

# 013/2023

Maximum : 100 marks

Time : 1 hour and 30 minutes

- Which of the following statements are TRUE about the resistance of a material?
  - Resistance varies directly as its area of cross section
  - Resistance varies inversely as the length of the material
  - Resistance does not depend on the nature of the material
  - Resistance depends on the temperature of the material

(A) Both (i) and (iv)    (B) Both (ii) and (iii)  
(C) Both (i) and (ii)    (D) (iv) only
- Which of the following is NOT a good conductor of electricity?

(A) Acids    (B) Sea water  
(C) Pure mineral oil    (D) Gold
- The SI unit of Electrical Conductivity is:

(A) Siemens per meter    (B) Siemens per square meter  
(C) Ohm per meter    (D) Ohm-meter
- Two wires A and B have the same cross section and are made of the same material. Resistance of A is  $600\ \Omega$  and Resistance of B is  $200\ \Omega$ . The number of times of A is longer than B is:

(A) 3    (B) 2  
(C) 0.33    (D) 6
- If two identical  $4\text{A}$ ,  $2\ \Omega$  Norton equivalent circuits are connected in parallel with like polarity to like, the combined Norton equivalent circuit is:

(A)  $8\text{A}$ ,  $4\ \Omega$     (B)  $0\text{A}$ ,  $1\ \Omega$   
(C)  $8\text{A}$ ,  $1\ \Omega$     (D)  $4\text{A}$ ,  $4\ \Omega$
- The Superposition theorem is essentially based on the concept of:

(A) Duality    (B) Linearity  
(C) Reciprocity    (D) Non-linearity
- One Kilowatt hour of electrical energy equals:

(A) 3600 Joules    (B) 735.5 Watts  
(C) 4186 Joules    (D) 860 Kilo-calorie

8. Two similar electric charges of 1 Coulomb each are placed 1 meter apart in air. Force of repulsion between them would be nearly:
- (A) 1 N (B)  $9 \times 10^9 N$   
(C) 0 N (D)  $8.85 \times 10^{-12} N$
9. If a dielectric slab of thickness 6 mm and  $\epsilon_r = 5$  is inserted between the plates of an air capacitor with plate separation of 8 mm, its capacitance is :
- (A) Increased (B) Decreased  
(C) Almost halved (D) Unaffected
10. A capacitor that stores a charge of 0.2 Coulombs at 10 volts has a capacitance of:
- (A) 2 Farad (B) 0.02 Farad  
(C) 50 Farad (D) 10 Farad
11. Permeability in a magnetic circuit corresponds to \_\_\_\_\_ in an Electric Circuit.
- (A) Reluctivity (B) Resistivity  
(C) Conductivity (D) Susceptibility
12. The lifting power of an electromagnet depends on:
- (A) Pole area of electromagnet (B) Magnetic flux density  
(C) Shape of electromagnet (D) Both (A) and (B)
13. Which of the following instruments are equally accurate on dc as well as ac circuits?
- (A) Dynamometer wattmeter (B) Moving iron ammeter  
(C) Induction wattmeter (D) PMMC voltmeter
14. Induction watt hour meters are free from:
- (A) Phase error (B) Creeping error  
(C) Temperature error (D) Frequency error
15. The RMS value of a half wave rectified current is 5A, its value for full wave rectification would be:
- (A)  $\frac{10}{2} A$  (B)  $\frac{10}{\sqrt{2}} A$   
(C)  $\frac{10}{\pi} A$  (D)  $\frac{20}{\pi} A$

16. The reactance offered by a capacitor to alternating current of frequency 50 Hz is  $20\ \Omega$ . If the frequency is increased to 100 Hz reactance becomes:
- (A)  $40\ \Omega$  (B)  $20\ \Omega$   
(C)  $10\ \Omega$  (D)  $5\ \Omega$
17. Which of the following is NOT considered a fixed cost while calculating the cost of electric power generation?
- (A) Salaries of high officials (B) Interest on capital cost  
(C) Repair and maintenance (D) Taxes and Insurance
18. If power factor is unity, the reactive power is:
- (A) Unity (B) Equal to  $I^2R$   
(C) Zero (D) A negative quantity
19. In a series RLC circuit,  $R = 100\ \Omega$ ,  $X_L = 300\ \Omega$ ,  $X_C = 200\ \Omega$ . The phase angle of the circuit is:
- (A)  $0^\circ$  (B)  $45^\circ$   
(C)  $180^\circ$  (D)  $90^\circ$
20. In an ac circuit, the ratio of KW/KVA represents:
- (A) Power factor (B) Peak factor  
(C) Load factor (D) Demand factor
21. Speed/time curve for electric trains for city service does not have:
- (A) Coasting period (B) Free running period  
(C) Constant acceleration period (D) Braking period
22. While considering train movement crest speed is the:
- (A) Maximum speed attained by a train during the run  
(B) Average speed attained by a train during the run  
(C) Ratio of distance between the stops and actual time of run  
(D) Ratio of distance between the stops and sum of actual time of run and stop time
23. Magnetic materials are heated with the help of:
- (A) Radiation (B) Electric Arc  
(C) By Convection (D) Hysteresis loss

24. During regenerative braking of electric motors:
- (A) It's field is disconnected from the supply
  - (B) It's armature is reverse connected
  - (C) It's field is reverse connected
  - (D) They are made to run as generators
25. The advantage of corona effect in transmission line is that:
- (A) It works as a safety valve for electrical surges
  - (B) It generates ozone
  - (C) The overall efficiency of the transmission line is increased
  - (D) Makes line current non sinusoidal
26. The sag of transmission line is least affected by:
- (A) Temperature
  - (B) Weight of the conductor per unit length
  - (C) Length of the conductor
  - (D) Current passes through the conductor
27. An interconnector between two generating stations facilitates to:
- (A) Keep their voltages constant
  - (B) Run them in parallel
  - (C) Transfer of power in one particular direction only
  - (D) Reduce losses in the transmission line
28. The string efficiency of a suspension type insulator can be increased by:
- (A) By using longer cross arms
  - (B) Providing guard ring
  - (C) Using identical insulator discs
  - (D) Both (A) and (B)
29. Volume of copper required for an ac transmission line is inversely proportional to:
- (A) Line current
  - (B) Length of line conductor
  - (C) Transmitted power
  - (D) Power factor
30. Sheaths are used in underground cables to:
- (A) Provide insulation to the conductor
  - (B) Protects from moisture and gases
  - (C) Provide mechanical strength
  - (D) All of the above

31. Which of the following expressions depicts the diversity factor?
- (A) Ratio of maximum demand on the power station to the rated capacity of the power station
  - (B) Ratio of maximum demand on the power station to its connected load
  - (C) Ratio of sum of individual maximum demands to the maximum demand on the power station
  - (D) Ratio of average load in the power station to the maximum demand during a given period
32. Which of the following is NOT a Non Conventional energy source?
- (A) Magneto hydro dynamics generator
  - (B) Natural gas
  - (C) Fuel cell
  - (D) Bio mass
33. Which of the following methods is an electrical storage method of solar energy?
- (A) Inductor storage
  - (B) Thermo-Chemical storage
  - (C) Pebble bed storage
  - (D) Flywheel storage
34. Impedance relay is used for the protection of:
- (A) Medium transmission lines
  - (B) Short transmission lines
  - (C) Long transmission lines
  - (D) Any of the above
35. On which of the following effects of electric current, a fuse operates?
- (A) Photovoltaic effect
  - (B) Electrostatic effect
  - (C) Heating effect
  - (D) Magnetic effect
36. Which of the following circuit breakers are most suitable for the voltage 765 KV?
- (A) Vacuum circuit breakers
  - (B) Air blast circuit breakers
  - (C) SF6 circuit breakers
  - (D) Air break circuit breakers
37. Deflection torque in a measuring instrument:
- (A) Opposes control torque
  - (B) Opposes damping torque
  - (C) Both (A) and (B)
  - (D) None of the above
38. Due to phase error energy meter will read:
- (A) Active power
  - (B) Reactive power
  - (C) Power factor
  - (D) None of the above
39. The scale of a ammeter is uniform. Its type is:
- (A) Moving iron
  - (B) Permanent magnet moving coil
  - (C) Induction type
  - (D) Dynamometer type

40. Which of the following bridge is used for the measurement of dielectric loss?  
 (A) Maxwell's bridge (B) Anderson bridge  
 (C) Schering bridge (D) De Sauty's bridge
41. In two – wattmeter method of power measurement, one of the wattmeter shows negative reading when the load power factor angle is:  
 (A)  $0^\circ$  (B)  $45^\circ$   
 (C) Greater than  $60^\circ$  (D)  $60^\circ$
42. The current passing through a  $10\ \Omega$  resistance is given by  $I = 4 + 2\sqrt{2} \sin 314t$  A. This current is measured by Permanent magnet moving coil meter is:  
 (A) 4A (B) 6A  
 (C)  $2\sqrt{2}$  A (D)  $\sqrt{20}$  A
43. Voltages  $V_1 = 5 \sin \omega t$  and  $V_2 = 10 \sin \omega t$  are connected to X and Y terminals of a CRO respectively. What is the shape of figure seen on the CRO?  
 (A) A Circle (B) An Ellipse  
 (C) A Parabola (D) A Straight Line
44. In a digital voltmeter, the oscillator frequency is 500 KHz. The ramp voltage falls from 8V to V in 25ms. What is the number of pulses counted by the counter?  
 (A) 20 (B) 12500  
 (C) 5000 (D) 2500
45. Hall effect transducers are used for measuring:  
 (A) Current (B) Electric field  
 (C) Magnetic field (D) Pressure
46. As per the recommendation of ISI the number of outlets are permitted in a power circuit:  
 (A) 10 points (B) 5 points  
 (C) 2 points (D) 1 point
47. The SI unit of Luminance is:  
 (A) Candela (B) Lux  
 (C) Candela/m<sup>2</sup> (D) Lumen
48. A source of light of 1000 Candelas is situated 5 m above a working surface. Calculate the illuminance directly below the source in Lux:  
 (A) 25 (B) 200  
 (C) 500 (D) 40

49. A fluorescent tube can be operated on:
- (A) AC only (B) DC only  
(C) Both AC as well as DC (D) None
50. In which type of wiring vulcanized Indian rubber and polyvinyl chloride insulated wires are used as conductor?
- (A) CTS wiring (B) Cleat wiring  
(C) Lead sheathed wiring (D) Conduit wiring
51. The loop earth wire shall be of size less than:
- (A) 8 SWG (B) 10 SWG  
(C) 20 SWG (D) 14 SWG
52. What is the maximum length of the flexible conduit in the motor installation?
- (A) Less than 1.25 m (B) Less than 3 m  
(C) Less than 3.5 m (D) Maximum upto 5 m
53. The Armature resistance of a 4-Pole Wave wound DC machine is  $0.08\Omega$ . If the armature is rewound as Lap winding. What is the armature resistance?
- (A)  $0.32\Omega$  (B)  $0.16\Omega$   
(C)  $0.04\Omega$  (D)  $0.02\Omega$
54. In three point starter, the overload release coil operate, if \_\_\_\_\_ current increases beyond set limit.
- (A) Field (B) Armature  
(C) Line (D) Neutral
55. What is the shape of armature flux in DC machine due to armature reaction?
- (A) Flat topped (B) Saddle  
(C) Peaky (D) Triangular
56. A DC series motor is running at rated speed. If the field winding is short circuited then the motor will
- (A) Stop (B) Run at dangerously high speed  
(C) Damage (D) All of the above
57. A transformer is a
- (A) Constant flux device (B) Phase shifting device  
(C) Negative feedback circuit (D) All of the above

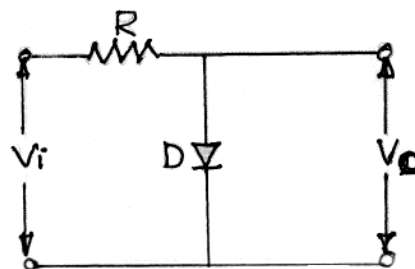
58. Which winding structure require more insulation?  
 (A) Concentric winding (B) Interleaved winding  
 (C) Sandwiched winding (D) All of the above
59. If the load power factor of transformer is 0.85 lagging, then its primary power factor is:  
 (A) 0.8 lag (B) 0.95 lag  
 (C) 0.85 lag (D) Unity pf
60. The ratio error of a current transformer mainly depends on:  
 (A) Types of transformer used on secondary  
 (B) Eddy current loss of the core  
 (C) Power factor of the load  
 (D) All of the above
61. Skewing of squirrel cage rotor bars does not eliminate:  
 (A) Space harmonics (B) Cogging  
 (C) Magnetic hum (D) Crawling
62. Slip ring induction motor has \_\_\_\_\_ excitation current and \_\_\_\_\_ full load power factor as compared to squirrel cage induction motor.  
 (A) High, High (B) High, Low  
 (C) Low, High (D) Low, Low
63. The supply voltage to a induction motor is 192V instead of 240V. Determine reduction in starting current in percentage:  
 (A) 40% (B) 50%  
 (C) 10% (D) 20%
64. Two identical alternators each are rated for 25 MVA, 11 KV having a sub transient reactance of 10% are connected in parallel. The short circuit level at the bus bar is:  
 (A) 500 MVA (B) 400 MVA  
 (C) 125 MVA (D) 100 MVA
65. In a synchronous generator ratio of short circuit current to open circuit voltage is:  
 (A) Synchronous reactance (B) Synchronous impedance  
 (C) Synchronous admittance (D) Synchronous resistance
66. A Synchronous motor is said to be over excited when it is operated at \_\_\_\_\_ power factor.  
 (A) Unity (B) Leading  
 (C) Lagging (D) Leading or Lagging



67. Reluctance motor is basically:
- (A) DC shunt motor (B) DC series motor  
(C) Single phase induction motor (D) Single phase synchronous motor
68. The step angle of the stepper motor is  $5^\circ$ . If the stepping frequency is 3600 pulses per second, then the shaft speed will be:
- (A) 50 rps (B) 144 rps  
(C) 2.5 rps (D) 25 rps
69. When a UJT is used for triggering an SCR, the wave shape of the voltage obtained from the UJT circuit is a:
- (A) Square wave (B) Sine wave  
(C) Trapezoidal wave (D) Saw-tooth wave
70. TRIAC is a:
- (A) 2 terminal bilateral switch (B) 2 terminal switch  
(C) 3 terminal bi-directional switch (D) 3 terminal unilateral switch
71. Choose the correct statement:
- (A) MOSFET is a uncontrolled device  
(B) MOSFET is a current controlled device  
(C) MOSFET is a voltage controlled device  
(D) MOSFET is a temperature controlled device
72. An SCR is turned off by:
- (A) Reducing gate voltage to zero (B) Reducing anode voltage to zero  
(C) Reverse biasing the gate (D) None of the above
73. The load voltage of a chopper can be controlled by varying the :
- (A) Firing angle (B) Extinction angle  
(C) Reactor position (D) Duty cycle
74. Which of the device converts the AC supply of one frequency into an AC supply of a different frequency?
- (A) Pulse converter (B) Controller  
(C) Cycloconverter (D) Inverter
75. The SMPS working is based on:
- (A) Chopper principle (B) Integral control principle  
(C) Frequency control principle (D) Phase control principle

76. One of the basic requirements of servo motor is that it must produce high torque at all:  
 (A) Loads (B) Speeds  
 (C) Frequencies (D) Voltages
77. Register of microprocessor which keeps track of the execution of program and which contain the memory address of next instruction to be executed is called:  
 (A) Index register (B) Program counter  
 (C) Memory address register (D) Instruction register
78. What is the size of RAM and ROM in 8051 microcontroller?  
 (A) 128 byte RAM and 4 byte ROM (B) 128 kB RAM and 4 kB ROM  
 (C) 128 byte RAM and 4 kB ROM (D) 128 kB RAM and 4 byte ROM
79. Which of the timer can operate in the 16 bit condition?  
 (A) Timer 0 (B) Timer 1  
 (C) Timer 2 (D) All of the above
80. The programmable logic controller is classified into:  
 (A) Two (B) Three  
 (C) Four (D) Five
81. Which of the following are the components of process automation?  
 (A) Sensors (B) Controllers  
 (C) Actuators (D) All of the above
82. Distributed control system is \_\_\_\_\_ system.  
 (A) Computerized control (B) Component control  
 (C) Compromise control (D) None of the above
83. Which of the following is a correct statement?  
 (A) PI controllers improves steady state response  
 (B) PD controllers improves transient response  
 (C) Both (A) and (B)  
 (D) None of the above
84. How many levels are present in Distributed Control System manufacturing?  
 (A) 3 (B) 4  
 (C) 5 (D) 6
85. The band gap of Silicon at room temperature is:  
 (A) 1.4 eV (B) 0.7 eV  
 (C) 1.1 eV (D) 1.3 eV

86. The emitter of a transistor is generally heavily doped because it:
- (A) Must possess low resistance (B) Is the first region of the transistor  
 (C) Has to supply the charge carriers (D) Has to dissipate maximum power
87. Ripple frequency of the output wave form of a full-wave rectifier when fed with a 50 Hz sine wave is:
- (A) 25 Hz (B) 200 Hz  
 (C) 50 Hz (D) 100 Hz
88. A zener diode, when used in voltage stabilization circuits, it is biased in:
- (A) Reverse breakdown region  
 (B) Reverse bias region below the breakdown voltage  
 (C) Forward bias region  
 (D) Forward bias constant current mode
89. Regulator IC 7905 provides regulated output voltage equal to:
- (A) 18 V (B) - 12 V  
 (C) 9 V (D) - 5 V
90. A network that shifts a waveform to a different DC level, without changing the appearance of the applied signal:
- (A) Voltage divider (B) Clamper  
 (C) Clipper (D) Rectifier
91. Which of the following multivibrator is called the flip-flop?
- (A) Astable multivibrator (B) Monostable multivibrator  
 (C) Bistable multivibrator (D) Both (B) and (C)
92. Following circuit is \_\_\_\_\_ clipper.



- (A) Shunt negative (B) Shunt positive  
 (C) Series negative (D) Series positive

93. Two amplifiers are connected in series (cascaded). The first amplifier has a voltage gain of 12 and the second has a voltage gain of 15. Find the output ac signal if the input signal is 0.05 volt:
- (A) 180 V (B) 1.8 V  
(C) 9 V (D) 90 V
94. How many types of coupling methods are there in a single stage transistor amplifier?
- (A) Three (B) Two  
(C) Four (D) One
95. Consider the following statements:
1. A schmitt trigger circuit can be emitter-coupled-bi-stable circuit.
  2. Schmitt trigger circuit exhibits hysteresis phenomenon.
  3. The output of a Schmitt trigger will be triangular if the input is square wave.
- Which of these statements are correct?
- (A) 1, 2 and 3 (B) 2 and 3 only  
(C) 1 and 2 only (D) 1 and 3 only
96. Op-Amp performs which type of mathematical operations?
- (A) Frequency dependent (B) Linear  
(C) Non-linear (D) All of the above
97. What is the value is to be considered for a don't care condition?
- (A) 1 (B) 0  
(C) Any number except 0 and 1 (D) Either 0 or 1
98. In a J-K flip-flop, if J=K the resulting flip-flop is known as:
- (A) T flip-flop (B) D flip-flop  
(C) S-R flip-flop (D) S-K flip-flop
99. Ripple counter also called:
- (A) VLSI counter (B) Synchronous counter  
(C) Asynchronous counter (D) SSI counter
100. Based on how data is entered or shifted out, shift registers are classified into \_\_\_\_\_ categories.
- (A) 5 (B) 2  
(C) 4 (D) 3

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