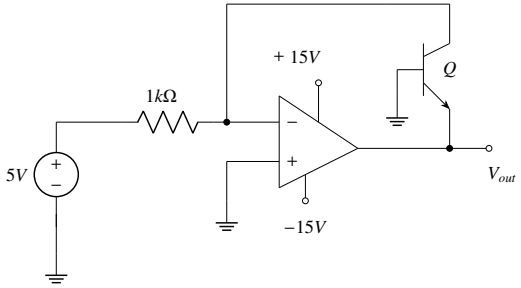
# 2013-EE-1-13

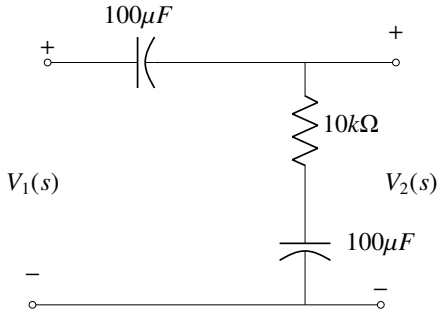
EE24BTECH11010 - BALAJI B

1) In the circuit shown below what is the output voltage ($V_{\text{out}}$) in Volts if a silicon transistor $Q$ and an ideal op-amp are used? (2013-EE)



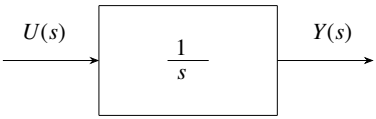

a) $-15$
b) $-0.7$
c) $+0.7$
d) $+15$

2) The transfer function $\frac{V_2(s)}{V_1(s)}$ of the circuit shown below is (2013-EE)




a) $\frac{0.5s+1}{s+1}$
b) $\frac{3s+6}{s+2}$
c) $\frac{s+2}{s+1}$
d) $\frac{s+1}{s+2}$

3) Assuming zero initial condition, the response $y(t)$ of the system given below to a unit step input $u(t)$ is



a) $u(t)$
b) $tu(t)$
c) $\frac{t^2}{2}u(t)$
d) $e^{-t}u(t)$

4) The impulse response of the system is $h(t) = tu(t)$. For an input $u(t-1)$, the output is (2013-EE)

a) $\frac{t^2}{2}u(t)$ b) $\frac{t(t-1)}{2}u(t-1)$ c) $\frac{(t-1)^2}{2}u(t-1)$ d) $\frac{t^2-1}{2}u(t-1)$

5) Which one of the following statements is **NOT TRUE** for a continuous time casual and stable LTI system? (2013-EE)
   a) All the poles of the system must lie on the left side of the $j\omega$ axis
   b) Zeros of the system can lie anywhere in the $s-$ plane.
   c) All the poles must lie within $|s| = 1$
   d) All the roots of the characteristic equation must be located on the left side of the $j\omega$ axis.

6) Two systems with impulse response $h_1(t)$ and $h_2(t)$ are connected is cascade. Then the overall impulse response of the cascaded system is given by (2013-EE)
   a) A product of $h_1(t)$ and $h_2(t)$
   b) Sum of $h_1(t)$ and $h_2(t)$
   c) Convolution of $h_1(t)$ and $h_2(t)$
   d) substraction of $h_2(t)$ from $h_1(t)$

7) A source $v_s(t) = V\cos 100\pi t$ has an internal impedance of $(4 + j3)\,\Omega$. If a purely resistive load connected to this source has to extract the maximum power out of the source, its value in $\Omega$ should be (2013-EE)

a) 3 b) 4 c) 5 d) 7

8) A single-phase load is supplied by a single-phase voltage source. If the current flowing from the load to the source is $10\angle -150^{\circ}\ A$ and if the voltage at the load terminals is $100\angle 60^{\circ}$, then the (2013-EE)
   a) load absorbs real power real power and delivers reactive power
   b) load absorbs real power real power and absorbs reactive power
   c) load delivers real power real power and delivers reactive power
   d) load delivers real power real power and absorbs reactive power

9) A single-phase transformer has no-load loss of $64W$, as obtained from an open-circuit test. When a short-circuit test is performed on it with 90% of the rated currents flowing in its both $LV$ and $HV$ windings, the measured load is $81W$. The transformer has maximum efficiency when operated at (2013-EE)

a) 50.0% of the rated current.
b) 64.0% of the rated current.
c) 80.0% of the rated current.
d) 88.8% of the rated current.

10) The flux density at a point in space is given by $\mathbf{B} = 4x\mathbf{a_x} + 2ky\mathbf{a_y} + 8\mathbf{a_z} Wb/m^2$. The value of constant $k$ must be equal to (2013-EE)

a) $-2$ b) $-0.5$ c) $+0.5$ d) $+2$

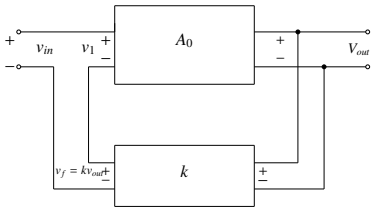
11) A continuous random variable $X$ has a probability density function $f(x) = e^{-x}, 0 < x < \infty$. Then $P\{X > 1\}$ (2013-EE)

a) 0.368 b) 0.5 c) 0.632 d) 1.0

12) The curl of the gradient of the scalar field defined by $V = 2x^2y + 3y^2z4z^2x$ is (2013-EE)

a) $4xy\mathbf{a_x} + 6yz\mathbf{a_y} + 8zx\mathbf{a_z}$
b) $4\mathbf{a_x} + 6\mathbf{a_z} + 8\mathbf{a_z}$
c) $\left(4xy + 4z^2\right)\mathbf{a_x} + \left(2x^2 + 6yz\right)\mathbf{a_y} + \left(3y^2 + 8zx\right)\mathbf{a_z}$
d) 0

13) In the feedback network shown below, if the feedback factor $k$ is increased, then the (2013-EE)




a) input impedance increases and output impedance decrease
b) input impedance increases and output impedance also increase
c) input impedance decrease and output impedance also decrease
d) input impedance decreases and output impedance increases