EE 2012 14-26

EE24BTECH11005 - Arjun Pavanje

14) With the initial condition $x(1) = 0.5$, the solution of the differential equation

$$t\frac{dx}{dt} + x = t$$

a) $x = t - \frac{1}{2}$
b) $x = t^2 - \frac{1}{2}$
c) $x = \frac{t^2}{2}$
d) $x = \frac{t}{2}$

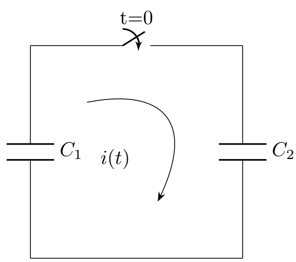
15) The unilateral laplace transform of $f(t) = \frac{1}{s^2+s+1}$ is

a) $-\frac{s}{s^2+s+1^2}$
b) $-\frac{2s-1}{s^2+s+1^2}$
c) $\frac{s}{s^2+s+1^2}$
d) $\frac{2s-1}{s^2+s+1^2}$

16) The average power deliver to an impedence $(4 - j3)\,\omega$ by a current $5\cos(100\pi t + 100)$

a) $44.2W$
b) $50W$
c) $62.5W$
d) $125W$

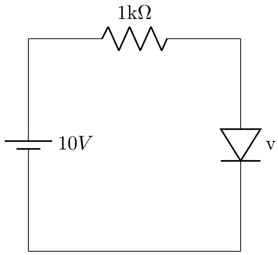
17) In the following figure, C_1 and C_2 are ideal capacitors. C_1 has been charged to $12V$ before the ideal switch S is closed at $t = 0$. The current $i(t)$ for all t is



a) zero
b) a step function
c) an exponentially decaying function
d) an impulse function

18) The $i - v$ characteristics of the diode in the circuit given below are

$$\begin{cases} \frac{v-0.7}{500}A, & v \geq 0.7V \\ 0A, v < 0.7V \end{cases}$$



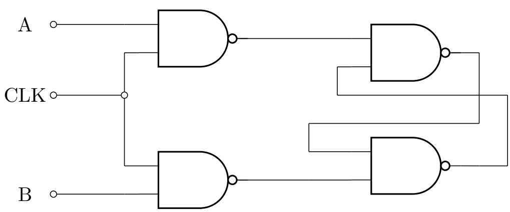
The current in the circuit is,

a) $10mA$
b) $9.3mA$
c) $6.67mA$
d) $6.2mA$

19) The output Y of a $2-bit$ comparator is logic 1 whenever the $2-bit$ input A is greater than the $2-bit$ input B. The number of combinations for which the output is logic 1.is

a) 4
b) 6
c) 8
d) 10

20) Consider the given circuit,

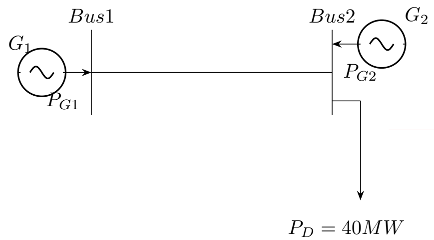


In this circuit, the race around

a) Does not occur
b) Occurs when $CLK = 0$

c) Occurs when $CLK = 0$ and $A = B = 1$ d) Occurs when $CLK = 1$ and $A = B = 0$

21) The figure shoes a two-generator system supplying a load of $P_D = 40MW$, connected at bus 2



The fuel costs of generators G_1, G_2 are:
$C_1\left(P_{G1}\right) = 10{,}000 Rs/MWh$ and $C_2\left(P_{G2}\right) = 12{,}500 Rs/MWh$
and the loss in the line $P_{loss(pu)} = 0.5P^2_{G1(pu)}$, where the loss coeffecient is specified in pu on a $100MVA$ base. The most economic power generation schedule in MW is,

a) $P_{G1} = 20, P_{G2} = 22$

b) $P_{G1} = 22, P_{G2} = 20$

c) $P_{G1} = 20, P_{G2} = 20$

d) $P_{G1} = 0, P_{G2} = 40$

22) The sequence of components in a fault current are as follows: $I_{\text{positive}} = j1.5pu, I_{\text{negative}} = -j0.5pu, I_{\text{zero}} = -j1pu$. The type of fault in the system is

a) LG

b) LL

c) LLG

d) $LLLG$

23) A half-controlled single-phase bridge rectifier is supplying an $R-L$ load. It is operated at a firing angle α and the load current is continuous. The fraction of cycle that the freewheeling diode conducts is

a) $\frac{1}{2}$

b) $1 - \frac{\alpha}{\pi}$

c) $\frac{\alpha}{2\pi}$

d) $\frac{\alpha}{\pi}$

24) The typical ratio of latching current to holding current in a $20A$ thyristor is

a) 5.0

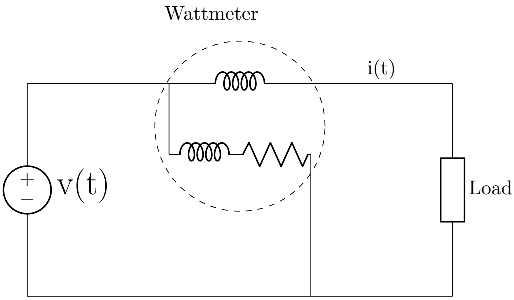
b) 2.0

c) 1.0

d) 0.5

25) For the circuit shown in the figure, the voltage and current expressions are

$$v(t) = E_1 \sin \omega t + E_3 \sin 3\omega t$$
$$i(t) = I_1 \sin \omega t - \phi_1 + I_3 \sin 3\omega t - \phi_3 + I_5 \sin 5\omega t$$



The average power measured by the wattmeter is

a) $\frac{1}{2} E_1 I_1 \cos \phi_1$

b) $\frac{1}{2} \left[E_1 I_1 \cos \phi_1 + E_1 I_3 \cos \phi_3 + E_1 I_5 \right]$

c) $\frac{1}{2} \left[E_1 I_1 \cos \phi_1 + E_3 I_3 \cos \phi_3 \right]$

d) $\frac{1}{2} \left[E_1 I_1 \cos \phi_1 + E_3 I_1 \cos \phi_1 \right]$

26) Given that

$$\mathbf{A} = \begin{pmatrix} -5 & -3 \\ 2 & 0 \end{pmatrix}, \mathbf{I} = \begin{pmatrix} 1 & 0 \\ 0 & 1 \end{pmatrix}$$

the value of $\mathbf{A}^3$ is

a) $15\mathbf{A} + 12\mathbf{I}$

b) $19\mathbf{A} + 30\mathbf{I}$

c) $17\mathbf{A} + 15\mathbf{I}$

d) $17\mathbf{A} + 21\mathbf{I}$