Answer-key & Solution

SSC JE (Circuit Theory)
Date 15.07.2017

1. C	13. B	25. C	37. D	49. A	61. B	73. B	85. C
2. B	14. D	26. D	38. C	50. D	62. B	74. B	86. B
3. D	15. A	27. B	39. B	51. B	63. D	75. A	87. C
4. A	16. D	28. A	40. C	52. A	64. C	76. D	88. B
5. D	17. A	29. B	41. C	53. C	65. D	77. D	89. C
6. B	18. A	30. C	42. A	54. A	66. B	78. C	90. A
7. A	19. D	31. A	43. A	55. C	67. A	79. D	
8. D	20. B	32. A	44. B	56. B	68. C	80. A	
9. D	21. C	33. B	45. C	57. A	69. A	81. A	
10. D	22. B	34. A	46. A	58. A	70. A	82. D	
11. D	23. A	35. C	47. B	59. A	71. A	83. C	
12. B	24. A	36. C	48. A	60. B	72. B	84. A	

Note : *If your opinion differ regarding any answer, please message the mock test and Question number to 9560620353*

Note : *If you face any problem regarding result or marks scored, please contact : 9313111777*

SOLUTION

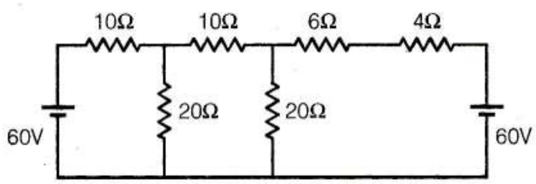
51.(B) At resonance

$I = I_R = 1$ mA

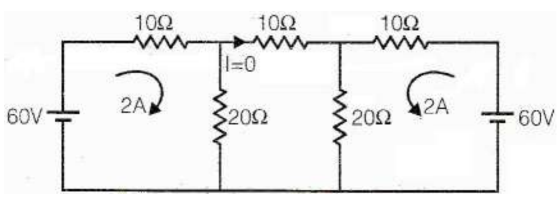
$$|I_R + I_L| = \sqrt{I_R^2 + I_L^2} = \sqrt{1^2 + I_L^2} > 1mA$$

$$|I_R + I_L| > 1mA$$

52.(A) Using source transformation, the circuit is redrawn.



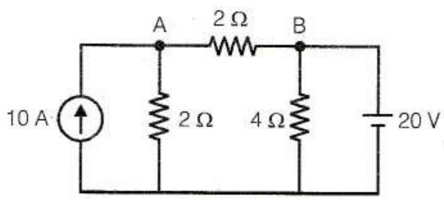
Further,



It is a symmetrical network.

So, I = 0.

53.(C)



Applying KCL at node A

$$\frac{V_A}{2} + \frac{V_A - V_B}{2} = 10$$

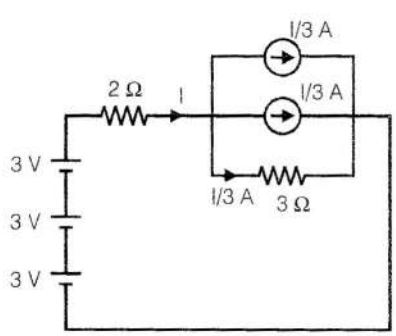
⇒ $2V_A - V_B = 20$ ...(i)

But, $V_B = 20$ V

Hence current through branch AB

$$= \frac{V_A - V_B}{2} = \frac{20 - 20}{2} = 0$$

56.(B)



Applying KVL to mesh

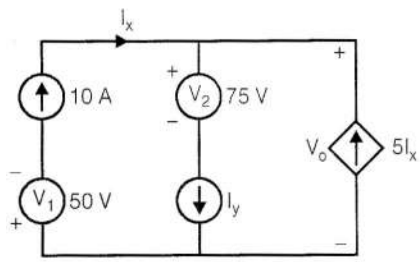
$$-3 - 3 - 3 + 2I + 3\frac{I}{3} = 0$$

$3I = 9 \Rightarrow \quad 1 = 3\,Amp.$

So voltage developed across 3Ω

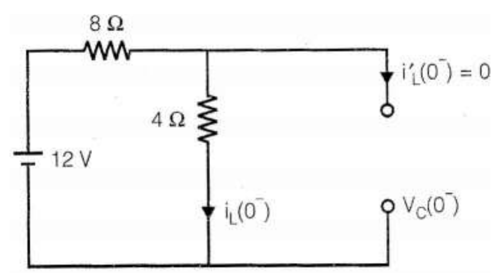
$$= 3\frac{I}{3} = 3V$$

57.(A)



According to Tellegen's theorem, net power developed in any circuit is always zero.

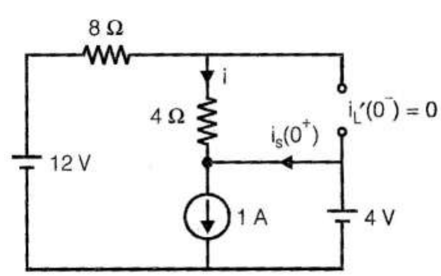
58.(A) At $t = 0^-$ circuit is in steady state; so it can be redrawn as



$$i_L(0^-) = \frac{12}{12} = 1A$$

$$V_C(0^-) = 4 \times 1 = 4V$$

Now at $t = 0^+$ circuit can be redrawn as



Now $i = \frac{12-4}{8+4} = \frac{3}{2} A$

But, $i + i_S(0^+) = 1$

$\therefore \quad i_S(0^+) = 1 - i = 1 - \frac{2}{3}$

$\Rightarrow \quad i_S(0^+) = \frac{1}{3} A$

59.(A) Applying KVL, $20 - 5I - 5\left(1 + \frac{V_1}{5}\right) = 0$

$20 - 10I - 20 = 0$

$\Rightarrow$ I = 0

$\therefore$ Only dependent source acts.

$\frac{V_1}{5} = 4A$

Power delivered

$= I^2R = 16 \times 5 = 80$ W

60.(B) Average power is same as RMS power.

$$P = I^2_{rms}R = \left(\frac{5}{\sqrt{2}}\right)^2 \times 4 = \frac{25}{2} \times 4 = 50W$$

$\frac{25}{2} \times 4 = 50W$ (Power is consumed only by resistance) i.e by real part of impedance.

64.(C) Code

Red – 2

Orange – 3

Orange – 3

equivalent resistance (R_{eq}) = 23×10^3

Source voltage = 50V

$= \frac{50}{23 \times 10^3} = \frac{50}{23} mA$

$\Rightarrow 2.17$

$\Rightarrow$ 2.2 A Appromiate

65.(D) Iav = ?

for metalic wire,

electron per second = 10^{20} e/s–

q = it.

For t = 1 sec

q = i

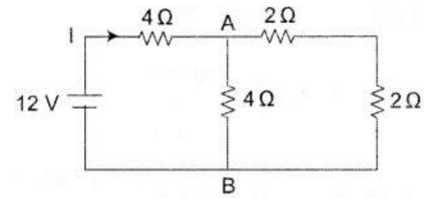
q = ne = $10^{20} \times 1.6 \times 10^{-19}$

$\Rightarrow$ q = 10 × 1.6

$\Rightarrow$ q = 16 coulomb

i = q = 16 amp (t = 1)

87.(C) In order to calculate the voltage across 4Ω resistor, first we will calculate the current in 4 resistor due to voltage source, due to finding this calculate I as shown in the figure.



$I = \frac{V}{R_{eq}}$

$R_{eq} = 4 + 4 \| (2+2) = 4 + 2 = 6\Omega$

so, $I = \frac{12}{6} = 2\,amp.$

Now, the current in branch AB

$= I \times \frac{4}{4 \times 4} = \frac{2 \times 4}{8} = 1\,amp.$

so, voltage drop across 4 Ω = 1 × 4 = 4 V

88.(B) In a series R-C circuit

$V_C = 60$ V

$V_R = 80$ V

Input voltage V_{in} = ?

from the circuit

$|V_{in}| = \sqrt{V_C^2 + V_R^2}$

$\Rightarrow |V_{in}| = \sqrt{(60)^2 + (80)^2} \Rightarrow |V_{in}| = \sqrt{3600 + 6400}$

$\tan\theta = \frac{V_C}{V_R} = \frac{60}{80} = \frac{3}{4}$

$\theta = \tan^{-1}\left(\frac{3}{4}\right) = +36.86 = 37^\circ C$

$V_{in} = |V_{in}| \angle -\theta$

$V_{in} = 100\angle -37^\circ C$

90.(A) V = $V = 10\angle 15^\circ$; $I = 2\angle -45^\circ$

Active power

$= V_{rms} \cdot I_{rms} \cos\theta = \frac{10 \times 2}{2} = 10\,Watt$

Reactive power = $V_{rms}\, I_{rms} \sin\theta$

$= \frac{10 \times \sqrt{3} \times 2}{2} = 17.3\,VAr$