Question one:
(1) Define the following
(a) Open loop
(b) Close loop
(c) Transfer function
(d) Laplace transforms
(2) Give an example of general application of
(a) Open-loop
(b) Closed-loop

Question two:
(1) Write the general form of Laplace transforms
(2) Evaluate the Laplace transforms of the following functions of time $f(t)$ for $t>0$, with $f(t)=0$ for $t<0$ in all cases:
   (a) $2$
   (b) $3t$
   (c) $\frac{df(t)}{dt}$
   (d) $\sin(wt)$
(3) Discuss the uses of PNP and NPN transistors as switch (circuit diagram required)

Question three:
(1) Steps down the procedure for driving, by theoretical means, the transfer function for any system
(2) Derive the transfer function of the RLC circuit shown in fig(1) with input the voltage $V_i(t)$ and output the voltage $V_o(t)$. 
(3) Derive the overall transfer function for the system represented by fig(2).

**Question four:**

(1) Explain the response of second order system to transient inputs:
   (a) Unit step input
   (b) Unit ramp input
(2) For a system component with transfer function $G(s) = \frac{Y(s)}{X(s)} = \frac{1}{s + 5s + 4}$ find the response $y(t)$ to an input forcing function $x(t)$ which is:
   (a) a unit step
   (b) a unit ramp

**Question five:**

(1) Discuss the analysis of feedback systems stability.
(2) A unity feedback system has forward loop transfer function $\frac{5}{s(s+1)(s+3)}$. Is it stable?
(3) A feedback system has a process with transfer function $G(s) = \frac{5}{s(s+1)(s+3)}$ in the forward loop, and transfer function $H(s) = \frac{1}{s+1}$ in the feedback loop. Is it stable?