the materials is 5, the location of the materials with respect to the core of the cable will be.
- A) 2.5, 3.0, 3.5
 B) 3.0, 2.5, 3.5
 C) 3.5, 3.0, 2.5
 D) 3.5, 2.5, 3.0
66. 11 kV cable after installation should be checked for a short duration at a voltage of
- a) 100kV
 b) 33kV
 c) 20kV
 d) 11kV
- A) b is the right answer
 B) a is the right answer
 C) c is the right answer
 D) both a and d are right
67. Consider the following statements:
- Assertion (A): TRIODE AC semiconductor switch which is triggered into conduction by a gate signal like the action of an SCR.
- Reason (R): It differs from the SCR in that it can conduct in both directions of current flow in response to a positive or negative gate signal.
- The correct answer is
- A) A and R are both correct and R is the correct explanation of A
 B) A and R are both correct and R is NOT the correct explanation of A
 C) A is correct, but R is NOT correct
 D) A is NOT correct, but R is correct

68. Match the following

- | | Commutation |
|----|---------------------|
| a. | Line Commutation |
| b. | Load Commutation |
| c. | Voltage commutation |

Action

- Reverse voltage in Parallel to the thyristor.
 Natural reversal of line voltage
 Circuits supplied from DC source.

	a	b	c
A	1	2	3
B	1	3	2
C	2	1	3
D	2	3	1

69. The single phase full converter has an RL load having inductance 6.5mH, resistance 0.5 ohm, and $E=10V$. The input voltage is $V_s=120V$ at rms 60Hz. Determine the load current I_{Lo} at $\alpha = 60^\circ$

- A) $I_{Lo} = 49.34A$
 B) $I_{Lo} = 490.34A$
 C) $I_{Lo} = 4.934A$
 D) $I_{Lo} = 4900.34A$

70. The buck regulator has an input of $V_s=12V$. The required average output voltage is $V_a=5V$. The peak-to-peak ripple voltage is 20mV. The switching frequency 25kHz. If the peak-to-peak ripple current of the inductor is limited to 0.8A Determine the duty cycle, filter inductance, and capacitance

- a) 41.67% $L=145.83\mu H$, $C=200\mu F$
 b) 42.67% $L=145.83\mu H$, $C=200\mu F$
 c) 41.67% $L=155.83\mu H$, $C=200\mu F$
 d) 41.67% $L=145.83\mu H$, $C=210\mu F$
 A) b is correct
 B) c is correct
 C) d is correct
 D) a is correct

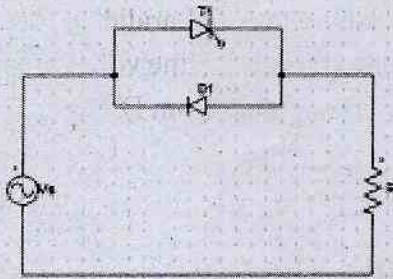
71. Applications of cyclo converters include

- a) speed control of ac drives
 b) induction heating
 c) static VAr compensation

The correct answer is

- A) a and b
 B) a and c
 C) c and b
 D) a, b and c

72. In the below-given voltage controller circuit



- A) the positive half cycle at the load is the same as the supply V_s
 B) the negative half cycle at the load is the same as the supply V_s
 C) the positive and negative half cycles at the load are identical to the supply
 D) none of the mentioned
73. Which control systems consume very low power for motion control in AC and DC motor/
 a) Armature Control
 b) Field control
 c) Voltage control
 d) Drive control
 A) d only
 B) a and c
 C) c and b
 D) a, b and d
74. The speed of a separately excited DC motor is controlled by a chopper. The DC supply voltage is 120V, armature circuit resistance is 0.5ohm, armature circuit inductance is 20m H and motor constant is $k_a \theta = 0.05 \text{ V/rpm}$. The motor drives a constant torque load requiring an average armature current of 20A. find the range of speed control and the range of duty cycle when the motor current is continuous.
 A) 0 to 2200 RPM, 0.083
 B) 0 to 22 RPM, 0.083
 C) 0 to 220 RPM, 0.083
 D) 0 to 22000 RPM, 0.083
75. In dual mode dual converter
 a) Linear transfer characteristics are obtained
 b) Response is fast
 c) The crossover technique is simple
 The correct answer/s is/are
 A) above mentioned is the advantage of the dual converter with circulating current
 B) above mentioned is the advantage of the dual converter without circulating current
 C) both are correct
 D) both are wrong

76. Which of the following device is NOT suitable for parallel operation?
- A) BJT
 - B) MOSFET
 - C) TRIAC
 - D) IGBT
77. In the 8085 processor, Register B contains 0X03 and Register C contains 0X04, What is the content of the Accumulator after the execution of the program given below?
- ```
MVIA, 0X00H
LOOP: ADD B
DCR C
JNZ LOOP
HLT
```
- A) 0X03
  - B) 0X07
  - C) 0X0C
  - D) 0X0F
78. If a 90 GB memory has to be connected to a microprocessor, minimum how many address lines are required ?
- A) 36
  - B) 39
  - C) 32
  - D) 37
79. Suppose registers 'A' and 'B' contain 50H and 40H respectively. After instruction MOVA and B, what will be the contents of registers A and B?
- A) 40H, 40H
  - B) 50H, 40H
  - C) 50H, 50H
  - D) 60H, 40H



80. The clock frequency of an 8085 microprocessor is 5 MHz. If the time required to execute an instruction is 1.4 microseconds, then the number of T-states needed for executing the instruction is
- 1
  - 6
  - 7
  - 4
81. The instruction, MOV AX,1234H is an example of
- Register addressing mode
  - Immediate addressing mode
  - Based Indexed addressing mode
  - Direct addressing mode
82. Which one is the lumen
- Lumen=candle power of source X solid angle
  - Lumen= two candle power of source X solid angle
  - Lumen=candle power of source
- b is correct
  - a is correct
  - c is correct
  - All the answers are wrong
83. Consider the following statements:
- Assertion (A): A lamp gives 1500 c.p in every direction below the horizontal and no illumination above the horizontal. Find the total radiation sent vertically downward.
- Reason (R): The angle of plane  $180^\circ$ . So the flux is 4710 lumens only
- The correct answer is
- A and R are both correct and R is the correct explanation of A
  - A and R are both correct and R is NOT the correct explanation of A
  - A is correct, but R is NOT correct.
  - A is NOT correct, but R is correct



84. The average illumination is

- A) Flux received on the working plane/area of the working plane
- B) Area of the working plane/ Total lamp flux
- C) Flux received on the working plane/total lamp flux
- D) Total lamp flux/ area of the working plane

85. A photocell has a sensitivity of  $12\mu\text{A}/\text{lumen}$  and operates with a load of  $1.5\text{M}\Omega$ . The projected area of the cathode is  $5.08 \times 3.75 \text{ cm}^2$ . Determine the output voltage when the cell is illuminated by

|    | Illuminated by                      |    | Volts  |
|----|-------------------------------------|----|--------|
| a. | A 60 c.p lamp at a distance of 1.8m | 1) | 0.823V |
| b. | A 6 c.p lamp at a distance of 0.5m  | 1) | 0.132V |
| c. | A 10 c.p lamp at a distance of 1.2m | 1) | 0.635V |

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

86. \_\_\_\_\_ within which the diversity of illumination produced on a surface at right angles to the beam does not exceed 10 to 1.

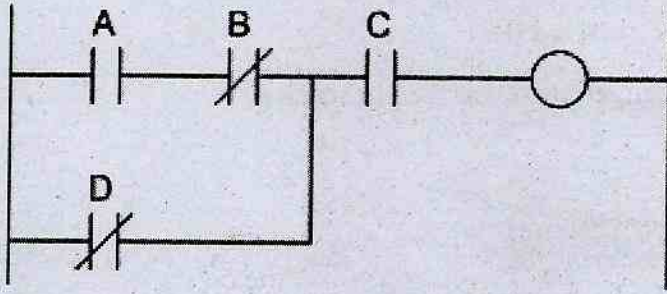
- A) Beam angle
- B) Beam Lumens
- C) Waste light factor
- D) Depreciation factor

87. Ladder logic programming consists primarily of:

- A) Virtual relay contacts and coils
- B) Logic gate symbols with connecting lines
- C) Function blocks with connecting lines
- D) Text-based code



88. The Boolean representation of this PLC program is:



- A)  $ABC + D$   
 B)  $C + (A + B)D$   
 C)  $C + D(A + B)$   
 D)  $C(AB + D)$
89. In the below-mentioned statement which one is not suitable for the ideal traction system
- A) The coefficient of adhesion should be low so that high tractive effort at the start is possible and rapid acceleration of the train can be obtained  
 B) It should be possible to overload the equipment for short periods.  
 C) The wear caused on the brake shoes, wheel tyres, and the track should be minimum  
 D) The locomotive unit should be self-contained so that it can run on any route.
90. In electric traction application, which motor is suitable for the braking system
- A) DC series Motor with Rheostatic braking  
 B) DC shunt motor with Rheostatic braking  
 C) Three Phase Induction motor with plugging  
 D) DC series motor with plugging
91. The tractive effort exerted by a locomotive while hauling a train on the level track at 50 Kmph is 35000 Newton. If the locomotive has a haul of the same train at the same speed on a gradient and the tractive effort required is 55000 Newton, Determine the horsepower delivered by the locomotive when the motor is used DC series motor.
- a) 828HP  
 b) 1101HP  
 c) 1200HP  
 d) 2598HP  
 A) d is correct  
 B) a is correct  
 C) c is correct  
 D) All answers are wrong



92. Locomotives with monometer bogies have
- A) Uneven distribution of tractive effect
  - B) Suitability for the passenger as well as freight service
  - C) Lot of skidding
  - D) Low coefficient of adhesion
93. Which of the following is an advantage of electric traction over other methods of traction?
- A) Faster acceleration
  - B) No pollution problems
  - C) Better braking action
  - D) All of the above
94. Determine the power rating of a microwave oven, if it has a resistance of  $36\Omega$ . The oven is attached to a 230V power line.
- A) 147W
  - B) 1470W
  - C) 1.47MW
  - D) 1.47W
95. The Thevenin's equivalent resistance is found by Basin Range in the USA
1. Short-circuiting the given two terminals
  2. Removing their voltages source by their internal resistances
  3. Removing their Current source by their internal resistance
  4. Short circuit their current sources
- The correct answer/s is/are
- A) 3 only
  - B) 2 and 3 only
  - C) 1 and 2 only
  - D) 1, 2 and 4



96. A good application for a timed interrupt in a PLC program would be:
- A) A communications function block
  - B) A PID function block
  - C) A math function block
  - D) A motor start/stop rung
97. Which two properties are required to reduce thermal fatigue?
- A) High melting point and high electrical resistance
  - B) Good oxidation resistance and good creep strength
  - C) Low melting point and low electrical resistance
  - D) Low elastic modulus and low thermal expansion
98. Which of the following is not a characteristic of UJT?
- A) Bilateral conduction
  - B) Peak point voltage
  - C) Negative Resistance
  - D) Intrinsic stand-off ratio
99. A 5 H.P., 50Hz, 3-phase, 440 V, induction motors are available for the following r.p.m. Which motor will be the costliest?
- A) 730 r.p.m.
  - B) 960 r.p.m.
  - C) 1440 r.p.m.
  - D) 2880 r.p.m.
100. According to application, instruments are classified as
- A) Switchboard
  - B) Portable
  - C) Both (A) and (B)
  - D) None of these
-



# ROUGH WORK



## **ROUGH WORK**



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