ELECTRICAL ENGINEERING

PAPER-II

1. If the bandwidth of i^{th} channel is 'W_i' and the total number of channels accommodated in a time interval of T is 'N', then the minimum bandwidth 'B_{min}' for TDM is equal to

 a. $N\sum_{i=1}^{N} w_i$

 b. $\dfrac{N}{\sum_{i=1}^{N} w_i}$

 c. $\sum_{i=1}^{N} w_i$

 d. $\dfrac{1}{\sum_{i=1}^{N} w_i}$

2. In a DSB-SC system with 100% modulation, the power saving is

 a. 50%
 b. 66%
 c. 75%
 d. 100%

3. The noise figure of an amplifier is 6 dB. If the input SI N ratio is 38 dB, then the output S/N ratio will be

 a. 44dB
 b. 40dB
 c. 36 dB V
 d. 32 dB V

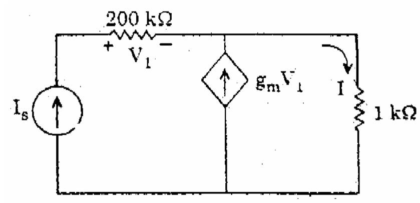
4. The output V_R of the ratio detector and the output V_F of similar Foster-Seeley discriminator are related as

 a. $V_F = V_R$
 b. $V_F > V_R$
 c. $V_F = 0.51\ V_R$
 d. $V_F = 2.51\ V_R$

5. Without any filtering, a broadcast station at 1600 kHz is heard together with another station at 2500 kHz on a superheterodyne receiver. The IF employer would have been

 a. 900 kHz
 b. 450 kHz
 c. 300 kHz
 d. 225 kHz

6. In the circuit shown in the given figure, if g_m is 0.5×10^{-3}, then the current 'I' will be



 a. I_s
 b. $100\ I_s$
 c. $101\ I_s$
 d. $200\ I_s$

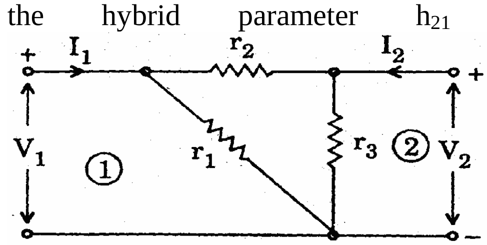
7. In a delta modulation scheme the step height is 75 mV and step width is 1.5 ms. The maximum slope that the staircase can track is

 a. 50 V/s
 b. 55 V/s
 c. 60 V/s
 d. 65 V/s

8. Two signals have the same frequency spectrum but different phase function. Their power density spectrum will

 a. differ in phase
 b. differ by $e^{\omega t0}$
 c. differ by ω_0
 d. be identical

9. For the network shown in the given figure, the hybrid parameter h_{21} is



a. $\frac{r_2}{r_1 + r_2}$

b. $\frac{r_1 + r_2}{r_1 + r_2 + r_3}$

c. $-\frac{r_2}{r_1 + r_2}$

d. $-\frac{r_1}{r_1 + r_2}$

10. In a dc machine, the armature is always on the rotor unlike an ac machine where it could be either on the stator or rotor, because

a. commutation action would otherwise not be possible

b. armature reaction demagnetising action would otherwise be more

c. otherwise it would not be possible to place compensating winding in pole shoes

d. self-starting of dc motor would not be possible otherwise

11. The armature mmf of a dc machine has

a. triangular space distribution and rotates at the speed of armature

b. trapezoidal space distribution and is stationary in space

c. stepped distribution and rotates at the speed of the armature

d. triangular space distribution and is stationary in space

12. Consider the following statements :

For a level compounded dc generator to run at constant speed, the series field mmf must effectively compensate

1. armature reaction mmf
2. armature resistance voltage drop
3. brush contact voltage drop

Which of these statements is/are correct?

a. 2 alone

b. 1 and 2

c. 1 and 3

d. 1, 2 and 3

13. Consider the following statements:

1. Interpole windings are connected in series with armature winding
2. Polarity of interpole must be the same as that of the main pole in advance
3. Distortion of the main field under the pole shoes is not affected by the use of interpoles

Which of these statements regarding interpole used in dc motors is/are correct?

a. 1 and 2

b. 2 and 3

c. 1 and 3

d. 1 alone

14. A series motor drawing an armature current of I_a is operating under saturated magnetic conditions. The torque developed in the motor is proportional to

a. $1 / I_a$

b. $1 / I_a^2$

c. I_a^2

d. I_a

15. A dc shunt motor having unsaturated magnetic circuit runs at 1000 rpm with rated voltage. If the applied voltage is half of the rated voltage, the motor will run at

a. 2000 rpm

b. 1000 rpm

c. 750 rpm

d. 500 rpm

16. A 200 V dc shunt motor delivers an output of 17 kW with an input of 20 kW. The field winding resistance is 50 Ω and armature resistance is 0.04Ω. Maximum efficiency will be obtained when the total armature copper losses are equal to

a. 2632 W

b. 3000 W

c. 3680 W

d. 5232W

17. Match List I with List II and select the correct answer :

List I

A. Voltage drop test

B. Hopkinson's test

C. Swineburne's test

D. Retardation test

List II

1. Efficiency

2. Separation of iron and friction losses
3. Open- and short-circuited armature coild
4. Temperature rise

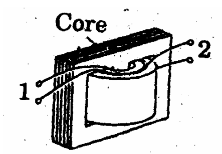
	A	B	C	D
a.	3	1	4	2
b.	2	4	1	2
c.	3	4	1	2
d.	2	1	4	3

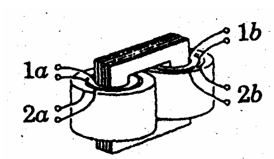
18. Match List I with List II and select the correct answer:

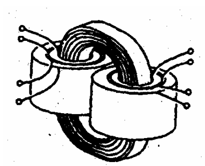
List I

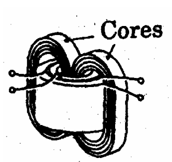
A. Shell type with wound core
B. Core type with core of laminated sheets
C. Shell type with laminated core
D. Core type with wound core

List II

1. 

2. 

3. 

4. 

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

19. A 10 kVA, 400 V/ 200 V single-phase transformer with a resistance of 3% and a reactance of 6% is supplying a current of 50 A to a resistive load. The voltage across the load is

a. 194 V
b. 196 V
c. 198 V
d. 390 V

20. A 3-phase alternator is connected to a Dd transformer. The hysteresis and eddy current losses of the transformer are respectively 300 W and 400 W. If the speed of the alternator is reduced by 10%, then the hysteresis and eddy current losses of the transformer will be respectively

a. 228 W and 262.44 W
b. 243 W and 324 W
c. 243 W and 360 W
d. 270 W and 400 W

21. In an autotransformer of voltage ratio V_1 / V_2 and $V_1 > V_2$, the fraction of power transferred inductively is

a. $\frac{V_1}{V_1+V_2}$
b. $\frac{V_2}{V_1}$
c. $\frac{V_1-V_2}{V_1+V_2}$
d. $\frac{V_1-V_2}{V_1}$

22. The windings of a Q kVA, V_1 / V_2 volts, three phase Dd core type transformer are reconnected to work as a single-phase transformer, the power rating and the maximum voltage ratio of the new configuration will be respectively

a. Q/3 kVA and V_1/V_2 volts
b. 3Q kVA and $3V_1$ / $3V_2$ volts
c. 2Q kVA and $\sqrt{3}\,V_1 / \sqrt{3}\,V_2$ volts
d. 2/3Q kVA and $2V_1$ / $2V_2$ volts

23. The mmf produced by the current of a 3-phase induction motor

a. rotates at the speed of rotor in the air gap
b. is standstill with respect to stator mmf
c. rotates at slip speed with respect to stator mmf
d. rotates at synchronous speed with respect to rotor

24. A 3-phase slip-ring induction motor is wound for 4 poles on stator and 6 poles on rotor. When 3-phase balanced voltage

source at 50 Hz is applied to the motor, it will run at :

a. 1500rpm

b. 1000rpm

c. 750 rpm

d. zero speed

25. If the rotor power factor of a 3-phase induction motor is 0.866, the spatial displacement between the stator magnetic field and the rotor magnetic field will be

a. 30°

b. 90°

c. 120°

d. 150°

26. The stator of a 6-pole, 3-phase induction motor is fed from a 3phase, 50 Hz supply which contains a pronounced fifth time harmonic. The speed of the fifth space harmonic field produced by the fifth time harmonic in the stator supply will be

a. 200 rpm

b. 1500 rpm

c. 1000 rpm

d. 5000 rpm

27. A 6-pole, 50 Hz wound rotor induction motor when supplied at the rated voltage and frequency with slip-ring open-circuited, developed a voltage of 100 V between any two rings. If the rotor is driven by an external means at 1000 rpm opposite to the direction of stator field, the frequency of voltage across slip-rings will be

a. zero

b. 50 Hz

c. 100 Hz

d. 200 Hz

28. In a 3-phase squirrel cage induction motor, skewing of rotor slots reduces

a. parasitic torque and noise but increases pullout torque

b. parasitic torque and noise but increases starting torque

c. noise but increases pullout torque and parasitic torque

d. parasitic torque, noise, pullout torque and starting torque

29. An induction motor and synchronous motor are connected to a common feeder line. To operate the feeder line at unity pf, the synchronous motor should be

a. under-excited

b. over-excited

c. normally excited

d. disconnected from the common terminals

30. Consider the following statements regarding the design of distributed armature winding in a 3-phase alternator :

1. It reduces the phase belt harmonics
2. It increases utilisation of armature iron and copper
3. It increases rigidity and mechanical strength of the winding
4. It reduces copper in the overhang of the winding

Which of these statements are correct?

a. 1, 3 and 4

b. 2, 3 and 4

c. 1, 2 and 3

d. 1, 2 and 4

31. Match List I (Power factor) with list II (Armature reaction of an alternator) and select the correct answer :

List I

A. UPF

B. ZPF lagging

C. ZPF leading

D. Intermediate Lagging

List II

1. Fully demagnetising
2. Fully magnetising
3. Cross - magnetising
4. Partly cross-magnetising and
5. partly demagnetising

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

32. ac tachometers are often built with thin metallic drag cup rotor to

a. reduce inertia

b. obtain low Q

c. make them suitable for high frequency (400 Hz) operation

d. eliminate direct coupling between two stator windings

33. In a synchronous machine, damper windings are used to

a. help in starting as a motor

b. run it as an induction motor

c. help in starting as a motor and to reduce hunting

d. increase efficiency

34. Match List I with list II and select the correct answer:

List I

Flux due to

A. currents in damper windings

B. currents in field windings

C. armature currents with unity internal pf

D. armature currents with zero pf

List II

1. Direct axis synchronous reactance
2. Quadrature axis synchronous reactance
3. Transient reactance
4. Sub-transient reactance

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

35. During the turn - off process of a thyristor, the current flow, does not stop at the instant when the current reaches zeros but continues to flow to a peak value in the reverse direction. This is due to

a. commutation failure

b. hole storage effect

c. presence of reverse voltage across the thyristor

d. protective inductance in series with the thyristor

36. Consider the following statements:

1. BJT has lower power losses than MOSFETs.
2. MOSFETs have lower power losses than IGBTs
3. SCRs have lower power losses than MOSFETs and IGBTs

Which of these statements are correct?

a. 1, 2 and 3

b. 1 and 2

c. 2 and 3

d. 1 and 3

37. A thyristor converter of 415 V, 100 A is operating at rated load. Details of the. thyristor used are, as follows :

'ON' state power loss = 150 W,

Thermal resistance

Junction to case = 0.01° C/W

Case to sink = 0.08° C/W

Sink to atmosphere = 0.09° C/W

Assume ambient temperature as 35°C. The junction temperature for 100% load is

a. 48.5° C

b. 54.5° C

c. 60° C

d. 62° C

38. When compared to those of a symmetrical thyristor, the turn-off time and reverse blocking voltage of an asymmetrical thyristor are respectively

a. large and large

b. large and small

c. small and large

d. small and small

39. Match List I (Devices) with List II (Properties) and select the correct answer :

List I

A. Triac

B. Reverse conducting thyristor (RCT)

C. Gate turn-off thyristor (GTO)

D. Amplifying gate thyristor

List II

1. Good di/dt behaviour even at low gate currents
2. Normally provided with a small continuous negative, gate pulse during off state
3. Negative gate pulse for reverse conduction
4. No gate pulse for reverse conduction

	A	B	C	D

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

40. In a 3-phase semi-converter, if the firing angle is less than or equal to 60°, then the duration of conduction of each thyristor and diode would be respectively

a. 60° and 60°

b. 90° and 30°

c. 120° arid 120°

d. 180° and 180°

41. A 3-pulse converter feed an RLE Load. The source has a definite inductance causing overlap. The thyristors are ideal. It has an overlap angle 'μ' of 20^0 at the minimum firing angle 'α'. The current remains constant in the complete range of firing angles. The range of firing angles of the converter would be

a. $0^0 < \alpha < 180°$

b. $20° < \alpha < 180°$

c. $20^0 < \alpha < 160°$

d. $0° < \alpha < 160°$

42. Match List I with List II and select the correct answer

List I

A. Phase-controlled rectifier feeding RL load with perfect smoothing

B. Single-pulse converter feeding RL load

C. A constant dc voltage-fed dc to ac inverter feeding RL load

D. A constant dc current-fed dc to ac inverter feeding RL load

List II

1. Output voltage depends on the values of R and L of the load

2. Depends on firing angle

3. Constant and independent of R and L of the load

4. Depends on firing angle and also impedance angle of the load

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

43. In a 2-pulse bridge converter with freewheeling diode, the width of the diode current pulse is (α is the firing angle)

a. $\pi + \alpha$

b. $\pi - \alpha$

c. π

d. 2α

44. A single-phase ac voltage regulator is fed from a 50 Hz supply system. If it supplies a load comprising a resistance of 2 Ω connected in series with an inductance of 6.36 mH, then the range of firing angle 'α' providing controlled voltage would be

a. $0° < \alpha < 180°$

b. $45^0 < \alpha < 180^0$

c. $90^0 < \alpha < 180^0$

d. $0° < \alpha < 45°$

45. The most accurate and versatile method of achieving reactive power compensation is by using

a. switched capacitors

b. fixed capacitor with controlled reactor

c. saturable reactor with capacitor bank

d. switched capacitor with controlled reactors

46. A voltage source inverter will have better performance if its

a. load inductance is small and source inductance is large

b. both load and source inductances are small

c. both load and source inductances are large

d. load inductance is large and source inductance is small

47. Consider the following features:

1. Inherent short-circuit protection
2. Regeneration capability
3. Need for inverter grade thyristors
4. Voltage spikes across the load

Which of these are the features associated with current source inverter?

a. 1, 2 and 3

b. 2, 3 and 4

c. 1, 3 and 4

d. 1, 2 and 4

48. A series capacitor commutated inverter can operate satisfactorily

a. if $\frac{1}{LC} > \frac{R^2}{4L^2}$

b. if $\frac{1}{LC} = \frac{R^2}{4L^2}$

c. if $\frac{1}{LC} < \frac{R^2}{4L^2}$

d. irrespective of the values of R, L and C

49. A single-phase full-bridge voltage source inverter operating in square wave mode supplied a purely inductive load. If the inverter time period is T, then the time duration for which the feedback diodes conduct in a cycle is

a. T

b. T/2

c. T/4

d. T/8

50. If power P available from a hydro scheme is given by the formula P = 9.81 QH, where Q is the flow rate through the turbine in l / s and H is the head in metres, then P will be in units of

a. W

b. HP

c. kJ/s

d. kWH

51. A coal-fired steam power station working at a plant load factor of 80% has one 500 MW generating unit. If the heat content of coal is 2 kWh/kg, the overall plant efficiency is 40% and a train load of coal is 2000 metric tons, then the number of trains required daily for the plant is

a. 1

b. 6

c. 10

d. 24

52. In a nuclear power station using Boiling Water Reactor (BWR), water is used as

a. a moderator but not as a coolant

b. a coolant but not as a moderator

c. both moderator and coolant

d. neither moderator nor coolant

53. In a nuclear reactor, chain reaction is controlled by introducing

a. iron rods

b. cadmium rods

c. graphite rods

d. brass rods

54. In the statement, "In a star/delta transformer, there exists a phase difference of ___'X'___ between the corresponding phases of primary and secondary __'Y'__", 'X' and 'Y' stand respectively for

a. 60° and voltages

b. 60° and currents

c. 30° and voltages

d. 30° and currents

55. Which of the following conditions is/are necessary for the parallel operation of two transformers?

a. Percentage impedance should be the same

b. Polarities of both secondaries should be' the same

c. Voltage ratings should be the same

d. All the conditions mentioned above in (a), (b) and (c)

56. The impedance per phase of a 3-phase transmission line; on a base of 100 MVA, 100 kV is 2 pu. The value of this impedance on a base of 400 MVA and 400 kV would be

a. 1.5 Pu

b. 1.0 pu

c. 0.5 pu

d. 0.25 Pu

57. The values of A, B, C and D constants for a short transmission line are respectively

a. Z, 0, 1 and 1

b. 0, 1, 1 and Z

c. 1, Z, 0 and 1

d. 1, 1, Z and 0

58. The self GMD of a conductor with three strands each of radius 'r' arid touching each other is

a. $r\,(0.7788 \times 2 \times 2)^{1/3}$

b. $r\,(0.7788 \times 2 \times 2 \times 2)$

c. $r\,(0.7788 \times 2 \times 2 \times 2)^{3}$

d. $r\,(0.7788 \times 2 \times 2)^{3}$

59. If a short transmission line is delivering to lagging pf load, the sending-end pf would be (notations have their usual meaning)

a. $\dfrac{V_R \cos\phi + IR\sin\phi}{V_S}$

b. $\dfrac{V_R \cos\phi + IR}{V_S}$

c. $\dfrac{V_R \cos\phi + IR}{V_S}$

d. $\dfrac{V_R \sin\phi + IR\cos\phi}{V_S}$

60. If the positive, negative and zero sequence reactances of an element of a power system are 0.3, 0.3 and 0.8 respectively, then the element would be a

a. synchronous generator
b. synchronous motor
c. static load
d. transmission line

61. An isolated synchronous generator with transient reactance equal to 0.1 pu on a 100 MVA base is connected to the high voltage bus through a step up transformer of reactance 0.1 Pu on a 100 MVA base. The fault level at the bus is

a. 1000 MVA
b. 500 MVA
c. 50 MVA
d. 10 MVA

62. If a generator of 250 MVA rating has an inertia constant of 6 MJ/MVA, its inertia constant on 100 MVA base is

a. 15 MJ/MVA
b. 10.5 MJ/MVA
c. 6 MJ/MVA
d. 2.4 MJ/MVA

63. An overhead line with surge impedance of 400 Ω is terminated through a resistance 'R'. A surge travelling over the line will not suffer any reflection at the junction, if the value of R is

a. 100 Ω
b. 200 Ω
c. 400 Ω
d. 800 Ω

64. An overhead line with a surge impedance of 400 Ω is connected to a transformer by a short length of cable of surge impedance 100 Ω. If a rectangular surge wave of 40 kV travels along the line towards the cable, then the voltage, of the wave travelling from the junction of the overhead ,line through the cable towards the transformer would be

a. 16 kV
b. 24 kV
c. 32 kV
d. 36 kV

65. Disruptive corona begins in smooth cylindrical conductors in air at NTP if the electric field intensity at the conductor surface goes up to

a. 21.1 kV(rms) / cm
b. 21.1 kV(peak) / cm
c. 21.1 kV(average) / cm
d. 21.1 kV(rms) / m

66. Load flow studies involve solving simultaneous

a. linear algebraic equations
b. non - linear algebraic equations
c. linear differential equations
d. non-linear differential equations

67. A 12-bus power system has 3 voltage controlled buses. The dimensions of the Jacobian matrix will be

a. 21×21
b. 21×19
c. 19×19
d. 19×21

68. An over-current relay, having a current setting of 125% is connected to a supply circuit through a current transformer of ratio 400/5. The pick-up value is

a. 6.25 A
b. 10 A
c. 12.5 A
d. 15 A

69. If the inductance and capacitance of a power system are respectively 1 H and 001 μF and the. instantaneous value of interrupted current is 10 A, then the voltage across the breaker contact will be

a. 50 kV

b. 57 kV

c. 60 kV

d. 100 kV

70. A three-phase circuit breaker is rated at' 2000 MVA; 33 kV. Its making current will be

a. 35 kA

b. 70 kA

c. 89 kA

d. 161 kA

71. In Merz Price percentage differential protection of a Δ–Y transformer, the CT secondaries connection in the primary and secondary windings of the transformer would be in the form

a. Δ–Y

b. Y–Δ

c. Δ–Δ

d. Y–Y

72. When there is interference in an overhead communication line running parallel and in close proximity to an overhead power Line, the voltage induced in the communication line in the longitudinal and lateral directions by 'the power line are due to

a. magnetic induction and electric induction respectively

b. electric induction and magnetic induction respectively

c. both magnetic induction and electric induction

d. magnetic induction only

73. In the case of a HVDC system, there is

a. charging current but no skin effect

b. no charging current but skin effect

c. neither charging current nor skin effect

d. both charging current and skin effect

74. Shunt compensation in an EHV Ine is used to improve

a. stability and fault level

b. fault level and voltage profile

c. voltage profile and stability

d. stability, fault level and voltage profile

75. Two alternators each having 4% speed regulation are working in parallel. Alternator '1' is rated for 12 MW and alternator '2' is rated for 8 MW When the total load is 10 MW the Loads shared by alternators 1 and 2 would be respectively

a. 4 MW and 6 MW

b. 6 MW and 4 MW

c. 5 MW ad 5 MW

d. 10 MW and zero

76. The cost function of a 50 MW generator is given by (P_i is the generator, loading)

$$F(P_i) = 225 + 53\, P_i + 0.02\, P_i^2$$

When 100% loading is

a. Rs. 55 per MWh

b. Rs. 55 per MW

c. Rs. 33 per MWh

d. Rs. 33 per MW

77. In terms of power generation and B_{mm} coefficients, the transmission loss for a two-plant system is (Notations have their usual meaning)

a. $P_1^2\, B_{11} + 2\, P_1P_2\, B_{12} + P_2^2\, B_{22}$

b. $P_1^2\, B_{11} - 2\, P_1P_2\, B_{12} + P_2^2\, B_{22}$

c. $P_2^2\, B_{11} + 2\, P_1P_2\, B_{12} + P_1^2\, B_{22}$

d. $P_1^2\, B_{11} + P_1P_2\, B_{12} + P_2^2\, B_{22}$

78. Assertion (A) : A threshold effect is observed in square law detectors.

Reason (R) : Square law detector is nonlinear.

a. Both A and R are true and R is the correct explanation of A

b. Both A and R are true but R is NOT the correct explanation of A

c. A is true but R is false

d. A is false but R is true

79. Assertion (A) : PSK is inferior to FSK.

Reason (R) : PSK requires less bandwidth than FSK.

a. Both A and R are true and R is the correct explanation of A

b. Both A and R are true but R is NOT the correct explanation of A

c. A is true but R is false

d. A is false but R is true

80. Assertion (A) : The op-amp is known for its very high voltage gain and broad bandwidth.

Reason (R) : The op-amp has high R CMRR.

a. Both A and R are true and R is the correct explanation of A
b. Both A and R are true but R is NOT the correct explanation of A
c. A is true but R is false
d. A is false but R is true

81. Assertion (A) : A MOSFET amplifier offers very high input impedance irrespective of its circuit configuration.

Reason (R) : MOSFET has extremely low gate current.

a. Both A and R are true and R is the correct explanation of A
b. Both A and R are true but R is NOT the correct explanation of A
c. A is true but R is false
d. A is false but R is true

82. Assertion (A) : In a bipolar junction transistor, the emitter region width (in comparison to base region width) is immaterial in the design so long as the base doping is kept lower than the emitter doping.

Reason (R) : The emitter injection efficiency is also dependent on both emitter and base region width and their relative dopings.

a. Both A and R are true and R is the correct explanation of A
b. Both A and R are true but R is NOT the correct explanation of A
c. A is true but R is false
d. A is false but R is true

83. Assertion (A) : On supplying 2-phase voltages to balanced two-phase windings (two identical windings in space quadrature), a rotating field is developed.

Reason (R) : The amplitude of rotating field is 1.5 times that of each phase.

a. Both A and R are true and R is the correct explanation of A
b. Both A and R are 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

84. Assertion (A) : The rotor resistance of a deep bar type cage induction motor is higher than the running resistance.

Reason (R) : The extra resistance present in the rotor circuit at starting is cut out by a centrifugal switch during normal running.

a. Both A and R are true and R is the correct explanation of A
b. Both A and R are 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

85. Assertion (A) : It is easy to parallel power MOSFETs for increased current handling capability.

Reason (R) : The ON state resistance of a power MOSFET has a positive temperature coefficient.

a. Both A and R are true and R is the correct explanation of A
b. Both A and R are 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

86. Assertion (A) : It is strongly recommended that the GTO (Gate Turn— Off thyristor) should not be turned 'on' until it has been 'off' for a specified time.

Reason (R) : There may be poor current sharing between the various cathode islands.

a. Both A and R are true and R is the correct explanation of A
b. Both A and R are 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

87. Assertion (A) : Variable frequency square wave inverter providing variable voltage cannot be operated below 10% of base frequency.

Reason (R) : The thyristors get damaged due to high di/dt.

a. Both A and R are true and R is the correct explanation of A
b. Both A and R are 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

88. Assertion A : Voltage-time insulation coordination curves for the equipment to be protected and the lightning arrester to be employed are used for determining the required insulation levels.

Reason (R) : Voltage - time insulation coordination curves indicate the time of arrival of the peak of surge wave at the equipment location.

a. Both A and R are true and R is the correct explanation of A
b. Both A and R are 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

89. Assertion (A) : In a high- or medium-head hydroelectric power station having a long penstock, a surge-tank is provided near the turbine.

Reason (R) : A surge-tank stores additional water to be released during the peak-load period.

90. The main functions of the presentation layer of the OSI model include

a. encryption and authentication
b. authentication and compression
c. compression and coding
d. encryption and compression

91. Which one of the following signal combinations will generate MEMR signal?

a. $IO/\overline{M} \wedge \overline{RD}$
b. $IO/\overline{M} \wedge \overline{RD}$
c. $\overline{IO/\overline{M}} \wedge \overline{RD}$
d. $\overline{IO/\overline{M}} \wedge \overline{RD}$

92. An ADC normally used in a 3½ digit multimeter is of

a. dual slope integration type
b. voltage to frequency converter type
c. flash (or parallel) type
d. successive approximation type

93. Consider the following statements:

A tunnel diode is

1. made of Ge or GaAs.
2. an abrupt junction with both sides heavily doped.
3. a hyper abrupt junction with both sides heavily doped.
4. a majority camer device.

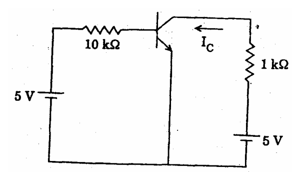
Which of these statements are correct?

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

94. The sensitivity of a photodiode depends upon

a. light intensity and depletion region width
b. depletion region width and excess carrier life time
c. excess carrier life time and forward bias current
d. forward bias current and light intensity

95. In the pnp transistor circuit shown in the given figure, the transistor is in V, saturation with values of V_{be} = 0.7 V, $V_{ce(sat)}$ = 0.3 V and β_{min} = 20. The value of I_C will be



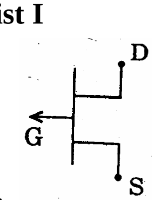
a. 4.7 mA
b. 5.3 mA
c. 8.6 mA
d. 10 mA

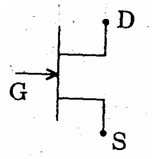
96. The mobility of electrons in a material is expressed in units of

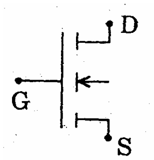
a. V / s
b. m^2 / V-s
c. m^2 / s
d. J / K

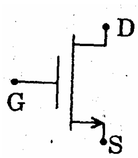
97. Match List I (Symbols) with List II (Devices) and select the correct answer :

List I

A. 

B. 

C. 

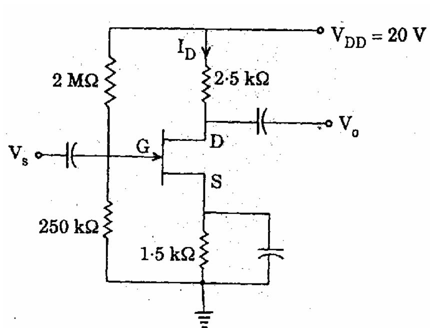
D. 

List II

1. Depletion mode MOSFET
2. p - channel JFET
3. n - channel JFET
4. Enhancement mode MOSFET

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

98. FET voltage divider bias circuit is shown in the given figure. If I_D = 4mA, then V_{GS} and V_{DS} will be respectively.



a. — 3.78 V and 4 V
b. 4 V and — 3.78 V
c. —3.78 V and —4V
d. —4 V and —3.78 V

99. If V_m is peak value of an applied voltage in a half-wave rectifier with a large capacitor across the load, then the peak inverse voltage will be

a. $V_m / 2$
b. V_m
c. $\sqrt{2}\, V_m$
d. $2V_m$

100. Consider the following features regarding an amplifier:

1. Voltage gain being less than one
2. High input impedance
3. High output impedance
4. High current gain

Which of these are the characteristic features of an emitter follower amplifier?

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

101. The upper cut-off frequencies f_{21} and f_{22} of the two stages of a cascaded amplifier are respectively 5 MHz and 3.3 MHz, The equivalent upper cut-off frequency of the cascaded amplifier would be

a. 4.16 MHz
b. 3.33 MHz
c. 2 MHz
d. 5 MHz

102. Match List I with List II and select the correct answer :

List I

A. When bridge oscillator
B. Voltage shunt feedback amplifier
C. Crystal oscillator
D. Current shunt feedback amplifier

List II

1. Low output impedance
2. RF frequency range
3. Audio frequency range
4. High input impedance
5. High output impedance

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

103. An amplifier circuit has an overall current gain of –100 and an input resistance of 10 kΩ with a load resistance of 1 kΩ. The overall voltage gain of the amplifier is

a. 5 dB
b. 10 dB
c. 20 dB

d. 40 dB

104. An op-amp has a common mode gain of 0.01 and a differential mode gain of 10^5. Its common mode rejection ratio would be

a. 10^{-7}

b. 10^{-3}

c. 10^3

d. 10^7

105. The Barkhausen criterion for sustained oscillation is given by

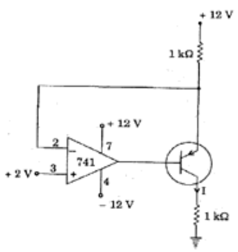
a. $A\beta = 1$

b. $|A\beta| \geq 1$

c. $|A\beta| < 1$

d. $\angle A\beta = 180^o$

106. An op-amp circuit is shown in the given figure. The current 'I' is



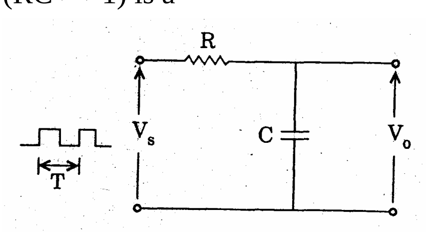
a. zero

b. 6mA

c. 10 mA

d. 12 mA

107. The waveform of the output voltage 'V_0' for the circuit shown in the given figure (RC > >1) is a



a. sinusoidal wave

b. square wave

c. series of spikes

d. triangular wave

108. A 10 MHz square wave clocks a 5-bit ripple counter. The frequency of the third flip-flop's output would be

a. 2 MHz

b. 1.25 MHz

c. 50 MHz

d. 615 MHz

109. The states of a RS flip-flop are given in the following table :

States	R	S	Q_n	Q_{n+1}
1	0	0	1	1
2	0	1	0	1
3	1	0	1	0

The mode of operation of states 1, 2 and 3 are respectively

a. indeterminate, set and reset

b. prohibited, set and hold

c. set, hold and reset

d. hold, set and reset

110. Match List I (Circuits) with List II (Applications) and select the correct answer :

List I

A. Astable multivibrator

B. Schmitt trigger

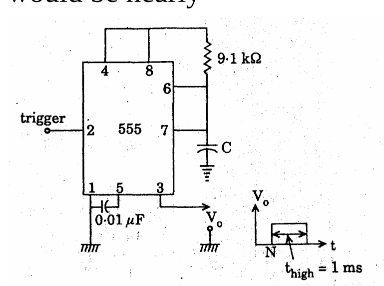
C. Bistable multivibrator

List II

1. Counter
2. Sweep generator
3. Voltage to frequency converter
4. Comparator

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

111. A monostable multivibrator circuit is shown in the given figure. The value of C would be nearly



a. 0.001 μF

b. 0.01 μF

c. 0.1 μF

d. 1 μF

112. A 4-bit modulo 16 ripple counter uses JK flip-flop. If the propagation delay of each

flip-flop is 50 ns, the maximum clock frequency that can be used is

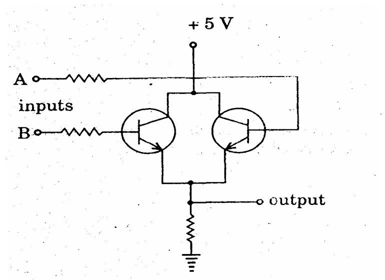
a. 20 MHz

b. 10 MHz

c. 5 MHz

d. 4 MHz

113. The circuit shown in the given figure is



a. an AND gate

b. an OR gate

c. a XOR gate

d. a NAND gate

114. In the case of a 16-bit processor, a single instruction is enough to process a function. For processing the same function.

a. more than one 8-bit processors will be required to work in sequence

b. more than one 8-bit processors will be required to work in parallel

c. a long sequence of instructions will be required for a 8-bit processor

d. the same instruction will do for a 8-bit processor also

115. Consider the following functions of an 8086 microprocessor:

1. Temporary storage of data

2. Storing offset of a memory address in DS

3. String instructions

4. JNLE instructions

5. JCXZ instructions

Which of these functions require the use of the SI and DI registers?

a. 1, 2 and 3

b. 1, 2 and 4

c. 2, 3 and 5

d. 3, 4 and 5

116. Which one of the following sets of status signals is used in an 8085 microprocessor to uniquely identify the seven machine cycles ?

a. IO / $\overline{M}$, $\overline{RD}$, $\overline{WR}$,

b. S_1, S_0, $\overline{INTA}$

c. IO / $\overline{M}$, S_1, S_0

d. S_2, S_1, S_0

117. Control bus is used for transmitting and receiving control signals between

a. processor and key board

b. processor and various devices

c. processor and memory

d. input devices and memory

118. If (BX) = 0158

(DI) = 10A5

Displacement = 1B57

(DS) = 2100

(where DS is used as a segment register) then the effective and physical addresses produced using "RELATIVE BASE INDEXED INDIRECT ADDRESSING" will be respectively

a. 2D54 and 23D54

b. 23D54 and 2D54

c. 1B57 and 1CAF

d. 1CAF and 1B57

119. A sequence of instruction is executed as follows :

begin

decode the instruction fetched;

if operand in memory then fetch, operand;

execute instructions;

end

This sequence of instructions has performed

a. fetch cycle

b. both fetch and execute cycles

c. execute and decode cycles

d. execute cycle.

120. An 8085 microprocessor based system drives a multiplexed 5-digit, 7-segment display. The digits are refreshed at a rate of 500 Hz. The ON time for each digit (assumed equal) is

a. 4×10^{-3} s

b. 0.4×10^{-3} s

c. 10^{-2} s

d. 2.5×10^{-2} s