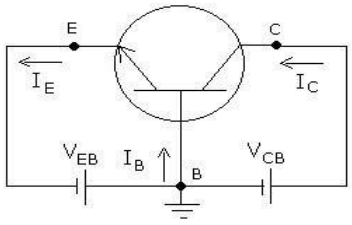
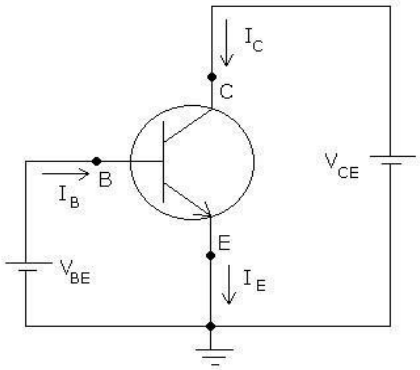
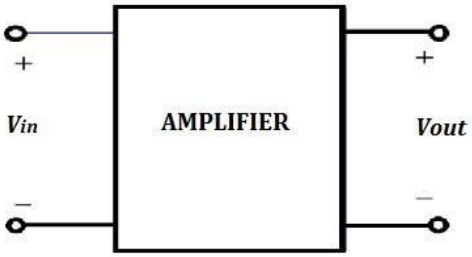
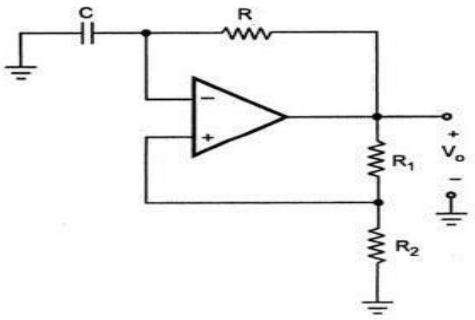
ECE - 1051: Basic Electronics
List of Formulae

1.	Diode Current	$I_D = I_s\{e^{\frac{kV_D}{T_K}} - 1\}$	I_s: Reverse saturation current V_D : Bias potential k = 11,600/ɳ T_K : Operating temperature in kelvin.
2.	Ripple Factor of Half-wave rectifier with capacitor filter	$\frac{1}{2\sqrt{3}fCR_L}$	*f:* frequency. *C*: Capacitance. R_L: Load resistance.
3.	Ripple Factor of fullwave rectifier with capacitor filter	$\frac{1}{4\sqrt{3}fCR_L}$	*f:* frequency. *C*: Capacitance. R_L: Load resistance.
4.	DC output voltage of Half-wave rectifier	$\frac{2fCR_L}{1+2fCR_L}$	*f:* frequency *C*: Capacitance R_L: Load resistance
5.	DC output voltage of full-wave rectifier	$\frac{4fCR_L}{1+4fCR_L}$	*f:* frequency *C*: Capacitance R_L: Load resistance
6.	Emitter Current of Bipolar junction transistor	$I_E = I_C + I_B$	I_C : Collector current I_B : Base current

7.	Collector Current of Bipolar junction transistor in CB Configuration	 $I_C=\alpha I_E+I_{CBO}$	α : Common-base current gain I_{CBO} : Common base leakage current
8.	Collector Current of Bipolar junction transistor in CE Configuration	 $I_C=\beta I_B+I_{CEO}$)	β: Common emitter current gain. I_{CEO} : Common emitter leakage current.
9.	Voltage Gain of Amplifier in decibels	 $(A_V)_{dB} = 20log_{10}(\frac{V_{Out}}{V_{In}})$	V_{Out} :Output voltage V_{In} :Input voltage

10.	Common Mode Rejection Ratio (CMRR)	$CMRR = 20\log(\frac{A_d}{A_{cm}})$	A_d :Differential voltage gain A_{cm} :Common mode voltage gain
11.	Time period of output of Operational amplifier based square wave generator	 $T = 2RCln(\frac{1+\beta}{1-\beta})$	β : Feedback factor $= \frac{R_2}{R_1+R_2}$ *R:* Resistance. *C:* Capacitance

12.	Output voltage of Differential Amplifier	$V_O = A_d V_d + A_{cm} V_{cm}$	A_d : Differential voltage gain A_{cm} : Common mode voltage gain. V_d : Differential voltage. V_{cm} : Common mode voltage.
13.	Commutative Law	Property 1: $(x + y) = (y + x)$ Property 2: $x.\ y = y.\ x$	*x,y,z*…are Boolean Variables
14.	Associative Law	Property 1: $(x + y) + z = x + (y + z)$ Property 2: $(x.\ y)z = x(y.\ z)$	
15.	Distributive Law	Property 1: $x\ (y + z) = x.\ y + x.\ z$ Property 2: $x + x.\ y = x + y$	

16.	DeMorgan's Theorem	Theorem 1: $\bar{x+y} = \bar{x}.\bar{y}$ Theorem 2: $\bar{x.y} = \bar{x} + \bar{y}$	
17.	Amplitude Modulated signal	$S(t) = A_C[1 + k_a m(t)]Cos(2\pi f_c t)$	A_c *:* Amplitude of carrier signal. k*a :* Amplitude sensitivity. *m(t) :* Modulating signal. f_c *:* frequency of carrier signal.
18.	Modulation Index of AM Signal	$\mu = k_a m(t)$	k_a *:* Amplitude sensitivity. *m(t) :* Modulating signal.
19.	Frequency Modulated signal	$S(t) = A_C Cos[2\pi f_c t + 2\pi k_f \int_0^t m(t)dt]$	A_c *:* Amplitude of carrier signal. k_f *:* Frequency sensitivity. *m(t) :* Modulating signal. f_c *:* frequency of carrier signal
20.	Carson's rule	$B_T = 2(\Delta f + f_m)$	Δf *:* Frequency deviation. f_m *:* frequency of modulating signal