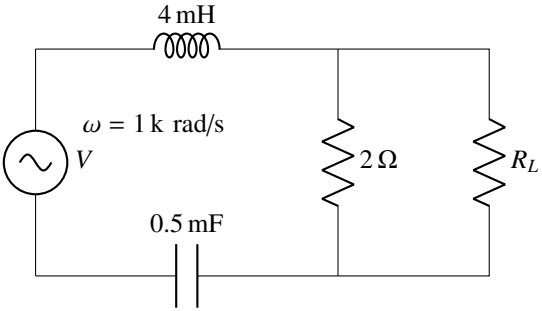
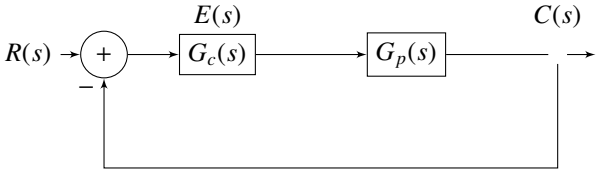
2021-EE

EE24BTECH11060 - sruthi bijili

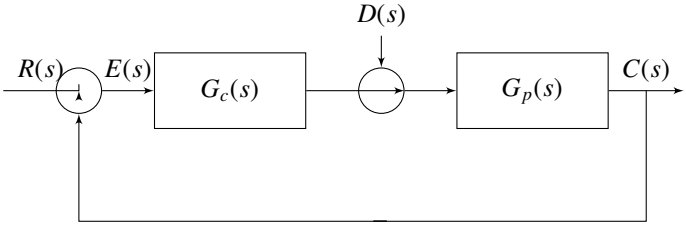
1) In the given circuit,for the maximum power to br delivered to R_L, its value should be ...Ω



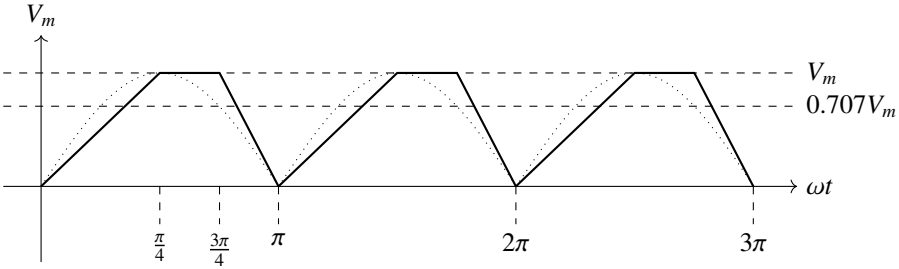
2) One coulomb of point charge moving with a uniform velocity 10 $\hat{x}$ $\frac{m}{s^2}$ enters the region $x \geq 0$ having a magnetic flux density $\bar{B}$=$10y\hat{x} + 10x\hat{y} + 10\hat{z}$ T. The magnitude of force on the charge at x=0^+ is ...N.
$\hat{x}$,$\hat{y}$ and $\hat{z}$ are the unit vectors along x-axis,y-axis and z-axis respectively
3) Consider a large parallel plate capacitor. The gap d between the two plates is filled entirely with a dielectric slab of relative permittivity 5.The plates are initially charged to a potential difference of V volts and the then disconnected from the source. If the dielectric slab is pulled out completely,then the ratio of the new electric field E_2 in the gap to the original electric field E_1 is...
4) Consider a continuous-time signal $X(t)$ defined by $X(t) = 0$ for $|t|$ >0,and $X(t)$=$1-|t|$ for $|t| \leq 1$.Let the fourier transform of $X(t)$ be defined as $X(\omega)$=$\int_{-\infty}^{\infty} x(t)\, e_{-jwt} dt$.The maximum magnitude of $X(\omega)$ is ....
5) A belt-driven DC shunt generator running at 300RPM delivers 100kW to a $200V$.Ignoring armature reaction,the speed of the motor is ...RPM.
6) An 8-pole 50Hz,three-phase,slip-ring induction motor has an effective rotor resistance of 0.08Ω per phase. Its speed at maximum torque is 650 RPM. The additional resistance per phase that must be inserted in the rotor to achieve maximum torque at start is ...Ω.Neglect magnetizing current and stator leakage impedance. Consider equivalent circuit parameters referred to stator.
7) Consider a closed-loop system as shown.$G_p(S)$=$\frac{14.4}{s(1+0.1s)}$ is the plant transfer function and $G_e(s) = 1$ is the compensator. For a unit-step input,the output response has damped oscillations. The damped natural frequency is ... $\frac{rad}{s}$.



8) In the given figure, plant $G_p(s)=\frac{2.2}{(1+0.1s)(1+0.4s)(1+1.2s)}$ and compensator $G_e(s)=k\left(\frac{1+T_1 s}{1+T_2 s}\right)$.The external disturbance input is D_s. It is desired that when the disturbance is a unit step,the steady-state error should not exceed 0.1 unit. The minimum value of K is...

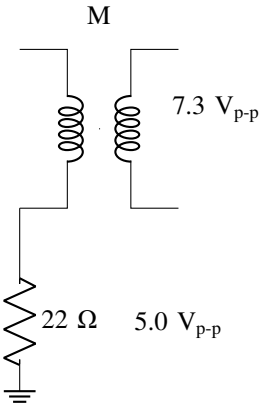


9) The waveform shown in the solid line is obtained by clipping a full-wave rectified sinusoidal.The ratio of the RMS value of the full-wave rectified waveform to the RMS value of the clipped waveform is ...

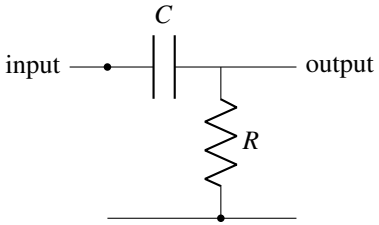


10) The state space representation of a first-order system is given as
$\dot{x}=-x+u$
$y=x$
where,x is the state variable,u is the control input and y is the controlled output. Let $u=-kx$ be the control law,where K is the controller gain. To place a closed-loop pole at -2,the value of K is...

11) An air-core radio-frequency transformer as shown has a primary winding and a secondary windingand connect an AC source across the transformer and connect other end to the resistor. The mutual inductance M between the windings of the transformer is ...μH.



12) A $100Hz$ square wave,switching between $0V$ and $5V$,is applied to a CR high-pass filter circuit as shown.The output voltage waveform across the resistor is $6.2V$ peak-to-peak. If the resistance R is 820Ω,then the value of C is $\ldots\mu F$.



13) A CMOS schmitt-trigger inverter has a low output level of $0V$ and a high output level of $5V$. It has input thresholds of $1.6V$ and $2.4V$. The input capacitance and output resistance of the schmitt-trigger are negligible. The frequency of the oscillator shown in $\ldots Hz$.