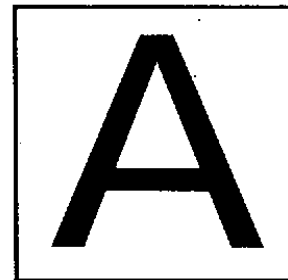


DO NOT OPEN THIS TEST BOOKLET UNTIL YOU ARE ASKED TO DO SO

T.B.C. : P-RSR-L-RRA

Test Booklet Series

Serial **41853**



TEST BOOKLET
ELECTRICAL ENGINEERING

Paper I

Time Allowed : Two Hours

Maximum Marks : 200

INSTRUCTIONS

1. IMMEDIATELY AFTER THE COMMENCEMENT OF THE EXAMINATION, YOU SHOULD CHECK THAT THIS TEST BOOKLET DOES **NOT** HAVE ANY UNPRINTED OR TORN OR MISSING PAGES OR ITEMS ETC. IF SO, GET IT REPLACED BY A COMPLETE TEST BOOKLET.
2. ENCODE CLEARLY THE TEST BOOKLET SERIES A, B, C, OR D AS THE CASE MAY BE IN THE APPROPRIATE PLACE IN THE ANSWER SHEET.
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.
4. This Test Booklet contains **120** items (questions). Each item comprises four responses (answers). You will select the response which you want to mark on the Answer 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 Answer Sheet provided. See directions in the Answer Sheet.
6. All items carry equal marks.
7. Before you proceed to mark in the Answer Sheet the response to various items in the Test Booklet, you have to fill in some particulars in the Answer Sheet as per instructions sent to you with your Admission Certificate.
8. After you have completed filling in all your responses on the Answer Sheet and the examination has concluded, you should hand over to the Invigilator **only the Answer Sheet**. You are permitted to take away with you the Test Booklet.
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 A CANDIDATE IN THE OBJECTIVE TYPE QUESTION PAPERS.
 - (i) There are four alternatives for the answer to every question. For each question for which a wrong answer has been given by the candidate, **one-third (0.33)** 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 to 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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1. The following equation is **not** valid for magneto-static field in inhomogeneous magnetic materials :
 - (a) $\nabla \cdot \mathbf{B} = 0$
 - (b) $\nabla \cdot \mathbf{H} = 0$
 - (c) $\nabla \times \mathbf{A} = \mathbf{B}$
(A is magnetic vector potential)
 - (d) $\nabla \times \mathbf{H} = \mathbf{J}$
2. The normal components of electric flux density across a dielectric-dielectric boundary
 - (a) Are discontinuous
 - (b) Are continuous
 - (c) Depend on the magnitude of the surface charge density
 - (d) Depend on electric field intensity
3. The electric field intensity phasor of an EM wave in free space is $\mathbf{E} = 10e^{-j4y} \mathbf{a}_x$ V/m. The angular frequency ω , in radian per second, is
 - (a) $4 \times 3 \times 10^8$
 - (b) $4y \times 3 \times 10^8$
 - (c) $t \times 3 \times 10^8$
 - (d) $10 \times 3 \times 10^8$
4. In free space $\bar{\mathbf{H}}$ field is given as $\bar{\mathbf{H}}(Z, t) = \frac{1}{6\pi} \cos(\omega t + \beta Z) \mathbf{a}_y$. $\bar{\mathbf{E}}(Z, t)$ is
 - (a) $20 \cos(\omega t + \beta Z) \mathbf{a}_x$
 - (b) $20 \cos(\omega t + \beta Z) \mathbf{a}_z$
 - (c) $20 \sin(\omega t + \beta Z) \mathbf{a}_y$
 - (d) $20 \sin(\omega t + \beta Z) \mathbf{a}_x$
5. Screw projecting into the waveguide is
 - (a) Capacitive discontinuity
 - (b) Inductive discontinuity
 - (c) May be capacitive or inductive depending upon the position inside the guide
 - (d) None of the above
6. Depth of penetration δ is equal to $\frac{\lambda}{2\pi}$ for
 - (a) Good insulator
 - (b) Good conductor
 - (c) Lossy medium
 - (d) Low values of λ
7. When a plane wave propagates in a dielectric medium
 - (a) The average electric energy and the average magnetic energy densities are not equal
 - (b) The average electric energy and the average magnetic energy densities are equal
 - (c) The net average energy density is finite
 - (d) The average electric energy density is not dependent on the average magnetic energy density
8. A transmission line is distortionless if
 - (a) $RG = LC$
 - (b) $RC = GL$
 - (c) $\frac{R}{C} = \frac{G}{L}$
 - (d) $R = G$
9. If the maximum and minimum voltages on a transmission line are 4 V and 2 V, respectively, for a typical load, VSWR is
 - (a) 1.0
 - (b) 0.5
 - (c) 2.0
 - (d) 8.0
10. For a lossy transmission line, the characteristic impedance does **not** depend on
 - (a) The operating frequency of the line
 - (b) The conductivity of the conductors
 - (c) Conductivity of the dielectric separating the conductors
 - (d) Length of the line

11. A higher directivity is specified by
 (a) High gain high bandwidth
 (b) Low gain high bandwidth
 (c) High gain low bandwidth
 (d) Low gain low bandwidth
12. A lossless transmission line of characteristic impedance 300Ω and length $\frac{\lambda}{2}$ is shorted at one end and is terminated in its characteristic impedance at the other. The input impedance measured at the mid section of the line is
 (a) 0Ω
 (b) 100Ω
 (c) 300Ω
 (d) 150Ω
13. The Fermi level in an n-type semiconductor at zero degree Kelvin lies
 (a) Below the donor level
 (b) Half-way between the conduction band and the donor level
 (c) Half-way between the conduction band and the valence level
 (d) Close to the valence band
14. According to free electron theory, electrons in a metal are subjected to
 (a) Constant potential
 (b) Sinusoidal potential
 (c) Square wave potential
 (d) Non-periodic potential
15. Controlled addition of group III element to an elemental semiconductor results in the formation of
 (a) Intrinsic semiconductor
 (b) n-type semiconductor
 (c) p-type semiconductor
 (d) Degenerate semiconductor
16. Phonons (Quanta of lattice vibration) obey
 (a) Maxwell distribution
 (b) Maxwell-Boltzmann distribution
 (c) Fermi-Dirac distribution
 (d) Bose-Einstein distribution
17. The Fermi energy E_F of a metal is proportional to (n is the number of free electrons per unit volume of the metal) as
 (a) n^2
 (b) $n^{\frac{1}{2}}$
 (c) $n^{\frac{2}{3}}$
 (d) $n^{\frac{3}{2}}$
18. If w is the width of the depletion region in a p-n junction, the transition capacitance is proportional to
 (a) w
 (b) w^2
 (c) $1/w$
 (d) $1/w^2$
19. The temperature coefficient of a resistance of a doped semiconductor is
 (a) Always positive
 (b) Always negative
 (c) Zero
 (d) Positive or negative depending on the level of doping
20. The current flow in a semiconductor is due to
 1. Drift current
 2. Displacement current
 3. Diffusion current
 (a) 1, 2 and 3
 (b) 1 and 2 only
 (c) 1 and 3 only
 (d) 2 and 3 only

21. Materials in superconducting state have the property of
- Absorbing magnetic field
 - Repelling magnetic field
 - Absorbing electric field
 - Repelling electric field
22. A superconductor may be used for generating
- Voltage
 - Pressure
 - Temperature
 - Magnetic field
23. As temperature falls below the transition temperature, the value of critical magnetic field of a superconductor
- Remains unchanged
 - Increases
 - Decreases
 - First increases, reaches a peak and then decreases
24. The energy gap of a superconductor
- Is independent of temperature
 - Increases with temperature
 - Is maximum at a critical temperature
 - Is minimum at a critical temperature
25. Which of the following properties is *not* correct for a superconductor in its superconducting stage ?
- Its resistivity is zero
 - Magnetic flux density inside the conductor is zero
 - Its relative permeability is unity
 - Its magnetic susceptibility is negative
26. Lead
- Is not used to form cable sheaths.
 - Is least affected by sea water.
 - Has good malleable and ductile properties.
 - Will not alloy with many other metals.
- 1 and 2 are correct
 - 2 and 3 are correct
 - 3 and 4 are correct
 - 1 and 4 are correct
27. The geometrical configuration of one molecule of C_{60} -buckminsterfullerene contains
- 12 hexagons and 20 pentagons of Carbon atoms
 - 20 hexagons and 12 pentagons of Carbon atoms
 - 20 hexagons and 20 pentagons of Carbon atoms
 - 12 hexagons and 12 pentagons of Carbon atoms
28. Heating a permanent magnet results in the loss of magnetic behaviour because
- The atoms start vibrating
 - The magnetic dipoles start vibrating
 - The magnetic dipoles start realigning
 - The atoms start conducting
29. Paramagnetic susceptibility of a material
- Increases linearly with temperature
 - Decreases linearly with temperature
 - Increases linearly with $(1/T)$
 - Decreases linearly with $(1/T)$

30. The magnetic domains, during the process of magnetization of ferromagnetic materials,
- Only expand
 - Rotate first and then expand
 - Expand first and then rotate
 - Neither rotate nor expand
31. If the domain walls in a magnetic material can easily be moved, the material displays
- High flux density
 - High permeability
 - Permanent magnetic behaviour
 - High permittivity
32. Magnetic field of Earth has no vertical component at
- Magnetic poles
 - Magnetic equator
 - Latitude 45°
 - Longitude 45°
33. Match List I with List II and select the correct answer using the code given below the lists :
- | <u>List I</u> | <u>List II</u> |
|-----------------------|------------------|
| A. Magnetic induction | 1. Bohr magneton |
| B. Magnetic field | 2. Tesla |
| C. Magnetic moment | 3. Henry/metre |
| D. Permeability | 4. Ampere/metre |
- Code :**
- | | A | B | C | D |
|-----|---|---|---|---|
| (a) | 2 | 1 | 4 | 3 |
| (b) | 3 | 1 | 4 | 2 |
| (c) | 2 | 4 | 1 | 3 |
| (d) | 3 | 4 | 1 | 2 |
34. Soft iron is used to manufacture electro-magnets because it has
- High retentivity
 - High coercive field
 - Low retentivity
 - Low coercive field
35. Consider the following statements with regards to soft iron :
- It is a magnetic material.
 - It conducts electricity.
 - It is an alloy of iron and copper.
 - It is used to make permanent magnets.
- Which of these statements are correct ?
- 1 and 2
 - 2 and 3
 - 3 and 4
 - 1 and 4
36. A permeable substance is one
- Which is strong magnetic
 - Which is weak magnetic
 - Which is a good conductor
 - Through which magnetic lines of force can pass easily
37. High permittivity ceramic is used for capacitors of
- A few pF to a few hundred pF
 - A few μF to a few hundred μF
 - A few nF to a few hundred nF
 - A few mF to a few hundred mF

38. The commercial thermopiles are formed by
- Series of Si-Al thermocouples in an IC by doping Al layers on p-type Si on n-type Si epitaxial layers
 - Series of Cu-W thermocouple strips
 - Piezoelectric material strips piled together
 - Series of bismuth-telluride couples

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

<u>List I</u>	<u>List II</u>
A. Porcelain	1. Used for high frequency applications
B. Steatite	2. Used in capacitors to be operated at high frequencies
C. Mica	3. Used for insulators
D. Rutile	4. Releases water when heated

Code :

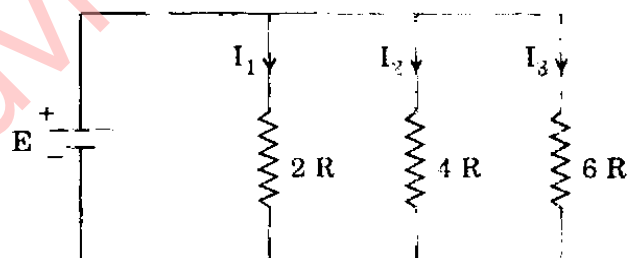
	A	B	C	D
(a)	3	1	4	2
(b)	1	2	4	3
(c)	3	4	2	1
(d)	1	4	2	3

40. Diamagnetic materials possess
- Permanent dipoles
 - Induced dipoles
 - Both permanent and induced dipoles
 - No dipoles

41. In the power measurement by ammeter-voltmeter method, if the voltmeter is connected across the load, then the value of the power will be

- The power consumed by the load
- The sum of power consumed by the load and ammeter
- The sum of power consumed by the load and voltmeter
- The sum of power consumed by the load, ammeter and voltmeter

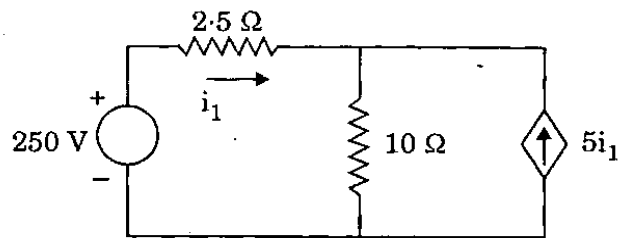
42.



Three parallel branches of resistors are connected across a dc source as shown in the figure. What is $I_1 : I_2 : I_3$?

- 3 : 2 : 6
- 2 : 4 : 6
- 6 : 3 : 2
- 6 : 2 : 4

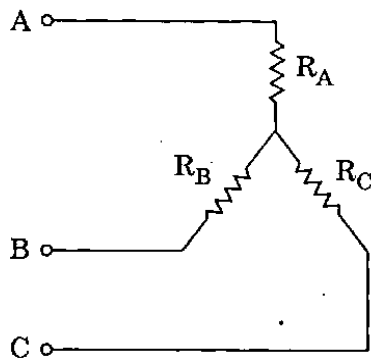
43.



In the circuit shown, the current i_1 is

- (a) 4 A
- (b) 2 A
- (c) 4.76 A
- (d) 20 A

44.



The following are the results of tests conducted on the above star-connected load :

The resistance between A and B with C open : 12 Ω

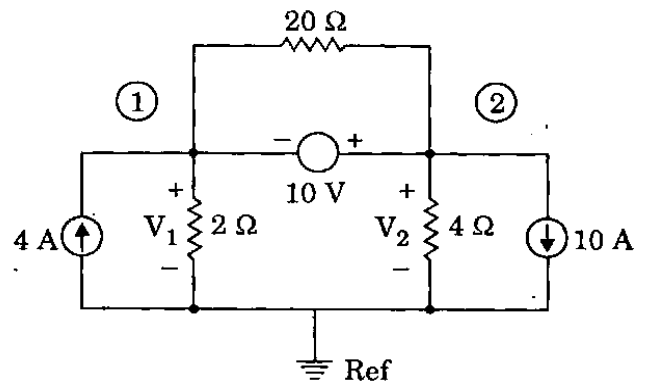
The resistance between B and C with A open : 22 Ω

The resistance between C and A with B open : 18 Ω

The individual resistances of R_A , R_B and R_C are, respectively,

- (a) 8 Ω, 14 Ω and 4 Ω
- (b) 10 Ω, 2 Ω and 8 Ω
- (c) 4 Ω, 8 Ω and 14 Ω
- (d) 6 Ω, 6 Ω and 8 Ω

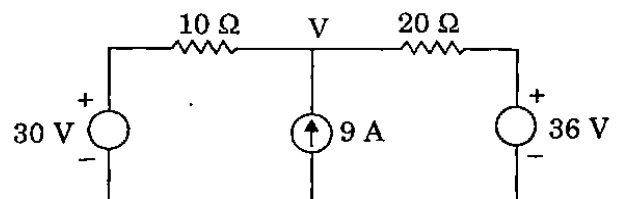
45.



When KCL is applied at the super node in the above circuit, the current equation in terms of node voltages V_1 and V_2 is

- (a) $-6 = \frac{V_1}{2} + \frac{V_2}{4}$
- (b) $4 = \frac{V_1 - V_2}{2} + \frac{V_1 - V_2}{20}$
- (c) $4 = \frac{V_1}{2} + \frac{V_1 - V_2}{20}$
- (d) $4 = \frac{V_1}{2} + \frac{V_2}{4}$

46.



The node voltage V in the circuit is

- (a) 6 V
- (b) 30 V
- (c) 36 V
- (d) 92 V

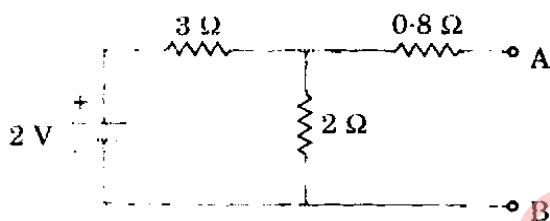
47. Match List I with List II and select the correct answer using the code given below the lists :

<u>List I</u>	<u>List II</u>
A. Equivalent circuit	1. Superposition
B. Linearity	2. Norton's
C. Bilateral	3. Tellegen's
D. Structure	4. Reciprocity

Code :

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

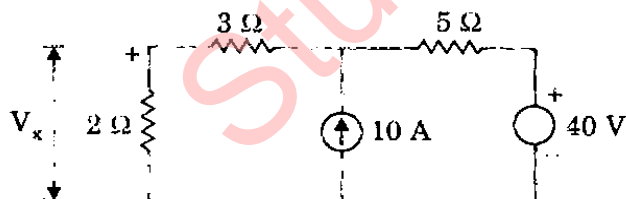
48.



The Norton equivalent between A and B for the circuit is

- (a) 2 A and 2.5 Ω
- (b) 0.5 A and 1 Ω
- (c) 1 A and 2 Ω
- (d) 0.4 A and 2 Ω

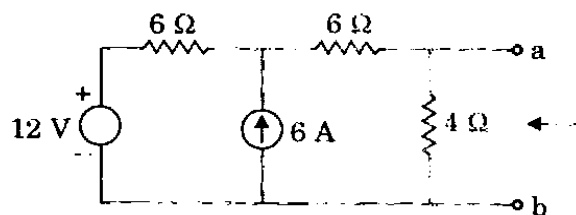
49.



The voltage V_x across the 2 Ω resistance in the circuit is

- (a) 16 V
- (b) 60 V
- (c) 18 V
- (d) 10 V

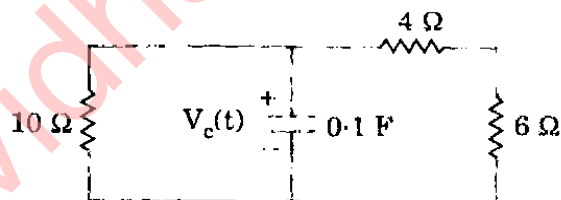
50.



Thevenin equivalent circuit to the left of the terminals a and b in the circuit, has equivalent voltage source V_{th} and equivalent resistance R_{th} , respectively, as

- (a) 12 V and 16 Ω
- (b) 20 V and 4 Ω
- (c) 12 V and 12 Ω
- (d) 12 V and 3 Ω

51.



In the circuit, if $V_c(0) = 25$ V, the expression for $V_c(t)$ for $t > 0$ is

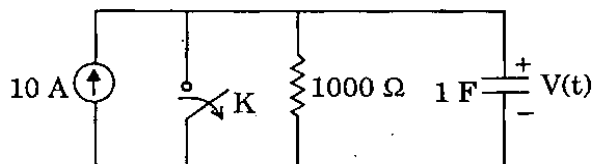
- (a) $V_c(t) = 20 e^{-0.4t}$ V
- (b) $V_c(t) = 25 e^{-0.4t}$ V
- (c) $V_c(t) = 20 e^{-2.5t}$ V
- (d) $V_c(t) = 25 e^{-2t}$ V

52.

A 0.2 H inductor with an initial current of 4 A is in parallel with a resistor of 100 Ω. The current at 0.8 ms is

- (a) $4 e^{-0.4}$ A
- (b) $4 e^{-16 \times 10^{-6}}$ A
- (c) $4 e^{-0.4 \times 10^{-3}}$ A
- (d) $4 e^{-16 \times 10^{-3}}$ A

53.



In the above network, the switch K is opened at $t = 0$. Then $\frac{dV}{dt}$ at $t = 0^+$ is

- (a) 1000 V/sec
- (b) 100 V/sec
- (c) 10 V/sec
- (d) 1 V/sec

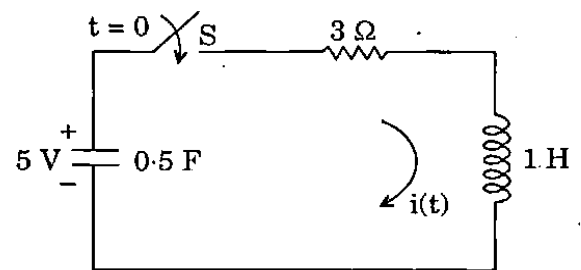
54. For the driving point impedance function of a circuit, $Z(s) = \frac{s+\alpha}{s+\beta}$, α and β real. Then voltage will lead the current if α and β are

- (a) positive and $\alpha > \beta$
- (b) positive and $\alpha < \beta$
- (c) positive and real negative, respectively
- (d) negative and real positive, respectively

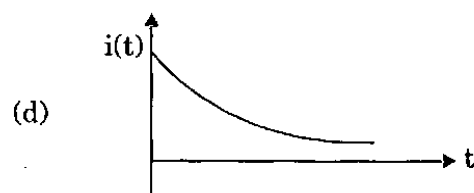
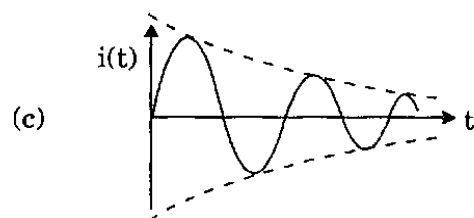
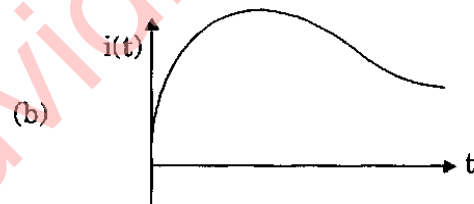
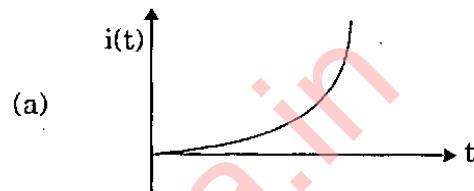
55. A 100Ω resistor has an effective inductance of $0.1 \mu\text{H}$ and a distributed capacitance of 10 pF . Its time constant at medium frequency is

- (a) 0 ns
- (b) 1 ns
- (c) 2 ns
- (d) 3 ns

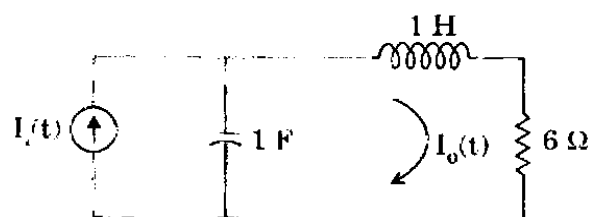
56.



The nature of current response $i(t)$ for $t \geq 0$ for the network shown is



57.



For the above circuit, the current gain

function $\frac{I_0(s)}{I_1(s)}$ has poles and zeros as

(a) No zeros,

$$P_1 = 3 + 2\sqrt{2},$$

$$P_2 = 3 - 2\sqrt{2}$$

(b) $Z_1 = 0; Z_2 = 2,$

$$P_1 = 3 + 2\sqrt{2},$$

$$P_2 = 3 - 2\sqrt{2}$$

(c) No zeros,

$$P_1 = 1, P_2 = 1$$

(d) $Z_1 = 1, Z_2 = 1,$

$$P_1 = 3 + j2\sqrt{2},$$

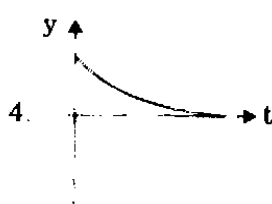
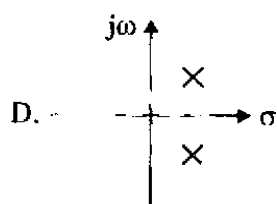
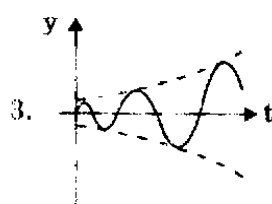
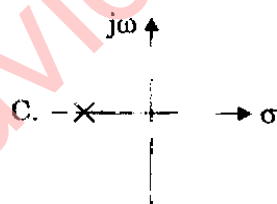
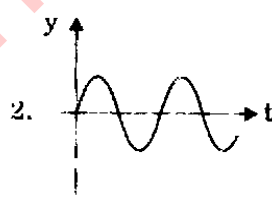
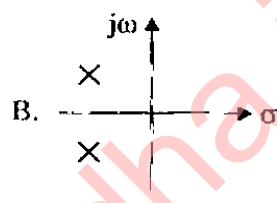
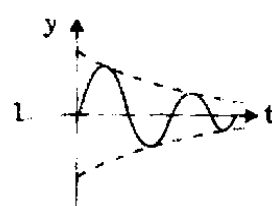
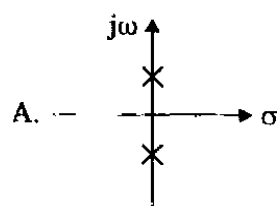
$$P_2 = 3 - j2\sqrt{2}$$

58.

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

List I

List II

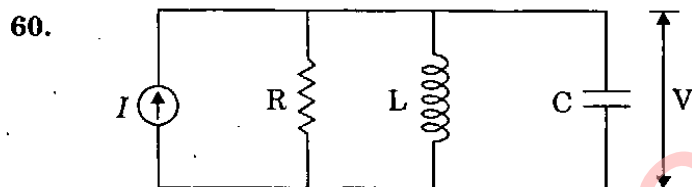


Code :

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

59. For the network function $\frac{V(s)}{I(s)} = \frac{s+3}{2s+3}$, the $v(t)$ at $t = 0$ for the relaxed circuit with unit step $i(t)$, is

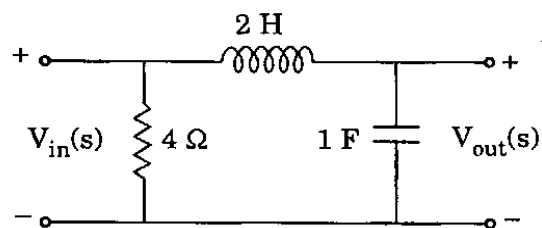
- (a) 0.5 V
- (b) 1.0 V
- (c) 1.5 V
- (d) 2.0 V



For the parallel RLC circuit shown, if $R = 10 \Omega$, $L = 0.1 \text{ H}$ and $C = 0.1 \text{ F}$, the current I is sinusoidal of frequency equal to the resonant frequency of the circuit, then the current through R is

- (a) 0
- (b) $0.1 I$
- (c) I
- (d) $10 I$

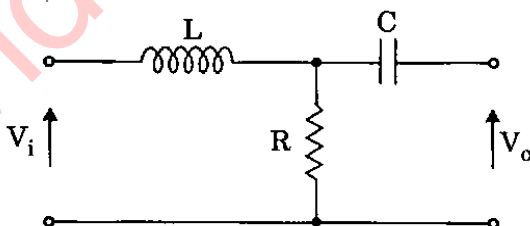
61.



The voltage transfer function of the network is

- (a) $\frac{1}{1+2s}$
- (b) $1+4s$
- (c) $6-s$
- (d) $\frac{1}{1+2s^2}$

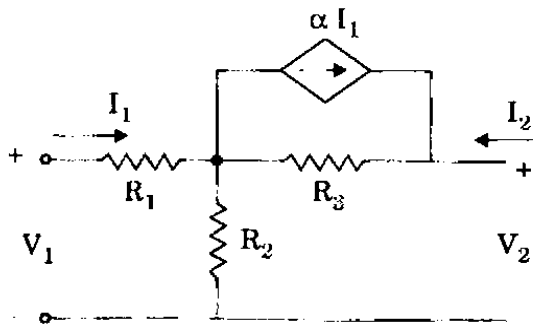
62.



The transfer function $\frac{V_o(s)}{V_i(s)}$ of the 2-port network is

- (a) $\frac{1}{1+s\frac{L}{R}}$
- (b) $\frac{1+sCR}{sc(R+sL)}$
- (c) $\frac{1}{sC(R+sL)}$
- (d) $\frac{s}{s+\frac{R}{L}}$

63.



Consider the two-port network as shown. The hybrid parameter h_{12} is

(a) $\frac{(\alpha R_3 + R_2)}{R_2 + R_3}$

(b) $\frac{(1 - \alpha)R_3}{R_2 + R_3}$

(c) $\frac{(\alpha - 1)R_2}{R_2 + R_3}$

(d) $\frac{R_2}{R_2 + R_3}$

64. A 2-port network is defined by the relation .

$$V_1 = \frac{3}{4} I_1 - \frac{1}{4} I_2, \quad V_2 = \frac{1}{2} I_1 + \frac{1}{2} I_2.$$

Then y_{12} is

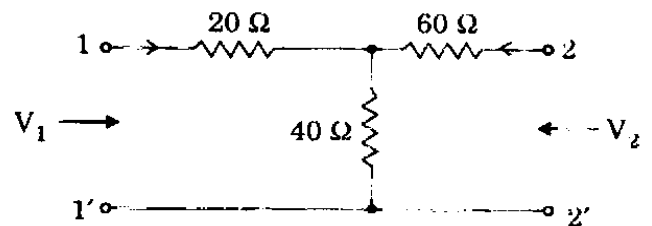
(a) $\frac{1}{2} \text{ } \Omega$

(b) $\frac{1}{2} \text{ } \Omega$

(c) $1 \text{ } \Omega$

(d) $1 \text{ } \Omega$

65.



For the two-port network, the impedance parameter matrix $[Z] = \begin{bmatrix} Z_{11} & Z_{12} \\ Z_{21} & Z_{22} \end{bmatrix}$ is

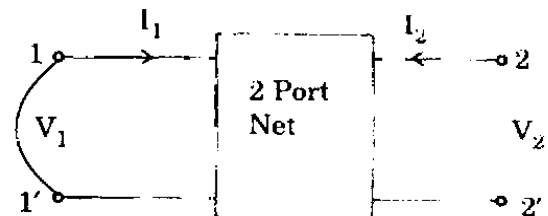
(a) $\begin{bmatrix} 60 \text{ } \Omega & 100 \text{ } \Omega \\ 40 \text{ } \Omega & 60 \text{ } \Omega \end{bmatrix}$

(b) $\begin{bmatrix} 40 \text{ } \Omega & 100 \text{ } \Omega \\ 60 \text{ } \Omega & 40 \text{ } \Omega \end{bmatrix}$

(c) $\begin{bmatrix} 60 \text{ } \Omega & 40 \text{ } \Omega \\ 40 \text{ } \Omega & 100 \text{ } \Omega \end{bmatrix}$

(d) $\begin{bmatrix} 40 \text{ } \Omega & 100 \text{ } \Omega \\ 100 \text{ } \Omega & 60 \text{ } \Omega \end{bmatrix}$

66.



When port-1 of a two-port network is short circuited, $I_1 = 4 I_2$ and $V_2 = 0.5 I_2$, then which of the following is true ?

(a) $Y_{11} = 4 \text{ mho}$

(b) $Y_{12} = 8 \text{ mho}$

(c) $Y_{21} = 16 \text{ mho}$

(d) $Y_{22} = 0.25 \text{ mho}$

67. The driving point impedance function,

$$Z(s) = \frac{s^2 + 2s + 2}{s^2 + s + 1}, \text{ may be realized by}$$

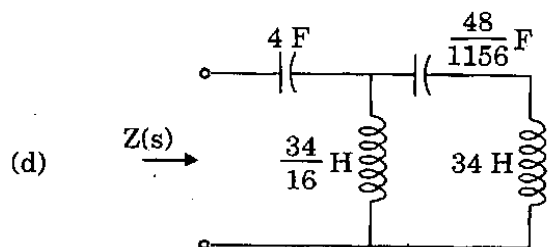
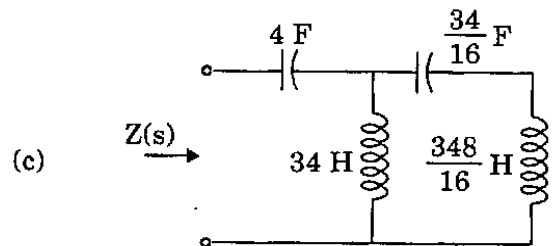
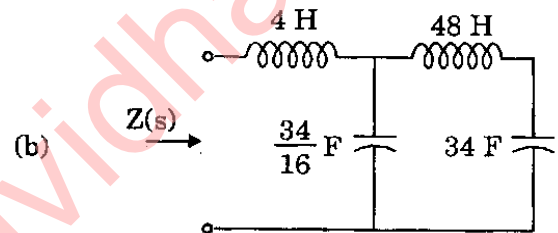
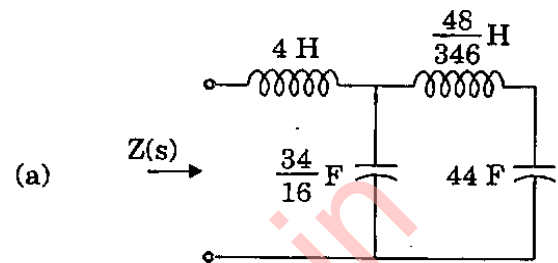
- (a) R-C network
- (b) R-L network
- (c) L-C network
- (d) None of the above networks

68. If an RC driving point impedance function, $Z(s)$ has equal number of poles and zeros at finite locations, then

- (a) $Z(0) \leq Z(\infty)$
- (b) $Z(0) \geq Z(\infty)$
- (c) $Z(0) < Z(\infty)$
- (d) $Z(0) > Z(\infty)$

69. Which one of the following networks represents the Cauer's IInd form for the given driving point impedance function

$$Z(s) = \frac{12s^4 + 10s^2 + 1}{6s^3 + 4s} ?$$



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

<u>List I</u>	<u>List II</u>
A. Work	1. Ampere per meter
B. Electric field strength	2. Weber
C. Magnetic flux	3. Volt per meter
D. Magnetic field strength	4. Joule

Code :

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

71. A 0-100 V voltmeter has an accuracy of 1 percent at full scale reading. What will be the error if it reads 50 V ?
- 1 percent
 - 2 percent
 - 0.5 percent
 - 4 percent

72. A resistance of $108\ \Omega$ is specified using significant figures as indicated below :

- $108\ \Omega$
- $108.0\ \Omega$
- $0.000108\ \text{M}\Omega$

Among these

- 1 represents greater precision than 2 and 3
- 2 represents greater precision but 1 and 3 represent same precision
- 2 and 3 represent greater precision than 1
- 1, 2 and 3 represent the same precision

73. What are the causes of gross error in the instruments ?

- Misreading of instruments
- Incorrect adjustment of instruments
- Errors due to defective instrument
- Errors due to effect of environment on the instrument

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

74. The measured value of a capacitor is $205.5\ \mu\text{F}$; whereas its true value is $202.4\ \mu\text{F}$. The relative error is

- 1.87%
- 1.94%
- 1.53%
- 1.73%

75. Which of the following types of errors come under systematic errors ?

- Irregular spring tension.
- Improper readings of an instrument.
- Loading effects.
- Error due to the presence of electric field or magnetic field.

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

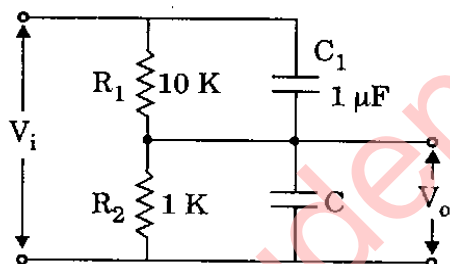
76. The value of a quantity and its uncertainty are given as 26455 ± 3754 without rounding off. Only two significant digits are relevant for error. Value of error rounded off to two significant figures is

- (a) 26500 ± 3800
- (b) 26400 ± 3800
- (c) 26460 ± 3750
- (d) 26400 ± 3700

77. The value of a shunt resistance required to convert an ammeter of 1 mA with 100 Ω internal resistances into 0 – 100 mA ammeter is

- (a) 2.2 Ω
- (b) 1.01 Ω
- (c) 1.2 Ω
- (d) 1.1 Ω

78.



A RC potentiometer to measure ac voltage, it is desired that $\frac{V_o}{V_i}$ should be independent of frequency. The value of C should be

- (a) 10 μF
- (b) 11 μF
- (c) 0.1 μF
- (d) 0.09 μF

79. The current and potential coils of a dynamometer type wattmeter were accidentally interchanged while connecting. After energizing the circuit, it was observed that the wattmeter did not show the reading. This could be due to the

- (a) Damage to potential coil
- (b) Damage to current coil
- (c) Damage to both the potential and current coil
- (d) Loose contacts

80. Consider the following statements associated with an energy meter :

1. It is an integrating type instrument.
2. It is an induction type instrument.
3. It uses a permanent magnet for rotation of aluminium disc.
4. It employs a high control torque.

Which of these statements are correct ?

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

81. A capacitor is connected across a portion of resistance of the multiplier in order to make the pressure coil circuit of the wattmeter non-inductive. The value of this resistance is r while the total resistance and inductance of the pressure circuit are respectively R_p and L . The value of the capacitance C is

- (a) $\frac{L}{R_p^2}$
- (b) $\frac{0.41 L}{r^2}$
- (c) $\frac{L}{r^2}$
- (d) $\frac{0.41 L}{R_p^2}$

82. The magnetic field responsible for the production of the deflecting torque in an accurate dynamometer type wattmeter, being very weak, the accuracy of the measurement can be increased by providing a

- (a) Magnetic shield around the instrument
- (b) Compensating winding along with the pressure coil
- (c) Astatic arrangement to the moving system of the instrument
- (d) Capacitance shunt across a portion of the pressure coil

83. Consider the following statements regarding the controlling torque :

- 1. It is not present in power factor meter.
- 2. It opposes the deflecting torque.
- 3. It is provided by air friction or by fluid friction.

Which of these statements are correct ?

- (a) 1, 2 and 3
- (b) 1 and 3 only
- (c) 2 and 3 only
- (d) 1 and 2 only

84. Consider the following statements in connection with deflection and null type instruments :

- 1. Null type instrument is more accurate than the deflection type one.
- 2. Null type of instrument can be highly sensitive as compared with deflection type instrument.
- 3. Under dynamic conditions, null type instrument is not preferred to deflection type instrument.
- 4. Response is faster in null type instrument as compared to deflection type instrument.

Which of these statements are correct ?

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

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

<u>List I</u>	<u>List II</u>
A. Moving iron and hot wire type	1. Air friction
B. Galvanometer	2. Electromagnetic
C. PMMC type	3. Fluid friction
D. Electrostatic type	4. Eddy current

Code :

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

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

List I

- A. Average value of current
B. Frequency of a wave form
C. Strain-gauge resistance

List II

1. Self-balancing bridge
2. Wein's bridge
3. PMMC ammeter

Code :

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

87. In a vibrating reed type frequency meter, all the reeds

- (a) Are of identical dimensions and weight
(b) Have different natural frequencies
(c) Have the same natural frequencies
(d) Are not placed closed to an electromagnet

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

List I

- A. Hay bridge
B. Wheatstone bridge
C. Wein bridge
D. Schering bridge

List II

1. Medium resistance
2. Frequency
3. Capacitance
4. High Q-inductance

Code :

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

89. Due to the effect of inductance in the pressure coil, a dynamometer type wattmeter

- (a) Reads low on lagging power factor and high on leading power factor
(b) Reads high on lagging power factor and low on leading power factor
(c) Reading is independent of the power factor
(d) Always reads lower than the actual value

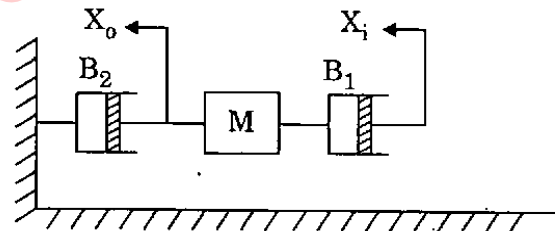
90. The full scale input voltage to an ADC is 10 V. If the resolution required is 5 mV, the minimum number of bits required for ADC is

- (a) 8
(b) 10
(c) 11
(d) 12

91. Which one of the following is *not* a self-generating type transducer ?

- (a) Thermocouple and thermopile
(b) Piezoelectric pick-up
(c) Photovoltaic cell
(d) Magnetostriction gauge

92.



For the mechanical system with mass and viscous friction components, shown in figure, $\frac{X_o(s)}{X_i(s)}$ is

- (a) $\frac{B_2}{Ms + B_1 + B_2}$
(b) $\frac{B_2}{Ms^2 + (B_1 + B_2)s}$
(c) $\frac{B_1}{Ms + B_1 + B_2}$
(d) $\frac{B_1}{Ms^2 + (B_1 + B_2)s}$

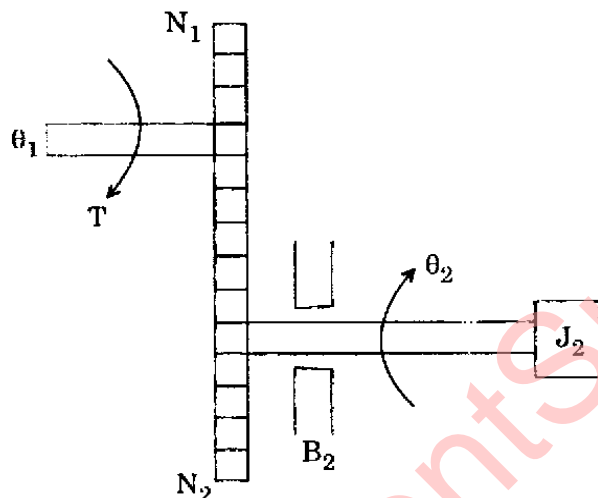
93. Match List I with List II and select the correct answer using the code given below the lists :

	List I	List II
A	Mass	1. Capacitor
B	Damper	2. Voltage
C	Spring	3. Resistor
D	Force	4. Inductor

Code :

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

94.



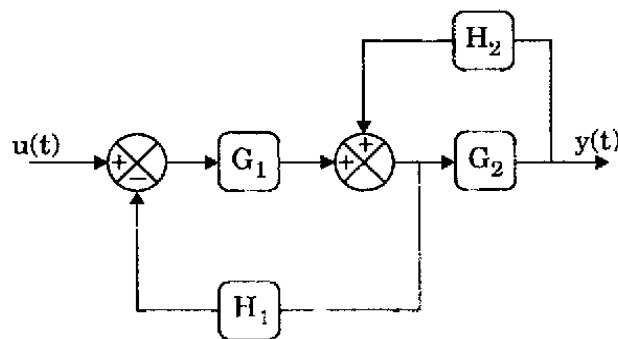
Consider the following relations with regard to the above shown gear trains :

- $\frac{\theta_1}{\theta_2} = \frac{N_2}{N_1}$
- $T_2 = J_2 \frac{d^2\theta_2}{dt^2} + B_2 \frac{d\theta_2}{dt}$
- $T_1 = J_2 \left(\frac{N_1}{N_2} \right)^2 \frac{d^2\theta_1}{dt^2} + B_2 \left(\frac{N_1}{N_2} \right)^2 \frac{d\theta_1}{dt}$

Which of these relations are correct ?

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

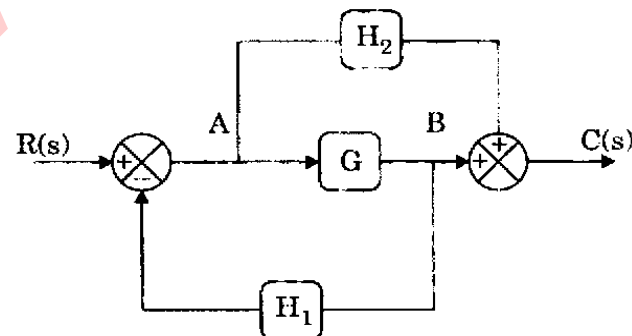
95.



The system transfer function for the block diagram shown is

- $\frac{G_1 G_2}{1 - G_2 H_2 + G_1 H_1}$
- $\frac{G_1 G_2}{1 - H_1 G_1 + G_2 H_1}$
- $\frac{G_1 G_2 H_1}{1 + G_2 H_1 + G_1 H_1}$
- $\frac{G_1 G_2 H_1}{1 + G_2 H_2 + G_1 H_1}$

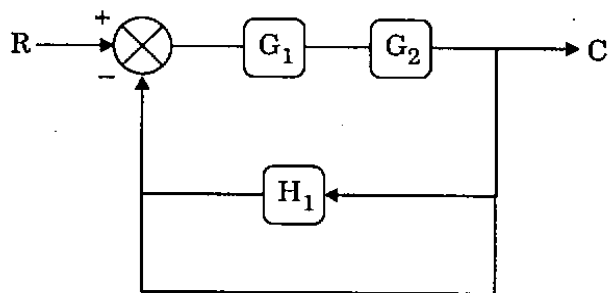
96.



The transfer function $\frac{C(s)}{R(s)}$ for the system shown above is

- $\frac{G + H_1}{1 + GH_2}$
- $\frac{G + H_2}{1 + GH_1}$
- $\frac{H_2}{1 + GH_1}$
- $\frac{GH_2}{1 + GH_1}$

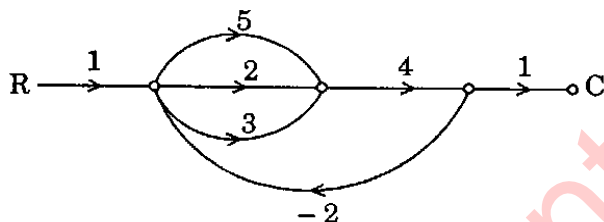
97.



The resulting equivalent transfer function of the system shown above is

- (a) $\frac{G_1 G_2}{1 + G_1 G_2 + G_1 G_2 H_1}$
- (b) $\frac{G_1 G_2}{1 + G_1 G_2 + G_1 H_1}$
- (c) $\frac{G_1 G_2}{1 + H_1 G_1 G_2}$
- (d) $\frac{G_1 G_2}{1 + G_1 G_2 + H_1}$

98.



Consider the following statements with regards to signal flow graph :

1. The number of loops are 3.
2. The number of loops are 2.
3. The number of forward paths are 3.
4. $\frac{C}{R}$ ratio is $\frac{40}{81}$.
5. $\frac{C}{R}$ ratio is $\frac{28}{81}$.

Which of these statements are correct ?

- (a) 1, 3, 4 and 5
- (b) 1, 3 and 4
- (c) 2, 3 and 4
- (d) 3, 4 and 5

99.

The transfer function of a linear control system is given by

$$G(s) = \frac{100(s+15)}{s(s+4)(s+10)}$$

In its Bode diagram, the value of gain for $\omega = 0.1$ rad/sec is

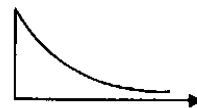
- (a) 20 db
- (b) 40 db
- (c) 60 db
- (d) 80 db

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

List IList II

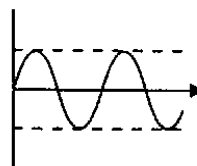
A. Two imaginary roots

1.



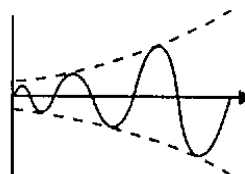
B. Two complex roots in RH of s-plane

2.



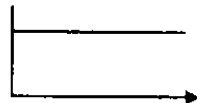
C. A single root on negative real axis

3.



D. A single root at the origin

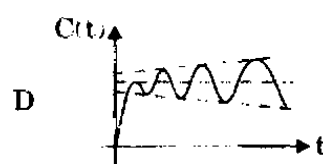
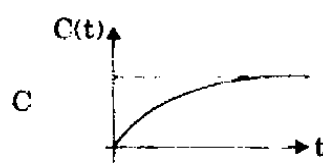
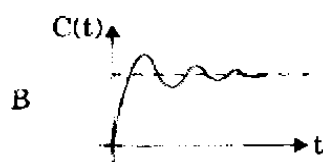
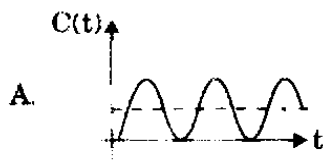
4.

Code :

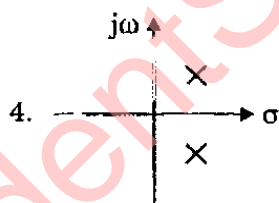
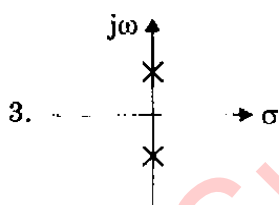
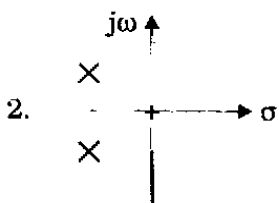
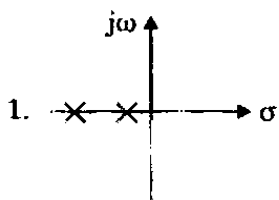
	A	B	C	D
(a)	4	1	3	2
(b)	2	1	3	4
(c)	4	3	1	2
(d)	2	3	1	4

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

List I



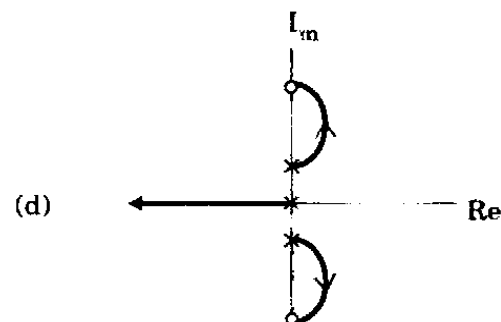
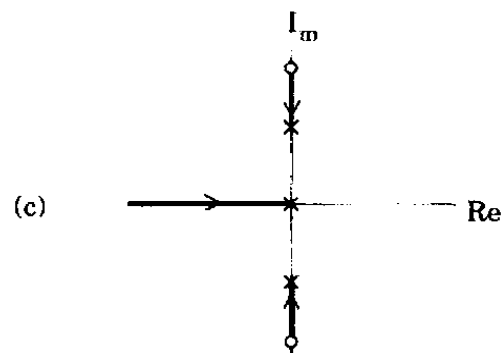
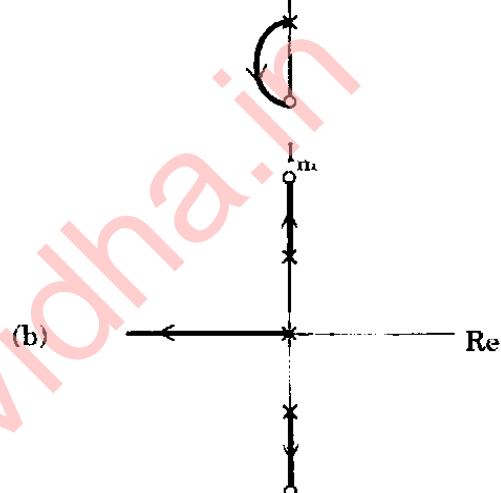
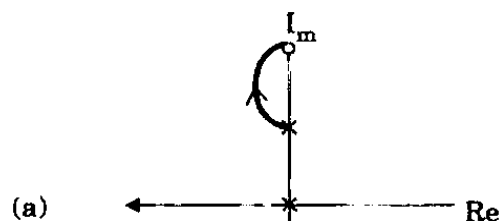
List II



Code :

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

102. Loop transfer function of unity feedback system is $G(s) = \frac{K(s^2 + 64)}{s(s^2 + 16)}$. The correct root locus diagram for the system is



the loop transfer function

$$G(s)H(s) = \frac{K}{s(s+3)^2} \text{ is}$$

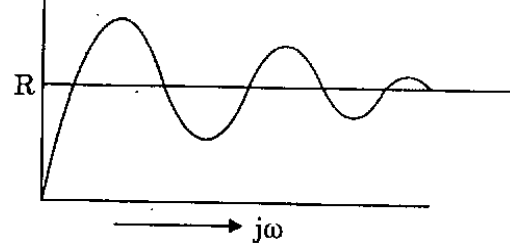
- (a) - 2.5
- (b) - 2.0
- (c) - 1.0
- (d) - 0.5

104. Consider the following statements regarding root loci plot :

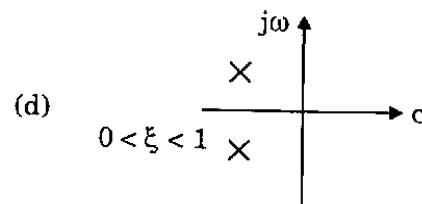
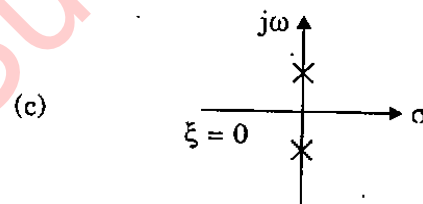
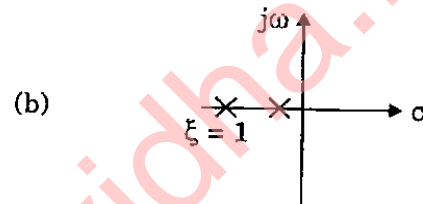
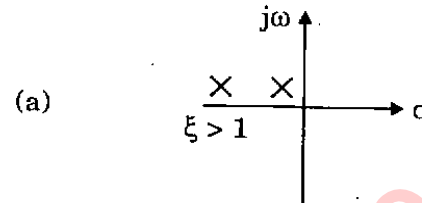
1. When gain K is zero, the roots coincide with the poles.
2. When K is increased, the roots move away from the poles.
3. A root locus diagram is always symmetric about the imaginary axis.
4. The number of branches terminates on infinity is open loop poles plus zeros.

Which of these statements are correct ?

- (a) 1 and 2
- (b) 2 and 3
- (c) 3 and 4
- (d) 1, 2, 3 and 4



For the response shown above, the correct root locations in the s -plane is





In the control system shown above the controller which can give zero steady-state error to a ramp input is of

- (a) Proportional type
- (b) Integral type
- (c) Derivative type
- (d) Proportional plus derivative type

107. Let $\dot{\mathbf{x}} = \begin{bmatrix} 1 & 2 \\ 0 & b \end{bmatrix} \mathbf{x} + \begin{bmatrix} 0 \\ 1 \end{bmatrix} u$

where b is an unknown constant. This system is

- (a) Uncontrollable for $b = 1$
- (b) Uncontrollable for $b = 0$
- (c) Uncontrollable for all values of b
- (d) Controllable for all values of b

108. The state variable description of a linear autonomous system is $\dot{\mathbf{x}} = \mathbf{A}\mathbf{x}$, where \mathbf{x} is the two-dimensional state vector and \mathbf{A} is given by

$$\mathbf{A} = \begin{bmatrix} 0 & -2 \\ -2 & 0 \end{bmatrix}$$

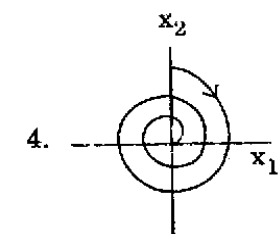
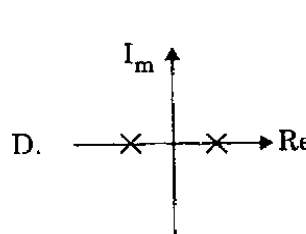
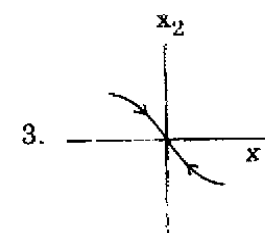
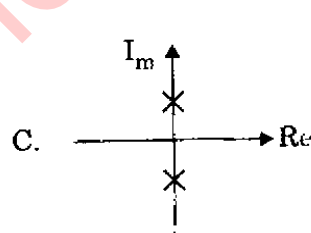
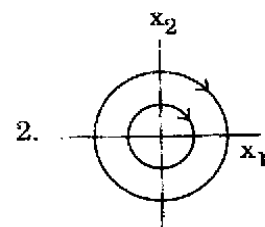
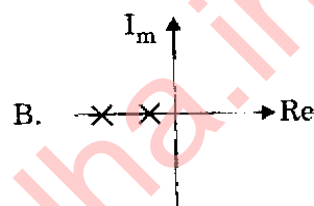
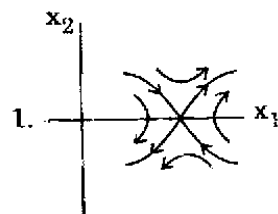
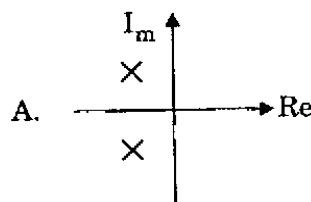
The poles of the system are located at

- (a) 2 and $+2$
- (b) $-2j$ and $+2j$
- (c) -2 and 2
- (d) $+2$ and $+2$

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

List I

List II



Code :

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

110. For a tachometer, if $\theta(t)$ is the rotor displacement, $e(t)$ is the output voltage and K is the tachometer constant, then the transfer function is defined as

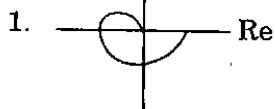
- (a) Ks^2
- (b) $\frac{K}{s}$
- (c) Ks
- (d) K

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

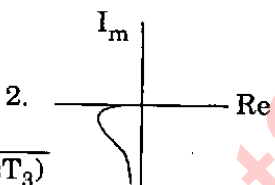
List I

List II

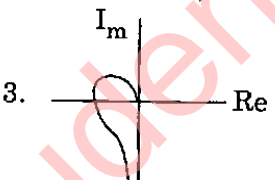
A. $G(s) = \frac{1+sT}{1+2sT}$



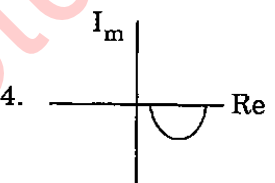
B. $G(s) = \frac{1}{(1+sT_1)(1+sT_2)(1+sT_3)}$



C. $G(s) = \frac{1+sT_1}{s(1+sT_2)(1+sT_3)}$

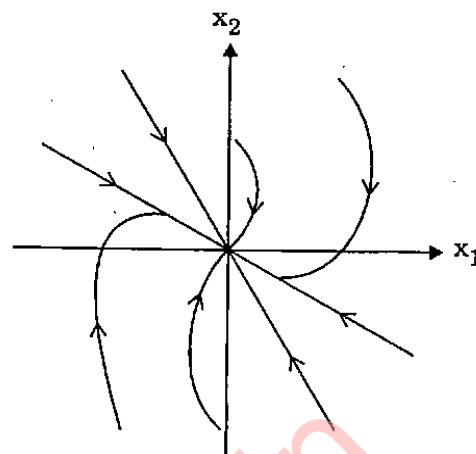


D. $G(s) = \frac{\omega_n^2}{s(s^2 + 2\xi\omega_n s + \omega_n^2)}$



Code :

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



The figure shown is a phase-plane representation of trajectories. The singular point shown is a

- (a) Unstable node
- (b) Saddle point
- (c) Stable focus
- (d) Stable node

Directions : Each of the next eight (08) items consists of two statements, one labelled as the 'Assertion (A)' and the other as 'Reason (R)'. You are to examine these two statements carefully and select the answers to these items using the codes given below :

Codes :

- (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

113. **Assertion (A) :** The electric field around a positive charge is outward.

Reason (R) : Gauss law states that the differential of the normal component of the outward electric flux density over a closed surface yields the positive charge enclosed.

114. *Assertion (A)* : Electromagnetic waves propagate being guided by parallel plate perfect conductor surface.

Reason (R) : Tangential component of electric field intensity and normal component of magnetic field intensity are zero on a perfect conductor surface.

115. *Assertion (A)* : A thin sheet of conducting material can act as a low-pass filter for electromagnetic waves.

Reason (R) : The penetration depth is inversely proportional to the square root of the frequency.

116. *Assertion (A)* : Superconductors cannot be used as coils for production of strong magnetic fields.

Reason (R) : Superconductivity in a wire may be destroyed if the current in the wire exceeds a critical value.

117. *Assertion (A)* : A network is said to be in resonance when the voltage and current at the network input terminals are in phase.

Reason (R) : In a two-terminal network containing at least one inductor and one capacitor, the resonance is defined as the condition which exists when the input impedance of the network is purely resistive.

118. *Assertion (A)* : It is always desirable to take measurements as close to the full scale as possible.

Reason (R) : The magnitude of the limiting error is a fixed quantity based on the full-scale reading of the meter and error increases as reading decreases.

119. *Assertion (A)* : Electrodynamic wattmeter is not suitable for low power factor power measurement.

Reason (R) : Many watt-meters are compensated for errors caused by inductance of voltage coil by means of a capacitor connected in parallel with a portion of multiplier series resistance.

120. *Assertion (A)* : AC bridge methods are the best and most usual methods for the precise measurement of self and mutual inductances and capacitances.

Reason (R) : Wagner earthing device is used in AC bridge for eliminating the effect of the earth capacitance.

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T.B.C. : P-RSR-L-RRB

Test Booklet Series

Serial No.

39321

TEST BOOKLET
ELECTRICAL ENGINEERING

Paper—II



Time Allowed : Two Hours

Maximum Marks : 200

INSTRUCTIONS

1. IMMEDIATELY AFTER THE COMMENCEMENT OF THE EXAMINATION, YOU SHOULD CHECK THAT THIS TEST BOOKLET DOES **NOT** HAVE ANY UNPRINTED OR TORN OR MISSING PAGES OR ITEMS, ETC. IF SO, GET IT REPLACED BY A COMPLETE TEST BOOKLET.
2. ENCODE CLEARLY THE TEST BOOKLET SERIES **A, B, C OR D** AS THE CASE MAY BE IN THE APPROPRIATE PLACE IN THE ANSWER SHEET.
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.
4. This Test Booklet contains **120** items (questions). Each item comprises four responses (answers). You will select the response which you want to mark on the Answer 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 Answer Sheet provided. See directions in the Answer Sheet.
6. All items carry equal marks.
7. Before you proceed to mark in the Answer Sheet the response to various items in the Test Booklet, you have to fill in some particulars in the Answer Sheet as per instructions sent to you with your Admission Certificate.
8. After you have completed filling in all your responses on the Answer Sheet and the examination has concluded, you should hand over to the Invigilator **only the Answer Sheet**. You are permitted to take away with you the Test Booklet.
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 A CANDIDATE IN THE OBJECTIVE TYPE QUESTION PAPERS.
 - (i) There are four alternatives for the answer to every question. For each question for which a wrong answer has been given by the candidate, **one-third (0.33)** 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 to 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.

DO NOT OPEN THIS TEST BOOKLET UNTIL YOU ARE ASKED TO DO SO

1. The applied voltage of a certain transformer is increased by 75%; while the frequency of the applied voltage is reduced by 25%. The maximum core flux density will :
 - (a) Increase by seven times
 - (b) Increase by three times
 - (c) Reduce to one quarter
 - (d) Remain the same
2. A 10 kVA, 2500/250 single phase transformer has the following results :

O.C Test	250 volts	0.8 amps	50 W
S.C Test	60 volts	3 amps	45 W

Then efficiency at half full load at 0.8 power factor will be :

 - (a) 98.49%
 - (b) 97.68%
 - (c) 98.28%
 - (d) 96.85%
3. A 4 kVA, 400 V/200 V single phase transformer has resistance of 0.02 pu and reactance of 0.06 pu. The resistance and reactance referred to high voltage side are :
 - (a) 0.2 Ω and 0.6 Ω
 - (b) 0.8 Ω and 2.4 Ω
 - (c) 0.08 Ω and 0.24 Ω
 - (d) 1 Ω and 3 Ω
4. The full-load copper-loss and iron-loss of a transformer are 6400 W and 500 W, respectively. The above copper loss and iron loss at half load will be :
 - (a) 3200 W and 250 W respectively
 - (b) 3200 W and 500 W respectively
 - (c) 1600 W and 125 W respectively
 - (d) 1600 W and 500 W respectively
5. In a transformer, zero voltage regulation at full load is :
 - (a) Not possible
 - (b) Possible at leading power factor load
 - (c) Possible at lagging power factor load
 - (d) Possible at unity power factor load
6. A two-winding 220 V/110 V, 1.5 kVA transformer is reconnected as a 220/330 V autotransformer. It is re-rated as :
 - (a) 3.88 kVA
 - (b) 4.488 kVA
 - (c) 1.58 kVA
 - (d) 2.258 kVA
7. A 2 V/1 V two-winding transformer is connected as an autotransformer. Its voltage regulation as an autotransformer compared to the two-winding transformer is
 - (a) The same
 - (b) 1.5 times
 - (c) 2 times
 - (d) 3 times
8. When one transformer is removed from a Δ Δ bank of 30 kVA transformer, the capacity of the resulting 3-phase transformer in V-V connection will be :
 - (a) 11.5 kVA
 - (b) 17.3 kVA
 - (c) 20 kVA
 - (d) 25.9 kVA
9. Which three-phase connection can be used in a transformer to introduce a phase difference of 30° between its output and corresponding input line voltages ?
 - (a) Star-star
 - (b) Star-delta
 - (c) Delta-delta
 - (d) Delta-zigzag

10. Conditions for parallel operation of transformers are :
1. The same voltage ratio
 2. The same per unit impedance
 3. The same polarity
 4. The same phase sequence
 5. The relative phase displacement
- Which are the absolutely essential conditions ?
- (a) 1, 2, 3, 4 and 5
 - (b) 2, 3 and 4
 - (c) 3, 4 and 5
 - (d) 1, 2 and 3
11. The emf induced in a conductor of machine driven at 600 rpm, the peak value of flux density is 1.0 Wb/m^2 , diameter of machine 2.0 meter and length of machine 0.30 m is :
- (a) 41.83 V
 - (b) 29.58 V
 - (c) 9.42 V
 - (d) 18.84 V
12. A 440 V , 3-phase, 10 pole and 50 Hz synchronous motor delivering a torque of $\frac{50}{\pi} \text{ Nm}$, delivers a power of :
- (a) 50 W
 - (b) 500 W
 - (c) 1000 W
 - (d) 2000 W
13. The maximum efficiency occurs in a separately excited dc generator when the terminal voltage is 220 V and the induced emf is 240 V, the stray losses, if the armature resistance is 0.2Ω , will be :
- (a) 1000 W
 - (b) 2000 W
 - (c) 3000 W
 - (d) 4000 W
14. An eight pole dc generator has a simple wave wound armature containing 32 coils of 6 turns each. Its flux per pole is 0.06 Wb . The machine is running at 250 rpm. The induced armature voltage is :
- (a) 96 V
 - (b) 192 V
 - (c) 384 V
 - (d) 768 V
15. How many segments will be there for the commutator of a 6-pole dc machine having a simple wave-wound armature with 72 slots ?
- (a) 73
 - (b) 72
 - (c) 71
 - (d) 70
16. Which one of the following statements is correct for the ideal field excitation during starting in case of shunt and compound motors ?
- (a) Maximum, because motor torque required to overcome friction and load torque.
 - (b) Maximum, because voltage should be built slowly.
 - (c) Maximum, because small excitation will lead to low operating speed during starting.
 - (d) It can be anything because it does not matter in case of these motors
17. A turbine-generator set has a regulation constant of 6% on the generator rating of 120 MVA, 50 Hz. The generator frequency decreases by 0.01 Hz . The increase in turbine output for steady-state operation is :
- (a) 0.8 MW
 - (b) 0.4 MW
 - (c) 0.2 MW
 - (d) 40 MW

18. With reference to hydropower station, the graphical representation of the discharge as a function of time is known as :
- Monograph
 - Hectograph
 - Load duration curve
 - Hydrograph
19. One million cubic meters of water is stored in a reservoir feeding a water turbine. The density of water is 993 kg/m^3 . If the centre of mass of water is 50 meters above the turbine and the losses are negligible, the energy produced by that volume of water is :
- 135.3 MWhr
 - 130 MWhr
 - 120 MWhr
 - 140 MWhr
20. For harnessing low variable water heads, the suitable hydraulic turbine with reaction and adjustable vanes runners is :
- Frames
 - Impeller
 - Kaplan
 - Pelton
21. In a thermal power station, a typical heat balance sheet, for a large turbine and surface condenser taken together, is the percentage distribution of heat energy in :
1. Work done or thermal efficiency
 2. Friction and windage loss
 3. Heat to circulating water
 4. Heat in condensate to be retained to the boiler.
- The percentage amount of heat in the heads stated above, in the descending order is :
- 3, 4, 1 and 2
 - 2, 1, 4 and 3
 - 3, 1, 4 and 2
 - 2, 4, 1 and 3
22. The incremental cost characteristics of two generators delivering a load of 200 MW are as follows :
- $$\frac{dF_1}{dP_1} = 2.0 + 0.01P_1$$
- $$\frac{dF_2}{dP_2} = 1.6 + 0.02P_2$$
- For economic operation the generators P_1 and P_2 should be
- 120 MW and 80 MW
 - 80 MW and 120 MW
 - 120 MW and 120 MW
 - 80 MW and 80 MW
23. The radiation shield for a nuclear power reactor for biological safety is provided by having the reactor :
- Immersed in water pool
 - Encased by thick metal walls
 - Encased by thick concrete wall
 - Isolated from outside world with strong magnetic fields
24. A 'Pumped storage hydro-electric plant' consists of :
- A synchronous machine and a multi-stage centrifugal pump in one shaft
 - A synchronous machine, a reaction turbine, and a multistage centrifugal pump all in one shaft
 - An induction generator, a synchronous machine and a reaction turbine, all in one shaft
 - An induction generator, a synchronous machine, and a multistage centrifugal pump, all in one shaft
25. The economics of power plant is greatly influenced by :
1. Load factor
 2. Utilization factor
 3. Unit capacity
 4. Type of load
- (a) 1, 2, 3 and 4
 - (b) 1, 3 and 4
 - (c) 1, 2 and 3
 - (d) 2, 3 and 4

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

List-I

List-II

- | | |
|---------------------|------------------------|
| A. Thyrite arrester | 1. Tower location |
| B. Sag template | 2. Cross bonding |
| C. Cable sheaths | 3. Restriking voltage |
| D. Circuit breaker | 4. Non-linear resistor |

Code :

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

27. The line currents of a 3-phase power supply are :

$$I_R = 3 + j5 \text{ A}$$

$$I_Y = 2 + j2 \text{ A}$$

$$I_B = -2 - j1 \text{ A}$$

The zero sequence current will be :

- (a) $1 + j2 \text{ A}$
 (b) $5 + j7 \text{ A}$
 (c) $1 + j4 \text{ A}$
 (d) $-2 - j1 \text{ A}$

28. The incremental fuel costs for two generating units G_1 and G_2 are given by :

$$IC_1 = 25 + 0.2 PG_1 \text{ and } IC_2 = 32 + 0.2 PG_2$$

where PG_1 and PG_2 are real powers generated by the units. The economic allocation for a total load of 250 MW, neglecting transmission loss, is given by

- (a) $PG_1 = 142.5 \text{ MW}$ and $PG_2 = 107.5 \text{ MW}$
 (b) $PG_1 = 109.75 \text{ MW}$ and $PG_2 = 140.25 \text{ MW}$
 (c) $PG_1 = 125 \text{ MW}$ and $PG_2 = 125 \text{ MW}$
 (d) $PG_1 = 100 \text{ MW}$ and $PG_2 = 150 \text{ MW}$

29. The main objective of load frequency controller is to apply control of :

- (a) Frequency alone
 (b) Frequency and at the same time of real power exchange via the outgoing lines
 (c) Frequency and at the same time of reactive power exchange via the outgoing lines
 (d) Frequency and bus voltages

30. The main objectives of load frequency control in a power system are :

1. To bring the steady state error to zero after load change
 2. To maintain the net tie-line flow
 3. To maintain voltages on all buses
 4. To economize the cost of generation
 (a) 1 and 2
 (b) 2 and 3
 (c) 3 and 4
 (d) 1, 2, 3 and 4

31. The current of a single phase load drawn from a 3-phase system, has :

- (a) Zero sequence component of current as zero
 (b) Negative sequence component of current more than positive sequence component
 (c) Positive, negative and zero sequence components equal
 (d) Negative sequence component of current less than positive sequence component

32. The 'Equal area criterion' for the determination of transient stability of the synchronous machine connected to an infinite bus :

- (a) Ignores line as well as synchronous machine resistances and shunt capacitances
 (b) Assumes accelerating power acting on the rotor as constant
 (c) Ignores the effect of voltage regulator and governor but considers the inherent damping present in the machine
 (d) Takes into consideration the possibility of machine losing synchronism after it has survived during the first swing.

33. If the inertia constant $H = 8 \text{ MJ/MVA}$ for a 50 MVA generator, the stored energy is :

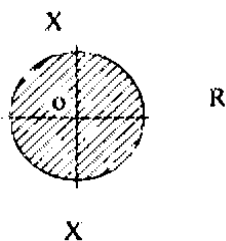
- (a) 50 MJ
 (b) 8 MJ
 (c) 400 MJ
 (d) 6.25 MJ

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

List-I

List-II

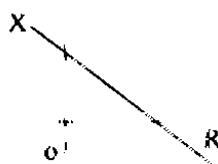
A. Mho relay 1.



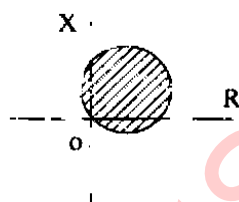
B. Plain impedance relay 2.



C. Directional relay 3.



D. Angle impedance relay 4.



Code :

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

35. In an HVDC system :
- Both generation and distribution are dc
 - Generation is ac and distribution is dc
 - Generation is dc and distribution is ac
 - Both generation and distribution are ac
36. Dark current in a semiconductor photo-diode is :
- The forward bias current
 - The forward saturation current
 - The reverse saturation current
 - The transient current

37. Compared to the bipolar junction transistor, a JFET :

- Has a larger gain bandwidth product
- Is less noisy
- Has less input resistance
- Has current flow due to only majority carriers

- 1, 2, 3 and 4 are correct
- 1 and 2 are correct
- 2 and 4 are correct
- 3 and 4 are correct

38. An emitter follower regulator has the following disadvantage

- It does not provide high gain
- No provision exists for varying the output voltage
- Its output resistance is high
- It cannot withstand high load current

39. Consider the following statements :

- A zener diode degrades the input signal at high frequencies due to its transition capacitance.
- The zener voltage V_Z does not vary with temperature.
- Regulation the zener diode is adversely affected at the knee current I_{ZK} due to limited power dissipation capacity.
- In a simple zener diode regulated circuit, amplification is not possible

Which of these statements are correct ?

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

40. For a transistor, turn-off time is :

- Sum of storage time and fall time
- Maximum value of storage time
- Maximum value of fall time
- Sum of rise time and fall time

41. In a common collector amplifier the voltage gain is :

- Constant
- Less than 1
- Varies with input voltage
- Varies with load impedance

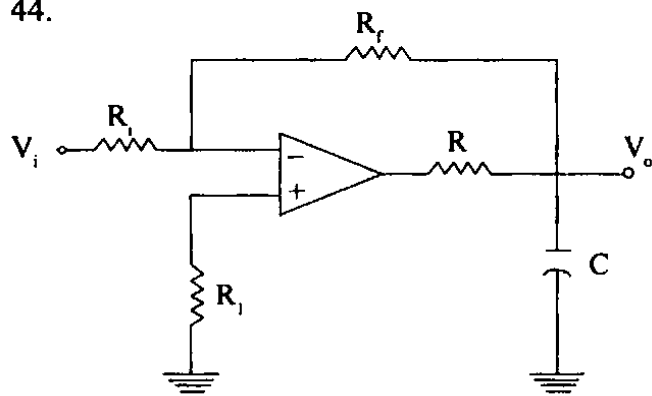
42. For a trans-conductance amplifier, input and output resistances are respectively :

- ∞ and 0
- 0 and ∞
- 0 and 0
- ∞ and ∞

43. Which one of the following is NOT true of direct coupled amplifiers ?

- (a) Low cost
- (b) Can amplify high frequency signals
- (c) Can amplify low frequency signals
- (d) Operating point shifts with temperature variations

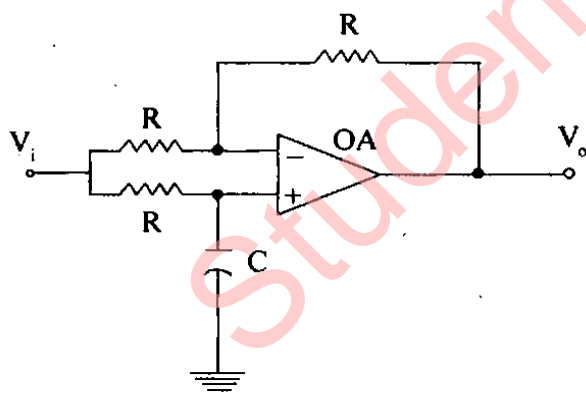
44.



The circuit shown is :

- (a) A low pass filter
- (b) A clamper
- (c) A lag compensated inverting amplifier
- (d) A narrow band video amplifier

45.



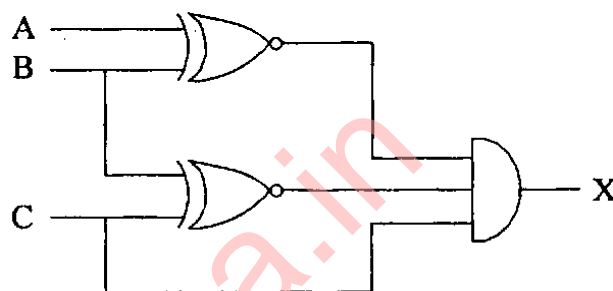
The circuit shown is :

- (a) A low pass filter
- (b) A high pass filter
- (c) A comparator
- (d) An all-pass filter

46. One shot multi-vibrator, with a pulse input gives an output :

- (a) A single triangular pulse
- (b) A square pulse
- (c) An impulse
- (d) A single sinusoid pulse

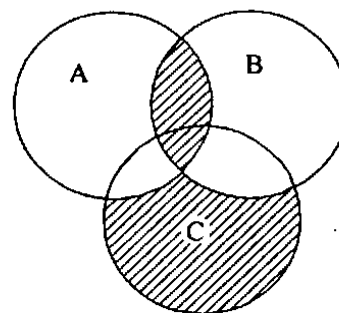
47.



For logic circuit shown, the required inputs A, B and C to make the output $X = 1$ are, respectively,

- (a) 1, 0 and 1
- (b) 0, 0 and 1
- (c) 1, 1 and 1
- (d) 0, 1 and 1

48.



The Boolean expression for the shaded area in the Venn diagram shown is :

- (a) $A + \bar{B} + C$
- (b) $AB + \bar{A}BC$
- (c) $A\bar{B}C + \bar{A}BC$
- (d) $AB + \bar{A}\bar{B}C$

49. Consider the following statements.

The h-parameters of a BJT :

1. Represent the input resistance, output conductance, current gain etc
2. Can be easily measured in the laboratory
3. Can be used in circuit analysis over a wide range of frequencies
4. Constitute a simple small signal model for easy circuit analysis at low frequencies where junction capacitances can be neglected.

Which of these statements are correct ?

- (a) 1, 2, 3 and 4
- (b) 1, 2 and 4
- (c) 1, 3 and 4
- (d) 2, 3 and 4

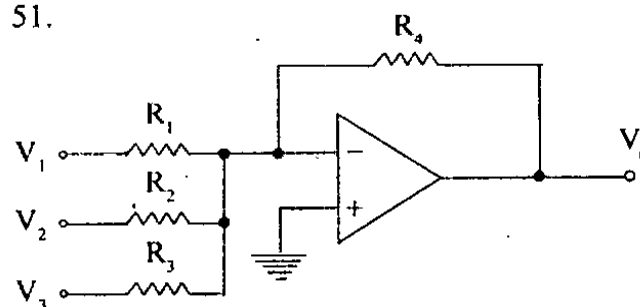
50. Consider the following statements :

1. Amplitude distortion arises due to different frequency components being amplified differently
2. White noise gives the same noise per unit bandwidth across the entire frequency spectrum
3. If an amplifier has two poles such that $p_2 = 4p_1$, then the dominant pole is p_2
4. The self-biasing emitter resistance of an amplifier is bypassed by a large capacitance to reduce degeneration at higher frequencies

Which of these statements are correct ?

- (a) 1, 2, 3 and 4
- (b) 2 and 4
- (c) 2 and 3
- (d) 3 and 4

51.



In the given circuit, the magnitude of the output voltage

$|V_0| = 3V_1 + 2V_2 + 7V_3$, then the values of R_1 , R_2 , R_3 and R_4 are :

- (a) 3 k Ω , 2 k Ω , 7 k Ω and 1 k Ω
- (b) $\frac{1}{4}$ k Ω , $\frac{1}{6}$ k Ω , $\frac{7}{12}$ k Ω and 12 k Ω
- (c) 4 k Ω , 6 k Ω , $\frac{12}{7}$ k Ω and 12 k Ω
- (d) $\frac{1}{3}$ k Ω , $\frac{1}{2}$ k Ω , $\frac{1}{7}$ k Ω and 12 k Ω

52. A semiconductor ROM is preferred to a semiconductor RAM because :

- (a) ROM is cheaper than RAM
- (b) ROM is faster
- (c) ROM does not require power supply for their operation
- (d) Program stored in the ROM cannot be altered

53. The first machine cycle of an instruction is always :

- (a) A memory read cycle
- (b) A fetch cycle
- (c) An I/O read cycle
- (d) A memory write cycle

54. If the status of the control lines SI and SO is LOW, then 8085 microprocessor is performing :
- Reset operation
 - HOLD operation
 - Halt operation
 - Interrupt acknowledge
55. The output data lines of microprocessors and memories are usually tristated because :
- More than one device can transmit information over the data bus by enabling only one device at a time
 - More than one device can transmit over the data bus at the same time
 - The data lines can be multiplexed for both input and output
 - It increases the speed of data transfers over the data bus
56. AND operation of $(79)_{10}$ and $(-56)_{10}$ results in :
- 50 H
 - 48 H
 - 42 H
 - 08 H
57. ALU (Arithmetic Logic Unit) of an 8085 microprocessor consists of :
- Accumulator, temporary register, arithmetic and logic circuits
 - Accumulator, arithmetic, logic circuits and five flags
 - Accumulator, arithmetic and logic circuits
 - Accumulator, temporary register, arithmetic, logic circuits and five flags
58. The description of a program counter (PC) in 8085 microprocessor is :
- An up/down counter
 - An 8-bit register
 - Initialized automatically by microprocessor
 - Used to point to stack memory area
59. Which components are NOT found on chip in a microprocessor but may be found on chip in a microcontroller ?
- SRAM and USART
 - EPROM and PORTS
 - EPROM, USART and PORTS
 - SRAM, EPROM and PORTS
60. Which value a program counter will have when non mask able interrupt of 8085 microprocessor is serviced ?
- 0004 H
 - 0014 H
 - 0024 H
 - 0034 H
61. For the purpose of data processing an efficient assembly language programmer makes use of the general purpose registers rather than memory. The reason is :
- The set of instructions for data processing with memory is limited
 - Data processing becomes easier when registers are used
 - More memory related instructions are required in the program for data processing
 - Data processing with registers takes fewer cycles than that with memory

62. While a program is being executed in an Intel 8085 microprocessor, the program counter of the microprocessor contains

- (a) The memory address of the instruction that is being currently executed
- (b) The memory address of the instruction that is to be executed next
- (c) The number of instructions that have already been executed
- (d) The total number of instructions in the current program still to be executed

63. Which one of the following statements is NOT correct ?

- (a) CMA is a single byte instruction and CMA is not an instruction
- (b) The instruction SUB A sets the zero flag
- (c) Bus is a group of wires
- (d) Instruction INR C does not affect carry flag

64. To execute the following instructions

[i] LDA 2100 H

[ii] LXI H, 2100 H

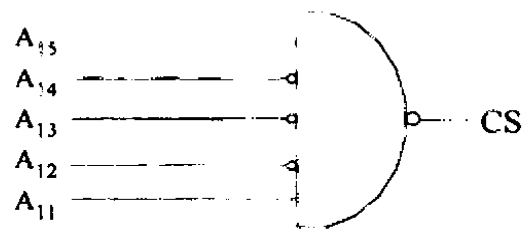
by an Intel 8085 microprocessor the numbers of memory cycles required are :

- (a) 2 for [i] and 2 for [ii]
- (b) 4 for [i] and 2 for [ii]
- (c) 3 for [i] and 3 for [ii]
- (d) 4 for [i] and 3 for [ii]

65. In 8085 microprocessor, during PUSH/PSW operation, stack pointer is :

- (a) Decrement by one
- (b) Decrement by two
- (c) Increment by one
- (d) Increment by two

66.



The logic circuit used to generate the active low chip select signal (CS) by an Intel 8085 microprocessor to address a peripheral is shown in the figure. The peripheral will respond to address in the range :

- (a) 7800 H - 7 FFF H
- (b) 1000 H - 1 FFF H
- (c) 8000 H - 8 FFF H
- (d) 8800 H - 8 FFF H

67. The 8259 A programmable Interrupt controller can

1. Manage eight interrupts
2. Vector an interrupt request anywhere in memory map
3. Have 8-bit or 16 bit interval between interrupt vector locations
4. Initialized with operational command words (OCW's)

- (a) 1 and 2
- (b) 2 and 3
- (c) 3 and 4
- (d) 1, 2, 3 and 4

68. To address the full memory space of an Intel 8085 microprocessor four RAMS of different sizes are available :

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

What minimal combination of chip(s) will serve the purpose ?

- (a) 1, 2, 3 and 4
- (b) 2
- (c) 3
- (d) 4

69. For which of the following systems, the signal to noise ratio is the highest ?

- (a) PAM
- (b) PWM
- (c) PPM
- (d) PAM and PWM

70. An indirect way of generating FM, is :

- (a) The Armstrong modulator
- (b) The reactance FET modulator
- (c) The varactor diode modulator
- (d) The reactance bipolar transistor modulator

71. Diode demodulator will ignore :

- (a) The amplitude modulation
- (b) The frequency modulation
- (c) PCM
- (d) PWM

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

List-I

List-II

- | | |
|------------------------------|-----------------------|
| A. Phase locked loop | 1. Mixer |
| B. Super-heterodyne receiver | 2. De-emphasis filter |
| C. FM receiver | 3. Diodes |
| D. Envelope detector | 4. VCO |

Code :

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

73. Quantizing noise occurs in :

- (a) Pulse width modulation
- (b) Frequency division multiplexing
- (c) Pulse code modulation
- (d) Time division multiplexing

74. If ACF denotes the autocorrelation function and PSD denotes the power spectral density, then for white noise, ACF is :

- (a) A Gaussian while PSD is uniform
- (b) A delta function while PSD is uniform
- (c) A delta function while PSD is exponential
- (d) An exponential while PSD is uniform

75. The demodulation of a delta modulated signal is achieved by :

- (a) Integration
- (b) Differentiation
- (c) Sampling
- (d) Band pass filtering

76. In phase modulation, phase deviation is proportional to :
- Carrier amplitude
 - Carrier phase
 - Message signal
 - Message signal frequencies
77. In differential PCM, each word indicates :
- Difference between a sample amplitude and a reference signal
 - Difference in amplitude between a sample and the previous sample
 - Addition of a sample amplitude and a reference signal
 - Addition of amplitude of a sample and the previous sample
78. PPM signal is :
- Differentiation of PWM
 - Integration of PWM
 - Differentiation of PAM
 - Not related to PWM or PAM
79. The main advantage of pre-emphasis circuit in FM transmitter is :
- To increase the carrier power
 - To improve the signal to noise ratio at low audio frequencies
 - To increase the bandwidth of side band
 - To improve the signal to noise ratio at high audio frequencies
80. The highest frequency stability is achieved by using an oscillator of the type :
- Colpitts
 - Crystal controlled
 - Hartley
 - RC oscillator
81. An aerial having a directivity of 90 is operating at a wavelength of 2 m. The maximum effective aperture of the aerial is :
- 7.16 m^2
 - 14.32 m^2
 - 28.64 m^2
 - 57.28 m^2
82. MSK (Minimum Shift Keying) is an orthogonal FSK scheme that gets its name from the fact that :
- The phase shift is minimum
 - The error probability is minimum
 - The transmission power required is minimum
 - The transmission bandwidth required is minimum
83. In high speed TDM, the channels are separated in the receiver employing :
- OR gate
 - NAND gate
 - NOR gate
 - AND gate
84. Which of the following component blocks is NOT required in the FDM transmitter block diagram ?
- Filter cutting off lower and higher frequencies
 - Filter cutting off higher frequencies
 - Single side band modulator
 - Double side band modulator

85. An SCR is in conducting state, a reverse voltage is applied between anode and cathode, but it fails to turn off. What could be the reason ?
- Positive voltage is applied to the gate.
 - The reverse voltage is small.
 - The anode current is more than the holding current.
 - Turn off time of SCR is large.
86. A reverse conducting thyristor (RCT) normally replaces :
- A pair of anti-parallel thyristors in a circuit
 - A combination of a thyristor and an anti-parallel diode in a circuit
 - A thyristor in a situation where it is not required to have reversed blocking capability at all
 - Conventional conversion grade thyristors having large turn off time
87. A thyristor can be switched from a non-conducting state to a conducting state by applying :
- Voltage more than forward break over voltage
 - A voltage with high $\frac{dv}{dt}$
 - Positive gate current with positive anode voltage
 - Negative gate current with positive anode voltage
- 1, 2, 3 and 4 are correct
 - 1, 2 and 4 are correct
 - 1, 2 and 3 are correct
 - 2, 3 and 4 are correct
88. A structure obtained by lightly doped n^- drift region between the layers of a pn junction a PIN diode is obtained. This structure is effective in :
- Making the diode support large reverse blocking voltages
 - Making reverse recovery process slow
 - Making the diode have high on-state voltage drop
 - Reducing the voltage spike during turn off due to stray inductance
89. Which one of the following statements is NOT correct for a MOSFET ?
- Are easy to parallel for higher current
 - Leakage current is relatively high
 - Have more linear characteristic
 - Overload and peak current handling capability are high
90. In a GTO, anode current begins to fall when the gate current :
- Is negative peak at time $t = 0$
 - Is negative peak at $t = \text{storage period } t_s$
 - Just begins to become negative at $t = 0$
 - Just begins to become positive at $t = 0$
91. Consider the following statements :
- A thyristor requires turn off circuit while transistor does not.
 - The voltage drop of a thyristor is less than that of a transistor.
 - A thyristor requires a continuous gate current.
 - A transistor draws continuous base current.
- Which of these statements are correct ?
- 1, 2, 3 and 4
 - 1 and 2
 - 2 and 4
 - 1 and 4

92. A field effect transistor with an anti-parallel body diode blocks :
- Bidirectional voltage and passes unidirectional current
 - Bidirectional voltage and passes bidirectional current
 - Unidirectional voltage and passes unidirectional current
 - Unidirectional voltage and passes bidirectional current
93. For low-speed high-power reversible operation, the most suitable drives are :
- Voltage source inverter fed ac drives
 - Current source inverter fed ac drives
 - Dual converter fed dc drives
 - Cycloconverter fed ac drives
94. An advantage of a cycloconverter is :
- Very good power factor
 - Requires few number of thyristors
 - Commutation failure does not short circuit the source
 - Load commutation is possible
95. In dc choppers, the waveforms for input and output voltages are respectively :
- Discontinuous and continuous
 - Both continuous
 - Both discontinuous
 - Continuous and discontinuous
96. The use of multiphase rectifier in place of 1-phase rectifier results in :
- Increased output voltage and reduced harmonics
 - Increased output voltage and increased harmonics
 - Decreased output voltage and reduced harmonics
 - Increased output voltage and no effect on harmonics
97. In a 3-phase semi-converter, for firing angle less than or equal to 60° , freewheeling diode conducts for :
- 90°
 - 60°
 - 30°
 - 0°
98. What is the waveform of the current flowing through the diode in a buck-boost converter ?
- Square wave
 - Triangular wave
 - Trapezoidal wave
 - Sinusoidal wave
99. In order to simplify the design of a converter transformer, the two converters in a dual converter should be connected using :
- Series connection
 - Cross connection
 - Direct anti-parallel connection
 - Anti-parallel connection
100. An integral cycle ac voltage controller is feeding a purely resistive circuit from a single phase ac voltage source. The current waveform consists alternately burst of N-complete cycle of conduction followed by M-complete cycles of extinction. The rms value of the load voltage equals the rms value of the supply voltage for :
- $N = M$
 - $N \gg 0$
 - $N = M \gg 0$
 - $M \gg 0$

Directions :—

Each of the next **Twenty (20)** items consists of two statements, one labeled as the 'Assertion (A)' and the other as 'Reason (R)'. You are to examine these two statements carefully and select the answers to these items using the codes given below :

Codes :

- (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

101. Assertion (A) : In a certain case, a dc shunt generator failed to build up the voltage.

Reason (R) : Shunt field resistance of a dc shunt generator should be more than its critical field resistance value to generate voltage.

102. Assertion (A) : While running on light load a salient pole synchronous machine can continue to operate on infinite bus-bars even if its excitation fails.

Reason (R) : A salient pole machine develops reluctance power due to the variable reluctance offered by the salient poles.

103. Assertion (A) : A squirrel cage induction motor is preferred to the slip ring induction motor.

Reason (R) : Higher starting torque is the main consideration.

104. Assertion (A) : If two transformers with different $\frac{X}{R}$ ratios are operated in parallel, one of the transformers becomes overheated when full KVA output is drawn from them.

Reason (R) : The impedance triangles are not identical in shape when two transformers having different voltage ratings are operated in parallel.

105. Assertion (A) : In a certain case of load change, an alternator became unstable and pulled-out.

Reason (R) : In an alternator, damper winding is present.

106. Assertion (A) : It is not necessarily desirable to compensate by a series capacitance for all the line reactance.

Reason (R) : Power can be transformed only if reactance is present.

107. Assertion (A) : The collector current in a BJT in common base mode increases slightly with increase in collector-base voltage.
Reason (R) : Increased collector-base bias causes avalanche breakdown to increase the current.
108. Assertion (A) : In a p-type semiconductor, with increase in the level of doping at a fixed temperature, the hole concentration increases but the electron concentration falls.
Reason (R) : Law of mass action holds good in case of semiconductors.
109. Assertion (A) : For class A operation of CE transistor amplifier, the operating point cannot be fixed near $V_{CE} = 0$ point.
Reason (R) : During the positive half of the input cycle, the transistor may be driven from 'active' region to 'saturation' region, thus loosing the class A wave shape in the output.
110. Assertion (A) : If the output voltage waveform in a transistor amplifier is a true replica of the input waveform, then it is said to be operated in class A mode. The Q point cannot be fixed near $I_C = 0$.
Reason (R) : The positive half cycle of the input will be clipped off in the output due to transistor being driven into cut-off from active region.
111. Assertion (A) : At 0°K , a semiconductor behaves as an insulator.
Reason (R) : No free carriers are available in the semiconductor at 0°K .
112. Assertion (A) : In a full-wave rectifier, it is absolutely necessary to use identical diodes having identical characteristics.
Reason (R) : In practice, it is never possible to have two diodes having identical characteristics due to technological limitations.
113. Assertion (A) : The operating point in a transistor amplifier shifts with changes in temperature.
Reason (R) : Reverse saturation current approximately doubles for every 10°C increase in temperature.
114. Assertion (A) : In the work function model of Schottky barrier diode contacts to n-type semiconductor, the metal work function will be higher than the semiconductor work function.
Reason (R) : To equalize the Fermi levels on the ferro sides of the contact, electrons from semiconductor surface move to metal side forming a space charge region at the semiconductor surface.

115. Assertion (A) : The energy band diagram of a real semiconductor cannot be represented by flat conduction and valence bands.

Reason (R) : The presence of energy states in the forbidden energy gap results in carrier trapping, giving rise to finite curvature in the bands.

116. Assertion (A) : Instruction SIM is necessary to implement the interrupts INTR.

Reason (R) : INTR requires external hardware for implementation.

117. Assertion (A) : STACK is used to temporarily store the data in RAM locations specified by the programmer in main program.

Reason (R) : PUSH and POP instructions are used to send or retrieve the data from the STACK.

118. Assertion (A) : Coherent FSK system is preferred to non-coherent FSK.

Reason (R) : Coherent FSK requires less power than non-coherent FSK.

119. Assertion (A) : In the FM receiver discriminator, both the sum of the voltages and ratios of the voltages are independent of frequency.

Reason (R) : The diodes face the same direction and the discriminator requires a limiter to reject amplitude changes of the carrier voltage.

120. Assertion (A) : In the power line communication, carrier frequency is chosen between 50 kHz and 500 kHz.

Reason (R) : No extra lines are necessary for the purpose and the same lines are used to carry both the electric power and information by carriers.

StudentSuvidha.in

StudentSuvidha.in

StudentSuvidha.in