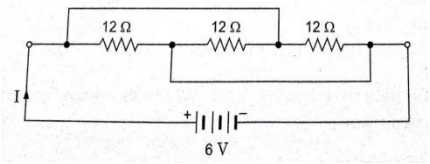
BASIC ELECTRICAL PAPER

1. For the circuit shown below the equivalent resistance will be



(A) 36Ω
(B) 12Ω
(C) 4Ω
(D) 6Ω

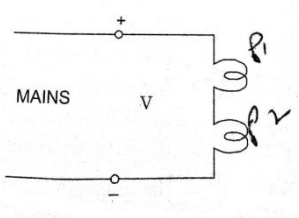
2. Twelve 1 Ω resistances are used as edges to form a cube. The resistance between two diagonally opposite corners of the cube is
(A) 5/6Ω
(B) 1Ω
(C) 6/5Ω
(D) 3/2Ω

3. How are 500 Ω resister connected so as to give an effective resistance of 750 Ω?
(A) Three resistor of 500 Ω each, in parallel.
(B) Three resistor of 500 Ω each, in series.
(C) Two resistor of 500 Ω each, in parallel.
(D) Two resistor of 500 Ω each, in parallel. And the combination in series with another 500 Ω resister.

4. Three resistances each of R Ω are connected to form a triangle. The resistance between any two terminals will be
(A) R Ω
(B) 3/2 R Ω
(C) 3 R Ω
(D) 2/3 R Ω

5. The element which are not capable of delivering energy by its own are known as
(A) Unilateral elements
(B) Nonlinear elements
(C) Passive elements
(D) Active elements

6. The incandescent bulb rated respectively as P_1 and P_2 for operation at a specified main voltage are connected in series across the mains as shown in the figure. Then the total power supplied by the main to the two bulbs.



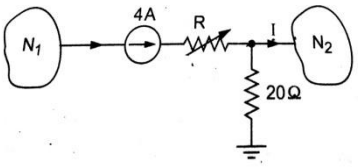
(A) $\frac{P_1P_2}{P_1+P_2}$
(B) $\sqrt{P_1^2 \times P_2^2}$
(C) (P_1+P_2)
(D) $\sqrt{P \times P_2}$

7. The unit of electric energy is
(A) Watt
(B) joule-second
(C) KWh
(D) Volt-Ampere

8. Permittivity is expressed in terms of
(A) N/m
(B) Webers/m
(C) Farad/meter
(D) Farad/sq.m.

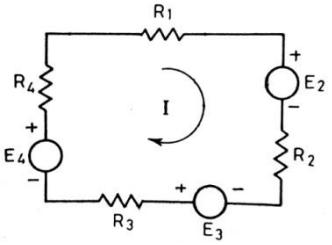
9. Conductance is the reciprocal of
(A) inductive reactance
(B) capacitive reactance
(C) resistance
(D)impedance

10. In the circuit shown in the figure, for R = 20 Ω the current 'I' is 2 A. When R is 10 Ω, the current 'I' would be



(A) 1 A
(B) 2 A
(C) 2.5 A
(D) 3 A

11. In the circuit shown below which is the correct equation when KVL is applied?



(A) $I(R_1+R_2+R_3+R_4)=E_2+E_3+E_4$

(B) $I(R_1-R_2+R_3+R_4)=E_2+E_3+E_4$

(C) $IR_1+E_2+IR_2+IR_3+IR_4=E_3+E_4$

(D) $IR_1+IR_2+IR_3+E_3+IR_4+E_4=E_2$

12. Out of the following which is an insulating material ?
(a) Copper
(b) Gold
(c) Silver
(d) Paper

13. The property of a conductor due to which it passes current is called
(a) resistance
(b) reluctance
(c) conductance
(d) inductance

14. Electric current passing through the circuit produces
(a) magnetic effect
(b) luminous effect
(c) thermal effect
(d) chemical effect

15. Temperature co-efficient of resistance is expressed in terms of
(a) ohms/°C
(b) mho/ohm °C
(c) /°C
(d) mhos/°C

16. Bulbs in street lighting are all connected in
(a) parallel
(b) series
(c) series-parallel
(d) end-to-end

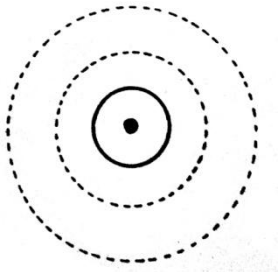
17. Conductance : mho ::
(a) resistance : ohm
(b) capacitance : henry
(c) inductance : farad
(d) lumen : steradian

18. One coulomb is equal to
a) 3×10^{12} electrons
b) 3×10^{10} electrons
c) 3×10^{15} electrons
d) 6.28×10^{18} electrons

19. The force between two charges of 2 coulombs each, if placed at a distance of 2 meters apart in air, will be
a) 9×10^{12} *newton*
b) 9×10^{15} *newton*
c) 9×10^{9} *newton*
d) 9×10^{6} *newton*

20. An air condenser with, capacitance 0.001 μF is connected to a d.c. voltage of 200 volts. The energy stored in the condenser will be
a) 10 μ joules
b) 20 μjoules
c) 20 joules
d)20μ μjoules

21. The direction of magnetic lines of force in the current carrying conductor shown in figure below is



a) clockwise
b) anticlockwise
c) upwards
d) downwards

22. Permittivity is expressed in terms of
a) N/m
b) Weber's/m
c) Farad/meter
d) Farad/sq.m.

23. Dielectric strength of a medium is usually expressed in
a) kV/mm
b) Coulombs/mm
c) Newton's/mm
d) Joules/sq.m

24. Dielectric strength of air is nearly
a) 30 kV/cm (max)
b) 30 kV/mm
c) 300 kV/mm
3000kV/mm

25. If three 10 μF capacitors are connected in parallel, the net capacitance is
a) 20 μF
b) 30 μF
c) 40 μF
d) 50 μF

26. The capacitance of a capacitor is not affected by

a) distance between plates
b) area of plates
c) thickness of plates
d) all of the above

27. Which of the following expression is correct for electric field strength ?
a) $E = D/\varepsilon$
b) $E = D^2/t$
c) $E = jtD$
d) $E= nD^2$

28. The relative permittivity has the following units
a) F/m
b) m/F
c) Wb/m
d) no units

29. The unit of electric intensity is
a) N/C^2
b) Wb/m^2
c) N/C
d) N^2/C

30. The sign $\otimes$ in a plan view of a conductor means
a) the current flows into the drawing area
b) the current flows out of the drawing area
c) there is a positive current in the conductor
d) we cannot apply the cork screw rule

31. An air gap is usually inserted in magnetic circuits to
a) increase the flux b) prevent saturation
c) increase m.m.f. d) none of these

32. Silicon steel is used in electrical machines because it has
a) low hysteresis loss b) low retentivity
c) low coercivity d) none of these

33. The aim of shielding an instrument is
a) to prevent its damage due to moisture
b) to reduce the effect of stray magnetic fields on its reading
c) to increase the range of the instruments
d) none of these

34. The unit of relative permeability is
a) henry/metre b) henry
c) henry/sq. m d) it is dimensionless

35. A conductor of length L has current I passing through it, when it is placed parallel to a magnetic field. The force experienced by the conductor will be
a) zero b) BLI
c) B^2LI d) BLI^2

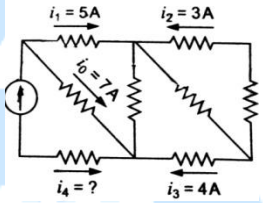
36 . Reciprocal of permeability is
a) reluctivity b) susceptibility
c) permittivity d) conductance

37. Which of the following is the unit of magnetic flux density ?
a) weber b) lumens
c) tesla d) none of the above

38. One Telsa is equal to
a) $1\ Wb/mm^2$ b) 1 Wb/m
c) $1\ Wb/m^2$ d) $1\ mWb/m^2$

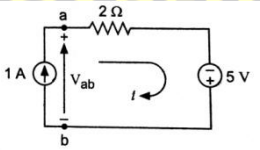
39. The unit of retentivity is
a) Weber b) Weber/sq. m
c) Ampere turn/mete d) Ampere turn

40. The current i_4 in the circuit of the figure is equal to



a) 12A b) – 12A
c) 4 A d) None of these

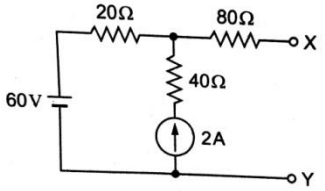
41. Assuming ideal elements in the circuit shown below, the voltage V_{ab} will be



a) – 3 V b) 0 V c) 3 V d) 5V

42. The superposition theorem is essentially based on the concept of
a) reciprocity b) linearity
c) duality d) non-linearity

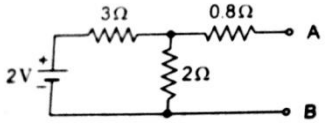
43. In the circuit, Thevenin's voltage and resistance across the terminals XY will be



a) 20 V and 100 Ω b) 40 V and 93.33 Ω

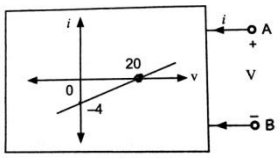
c) 60 V and 93.33 Ω d) 100 V and 100 Ω

44. The Norton equivalent between A and B for the circuit is



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

45. The resistance seen from the terminals A and B of the device whose characteristic is shown in the figure is



a) $-5\ \Omega$
b) $-\frac{1}{5}\ \Omega$
c) $\frac{1}{5}\ \Omega$
d) $5\ \Omega$

46. Millman's theorem yields equivalent
a) impedance or resistance
b) current source
c) voltage source
d) voltage or current source

47. The rms value of half-wave rectified symmetrical square wave current of 2 A is
a) $\sqrt{2}$ A b) 1A c) $\frac{1}{\sqrt{2}}$ A d) $\sqrt{3}$ A

48. The rms value of the voltage $u(t)=3+4\cos(3t)$ is
a) $\sqrt{17}$ V b) 5 V c) 7 V d) $(3+2\sqrt{2})$ V

49. The rms value of the resultant current in a wire carries a dc current of 10A and a sinusoidal alternating current of peak value 20 A is
a) 14·1A b) 17·3A
c) 22·4A d) 30·0A

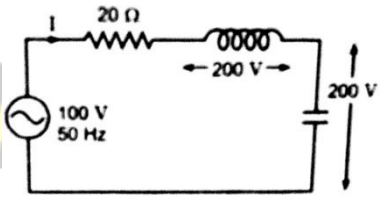
50. The power factor of an ac circuit is equal to
a) cosine of the phase angle
b) sine of the phase angle
c) unity for a resistive circuit
d) unity for a reactive circuit

51. When a sinusoidal voltage is applied across R-L series circuit having R = X_L, the phase angle will be
a) 90° b) 45 lag°
c) 45° lead d) 90° leading

52. For an ac circuit, if $v(t)=160\sin(\omega t+10^\circ)$ and $i(t)=5\sin(\omega t-20^\circ)$, then reactive power absorbed by the circuit is
a) 100 VARs b) 200 VARs
c) 300 VARs d) 400 VARs

53. A series circuit containing passive elements has the following
$v=200\sin(2{,}000t+50^\circ)$,
$i=4\cos(2{,}000t+13.2^\circ)$
The circuit elements
a) must be resistance and capacitance
b) must be resistance and inductance
c) must be inductance, capacitance and resistance
d) could be either resistance and capacitance or resistance, inductance and capacitance

54. The current in the circuit shown



a) 5 A b) 10 A c) 15 A d) 25 A

55. The small capacitance is added to a highly inductive circuit,
a) the angle between voltage and current will increase
b) the pf will increase
c) the pf will decrease
d) the power drawn will decrease

56. If Z = 3+ *j*4, then the conductance is
a) 3 S b) 1/3 S c) 3/25 S d) 4/25 S

57. Real part of admittance is _____ and the imaginary part is _____.
a) impedance, resistance
b) resistance, impedance

c) susceptance, inductance
d) conductance, susceptance

58. A series resonant circuit has a resistance of 47 ohms, inductance of 2H and capacitance of $2\mu F$ with a supply voltage of 10 volts. The current through the circuit at resonance is

a) 0.833 amp. b) 0.212 amp.

c) 0.196 amp. d) 0 amp.

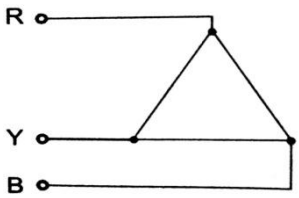
59. The value of current at resonance in a series RLC circuit is affected by the value of

a) R b) C c) L d) All of these

60. In resonant circuits, the power-factor at resonance is

a) zero b) 1 c) 0.5 d) 0.707

61. The phase sequence of the 3-phase system shown in given figure is



a) RYB b) RBY c) BRY d) YBR

62. In electrical circuits, transient currents are associated with

a) resistors b) inductors
c) capacitor d) both b) and c)

63. A component that opposes the change in circuit current is

a) resistance b) capacitance
c) inductance d) conductance

64. For a dc voltage an inductor

a) is virtually a short circuit..
b) is an open circuit.
c) depends on polarity.
d) depends on voltage value.

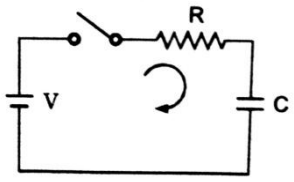
65. The time domain relationship between voltage and current in a capacitor is

a) $i_C(t) = \frac{1}{C}\frac{dv_C(t)}{dt}$

b) $i_C(t) = \frac{1}{C}\int_{-\infty}^{t} v_C(t)dt$

c) $i_C(t) = C\int_{-\infty}^{t} v_C(t)dt$ d) none of these

66. The transient response of the initially relaxed network shown in figure is



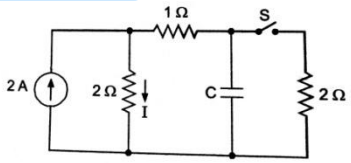
a) $i = \frac{V}{R}e^{-t/CR}$

b) $i = \frac{V}{R}e^{t/RC}$

c) $i = \frac{V}{R}(1-e^{-t/RC})$

d) $i = \frac{V}{R}(1+e^{-t/RC})$

67. The steady-state in the circuit, shown in the given figure is reached with S open. S is closed at $t = 0$. The current I at $t = 0^+$ is



a) 1 A b) 2 A c) 3 A d) 4 A

68. Laplace transform of a unit impulse function is

a) 1/s b) $1/s^2$ c) s d) 1

69. Laplace transform of a unit step function is

a) 1 b) 1/s c) s d) $1/s^2$

70. Laplace transform of e^{-at} is

a) 1/s b) a/s c) 1/(s – a) d) 1(s + a)

71. Laplace transform of te^{-at} is

a) $1(s + a)^2$ b) 1/s(s + a)
c) s/(s + a) d) s/(s – a)

72. A node in a circuit is defined as a

a) closed path
b) group of interconnected elements
c) open terminal of an elements
d) junction of two or more elements

73. The area of the hysteresis loop will be least for one of the following materials. It is?

a) wrought iron
b) silicon steel
c) hard steel

d) soft iron

74. The rate of change of current in a 4 H inductor in 2 Amps/sec. Find the voltage across inductor.

a) 16V b) 8V c) 2V d) 0.8V

75. When a source is delivering maximum power to the load, the efficiency will be?

a) below 50% b) above 50%
c) 50% d) maximum

76. When a series RL circuit is connected to a voltage source V at t = 0, the current passing through the inductor L at $t = 0^+$ is

a) infinite b) $\frac{V}{L}$
c) zero d) $\frac{V}{R}$

77. The Q-factor of a parallel resonant circuit is given by

a) $\frac{1}{R}\sqrt{\frac{L}{C}}$ b) $\frac{1}{R}\sqrt{\frac{C}{L}}$
c) $\frac{1}{R}\sqrt{1/LC}$ d) $\frac{R}{\sqrt{LC}}$

78. Tesla is same as

a) Weber/meter b) Weber/$(meter)^2$
c) Farad/meter d) Henry/$(meter)^2$

79. Four resistance 2Ω, 4Ω, 5 Ω , 20 Ω are connected in parallel. Their combined resistance is in parallel. Their combined resistance is

a) 1 Ω b) 2 Ω c) 4 Ω d) 5 Ω

80. Two wires A and B have the same cross-section and are made of the same materials. R_A =100 Ω. The number of times A is longer than B is:

a) 5 b) 6 c) 2 d) 4

ELECTRICAL TEST PAPER ANSWERS KEY [22-4-2017]

1. c	41. a
2. a	42. b
3. d	43. d
4. d	44. d
5. c	45. d
6. a	46. d
7. c	47. a
8. c	48. a
9. c	49. b
10. b	50. a
11. c	51. b
12. d	52. b
13. c	53. d
14. a	54. a
15. c	55. b
16. a	56. c
17. a	57. d
18. d	58. b
19. c	59. a
20. b	60. b
21. b	61. b
22. c	62. d
23. a	63. c
24. a	64. a
25. a	65. d
26. c	66. a
27. a	67. b
28. d	68. d
29. c	69. b
30. a	70. d
31. a	71. a
32. a	72. d
33. b	73. b
34. d	74. b
35. a	75. c
36. a	76. c
37. c	77.
38. c	78. b
39. b	79. a
40. b	80.