

ELECTRICAL SERIES - A

Please read instructions printed on the Answer sheet carefully before attempting questions.

Time : 2 Hrs.

Marks : 120

- A gang capacitor is a variable capacitor in which capacitance is varied by changing.
 - plate area
 - distance between plates
 - both (A) and (B)
 - dielectric
- If a multi-plate capacitor has 7 plates then
 - 7 capacitors will be in parallel
 - 7 capacitors will be in series
 - 6 capacitors will be in parallel
 - 6 capacitors will be in series
- A bar magnet of magnetic moment M is cut into two parts of equal length. The magnetic moment of either part is
 - M
 - $2M$
 - $M/2$
 - zero
- Two incandescent lamps of 100 W, 200 V are connected in parallel across 200 V supply. The total hot resistance will be
 - 800Ω
 - 200Ω
 - 400Ω
 - 600Ω
- The number of equations required to analyse a given network by nodal analysis is equal to
 - number of nodes
 - number of independent nodes
 - one less than the number of independent nodes
 - none of these
- An electric network is working under the maximum power transfer conditions. What would be the energy efficiency of the network?
 - 100%
 - 77.7%
 - 50%
 - zero
- A current I flows along an infinitely long straight thin walled tube, then the magnetic field at any point inside the tube is
 - ∞
 - zero
 - $\frac{\mu_0}{4\pi} \cdot \frac{2i}{r}$
 - $\frac{2i}{r}$

8. A bar magnet is released from rest along the axis of a very long vertical copper tube. After some time the magnet
- (A) will stop in the tube
 - (B) will move almost constant speed
 - (C) will move with an acceleration
 - (D) will oscillate
9. A low power factor of the circuit means that
- (A) it draws more active power
 - (B) it draws less line current
 - (C) it draws more reactive power
 - (D) it causes less voltage drop in the line
10. If a parallel resonant circuit is shunted by a resistance then
- (A) the circuit impedance is increased
 - (B) the Q of the circuit is increased
 - (C) the gain of the circuit is increased
 - (D) none of the above
11. In a 3 phase power measurement by two watt meter method, the reading of one of the watt meters was zero. The power factor of the load must be
- (A) unity
 - (B) 0.8
 - (C) 0.5
 - (D) zero
12. A dc series motor should always be started with load because
- (A) at no load it will rotate at dangerously high speed
 - (B) at no load it will not develop high starting torque
 - (C) it can not start without load
 - (D) it draws a small amount of current at no load
13. Cooling of transformers is required so as to
- (A) increase the efficiency
 - (B) reduce the losses
 - (C) to reduce humming
 - (D) to dissipate the heat generated in the windings.
14. In a 50 Hz, three phase induction motor, the frequency of rotor current is about
- (A) 50 Hz
 - (B) 10 Hz
 - (C) 2 Hz
 - (D) zero
15. A salient pole synchronous motor is running at no load. Its field current is switched off. The motor will
- (A) come to stop
 - (B) continue to run at synchronous speed
 - (C) continue to run at a speed slightly more than the synchronous speed
 - (D) continue to run at a speed slightly less than the synchronous speed

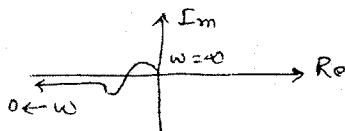
16. In a capacitor start capacitor run motor the two capacitors
 - (A) have similar construction
 - (B) are of different types
 - (C) have equal capacitance
 - (D) are disconnected when the motor attains full speed
17. In engineering design, the 'design gap' means.
 - (A) difference between the performance characteristics / parameters of the physical system and the designed system.
 - (B) non availability of the design procedures
 - (C) non-availability of one or more components of the system as mentioned in the design
 - (D) all of the above
18. Steering of a car by a man is
 - (A) an open-loop control system
 - (B) a closed-loop-feedback control system
 - (C) not a control system
 - (D) may be closed-loop or open-loop system, depending on the type of car in use
19. What do you mean by the 'impulse response' of a system?
 - (A) It is the transfer function of a linear, time invariant system
 - (B) when the output to a system exists for a very small period of time, it is known as the impulse response
 - (C) It is the output of the system when input is sinusoidal
 - (D) none of the above
20. What is the efficiency of a transformer operating under open circuit test conditions?
 - (A) 100%
 - (B) 50%
 - (C) 0%
 - (D) 25%
21. Single flow graph representation is preferred over the block diagram representation because
 - (A) lesser amount of drawing is needed
 - (B) signal flow graph looks more neat
 - (C) Mason's gain formula is available for calculating the overall gain of the system for signal flow graphs
 - (D) block diagram method is older one, where as signal flow graph method is a recent one.
22. In reference to electric network an ideal current source is one
 - (A) which supplies a constant current independent of the voltage drop across it
 - (B) which maintains a constant voltage only if a constant current is drawn from it
 - (C) which is capable of supplying large amount of current
 - (D) which supplies a large current if the voltage drop across its terminals is small and a small current if the voltage drop across its terminals is large.
23. According to f-v analogy which of the following parameters of mechanical systems is analogous to 'Charge' in electric system?
 - (A) displacement
 - (B) mass
 - (C) compliance
 - (D) damping coefficient

24. The ground terminal in electric supply system is analogous to _____ in pneumatic supply system
- (A) reservoir
 - (B) atmosphere
 - (C) earth
 - (D) vacuum
25. Resistance potentiometers are not used with very large voltages, because
- (A) these have fixed parameters
 - (B) these have predictable characteristics
 - (C) their resistance changes with the applied voltage
 - (D) these have poor heat dissipation properties
26. In a brushless dc motor, the reversal of direction of current is accomplished by
- (A) commutator
 - (B) electronic switching
 - (C) both (A) and (B)
 - (D) none of these
27. On increasing the length of a servomotor two times and reducing the diameter to half the torque / inertia ratio will be
- (A) increase eight times
 - (B) half
 - (C) double
 - (D) no change
28. To provide rate feedback voltage in positional control system. We use
- (A) potentiometer
 - (B) synchro transmitter
 - (C) tachogenerator
 - (D) synchro-transformer
29. If a stepper motor has m sets of stator windings and r number of teeth on the rotor. The stepping angle would be
- (A) $\frac{180}{mr}$
 - (B) $\frac{360}{mr}$
 - (C) $\frac{r.360}{m}$
 - (D) $\frac{m.180}{r}$
30. A unit consisting of synchro-transmitter and synchro-control transformer is a
- (A) single phase ac device
 - (B) three phase ac device
 - (C) two phase ac device
 - (D) dc device

31. The desirable shape of the rotor of a control transformer is
- (A) dumb bell
 - (B) cylindrical
 - (C) drag cup type
 - (D) none of these
32. Which one of following is not an application of amplidyne
- (A) dc voltage control in strip mills
 - (B) speed control unit in paper mills
 - (C) error detector
 - (D) gun turret positioning
33. The sensitivity of LVDT is of the order of
- (A) 40
 - (B) 2.5 r/ degree
 - (C) 10 mV/mm to 10V/mm
 - (D) none of these
34. An operational amplifier has
- (A) very high voltage gain
 - (B) high input impedance
 - (C) high output impedance
 - (D) both (A) and (B)
35. We know that in a magnetic amplifier, the control winding is supplied with ac. The output power is drawn from
- (A) dc source only
 - (B) ac source only
 - (C) both from dc source and ac source
 - (D) none of these
36. In case of 'gyro' in order to reduce the effect of frictional torque, it is desired to keep the angular momentum at the maximum possible value. The best way to do so is
- (A) increase the mass of gyro wheel
 - (B) increase the spin velocity of the wheel
 - (C) both (A) and (B)
 - (D) none of these
37. A mechanical accelerometer is a _____ order system
- (A) first
 - (B) second
 - (C) third
 - (D) forth
38. By using feedback in control systems the sensitivity to parameter variations is improved. This is achieved at the cost of
- (A) stability
 - (B) transient response
 - (C) loss of system gain
 - (D) reliability

39. The response to a constant actuating signal of a type-2 system is
- constant
 - second derivative of the controlled variable
 - constant rate of change of the controlled variable
 - none of these
40. The steady-state error due to a unit step input to a type-2 system is
- $\frac{1}{K_p}$
 - $\frac{1}{1+k_p}$
 - ∞
 - 0
41. If a control system is supposed to follow an input which is proportional to t^m , the type of the system should be
- less than m
 - m
 - more than m
 - none of these
42. The control system designed using ITAE criterion exhibits
- small overshoots
 - good damping
 - good sensitivity
 - all of these
43. The time at which the second maximum overshoot occurs in the response of second order control system is given by
- $$t = \frac{n\pi}{\omega_n \sqrt{1-\xi^2}} \text{ where } n \text{ is}$$
- 1
 - 2
 - 3
 - 4
44. For a general purpose second order system, the best value of damping ratio is
- zero
 - 1
 - 0.707
 - 0.5
45. The use of P-I error control action
- increases the order of the system
 - increases steady state error
 - decreases the order of the system
 - doesn't effect the order of the system

46. The presence of a row of zeros in the Routh array for the characteristic equation of a closed-loop control system indicates
- a pair of purely imaginary roots
 - four complex roots
 - pair of real roots symmetrically located about origin
 - any one or more of the above
47. For determination of the value of open-loop gain K at any point on the root-loci of the closed loop system we use
- magnitude condition only
 - angle condition only
 - both (A) and (B)
 - none of these
48. A linear time invariant control system with unsatisfactory steady state error is to be compensated. What type of cascade compensation would you like to provide?
- lead
 - lag
 - lag-lead
 - none of these
49. In terms of Bode plot, the system is stable if
- the phase cross over occurs earlier than the gain cross over
 - the gain cross over occurs earlier than the phase cross over
 - the gain cross over and phase cross over occur at the same frequency
 - the gain cross over and phase cross over occur before the natural frequency
50. Given a linear unity feedback control system with poor transient response but satisfactory steady state response. It is proposed to improve the transient response of the system by inserting a cascade compensator. Which compensator would you suggest?
- cascade lead
 - cascade lag
 - cascade lag-lead
 - cascade lead-lag
51. Determine the type of the system whose polar plot is represented in the following figure



- 0
- 1
- 2
- 3

52. The state space representation of a system is given as follows

$$\begin{bmatrix} \dot{x}_1 \\ \dot{x}_2 \end{bmatrix} = \begin{bmatrix} 0 & 1 \\ -3 & -2 \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \end{bmatrix} + \begin{bmatrix} 0 \\ 1 \end{bmatrix} u(t)$$

The transfer function $\frac{Y(s)}{U(s)}$ would be

$$y(t) = [1, 2] \begin{bmatrix} x_1 \\ x_2 \end{bmatrix}$$

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

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

(C) $\frac{2s+1}{s^2+2s^2+s+7}$

(D) $\frac{1}{s+5}$

53. Phase plane technique has the potential of analyzing the non-linear systems upto an order of

- (A) one
- (B) two
- (C) three
- (D) four

54. Reactance relay is normally preferred for protection against

- (A) earth fault only
- (B) phase fault only
- (C) both (A) and (B)
- (D) none of these

55. Where voltages are high and current to be interrupted is low the breaker preferred is

- (A) air blast CB
- (B) oil CB
- (C) vacuum CB
- (D) any of these

56. In order to have lower cost of electrical energy generation

- (A) the load factor and diversity factor should be low
- (B) the load factor should low but diversity factor should be high
- (C) the load factor should be high but diversity factor low
- (D) the load factor and diversity factors should be high

57. The velocity of traveling wave through a cable of relative permittivity 9 is

- (A) 9×10^8 m/sec
- (B) 3×10^8 m/sec
- (C) 10^8 m/sec
- (D) 2×10^8 m/sec

58. In case of a 3-phase short circuit in a system, the power fed into the system is
- (A) mostly reactive
 - (B) mostly active
 - (C) active and reactive both equal
 - (D) reactive only
59. An RLC series circuit remains predominantly inductive
- (A) at resonance frequency
 - (B) below resonance frequency
 - (C) above resonance frequency
 - (D) at the lower half power frequency
60. An alternator is delivering a balanced load at unity power factor. The phase angle between the line voltage and line current is
- (A) 90°
 - (B) 60°
 - (C) 30°
 - (D) 0°
61. Corona loss is less when the shape of the conductor is
- (A) circular
 - (B) flat
 - (C) oval
 - (D) independent of shape
62. A synchronous machine has higher capacity for
- (A) leading p.f
 - (B) lagging p.f
 - (C) it doesn't depend upon the p.f. of the machine
 - (D) it depends upon the p.f. of the load
63. The order of the lightning discharge current is
- (A) 10000 Amp
 - (B) 100 Amps
 - (C) 1 Amp
 - (D) 1μ Amp
64. The diagonal elements of a nodal admittance matrix are strengthened by adding
- (A) shunt inductances
 - (B) shunt capacitors
 - (C) loads
 - (D) generators
65. The order of sub harmonic during SSR for 50 Hz normal frequency is
- (A) 25 Hz
 - (B) $16 \frac{2}{3}$ Hz
 - (C) 10 Hz
 - (D) none of the above

66. A power system network with a capacity of 100 MVA has a source impedance of 10% at a point. The fault level at that point is
- (A) 10 MVA
 - (B) 30 MVA
 - (C) 3000 MVA
 - (D) 1000 MVA
67. Impulse ratio of insulators and lightning arrestors should be
- (A) both low
 - (B) high and low respectively
 - (C) low and high respectively
 - (D) both high
68. For a 15 bus power system with 3-voltage controlled bus, the size of Jacobian matrix is
- (A) 11×11
 - (B) 12×12
 - (C) 24×24
 - (D) 28×28
69. Control rods used in nuclear reactors are made of
- (A) Zirconium
 - (B) boron
 - (C) beryllium
 - (D) lead
70. The per unit impedance of a synchronous machine is 0.242. If the base voltage is increased by 1.1 times, the per unit value will be
- (A) 0.266
 - (B) 0.242
 - (C) 0.220
 - (D) 0.200
71. The breakdown voltage of a specimen is 65 kV at STP. The breakdown voltage at 73 cm Hg pressure and 35°C is
- (A) 69 kV
 - (B) 63.25 kV
 - (C) 64.33 kV
 - (D) 60.39 kV
72. All other parameters remaining identical, the ratio of voltages drop for an 8 stage to 4 stage Cockcroft Walton circuit approximately is
- (A) 2
 - (B) 8
 - (C) 4
 - (D) 2.828

73. For reducing tower footing resistance it is better to use
- (A) chemical and ground rods only
 - (B) chemical and counter poise only
 - (C) ground rod and counter poise only
 - (D) chemical, ground rods and counter poise
74. Sphere gap is used for measurement of
- (A) a.c. voltage only
 - (B) d.c. voltage only
 - (C) impulse voltage of any wave shape
 - (D) (A) and (B)
75. High power frequency currents are normally measured using
- (A) low shunt resistance
 - (B) current transformer
 - (C) hall element
 - (D) all the above methods
76. Annealing of metals
- (A) removes internal stresses
 - (B) increase the size of grains
 - (C) decreases conductivity
 - (D) none of these
77. Bronze is an alloy of
- (A) copper-and zinc
 - (B) copper, zinc and tin
 - (C) copper and tin
 - (D) none of these
78. The change in dimensions during the process of magnetization is called
- (A) skin effect
 - (B) hall's effect
 - (C) magnetostriction
 - (D) none of these
79. The forbidden energy gap for germanium is
- (A) 0.3 eV
 - (B) 3.5 eV
 - (C) 0.7 eV
 - (D) 1.12 eV
80. Hall's effect can be used to measure
- (A) electric field intensity
 - (B) magnetic field intensity
 - (C) carrier concentration
 - (D) none of these

81. What is the efficiency of a transformer operating under short circuit test conditions?
- (A) 100%
 - (B) 0%
 - (C) 50%
 - (D) 94%
82. The no load current taken by actual transformer lags the applied voltage by
- (A) 80°
 - (B) 60°
 - (C) 50°
 - (D) 30°
83. Distribution transformer have good all day efficiency due to
- (A) low copper loss
 - (B) low iron loss
 - (C) low copper as well as iron losses
 - (D) none of these
84. Three single phase transformers with a 10 kVA rating are connected in a closed delta arrangement. If one transformer is taken out, the output capacity of the system will be
- (A) 20 kVA
 - (B) 8.66 kVA
 - (C) 17.32 kVA
 - (D) 10 kVA
85. If full load copper loss of a transformer is 1600 W, its copper loss at 75% full load would be
- (A) 900 W
 - (B) 1200 W
 - (C) 1600 W
 - (D) 1800 W
86. The meter of multimeter will work on
- (A) d.c. supply
 - (B) a.c. supply
 - (C) both a.c. and d.c. supply
 - (D) half wave rectified a.c.
87. Megger is an instrument to measure
- (A) very low resistance
 - (B) insulation resistance
 - (C) Q of a coil
 - (D) inductance of a coil
88. What will happen if a voltmeter is connected like an ammeter is series to the load?
- (A) the meter will burnout
 - (B) the measurement will be too high
 - (C) an inadmissibly high current will flow
 - (D) there will be almost no current in the circuit

89. Inductance is measured by
- (A) Wien Bridge
 - (B) Schering bridge
 - (C) Maxwell's bridge
 - (D) Hay bridge
90. In a ballistic galvanometer, the deflecting torque is proportional to
- (A) the current through coil
 - (B) square of current through coil
 - (C) square root current through coil
 - (D) sine of measure and
91. A.P.T. is a device which is
- (A) electro statically coupled
 - (B) electrically coupled
 - (C) electromagnetically coupled
 - (D) none of these
92. In a thyristor, holding current is
- (A) more than latching current
 - (B) less than latching current
 - (C) equal to latching current
 - (D) very small
93. If the gate current of an SCR is increased, the forward breakdown voltage V_{BR} will
- (A) increase
 - (B) decrease
 - (C) not be affected
 - (D) infinite
94. Which of the following PNPN devices has two gates?
- (A) tri ac
 - (B) SCS
 - (C) SUS
 - (D) Di ac
95. Which of the following circuit is used for timing purpose
- (A) Astable multi-vibrator
 - (B) Monostable multi-vibrator
 - (C) Bistable multi-vibrator
 - (D) Schmitt trigger
96. In a single phase full converter, the number of SCRs conducting during overlap is to
- (A) 1
 - (B) 2
 - (C) 3
 - (D) 4

97. In single pulse modulation of PWM inverters, third harmonic can be eliminated if pulse width is equal to
- (A) 30°
 - (B) 60°
 - (C) 120°
 - (D) none of these
98. The most efficient oscillator operates as
- (A) class A
 - (B) class AB
 - (C) class AB
 - (D) class C
99. In a photo-transistor, the photo current is generated at
- (A) either of the junctions
 - (B) emitter base junctions
 - (C) collector base junction
 - (D) both the junctions
100. In resistance welding aluminium as compared to steel requires
- (A) large welding time
 - (B) smaller welding time
 - (C) equal welding time
 - (D) welding time depending upon the value of weld current
101. Who among the following prescribed separate Electorates for India on the basis of communal award in August 1932.
- a) Lord Curzon.
 - b) Lord Irwin.
 - c) Ramsay MacDonald.
 - d) Lord Linlithgo.
102. Which of the following is true?
- a) Finance Minister is the Chairman of Planning Commission.
 - b) The Prime Minister is the ex-officio Chairman of the Planning Commission.
 - c) Home Minister is the Chairman of the National Development Council.
 - d) Minister of Information and Broadcasting is the Chairman of the Press Council.
103. The International Date Line passes through which of the following:
- a) Indian Ocean.
 - b) Atlantic Ocean.
 - c) Pacific Ocean
 - d) Bay of Bengal.
104. In which city was the IIFA awards held.
- a) Singapore.
 - b) Bangkok.
 - c) Phuket.
 - d) Macau.

105. Which state of India was earlier ruled by the Portugese?
a) Puducherry.
b) Goa.
c) Madras.
d) Bombay.
106. In which of the following cities was the European Union-Pakistan Summit held in June 2009?
a) London.
b) Brussels.
c) Stockholm.
d) Rome.
107. The Nobel prizes are given in Stockhlom except for the Nobel Peace Prize which is given in another city of Europe. Name the city?
a) Oslo.
b) Berlin.
c) Prague.
d) Geneva.
108. Who among the following is the present Secretary General of the United Nations.
a) Ban Ki-Moon.
b) U Thand.
c) Shashi Tharoor.
d) Koffi Anan.
109. In which state of India is the "Tehri Dam" situated?
a) Assam.
b) Uttar Pradesh.
c) Karnataka.
d) Uttarakhand.
110. Who is the Prime Minister of Italy who has been in news recently?
a) Silvio Berlusconi.
b) Leonardo da vinci.
c) Mussolini.
d) Robert de Niro.
111. How many districts are there in Haryana?
(A) 21
(B) 25
(C) 28
(D) 32
112. As per census of 2001 the total population of Haryana is:
(A) 1,91,72,483 persons
(B) 2,11,44,564 persons
(C) 2,40,82,988 persons
(D) 2.50.90,000 persons
113. In which of the districts of Haryana is the H.M.T. factory situated?
(A) Panchkula
(B) Ambala
(C) Jind
(D) Faridabad

114. Where is the Atlas Industry in Haryana situated?
A) Sonipat
B) Gurgaon
C) Hisar
D) Panchkula
115. Which one of the following is situated in Gurgaon of Haryana?
(A) Manufacturing of Rajdoot Motor Cycle
(B) Manufacturing of Maruti Cars
(C) Manufacturing of Tata-Sumo
(D) All the above.
116. In which District of Haryana is Rajdoot Motor Cycle manufactured?
(A) Hisar
(B) Karnal
(C) Ambala
(D) Faridabad.
117. Ordinance regarding the prohibition of alcohol was passed on 1st July 1996. Later on it was withdrawn on:
a) 1st April 1998
b) 1st April, 1997
c) 1st June 1998
d) 1st August, 1997
118. In which of the following years was each village of Haryana electrified?
(A) In 1968
(B) In 1970
(C) In 1972
(D) In 1976
119. According to 2001 census what is the percentage of literacy in Haryana?
(A) 62.40%
(B) 55.85%
(C) 65.72%
(D) 67.9%
120. Where is the National Dairy Research Institute in Haryana located?
A) Sirsa.
B) Kurukshetra.
C) Jind.
D) Karnal.