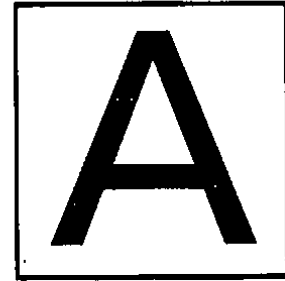


**DO NOT OPEN THIS TEST BOOKLET UNTIL YOU ARE ASKED TO DO SO**

**T.B.C. : Q-GUG-K-FFA**

**Test Booklet Series**

**Serial No 035841**



**TEST BOOKLET**  
**ELECTRICAL ENGINEERING**  
**PAPER I**

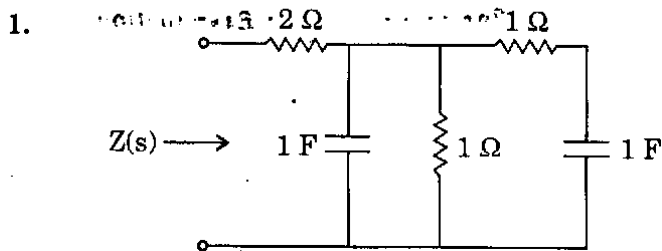
**Time Allowed : Two Hours**

**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.

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



For the driving point impedance function,

$$Z(s) = \frac{as^2 + 7s + 3}{s^2 + 3s + b}, \text{ the circuit realization is}$$

shown above. The values of 'a' and 'b' respectively are

- 4 and 5
- 2 and 5
- 2 and 1
- 2 and 3

2. Consider the following statements :

The A to D converter used in a digital instrument could be

- Successive approximation converter type.
- Flash converter type.
- Dual slope converter type.

The correct sequence in the increasing order of the conversion time taken by these types is

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

3. For photoconductors with equal electron and hole mobilities and perfect ohmic contacts at the ends, an increase in intensity of optical illumination results in

- a change in open circuit voltage
- a change in short circuit current
- decrease in resistance
- increase in resistance

4. Consider the following statements in connection with two-position controller :

- If the controller has a 4% neutral zone, its positive error band will be 2% and negative error band will be 8%.
- The neutral zone is also known as dead band.
- The controller action of a two-position controller is very similar to that of a pure on-off controller.
- Air-conditioning system works essentially on a two-position control basis.

Which of the above statements are correct ?

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

5. For the following driving point impedance functions, which of the following statements is true ?

$$Z_1(s) = \frac{s+2}{s^2+3s+5}$$

$$Z_2(s) = \frac{s+2}{s^2+5}$$

$$Z_3(s) = \frac{s+3}{s^2+2s+1}$$

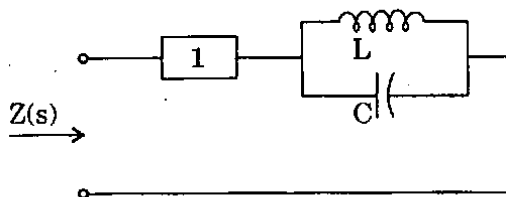
$$Z_4(s) = \frac{(s+2)(s+4)}{(s+1)(s+3)}$$

- $Z_1$  is not positive real
- $Z_2$  is positive real
- $Z_3$  is positive real
- $Z_4$  is positive real

6. A piezoelectric crystal has a thickness of 2.5 mm and a voltage sensitivity of 0.05 Vm/N. The piezoelectric crystal is subjected to an external pressure of  $1.6 \times 10^6 \text{ N/m}^2$ , then the corresponding output voltage is

- (a) 200 volts
- (b)  $3.2 \times 10^9$  volts/m of thickness
- (c)  $0.07 \times 10^{-9} \text{ V/(m}^3/\text{New)}$
- (d) 200 m volts

7.



A reactance network in the Foster's I form has poles at  $\omega = 0$  (zero) and  $\omega = \infty$  (infinity). The element in box-1 in the above network is

- (a) a capacitor
  - (b) an inductor
  - (c) a parallel LC circuit
  - (d) a series LC circuit
8. The measurement of Hall coefficient of a semiconductor with one type of charge carrier gives the information about
- (a) sign of charge carrier
  - (b) density of charge carrier
  - (c) both sign and density of charge carrier
  - (d) mass of the charge carrier

Consider the following statements with reference to the phase plane :

- 1. They are general and applicable to a system of any order.
- 2. Steady state accuracy and existence of limit cycle can be predicted.
- 3. Amplitude and frequency of limit cycle if exists can be evaluated.
- 4. Can be applied to discontinuous time system.

Which of the above statements are correct ?

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

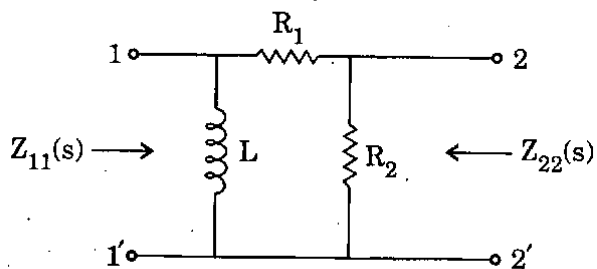
10. Consider the following units for the measurement of pressure directly :

- 1. Rolta meter
- 2. Bourdon tube
- 3. Planti meter
- 4. Vanes

Of these, the pressure can be measured by

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

11.



For the circuit shown above, the natural frequencies at port 2 are given by  $s + 2 = 0$  and  $s + 5 = 0$ , without knowing which refers to open-circuit and which to short-circuit. Then the impedances  $Z_{11}$  and  $Z_{22}$  are given respectively by

- (a)  $K_1 \frac{s+5}{s+2}, K_2 \frac{s+2}{s+5}$   
 (b)  $K_1 \frac{s+2}{s+5}, K_2 \frac{s+5}{s+2}$   
 (c)  $K_1 \frac{s}{s+5}, K_2 \frac{s+2}{s+5}$   
 (d)  $K_1 \frac{s+2}{s+5}, K_2 \frac{s+2}{s+5}$

12. If reflection coefficient for voltage be 0.6, the voltage standing wave ratio (VSWR) is

- (a) 0.66  
 (b) 4  
 (c) 1.5  
 (d) 2

13. Consider the following statements :

Piezoelectric materials serve as

1. A source of ultrasonic waves.
2. When electric field is applied, the mechanical dimensions of the substances are not at all altered.
3. Converts electrical energy to mechanical and vice versa.
4. Converts thermal energy to electrical energy.

Which of the above statements is/are correct ?

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

14. A two-port network is defined by the relation :

$$I_1 = 5 V_1 + 3 V_2$$

$$I_2 = 2 V_1 - 7 V_2$$

The value of  $Z_{12}$  is

- (a) 3  
 (b) -3  
 (c)  $\frac{3}{41}$   
 (d)  $\frac{2}{31}$

15. Consider the following statements :

1. The main shortcomings of diaphragms are that they are prone to shock vibrations.
2. Diaphragms have the advantages of high accuracy and good dynamic response.
3. Selection of material for diaphragms mainly depends upon temperature range and chemical nature of fluid coming in contact with diaphragm during pressure measurement.

Which of the above statements is/are correct ?

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

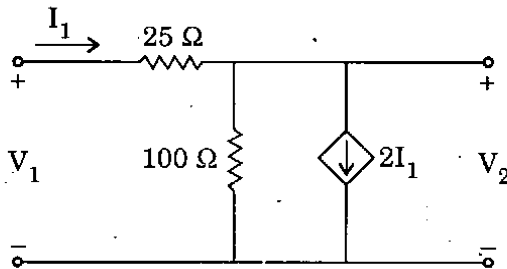
16. The Z-transform of  $x(K)$  is given by

$$x(Z) = \frac{(1 - e^{-T})Z^{-1}}{(1 - Z^{-1})(1 - e^{-T}Z^{-1})}$$

The initial value  $x(0)$  is

- (a) zero
- (b) 1
- (c) 2
- (d) 3

17.



The Y-parameters of the network shown above are

- (a)  $\begin{bmatrix} -0.04 & 0.04 \\ -0.04 & 0.03 \end{bmatrix}$
- (b)  $\begin{bmatrix} 0.04 & -0.04 \\ 0.04 & -0.03 \end{bmatrix}$
- (c)  $\begin{bmatrix} 0.04 & -0.03 \\ -0.04 & 0.03 \end{bmatrix}$
- (d)  $\begin{bmatrix} -0.04 & 0.03 \\ 0.04 & 0.03 \end{bmatrix}$

18. Consider the following statements :

Piezoelectric materials

1. Crystal can be shown as electrical equivalent circuit similar to an inductor and a capacitor (Tank circuit).
2. Quartz, Rochelle salt, tourmaline.
3. Used in voltage stabilizers.
4. This exhibits the reverse effect of electrostriction.

Which of the above statements are correct ?

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

19. A balanced RYB-sequence, Y-connected (Star connected) source with  $V_{RN} = 100$  volts is connected to a  $\Delta$ -connected (Delta connected) balanced load of  $(8 + j6)$  ohms per phase. Then the phase current and line current values respectively, are

- (a) 10 A; 30 A
- (b)  $10\sqrt{3}$  A; 30 A
- (c) 10 A; 10 A
- (d)  $10\sqrt{3}$  A;  $10\sqrt{3}$  A

20. A resistance strain gage with gage factor ( $S_p$ ) of 2 is bonded to a steel member, which is subjected to a strain of  $1 \times 10^{-6}$ . The original resistance value of this strain gage is  $120 \Omega$ . The change in resistance due to the applied strain is

- (a)  $60 \Omega$
- (b)  $240 \times 10^{-6} \Omega$
- (c)  $240 \Omega$
- (d)  $60 \times 10^{-6} \Omega$

21. A two-port network is described by the following equations :

$$V_1 = 50 I_1 + 20 I_2$$

$$V_2 = 30 I_1 + 10 I_2$$

Then, which one of the following is **not** correct ?

- (a)  $Z_{12} = 20$
- (b)  $Y_{12} = 0.2$
- (c)  $h_{12} = 2.0$
- (d)  $A = 25$

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

List I

- A. Hall effect
- B. Light energy
- C. Electric field
- D. Applied voltage

List II

- 1. Varistor
- 2. Photodiodes
- 3. Measuring low magnetic field
- 4. Liquid crystal display

Code :

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

23. The system matrix of a continuous time system is given by  $A = \begin{bmatrix} 0 & 1 \\ -3 & -5 \end{bmatrix}$ . Then the characteristic equation is

- (a)  $s^2 + 5s + 3 = 0$
- (b)  $s^2 - 3s - 5 = 0$
- (c)  $s^2 + 3s + 5 = 0$
- (d)  $s^2 + s + 2 = 0$

24. Consider the following statements :

The transfer impedances of a 2-port network remain constant when the position of excitation and response are interchanged if the network

- 1. is linear.
- 2. contains bilateral elements.
- 3. has high impedance.
- 4. is resonant.

Which of the above statements is/are correct ?

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

25. When a ferromagnetic substance is magnetized, there are small changes in dimensions. The phenomenon is called

- (a) Hysteresis
- (b) Magnetostriction
- (c) Diamagnetism
- (d) Dipolar relaxation

26. For a parallel RLC circuit, if  $R = 40 \Omega$ ,  $L = 2 \text{ H}$  and  $C = 0.5 \text{ F}$ , the bandwidth and quality factor are respectively

- (a) 20 rad/s, 0.05
- (b) 10 rad/s, 20
- (c) 20 rad/s, 10
- (d) 0.05 rad/s, 20

27. Consider the following statements :

1. Electromagnetic flowmeter is independent of liquid density.
2. Electromagnetic flowmeter cannot be employed for measuring flow of non-conducting fluids.

Which of the above statements is/are correct ?

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

28. If a series RLC circuit resonates at 1.5 kHz and consumes 100 watts from a 100 volts a.c. source operating at resonant frequency with a bandwidth of 0.75 kHz; the values of R, L and Q-factor of the circuit are respectively

- (a)  $100 \Omega$ ;  $\frac{0.2}{3\pi}$  H; 2
- (b)  $50 \Omega$ ;  $\frac{0.1}{2\pi}$  H; 4
- (c)  $100 \Omega$ ;  $\frac{2}{3\pi}$  H; 1
- (d)  $50 \Omega$ ;  $\frac{0.3}{2\pi}$  H; 3

29. Consider the following statements :

1. The main drawback of digital system is that the real world is mainly analog.
2. The major advantage of digital instruments over analog instruments is higher accuracy and better resolution.
3. Digital instruments are ordinarily used for the measurement of both analog and digital quantities.

Which of the above statements is/are correct ?

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

30. For a parallel resonant circuit, if the damped frequency is  $\sqrt{8}$  rad/s and the bandwidth is 2 rad/s, the resonant frequency of the circuit is

- (a) 10 rad/s
- (b) 7 rad/s
- (c) 3 rad/s
- (d) 2 rad/s

31. The resonant frequency of an RLC series circuit is 1.5 MHz with the resonating capacitor of 150 pF. The bandwidth is 10 kHz. The effective value of the resistor is

- (a)  $16.3 \Omega$
- (b)  $9.5 \Omega$
- (c)  $7.4 \Omega$
- (d)  $4.7 \Omega$

32. A 4-digit DVM (digital voltmeter) with a 100-mV lowest full-scale range would have a sensitivity of how much value while resolution of this DVM is 0.0001 ?

- (a) 0.1 mV
- (b) 0.01 mV
- (c) 1.0 mV
- (d) 10 mV

33. For the network function,

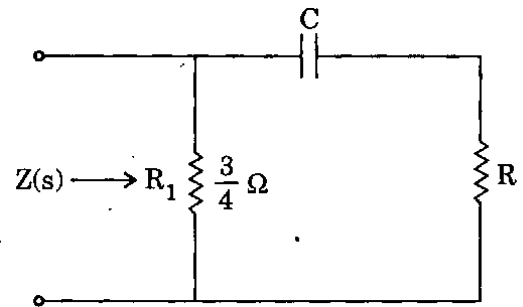
$T(s) = \frac{s}{s^2 + 2s + 100}$ , the resonant frequency and bandwidth are respectively

- (a) 10, 1
- (b) 10, 2
- (c) 100, 1
- (d) 100, 2

34. The state variable description of a linear autonomous system is  $\dot{X} = AX$  where  $X$  is a two-dimensional vector and  $A$  is a matrix given by  $A = \begin{bmatrix} 0 & -2 \\ 2 & 0 \end{bmatrix}$ . The poles of the system are located at

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

35.



For the circuit shown above, the two natural frequencies of the driving-point impedance  $Z(s)$  are given by  $s + 1 = 0$  and  $s + 4 = 0$ . It is not known, which is for open-circuit and which is for short-circuit. Then  $Z(s)$  is given by

- (a)  $\frac{3(s+4)}{16(s+1)}$
- (b)  $\frac{3(s+4)}{4(s+1)}$
- (c)  $3 \frac{(s+1)}{(s+4)}$
- (d)  $\frac{1(s+4)}{3(s+1)}$

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

<u>List I</u> (Meter)	<u>List II</u> (Type)
A. Reed frequency meter	1. Moving iron
B. Weston frequency meter	2. Vibrating
C. Weston Synchroscope	3. Moving coil
D. Ohm meter	4. Electro-dynamic

Code :

	<u>A</u>	<u>B</u>	<u>C</u>	<u>D</u>
(a)	2	1	4	3
(b)	3	1	4	2
(c)	2	3	4	1
(d)	3	4	1	2



37. A transfer function has a zero at  $s = -1$  and poles at  $s = -1 \pm j1$ . The multiplier being unity, if the input is unit step function, the steady state response is given by

- (a)  $0.5 \angle 0^\circ$
- (b)  $1.0 \angle 0^\circ$
- (c)  $2.0 \angle 0^\circ$
- (d)  $2.0 \angle 90^\circ$

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

List I

A. Ferro-electric materials

B. Anti-Ferroelectric materials

C. Ferrites

D. Ferro-magnetic materials

List II

1. Neel temperature

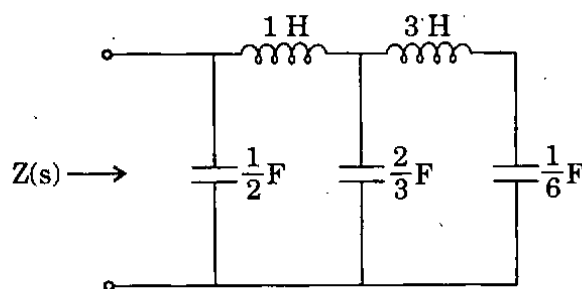
2. Magnetostrictive transducers

3. Magnetocaloric effect

4. Cannot be shaped by ordinary machining process

Code :

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



For the circuit shown, the values of  $Z(s)$  as  $s \rightarrow 0$  and  $s \rightarrow \infty$  are respectively given by

- (a)  $\frac{2}{s}, s$
- (b)  $\frac{6}{8s}, \frac{2}{s}$
- (c)  $\frac{8s}{6}, \frac{s}{2}$
- (d)  $4s + \frac{6}{s}, \frac{2}{s}$

40. The precision of a ramp type digital voltmeter depends on

- (a) frequency of the generator and slope of the ramp
- (b) frequency of the generator
- (c) slope of the ramp
- (d) switching time of the gate

41. The transfer function of a phase-lead compensator is given by  $G(s) = \frac{1+3Ts}{1+Ts}$ ,  $T > 0$ . The maximum phase shift provided by such a compensator is
- 90°
  - 60°
  - 45°
  - 30°
43. If the initial voltage across the capacitor of 2 Farad is  $V(0) = 1$ , the voltage and charge on the capacitor at  $t = 3$  sec after connecting a current source  $I_S = 2$  A at  $t = 0$  are respectively
- 2 V, 4 coulomb
  - 2 V, 4 coulomb
  - 4 V, 8 coulomb
  - 8 V, 4 coulomb

42. 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. Iron loss of a choke carrying a.c. current at 50 Hz along with d.c.	1. Electrostatic wattmeter
B. Calibration of a dynamometer type wattmeter	2. Oscilloscope
C. Dielectric loss of a capacitor at 20 Hz	3. D.C. Potentiometer
D. Power loss of an insulator testing at high voltages	4. A.C. Potentiometer

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

44. Consider the following statements :

The coercive force can be increased by

- Adding Cobalt because it is a ferromagnetic material.
- Adding Gold because it is a diamagnetic material.
- Adding Super alloy.
- Space charge polarizing.

Which of the above statements is/are correct ?

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

45. If the load impedance is 100 ohm and input impedance is 25 ohm, then the characteristic impedance of the transmission line is

- 70 ohm
- 60 ohm
- 50 ohm
- 40 ohm

46. Temperature below which certain materials are anti-ferromagnetic is called

- Curie temperature
- Neel temperature
- Wein temperature
- Debye temperature

47. Consider the following statements :

A step voltage is applied to an under-damped series RLC circuit in which R is variable. If R is

- increased, the steady-state voltage across C will be reduced.
- increased, the frequency of transient oscillations across C will be reduced.
- reduced, the transient oscillations will die down at a fast rate.
- reduced to zero, the peak amplitude of the voltage across C will be double that of input voltage.

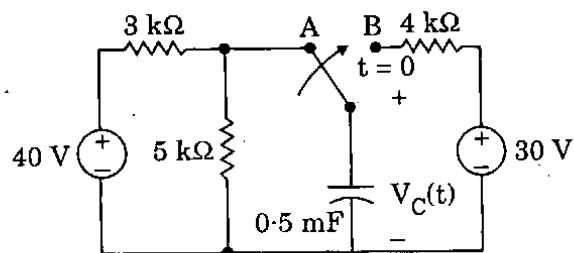
Which of the above statements is/are correct ?

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

48. A moving coil ammeter having a resistance of 1 ohm gives full scale deflection when a current of 10 mA is passed through it. The instrument can be used for the measurement of voltage up to 10 V by

- connecting a resistance of 999 ohm in series with the instrument
- connecting a resistance of 999 ohm parallel to the ammeter
- connecting a resistance of 999 ohm parallel to the load
- connecting a resistance of 1000 ohm in series with the load

49.



For the circuit shown above, the switch has been in position A for a long time. At  $t = 0$ , the switch is moved to B. Then, the capacitor voltage  $V_C(t)$  for  $t > 0$  is

- $V_C(t) = (24 - 6e^{-2t})$  V
- $V_C(t) = (30 - 15e^{-0.5t})$  V
- $V_C(t) = (6 - 6e^{-2t})$  V
- $V_C(t) = (30 - 5e^{-0.5t})$  V

50. Consider the following statements :

Electrets are the materials which are

- having permanent electric moments.
- electromagnets.
- very similar to permanent magnet materials.
- similar to anti-ferroelectric materials.

Which of the above statements is/are correct ?

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

51. Consider the following statements :

Magnetic susceptibility

1. depends on the nature of the magnetic material.
2. is not dependent on the relative permeability of the medium.
3. cannot be determined by measuring the force exerted on a magnetic material when placed in a magnetic field.
4. can be determined from  $M - H$  curve.

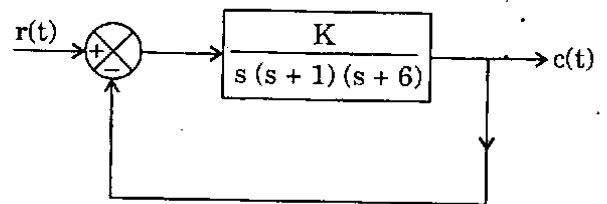
Which of the above statements is/are correct ?

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

52. For a series RLC circuit energized with a sinusoidal voltage source of frequency 4 rad/s, the applied voltage lags the current by an angle of  $\tan^{-1} 2$  degrees. Then the value of  $R$  for  $L = 1 \text{ H}$  and  $C = 0.05 \text{ F}$  is

- (a) 4.0 ohm
- (b) 2.0 ohm
- (c) 1.0 ohm
- (d) 0.5 ohm

53.



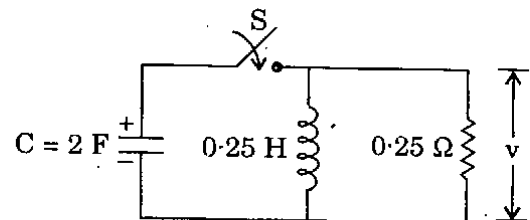
The feedback system shown above is stable for all values of  $K$  given by

- (a)  $K > 0$
- (b)  $K < 0$
- (c)  $0 < K < 42$
- (d)  $0 < K < 60$

54. The value of the multiplier resistance for a dc voltmeter, having 50 V range with  $5 \text{ k}\Omega/\text{V}$  sensitivity, employing a  $200 \mu\text{A}$  meter movement and having internal resistance of  $100 \Omega$ , is given by

- (a) 249.9  $\text{k}\Omega$
- (b) 200  $\Omega$
- (c) 200  $\text{k}\Omega$
- (d) 2.5  $\text{k}\Omega$

55.



For the given circuit, the initial inductor current and the voltage across the capacitor are zero and 2, respectively. When the switch  $S$  is closed at  $t = 0$ , the values of  $v$  and  $\frac{dv}{dt}$  are, respectively

- (a) 2, -4
- (b) 0, 0.25
- (c) 0, -0.5
- (d) 2, 0

56. 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. Enamel covering	1. Laminations
B. Insulation	2. Wires
C. Fibrous materials	3. Machines
D. Empire cloth	4. Transformers

**Code :**

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

57. For an a.c. circuit, if  $v(t) = 160 \sin(\omega t + 10^\circ)$  and  $i(t) = 5 \sin(\omega t - 20^\circ)$ , the reactive power absorbed by the circuit is

- (a) 100 VARs
- (b) 200 VARs
- (c) 300 VARs
- (d) 400 VARs

58. A signal of 10 V is applied to a 50 ohm coaxial transmission line, terminated in a 100 ohm load. The voltage reflection coefficient is

- (a)  $\frac{1}{4}$
- (b)  $\frac{1}{3}$
- (c)  $\frac{1}{2}$
- (d) 1

59. Consider the following statements :

Factors affecting the dielectric loss are

1. directly proportional to the frequency of supply voltage.
2. inversely proportional to the supply frequency.
3. inversely proportional to the square of the supply voltage.
4. directly proportional to the square of the supply voltage.

Which of the above statements are correct ?

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

60. A conductor 2 metre long lies along the Z-axis with a current of 10 A in  $\hat{a}_Z$  direction. If the magnetic field is  $\vec{B} = 0.05 \hat{a}_X$  T, the force on the conductor is

- (a)  $4.0 \hat{a}_Y$  N
- (b)  $1.0 \hat{a}_Z$  N
- (c)  $1.0 \hat{a}_Y$  N
- (d)  $3.0 \hat{a}_Z$  N

61. Using Routh's criterion, the number of roots in the right half S-plane for the characteristic equation :

$$s^4 + 2s^3 + 2s^2 + 3s + 6 = 0 \text{ is}$$

- (a) one
- (b) two
- (c) three
- (d) four

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

List I

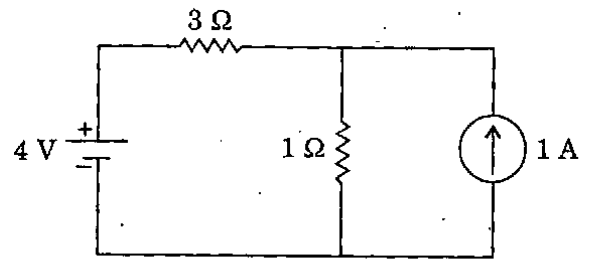
List II

- |                  |                                                   |
|------------------|---------------------------------------------------|
| A. Electrostatic | 1. Power at 50 Hz only                            |
| B. Induction     | 2. Power at frequencies ranging from dc to RF     |
| C. Dynamometer   | 3. Power at unity power factor and at high values |
| D. Thermal       | 4. Power at frequencies ranging from dc to 150 Hz |

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 |

63.



For the circuit shown, the voltage across the 1 ohm resistor is given by

- (a)  $\frac{7}{4}$  V
- (b)  $\frac{5}{4}$  V
- (c)  $\frac{7}{3}$  V
- (d)  $\frac{2}{3}$  V

64. Consider the following statements :

Characteristics of a good insulating material are

- 1. Should give uniform electric and thermal properties.
- 2. High permittivity.
- 3. Low dissipation factor.
- 4. Low insulating resistance.

Which of the above statements are correct ?

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

65. At a measuring frequency of  $10^{12}$  Hz, the dielectric constant of a material will be due to

- (a) Electronic polarization
- (b) Ionic polarization
- (c) Electronic and Ionic polarization
- (d) Electronic, Ionic and Orientational polarization

66. A load is connected to an active network. At the terminals to which the load is connected,  $R_{th} = 10 \Omega$  and  $V_{th} = 60 \text{ V}$ . Then the maximum power supplied to the load is

- (a) 360 W
- (b) 90 W
- (c) 60 W
- (d) 10 W

67. A basic D'Arsonval movement with a full scale deflection of  $50 \mu\text{A}$  and internal resistance of  $500 \Omega$  is used as voltmeter. The value of the multiplier resistance needed to employ this meter to measure a voltage range of  $(0 - 10) \text{ V}$  is given by

- (a) 100 k $\Omega$
- (b) 500 k $\Omega$
- (c) 199.5 k $\Omega$
- (d)  $2 \times 10^5 \text{ k}\Omega$

68. The feedback control system represented by the open loop transfer function

$$G(s)H(s) = \frac{10(s+2)}{[(s+1)(s+3)(s-5)]} \text{ is}$$

- (a) unstable
- (b) stable
- (c) marginally stable
- (d) insufficient data

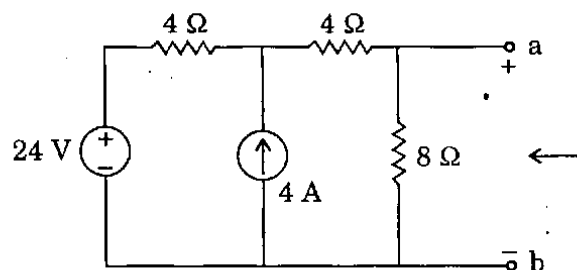
69. Consider the following statements regarding measurement of 3-phase power by two-wattmeter method; one of the wattmeter reads negative implying :

1. Power factor is less than 0.5.
2. Power flow is in the reverse direction.
3. Load power factor angle is greater than  $60^\circ$ .
4. Load is unbalanced.

Which of the above statements are correct ?

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

70.



Applying Norton's Theorem, the Norton's equivalent circuit to the left of the terminals a and b in the above circuit is having equivalent current source ( $I_N$ ) and equivalent resistance ( $R_N$ ) as

- (a)  $I_N = 5 \text{ A}$ ;  $R_N = 4 \Omega$
- (b)  $I_N = 4 \text{ A}$ ;  $R_N = 6 \Omega$
- (c)  $I_N = 9 \text{ A}$ ;  $R_N = 1.6 \Omega$
- (d)  $I_N = 4 \text{ A}$ ;  $R_N = 3 \Omega$

71. The property characteristic of ferroelectric materials is

- (a) Dielectric relaxation
- (b) Dielectric breakdown
- (c) Spontaneous polarization
- (d) Spontaneous magnetization

72. A uniform plane wave is propagating in a material for which  $\epsilon = 4\epsilon_0$ ,  $\mu = 7\mu_0$  and  $\sigma = 0$ . The skin depth for the material is

- (a) zero
- (b) infinity
- (c) 28 m
- (d) 14 m

73. Consider the following statements about superconductors :

1. The temperature at which the conductor becomes a superconductor is called transition temperature.
2. Superconductors repel magnetic flux lines.
3. All superconductors are paramagnetic materials.
4. Superconductors become normal when placed in a magnetic field of certain critical value.

Which of the above statements are correct ?

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

74. Consider the following statements in connection with the closed-loop poles of feedback control system :

1. Poles on  $j\omega$ -axis will make the output amplitude neither decaying nor growing in time.
2. Dominant closed-loop poles occur in the form of a complex conjugate pair.
3. The gain of a higher order system is adjusted so that there will exist a pair of complex conjugate closed-loop poles on  $j\omega$ -axis.
4. The presence of complex conjugate closed-loop poles reduces the effects of such non-linearities as dead zones, backlash and coulomb friction.

Which of the above statements is/are correct ?

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

75. The sensitivity of 200  $\mu$ A meter movement when it is used as a dc voltmeter is given by

- (a) 500  $\Omega/\text{mV}$
- (b) 5  $\Omega/\text{V}$
- (c) 0.5  $\Omega/\text{mV}$
- (d) 5  $\Omega/\text{mV}$

76. Consider a unity feedback control system with open-loop transfer function

$$G(s) = \frac{K(s+1)}{s(s+2)(s+3)}$$

The steady-state

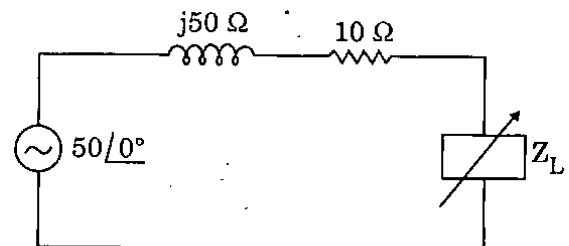
error of the system due to a unit step input is

- (a) zero
- (b)  $K/6$
- (c)  $6/K$
- (d) infinite

77. A 1 mA meter movement with an internal resistance of 100  $\Omega$  is to be converted into (0 – 100) mA. To achieve this, value of shunt resistance  $R_{sh}$  is given by

- (a) 1 k $\Omega$
- (b) 200  $\Omega$
- (c) 1.01  $\Omega$
- (d) 1.01 k $\Omega$

78.



The maximum power that can be transferred in the load  $Z_L$  in the above circuit is

- (a) 12.25 W
- (b) 62.5 W
- (c) 24.5 W
- (d) 500 W



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

List I

- A. Precision work  
B. Rheostat  
C. Heating devices  
D. Brushes

List II

1. Graphite  
2. Nichrome  
3. Constantan  
4. Magnesium

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

80. Consider the following statements :

1. In conducting medium the field attenuates exponentially with increasing depth.
2. Conducting medium behaves like an open circuit to the electromagnetic field.
3. In lossless dielectric relaxation time is infinite.
4. In charge-free region, the Poisson's equation becomes Laplace's equation.

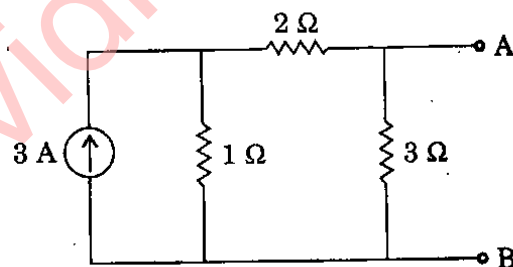
Which of the above statements are correct ?

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

81. In a Hexagonal Close Packed (HCP) crystal structure, if 'a' and 'c' represent, respectively the short and long unit cell dimensions the  $\left(\frac{c}{a}\right)$  ratio should be

- (a) 12.00  
(b) 0.74  
(c) 1.633  
(d) 16.33

82.



The Thevenin's equivalent of the circuit shown above is

- (a) 0.75 V, 1.5 Ω  
(b) 1.5 V, 1.5 Ω  
(c) 1.5 V, 0.75 Ω  
(d) 5.0 V, 1.5 Ω

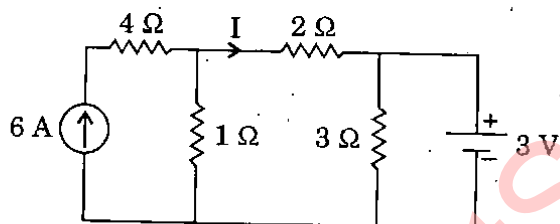
83. Consider the following statements about hot-wire instruments:-

1. They read equally well on dc and/or ac circuits.
2. They are simple and robust in construction and power consumption is low.
3. They are quite suitable for measurement of currents at very high frequencies.

Which of the above statements are correct ?

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

84.



For the circuit shown above, I is

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

85. A semiconductor has a band gap of 2 eV. The wavelength of radiation emitted from the semiconductor when electrons and holes recombine is

- (a) 625 nm
- (b) 625  $\mu\text{m}$
- (c) 625 mm
- (d) 625 cm

86. In free space

$\vec{E}(Z, t) = 60\pi \cos(\omega t - \beta Z) \vec{a}_x$  V/m. The average power crossing a circular area of  $\pi$  square metres in the plane  $Z = \text{constant}$  is

- (a)  $16\pi$  watts/ $\text{m}^2$
- (b)  $15\pi$  watts/ $\text{m}^2$
- (c)  $14\pi$  watts/ $\text{m}^2$
- (d)  $13\pi$  watts/ $\text{m}^2$

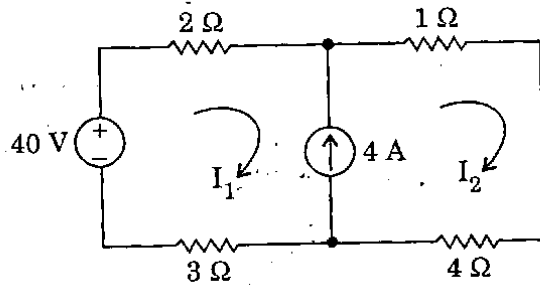
87. Match List I with List II and select the correct answer using the code given below the lists :

<u>List I</u>	<u>List II</u>
A. Metals	1. Are in spontaneously polarized state
B. Semiconductors	2. Finite forbidden gap
C. Insulators	3. Smaller forbidden gap
D. Ferroelectric crystals	4. Partially filled bands

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

88.



The currents  $I_1$  and  $I_2$  in the above circuit are respectively

- (a) 4 A; 4 A
- (b) 3 A; 5 A
- (c) 2 A; 6 A
- (d) 6 A; 2 A

89. A (0 – 25) Amp ammeter has a guaranteed accuracy of 1 percent of full scale reading. The current measured by this ammeter is 10 Amp. The limiting error in percentage for this instrument is

- (a) 2.5%
- (b) 0.5%
- (c) 0.25%
- (d) 0.025%

90. Given a unity feedback system with  $G(s) = \frac{K}{s(s+4)}$ , the value of K for damping ratio of 0.5 is

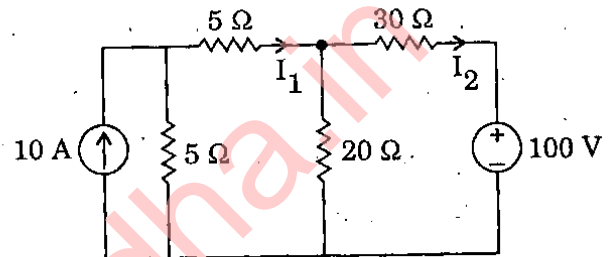
- (a) 1
- (b) 16
- (c) 4
- (d) 2

91.

The pressure in a tank varies from 20 psi to 100 psi. Further pressure in the tank is desired to be kept at 50 psi. The full scale error, when pressure inside the tank is 30 psi, is given by

- (a) - 62.5%
- (b) 25%
- (c) 80%
- (d) - 2.5%

92.



The currents  $I_1$  and  $I_2$  in the above circuit are respectively

- (a) 1.818 A; - 0.4545 A
- (b) 2.451 A; - 1.568 A
- (c) 0.4545 A; -1.818 A
- (d) 1.56 A; - 2.45 A

93. The following data are obtained by measurement on gold :

Density = 19.32 gm/cc

Resistivity = 2.42  $\mu\Omega$ /cm

Atomic weight = 197.2

The mobility of electrons in gold is

- (a)  $4.39 \times 10^{-3} \text{ m}^2/\text{V-sec}$
- (b)  $4.39 \times 10^{-2} \text{ m}^2/\text{V-sec}$
- (c)  $4.39 \text{ m}^2/\text{V-sec}$
- (d)  $4.39 \times 10^3 \text{ m}^2/\text{V-sec}$

94. A magnetic field  $\vec{B}$  of 2 T is normal to a copper strip 0.5 mm thick carrying an electron current of 40 A. If the electron density is  $10.0 \times 10^{28}$  per cubic metre, the voltage across the strip in micro volt is

- (a) 40
- (b) 30
- (c) 20
- (d) 10

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

List I

- A. High conductivity materials
- B. High resistivity materials
- C. Metals for lightly loaded contacts
- D. Materials for bimetallic strip

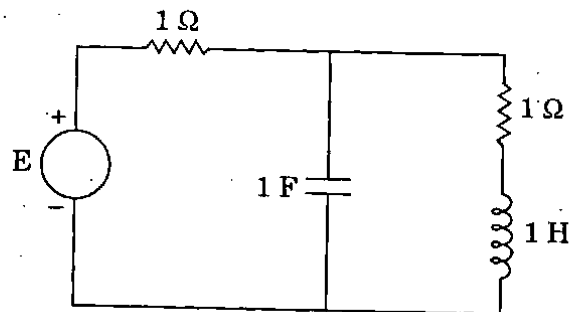
List II

- 1. Tungsten, Carbon
- 2. Platinum, Molybdenum
- 3. Aluminium, Copper
- 4. Iron, Nickel, Constantan

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 |

96.



If the power dissipated in the circuit shown above is 8 W, then the value of E will be

- (a) 2 V
- (b) 4 V
- (c) 8 V
- (d) 16 V

97. A resistance of 105 ohms is specified using significant figures as indicated below :

- 1. 105 ohms
- 2. 105.0 ohms
- 3. 0.000105  $\mu\Omega$

Among these

- (a) 1 represents greater precision than 2 and 3.
- (b) 2 and 3 represent greater precision than 1.
- (c) 1, 2 and 3 represent same precision.
- (d) 2 represents greater precision but 1 and 3 represent same precision.

98. Consider the following statements in connection with pole location :

1. A distinct pole always lies on the real axis.
2. A dominant pole has a large time constant.

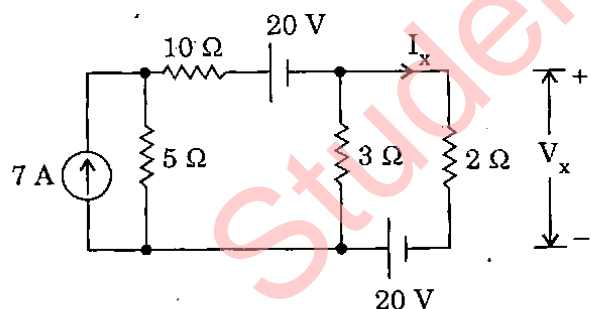
Which of the above statements is/are correct ?

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

99. A (0 – 250) V voltmeter has a guaranteed accuracy of 2 percent of full scale reading. The voltage measured by this voltmeter is 150 volts. The limiting error in percentage is

- (a) 2.5%
- (b) 0.05%
- (c) 3.33%
- (d) 5.0%

100.



The current  $I_x$  and voltage  $V_x$  in the above circuit are, respectively

- (a) 5 A; 10 V
- (b) 10 A; 20 V
- (c) 6 A; 12 V
- (d) 4 A; 8 V

101. Consider the following statements :

Secondary (or Molecular) bonds are

1. The attraction forces exist between atoms or molecules.
2. Stronger than primary bonds.
3. Can be divided as electrostatic bonds.
4. Weaker than primary bonds.

Which of the above statements is/are correct ?

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

102. Point charges of  $Q_1 = 2 \text{ nC}$  and  $Q_2 = 3 \text{ nC}$  are located at a distance apart. With regard to this situation, which one of the following statements is **not** correct ?

- (a) The force on the 3 nC charge is repulsive.
- (b) A charge of  $-5 \text{ nC}$  placed midway between  $Q_1$  and  $Q_2$  will experience no force.
- (c) The forces  $Q_1$  and  $Q_2$  are same in magnitude.
- (d) The forces on  $Q_1$  and  $Q_2$  will depend on the medium in which they are placed.

103. Consider the following statements referring to the magnetization :

1. In solenoid magnetization is due to a surface current distribution.
2. Magnetization has its origin in circulating current.
3. The solenoid dipole is represented by an infinitesimal current loop.
4. The magnetization is entirely solenoidal and divergent.

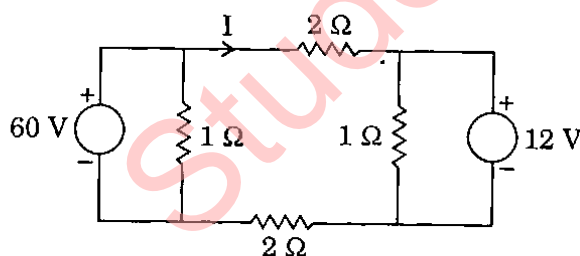
Which of the above statements is/are correct ?

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

104. Increase in the applied reverse voltage to a p-n junction results in increase in the

- (a) Depletion width
- (b) Barrier height
- (c) Depletion width and barrier height
- (d) Junction temperature

105.



For the circuit shown, the value of current,  $I$  is

- (a) 2 A
- (b) 3 A
- (c) 6 A
- (d) 12 A

106. Consider the following statements with regard to manufacture of a standard resistor :

1. The material should be of high resistivity and low temperature coefficient.
2. Resistors are shielded against magnetic field.
3. Nickel-chromium is best suited for resistance of high value.

Which of the above statements is/are correct ?

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

107. Consider the following statements in connection with the feedback of control systems :

1. Feedback can improve stability or be harmful to stability if it is not properly applied.
2. Feedback can always improve stability.
3. In many situations the feedback can reduce the effect of noise and disturbance on system performance.
4. In general the sensitivity of the system gain of a feedback system to a parameter variation depends on where the parameter is located.

Which of the above statements are correct ?

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

**Directions :** Each of the next thirteen (13) 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

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

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

**109. Assertion (A) :** Piezoelectric transducers can be used for measurement of both static and dynamic phenomena.

**Reason (R) :** Piezoelectric transducers have very good high frequency response.

**110. Assertion (A) :** Ionic bonds and covalent bonds are higher than metallic bonds.

**Reason (R) :** Ionic and covalent bonds are generally lower than other primary bonds.

**111. Assertion (A) :** The effects of noise disturbance and parameter variations are relatively easy to visualize and access through frequency response.

**Reason (R) :** Frequency response test is suitable for systems with very large time constants.

**112. Assertion (A) :** All the coefficients of the characteristic equation should be positive and no term should be missing in the characteristic equation for a system to be stable.

**Reason (R) :** If some of the coefficients are zero or negative then the system is not stable.

**113. Assertion (A) :** Process industry applications should ideally be tuned for critical damping.

**Reason (R) :** Critically damped response has no oscillations in the output.

**114. Assertion (A) :** Intrinsic semiconductors show negative Hall coefficient.

**Reason (R) :** The number of electrons and holes are equal in an intrinsic semiconductor.

**115. Assertion (A) :** A thermocouple type of indicating instrument measures the true r.m.s. value of the current that passes through it.

**Reason (R) :** It uses a p.m.m.c type of indicating instrument to measure the current.

116. *Assertion (A)* : Magnetic cores are generally used in main memory of a digital computer.

*Reason (R)* : Magnetic cores are slow and volatile.

117. *Assertion (A)* : Comparison methods of direct measurements are most widely used in electrical engineering practice.

*Reason (R)* : Comparison methods of direct measurements give high accuracy.

118. *Assertion (A)* : The Q-meter measures the Q-factor of a coil when the circuit is in resonance.

*Reason (R)* : The Q-factor of a coil depends only on its inductance and not on its resistance.

119. *Assertion (A)* : The spins within a magnetic domain are aligned permanently below Curie temperature in a ferromagnetic material.

*Reason (R)* : Ferromagnetic material is magnetic only when the domains are aligned by an external field.

120. *Assertion (A)* : Bellows are quite suitable for dynamic pressure measurements.

*Reason (R)* : Bellows are rugged, simple and rugged in construction and are capable of providing large force and wide pressure range of measurements.



SPACE FOR ROUGH WORK

Studentsuvidha.in

SPACE FOR ROUGH WORK

StudentSuvidha.in

SPACE FOR ROUGH WORK

StudentSuvidha.in

SPACE FOR ROUGH WORK

StudentSuvidha.in

---

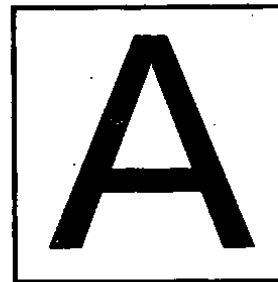
DO NOT OPEN THIS TEST BOOKLET UNTIL YOU ARE ASKED TO DO SO

---

T.B.C. : Q-GUG-K-FFB

Test Booklet Series

Serial No 035841



## 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. In how many different modes a universal shift register operates ?
  - (a) 2
  - (b) 3
  - (c) 4
  - (d) 5
  
2. Which of the following counter results in least delay ?
  - (a) Ring counter
  - (b) Ripple counter
  - (c) Synchronous counter
  - (d) Asynchronous counter
  
3. The average output voltage of a fly-back converter is  $V_o = 24 \text{ V}$  at a resistive load of  $R = 0.8 \Omega$ . The duty cycle ratio is  $\alpha = 50\%$  and the switching frequency is  $f = 1 \text{ kHz}$ . The on-state voltage drop of transistors and diodes are  $V_t = 1.2 \text{ V}$  and  $V_d = 0.7 \text{ V}$  respectively. The turn ratio of the transformer is  $a = N_s/N_p = 0.25$ . What is the efficiency of the converter ?
  - (a) 86.5%
  - (b) 96%
  - (c) 75%
  - (d) 90%
  
4. A shift register with the serial output connected back to the serial input is a
  - (a) Feedback shift register
  - (b) Shift register counter
  - (c) Universal shift register
  - (d) Serial to parallel converter

5. Consider the following statements :

The suitable configuration of HVDC converter is decided on the requirements of

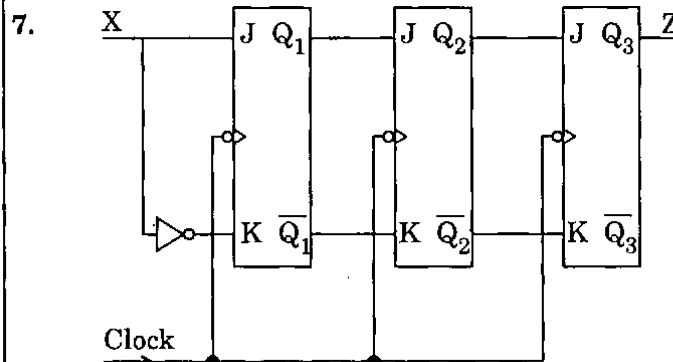
1. High pulse number.
2. Converter transformer utilization factor should be near to unity.

Which of the above statements is/are correct ?

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

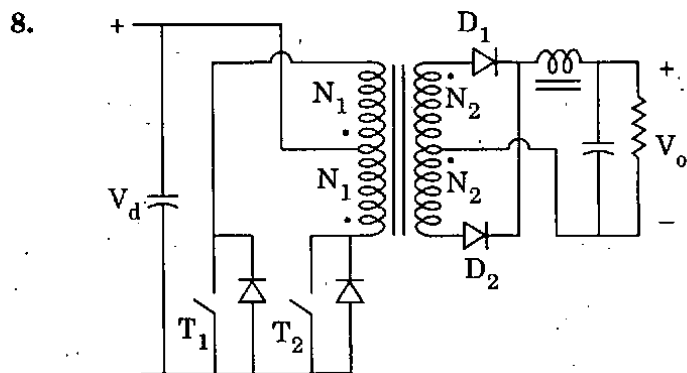
6. Fibre optic cables are used in power system applications mainly for

- (a) SCADA
- (b) Communication between power station and sub station
- (c) Communication between power station and load control centre
- (d) All of the above



Circuit shown above is a

- (a) Shift register
- (b) Binary counter
- (c) Ripple counter
- (d) Sequence detector



In push-pull type DC-DC converter the output voltage  $V_o$  is given by

(a)  $V_o = 2 \frac{N_2}{N_1} \cdot V_d \left( \frac{t_{ON}}{t_{ON} + t_{OFF}} \right)$

(b)  $V_o = \frac{N_2}{N_1} \cdot V_d \left( \frac{t_{ON}}{t_{ON} + t_{OFF}} \right)$

(c)  $V_o = 2 \frac{N_2}{N_1} \cdot V_d \left( \frac{t_{ON}}{t_{OFF}} \right)$

(d)  $V_o = \frac{N_2}{N_1} \cdot V_d \left( \frac{t_{ON}}{t_{OFF}} \right)$

9. Under voltage relays are mainly used for

- (a) Motor protection
- (b) Transformer protection
- (c) Transmission line protection
- (d) All of the above

10. If a line of surge impedance  $Z_o$  is terminated in an impedance  $Z$  then the reflection for current and voltage surges at the termination are given respectively by

(a)  $\frac{Z_o - Z}{Z_o + Z}, \frac{2Z}{Z_o + Z}$

(b)  $\frac{Z_o - Z}{Z_o + Z}, \frac{Z - Z_o}{Z_o + Z}$

(c)  $\frac{2Z_o}{Z_o + Z}, \frac{2Z}{Z_o + Z}$

(d)  $\frac{2Z_o}{Z_o + Z}, \frac{Z - Z_o}{Z_o + Z}$

11. A squirrel cage induction motor having a rated slip of 2% on full load has a starting torque of 50% of full load torque. The starting current is

- (a) Two times the full load current
- (b) Four times the full load current
- (c) Five times the full load current
- (d) Equal to the full load current

12. In a PWM inverter,  $f_o$  and  $f$  are the frequencies in Hz for the carrier signal and reference signal respectively. Then the number of pulses per half cycle is

(a)  $N = \frac{f}{f_o}$

(b)  $N = \frac{f}{2f_o}$

(c)  $N = \frac{f_o}{2f}$

(d)  $N = \frac{f_o}{f}$

13. The restriking voltage is measured in

- (a) RMS value
- (b) Peak value
- (c) Instantaneous value
- (d) Average value

14. The MMF produced by the rotor currents of a 3-phase induction motor

- (a) Rotates at the speed of rotor in the air gap
- (b) Is at stand with respect to stator MMF
- (c) Rotates at slip speed with respect to stator MMF
- (d) Rotates at synchronous speed with respect to rotor

15. LXI SP, 7FFFH  
MVI A, 25H  
XRI 02H  
PUSH PSW  
POP H  
MOV A, L  
ORI 10H  
HLT

What are the contents of A, H, L, SP and PSW registers after executing the above set of instructions ? Assume undefined flags always remain cleared.

- (a) 10H, 25H, 00H, 7FFFH, 00H respectively
- (b) 14H, 27H, 04H, 7FFFH, 04H respectively
- (c) 14H, 25H, 00H, 7FFFH, 04H respectively
- (d) 10H, 27H, 04H, 7FFFH, 00H respectively

16. The power factor of an induction motor operating at no load will have a value around

- (a) 0.9 lag
- (b) 0.2 lead
- (c) 0.2 lag
- (d) 0.9 lead

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

List I

List II

- |                                                               |                                           |
|---------------------------------------------------------------|-------------------------------------------|
| A. All types of faults                                        | 1. Negative sequence currents are present |
| B. All unsymmetrical faults                                   | 2. Zero sequence currents are present     |
| C. Fault involving ground with neutral of the system grounded | 3. Zero sequence currents are absent      |
| D. Fault involving ground with floating neutral               | 4. Positive sequence currents are present |

Code :

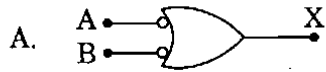
- |     | A | B | C | D |
|-----|---|---|---|---|
| (a) | 3 | 1 | 2 | 4 |
| (b) | 4 | 1 | 2 | 3 |
| (c) | 3 | 2 | 1 | 4 |
| (d) | 4 | 2 | 1 | 3 |



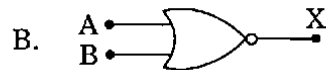
18. Match List I with List II and select the correct answer using the code given below the lists :

List I

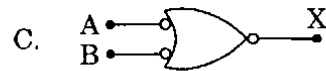
List II



1.  $AB$



2.  $\overline{AB}$



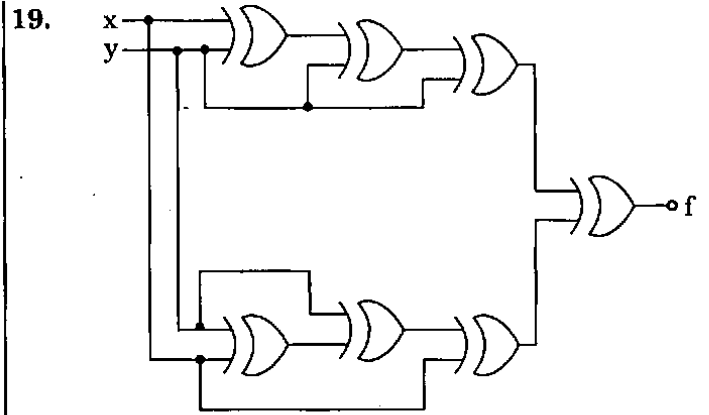
3.  $A + B$



4.  $\overline{A + B}$

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



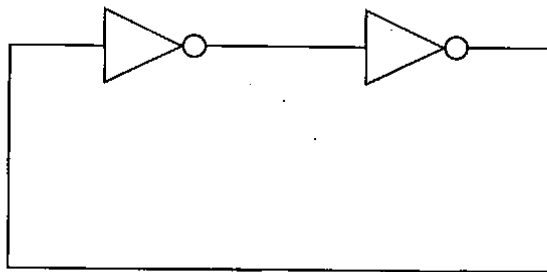
The circuit shown above generates the function of

- (a)  $x \oplus y$   
 (b) 0  
 (c)  $x\bar{y} + yx + \bar{y}x$   
 (d)  $x \cdot \bar{y}$

20. In a 3-phase induction machine, motoring, generating and braking operations take place in the range of slip "S" is :

- (a)  $1 > S > 0$ ,  $0 > S > -2$  and  $S > 1$   
 (b)  $S > 1$ ,  $1 > S > -1$  and  $0 > S > -1$   
 (c)  $S > 1$ ,  $0 > S > -1$  and  $1 > S > 0$   
 (d)  $0 > S > -1$ ,  $S > 1$  and  $1 > S > 0$

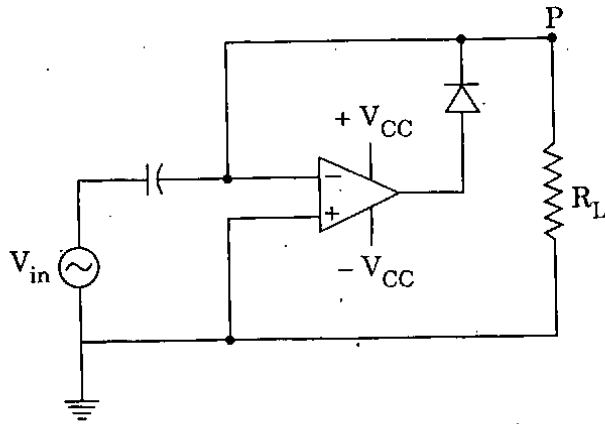
21. On receiving an interrupt the CPU of an 8085 microprocessor
- Completes the current instruction and then goes to the interrupt service routine
  - Branches off to the interrupt service routine immediately
  - Hands over control of address bus and data bus to the interrupting device
  - Goes to HALT state for pre-determined period
22. Which one of the following is **not** a characteristic of RTL logic families ?
- High switching speed
  - Poor noise immunity
  - Low power dissipation
  - Fan out is 5
23. For what value of damping parameter, the transient stability is assured by equal area criterion ?
- Independent of systems damping
  - If only damping is exactly zero
  - For all values of damping parameters
  - If only damping is positive and finite
24. Armature reaction AT of a synchronous generator supplying power at rated voltage with zero power factor lagging is
- Magnetizing
  - Demagnetizing
  - Cross-magnetizing
  - Both magnetizing and cross-magnetizing



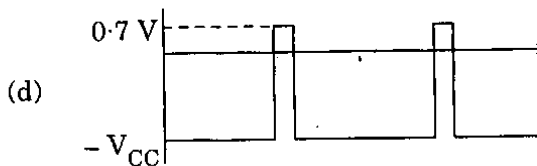
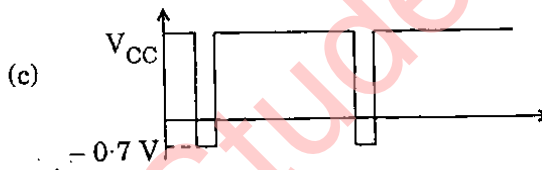
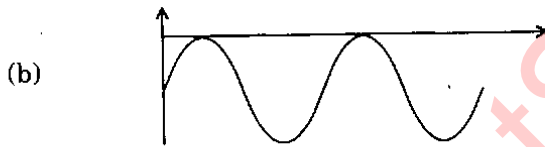
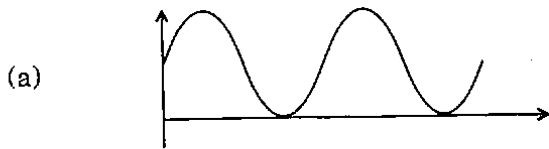
The digital circuit using two inverters as shown above acts as

- A bistable multivibrator
  - An astable multivibrator
  - A monostable multivibrator
  - An oscillator
26. Power factor of an alternator driven by constant prime mover input can be changed by changing its
- Speed
  - Load
  - Field excitation
  - Phase sequence
27. Which of the following power stations is mainly used to cover peak load on the system ?
- Coal based thermal power plant
  - Nuclear power plant
  - Gas based thermal power plant
  - Pumped storage hydro power plant

28.



For the given sinusoidal input to the circuit as shown above, the voltage waveform at point 'P' of the clamper circuit is



29.

A constant current source inverter supplies 20 A to a load resistance of  $1 \Omega$ . If the load resistance is changed to  $5 \Omega$ , then the load current

- (a) Remains same at 20 A whereas the load voltage changes to 100 V
- (b) Changes to 4 A from 20 A and the load voltage changes to 20 V
- (c) Changes to 4 A from 20 A and the load voltage changes to 80 V
- (d) And load voltage stay at 20 A and 20 V, respectively

30.

What is the assigned bandwidth of each of the channels in the AM broadcast band ?

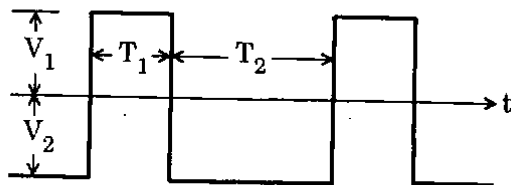
- (a) 5 kHz
- (b) 10 kHz
- (c) 15 kHz
- (d) 200 kHz

31.

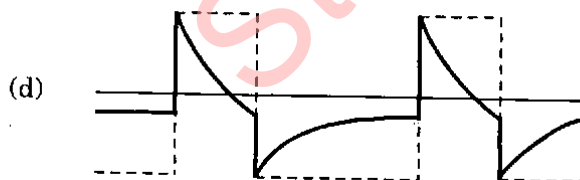
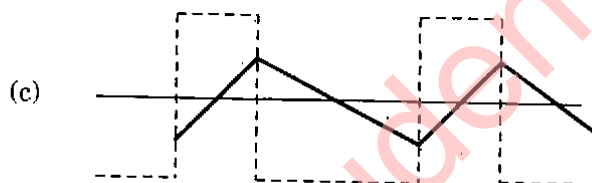
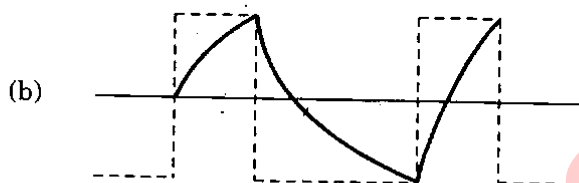
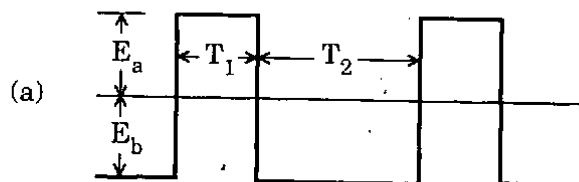
A 3-phase, 11 kV, 5 MVA alternator has synchronous reactance of  $10 \Omega$  per phase. Its excitation is such that the generated e.m.f. is 14 kV. If the alternator is connected to infinite bus bar, the maximum output at the given excitation is

- (a) 15,400 kW
- (b) 8,000 kW
- (c) 6,200 kW
- (d) 5,135 kW

32.



For low pass RC circuit the input waveform is as shown above. What will be the output waveform if the time constant of the circuit is equal to the time period of the input signal ( $RC = T_1 + T_2$ )?



33. Consider the following statements :

The armature torque in a dc motor is a function of

1. Field flux.
2. Armature current.
3. Speed.
4. Damping.

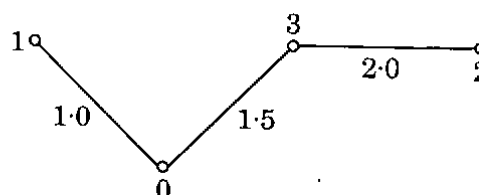
Which of the above statements is/are correct ?

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

34. Sixty-four number of  $256 \times 1$  bit RAM IC is arranged in 8 rows and 8 columns to get memory of

- (a) 1 kB
- (b) 2 kB
- (c) 4 kB
- (d) 8 kB

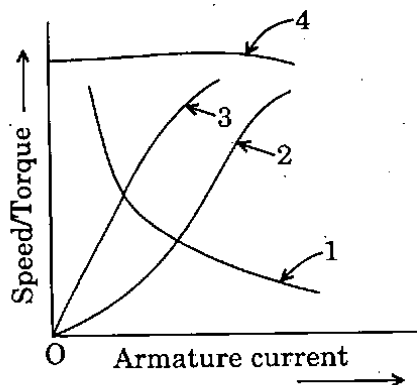
35.



For a graph of power system network shown in figure, where bus numbers and impedances are marked, assuming equal  $R/X$  of impedances, find the bus impedance matrix element  $Z_{22}$ .

- (a) 2.0
- (b) 3.5
- (c) 0.5
- (d) 4.5

36.



Consider the following statements :

In the above figure, the curves pertain to the dc motor.

- A. Speed Vs armature-current characteristic of a dc shunt motor.
- B. Torque Vs armature-current characteristic of a dc shunt motor.
- C. Speed Vs armature-current characteristic of a dc series motor.
- D. Torque Vs armature-current characteristic of a dc series motor.

What is the correct sequence of characteristics ?

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

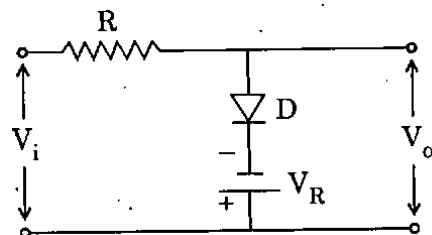
37. For a non-uniform quantizer more quantizing steps are used for signals of

- (a) Low frequency
- (b) High amplitude
- (c) Low amplitude
- (d) High frequency

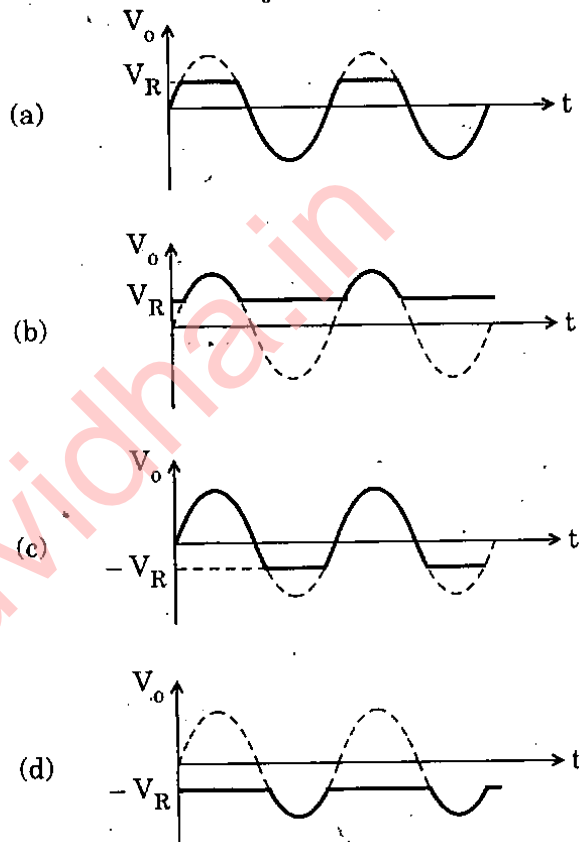
38. The armature MMF waveform of a dc machine is

- (a) Pulsating
- (b) Rectangular
- (c) Triangular
- (d) Sinusoidal

39.



For a sinusoidal input of peak value  $V_p$ , the output waveform  $V_o$  will be



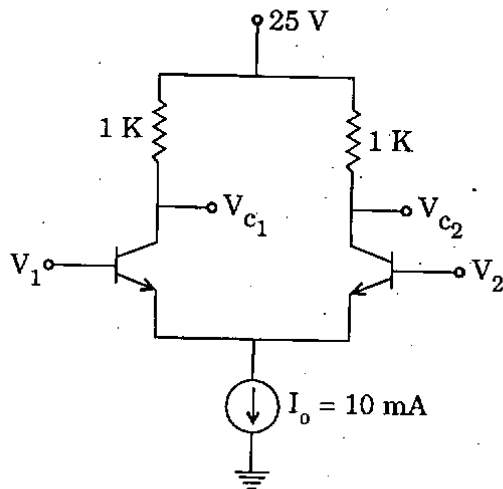
40. Consider the following :

1. EMF
2. Reversal
3. MMF
4. Direct

Which methods among these are for the determination of voltage regulation of an alternator ?

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

41.



In the difference amplifier as shown above, the differential output

$(V_{c2} - V_{c1})$  for  $V_1 = +5$  V,  $V_2 = 0$  V is

- (a) 0 V
- (b) 5 V
- (c) 10 V
- (d) 15 V

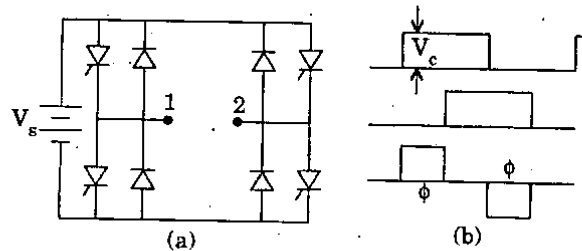
42. Consider the following parts of a dc machine :

1. Yoke
2. Armature core
3. Brushes
4. Pole core

Which of the above parts are subjected to iron loss ?

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

43.



The above figure shows an inverter circuit with a dc source voltage  $V_s$ . The semi-conductor switches of the inverter are operated in such a way that the pole voltages of  $V_{10}$  and  $V_{20}$  are shown in the figure (b). What is the RMS value of the pole voltage  $V_{12}$  ?

- (a)  $\frac{V_s \phi}{\sqrt{2\pi}}$
- (b)  $V_s \sqrt{\frac{\phi}{\pi}}$
- (c)  $V_s \sqrt{\frac{\phi}{2\pi}}$
- (d)  $\frac{V_s}{\pi}$

44. Which one of the following pulse communications systems is digital ?

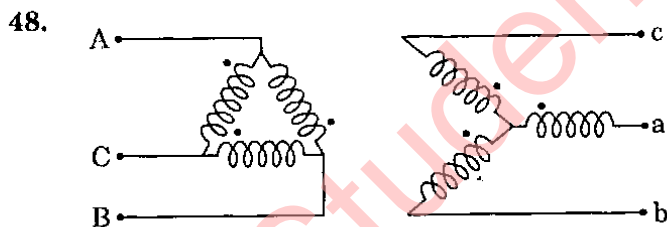
- (a) PAM
- (b) PCM
- (c) PPM
- (d) PWM

45. The input resistance  $R_i$  and output resistance  $R_o$  of an ideal current amplifier, in ohms, are
- 0 and 0
  - 0 and  $\infty$
  - $\infty$  and 0
  - $\infty$  and  $\infty$

46. MVI A, AAH  
ORI FFH  
RRC  
RRC  
CMC  
INR A

What are the contents of A and PSW registers after executing the above set of instructions in sequence?

- AAH and 00H
  - FFH and 66H
  - 00H and 54H
  - 00H and 00H
47. What will happen if a short circuit fault occurs in a switched capacitor controlled reactor?
- Oscillation
  - Capacitor discharge
  - Over voltage
  - Noise



For  $\Delta Y$  transformer, connections and terminal markings are shown in the above figure. If 1 and 2 represents positive and negative sequence, then the correct solution in per unit values for  $VA_1$  and  $VA_2$  is

- $jVa_1$  and  $-jVa_2$
- $Va_1$  and  $-jVa_2$
- $jVa_1$  and  $-Va_2$
- $Va_1$  and  $-Va_2$

49. For a P-pole machine, the relation between electrical and mechanical degrees is

- $\theta_{elec} = \frac{2}{P} \theta_{mech}$
- $\theta_{elec} = \frac{4}{P} \theta_{mech}$
- $\theta_{elec} = \theta_{mech}$
- $\theta_{elec} = \frac{P}{2} \theta_{mech}$

50. Consider the following devices :

- Synchronous condenser
- Saturable reactor
- SCCR
- FCCR

In which of these devices, the accuracy of compensation is very high and noise level is very low?

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

51.

A	BC			
	$\bar{B}\bar{C}$	$\bar{B}C$	$BC$	$B\bar{C}$
$\bar{A}$		1	1	1
A		1	1	

For a function F, the Karnaugh map is shown above. Then minimal representation of F is

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

52. Which one of the following statements is **incorrect** about the matched filter ?
- The maximum output SNR depends on the input signal energy.
  - The impulse response is reversed delayed version of the input signal.
  - The error probability depends on the wave shape of the signal.
  - Matched filter and correlator gives identical reception performances.
53. The smallest valid signed integer that can be stored in a memory location of a  $4k \times 8$  bit RAM is
- 0
  - 128
  - 2048
  - 65536
54. A 10 kVA, 400 V / 200 V single-phase transformer with 10% impedance, draws a steady short circuit current of
- 50 A
  - 150 A
  - 250 A
  - 350 A
55. For the parallel operation of transformers, which of the following conditions must be satisfied ?
- Same voltage ratios
  - Must be connected in proper polarities
  - $R_e/X_e$  ratio should be the same
  - Same kVA rating
56. Static VAR controllers are used to provide dynamic voltage regulation. These controllers are primarily of
- Thyristor switched inductors
  - Thyristor controlled capacitors
  - Thyristor switched resistors
  - Thyristor controlled inductors and thyristor switched capacitors
57. Consider the following statements :  
When Darlington circuit and normal single stage emitter followers are compared
- Both have near unity voltage gain.
  - Both have equal current gain.
  - Darlington circuit has higher output resistance.
  - Emitter follower has lower input resistance.
- Which of the above statements is/are correct ?
- 1 only
  - 1 and 4 only
  - 2 and 4 only
  - 1, 2, 3 and 4



58. 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. Source encoder	1. Reduce ISI
B. Channel encoder	2. Synchronization
C. Line coder	3. Message protection
D. Equalizer	4. Maximization of information transmitted

Code :

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

59. Handshaking mode of data transfer is
- Synchronous data transfer
  - Asynchronous data transfer
  - Interrupt driven data transfer
  - Level mode of DMA data transfer

60. Three individual 3-phase 400 kV power systems, each one of which consists of a generator transformer and a radial line having 3- $\phi$  symmetrical fault level of 20 GVA for fault at the remote end of lines, are now reinforced by interconnecting the remote end lines by three lines each of reactance  $j12 \Omega$  so that the fault level at each remote end of the radial lines on ignoring resistance becomes
- 10 GVA
  - $(20/3)$  GVA
  - 24 GVA
  - 20 GVA

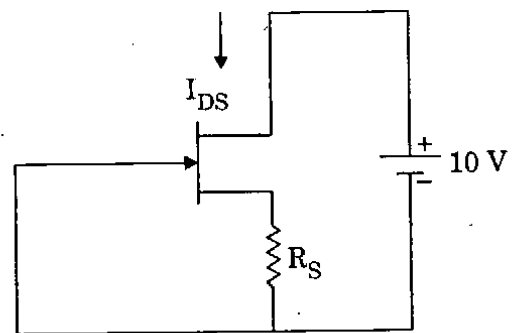
61. In Scott connection, if the turns ratio of main transformer is K, then the teaser transformer has turns ratio of

- $\frac{2K}{\sqrt{3}}$
- $\frac{\sqrt{3} K}{2}$
- $\frac{K}{\sqrt{3}}$
- $\frac{K}{2}$

62. A 3-phase thyristor controlled rectifier is feeding a purely resistive load on the DC side. The firing angle of the 6 thyristors of the converter is  $90^\circ$ . AC side is connected to a balanced 3-phase supply. Considering only the fundamental of the input current, active power P and reactive power Q estimated at the AC side of the rectifier are

- $P \neq 0, Q = 0$
- $P = 0, Q \neq 0$
- $P \neq 0, Q \neq 0$
- $P = 0, Q = 0$

63.



The JFET in the above circuit has an  $I_{DSS} = 10 \text{ mA}$ ,  $V_P = 5 \text{ V}$ . The value of the resistance  $R_S$  for a drain current of  $I_{DS} = 6.4 \text{ mA}$  is

- $1.06 \text{ k}\Omega$
- $560 \Omega$
- $470 \Omega$
- $156 \Omega$

64. In mode '0' (Zero) operation of 8255, the ports can be used as port :
- A as input port only
  - B as output port only
  - A as output port only
  - A as input or output port
65. Which one of the following modulation techniques has got maximum SNR ?
- AM-SSB
  - AM-DSB
  - FM
  - AM-SC
66. Load frequency controllers are carried out with
- P controllers only
  - I controllers only
  - D controllers only
  - PID controllers
67. Three identical generators supply power in a system having lossless transmission lines. Generator 1 is equipped with a speed governor that maintains its speed constant at the rated value while generators 2 and 3 have governors with droops of 5% and 4% respectively. For a given increase in system load in the steady state
- Generators 1, 2, 3 will share the increased load in the ratio of 0 : 5 : 4
  - Generators 1, 2, 3 will share the increased load equally
  - Generators 1, 2, 3 will share the increased load in the ratio of 0 : 4 : 5
  - Generator 1 will alone take the entire increased load and the output of generators 2 and 3 will remain unchanged
68. A  $\Delta/\Delta$  connected transformer is connected to V/V connected transformer. The ratio of VA rating of V/V connected transformer and  $\Delta/\Delta$  connected transformer is
- 57.7%
  - 100%
  - 50%
  - 75%
69. A dc motor operated from a type A chopper is switched to type B chopper. How does the motor operate when type A and B are in operation respectively ?
- Plugging and motoring
  - Motoring and plugging
  - Regenerative braking and motoring
  - Motoring and regenerative braking
70. The efficiency of a class B amplifier is 72% when the supply voltage is 24 V. The peak to peak output voltage is
- 20 V
  - 22 V
  - 25 V
  - 16 V
71. If the probability of a message is  $1/4$ , then the information in bits is
- 1 bit
  - 2 bit
  - 4 bit
  - 8 bit
72. A 16 bit memory address register can address memory locations of
- 16 k
  - 32 k
  - 64 k
  - 128 k

73. Load flow studies must be made on a power system before
- Making short circuit studies but not for transient stability studies on the power system
  - Making transient stability studies but not for short circuit studies on the power system
  - Making both short circuit and transient stability studies on the power system
  - For neither making short circuit studies nor transient stability studies on the power system
74. A conventional telephone line with 3 kHz bandwidth and having 30 dB signal-to-noise ratios can carry information at a rate of
- 30 kbps
  - 15 kbps
  - 3 kbps
  - 16 Mbps
75. A dc to dc transistor chopper supplied from a fixed voltage dc source feeds a fixed resistive inductive load and a free wheeling diode. The chopper operates at 1 kHz and 50% duty cycle. Without changing the value of the average dc current through the load, if it is desired to reduce the ripple content of the load current, the control action needed will be to
- Increase the chopper frequency keeping its duty cycle constant
  - Increase the chopper frequency and duty cycle in equal ratio
  - Decrease only the chopper frequency
  - Decrease only the duty cycle
76. Neglecting losses, if the power transformed inductively is equal to power transformed conductively in an auto-transformer, then the secondary to primary ratio of transformer is
- 0.5
  - 2
  - 1.5
  - 1.25
77. In modelling the equivalent circuit of a short length overhead transmission line, the line resistance and inductance are only considered because line capacitance to ground is
- Equal to zero
  - Finite but very small
  - Finite but very large
  - Infinite
78. A separately excited dc motor is started using a 3-phase ac/dc controlled rectifier using 'Soft starting'. For limiting the starting current, it is required that firing angle should be
- Gradually increased from  $0^\circ$  to  $180^\circ$
  - Fixed at  $30^\circ$
  - Gradually reduced from  $180^\circ$  to  $30^\circ$
  - Gradually increased from  $30^\circ$  to  $180^\circ$
79. The field, which is never present in an assembly language statement, is
- Opcode
  - Operand
  - Continue
  - Comment
80. A JFET is set up as a follower, with  $\mu = 200$ ,  $r_d = 100 \text{ k}$  and source load resistor  $R_L = 1 \text{ k}$ . The output resistance  $R_o$  is
- $1000 \Omega$
  - $500 \Omega$
  - $333 \Omega$
  - $666 \Omega$

81. A 3000 Hz bandwidth channel has a capacity of 30 kbps. The signal-to-noise ratio of the channel is

- (a) 20 dB
- (b) 25 dB
- (c) 30 dB
- (d) 40 dB

82. The content of the programme counter of an 8085 microprocessor is

- (a) The total number of instructions in the program already executed
- (b) The total number of times a subroutine is called
- (c) The memory address of the instruction that is being currently executed
- (d) The memory address of the instruction that is to be executed next

83. A 10 km long lossless transmission line has a reactance of  $0.3 \Omega/\text{km}$  and negligible shunt capacitance. The value of  $\begin{bmatrix} A & B \\ C & D \end{bmatrix}$  is

- (a)  $\begin{bmatrix} 1 & 0 \\ j3 & 1 \end{bmatrix}$
- (b)  $\begin{bmatrix} 1 & 0 \\ 0.3 & 1 \end{bmatrix}$
- (c)  $\begin{bmatrix} 1 & j3 \\ 0 & 1 \end{bmatrix}$
- (d)  $\begin{bmatrix} j3 & 0 \\ 1 & 1 \end{bmatrix}$

84. The most noise immune system is

- (a) SSB
- (b) PCM
- (c) PDM
- (d) PWM

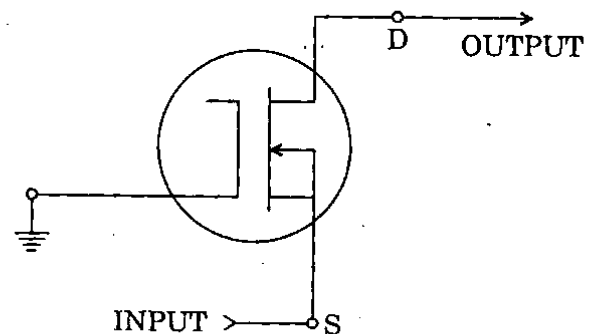
85. Consider the following statements :

1. Nuclear fission occurs whenever Uranium reacts with a neutron.
2. Nuclear fission is accompanied by the release of neutrons and gamma rays.
3. About 200 MeV of energy is released in the fission of a  $U^{235}$  nucleus.
4. Energy from the fission of  $U^{235}$  nucleus is released mainly as kinetic energy of the neutrons and the energy of gamma radiations.

Which of the above statements are correct ?

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

86.



The FET shown above is a

- (a) Common drain
- (b) Common gate
- (c) Common source
- (d) Common source follower

87. The opcode for the instruction "Add Immediately to Accumulator with carry" in 8085 microprocessor is

- (a) ADI
- (b) ACI
- (c) ADC
- (d) ADD

88. Thermal runaway is not encountered in FETs because

- (a)  $I_{DS}$  has a zero temperature coefficient
- (b)  $I_{DS}$  has a negative temperature coefficient
- (c)  $I_{DS}$  has a positive temperature coefficient
- (d) The mobility of the carriers increases with increase in temperature

89. It is advisable to use auto-transformer if the transformation ratio is

- (a) Greater than 1
- (b) Near to 1
- (c) 0.25
- (d) 0.5

90. Consider the following devices :

- 1. SCR
- 2. GTO
- 3. BJT
- 4. MOSFET
- 5. IGBT

Which of these devices do not belong to the family of transistors ?

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

91. Consider the following statements :

Pumped storage plants when operated in interconnected power systems serve to

- 1. Increase load factor of steam plant.
- 2. Provide added capacity to meet peak loads.
- 3. Decrease load factor of steam plant.
- 4. Provide added capacity to meet base loads.

Which of the above statements are correct ?

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

92. If a fixed amount of power is to be transmitted over certain length with fixed power loss, it can be said that volume of conductor is

- (a) Inversely proportional to magnitude of the voltage and that of power factor of the load
- (b) Inversely proportional to square of the voltage and square of power factor of the load
- (c) Proportional to square of voltage and that of power factor of the load
- (d) Proportional to magnitude of the voltage only

93. The de-emphasis filter in an FM receiver comes

- (a) Before FM demodulator
- (b) After FM demodulator and before baseband filter
- (c) After baseband filter
- (d) Before RF amplifier

94. In 8085 microprocessor, the order of priority for hardware interrupts, are
- INTR, RST 7.5, RST 6.5, RST 5.5, TRAP
  - TRAP, RST 7.5, RST 6.5, RST 5.5, INTR
  - TRAP, INTR, RST 5.5, RST 6.5, RST 7.5
  - INTR, RST 5.5, RST 6.5, RST 7.5, TRAP
95. For a 3-element feed water control in a coal fixed thermal power station, measurements of level of water in the boiler drums is made so that the water level does not
- Exceed a specified upper limit
  - Fall below a specified lower limit
  - Violate specified upper and lower limits
  - Restrict to a specified limit
96. In an auto-transformer, power is transferred, through
- Conduction process only
  - Induction process only
  - Both conduction and induction processes
  - Mutual coupling
97. In an LC series circuit connected to a dc supply of  $E$  volts via a thyristor when it turns off, the voltage that appears across the thyristor is
- $+E$
  - $+2E$
  - $-E$
  - $-2E$
98. The Fermi function for an electron is  $f(E)$ , where  $E$  is energy. Then, the Fermi function for a hole is
- $f(E)$
  - $1 - f(E)$
  - $1/f(E)$
  - $1 + f(E)$
99. Consider the following statements about FM :
- Modulation index determines the number of significant sideband components.
  - Theoretical bandwidth is infinite.
  - Carrier suppression is not possible.
  - Sidebands are not symmetric about carrier.
- Which of the above statements is/are correct ?
- 1, 2, 3 and 4
  - 1 and 2 only
  - 3 and 4 only
  - 3 only
100. An example of 8085-instruction that uses direct addressing is
- RLC
  - STA
  - RRC
  - CMA

**Directions :** Each of the next twenty (20) 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

**101. Assertion (A) :** A key specification of any memory device is its access time.

**Reason (R) :** The access time of the memory must be more than the access time of the microprocessor.

**102. Assertion (A) :** Port B of 8255A can only be used as input port.

**Reason (R) :** Port B can only be operated in Mode 0 or Mode 1.

**103. Assertion (A) :** In a transformer, open circuit (OC) test is conducted from low voltage side and short circuit (SC) test is conducted from high voltage side.

**Reason (R) :** OC test gives iron loss and SC test gives copper loss.

**104. Assertion (A) :** When large currents are required, it is necessary to use lap winding.

**Reason (R) :** In lap winding, equalizing connections are definitely needed.

**105. Assertion (A) :** A synchronous motor is not inherently self starting.

**Reason (R) :** At standstill the rotor of a synchronous motor is subjected to alternate forces of repulsion and attraction.

**106. Assertion (A) :** The diameter of the shaft of a synchronous condenser is very small.

**Reason (R) :** The synchronous condenser is a machine which is not expected to deliver any mechanical power output as per its design.

**107. Assertion (A) :** In normal operation, the non-inverting and inverting input terminals of an operational amplifier are at almost same potential.

**Reason (R) :** The two terminals are connected together.

**108. Assertion (A) :** FM systems employ pre-emphasis and de-emphasis.

**Reason (R) :** Pre-emphasis and de-emphasis are measured in micro-sec.

**109. Assertion (A) :** In mobile radio communication vertically polarized wave is preferred over horizontally polarized wave.

**Reason (R) :** Receiving antenna is always placed vertically.



110. *Assertion (A)* : The L and C components of the communication circuit in McMurray inverter are chosen such that the peak value of resonant current pulse during communication is sufficiently greater than the load current.
- Reason (R)* : A thyristor will successfully turn off if the current is maintained below holding value for a time greater than the turn off time of the device.
111. *Assertion (A)* : In HVDC systems, the voltage should be as high as possible and the rectifier control angle  $\alpha$  should be as low as possible.
- Reason (R)* : Control of dc voltage is exercised by the rectifier and inverter control angles  $\alpha$  and  $\gamma$  respectively.
112. *Assertion (A)* : Frequency of the system is the same, for synchronously connected machines.
- Reason (R)* : Frequency can be controlled by synchronous generators only.
113. *Assertion (A)* : D flip-flops are used to construct a buffer register.
- Reason (R)* : Buffer registers are used to store binary word temporarily.
114. *Assertion (A)* : An I/O device connected to microprocessor in I/O mapped I/O mode has an 8 bit port address.
- Reason (R)* : Microprocessor based system design uses concept of zero paging.
115. *Assertion (A)* : The port address in IN/OUT instruction is 8 bit.
- Reason (R)* : The address byte is duplicated in machine cycle for IN/OUT instruction.
116. *Assertion (A)* : A frequency mixer is used in the Armstrong indirect FM wave generator.
- Reason (R)* : It is required to increase the carrier frequency by a very larger factor than that needed for the frequency deviation increase.
117. *Assertion (A)* : Address bus is unidirectional.
- Reason (R)* : Data bus is bidirectional.
118. *Assertion (A)* : SIM instruction cannot be used to disable or change priority of INTR pin.
- Reason (R)* : INTR is a pseudo-vectored interrupt PIN.
119. *Assertion (A)* : Load flow studies are usually carried out using  $Y_{BUS}$ .
- Reason (R)* :  $Y_{BUS}$  is a sparse matrix and is generally matching with topology of the p.s. network.
120. *Assertion (A)* : The frequency of 8085 system is  $1/2$  of the crystal frequency.
- Reason (R)* : Microprocessor (8085) requires a two phase clock.



SPACE FOR ROUGH WORK

StudentSuvidha.in

SPACE FOR ROUGH WORK

StudentSuvidha.in

SPACE FOR ROUGH WORK

StudentSuvidha.in

SPACE FOR ROUGH WORK

StudentSuvidha.in