

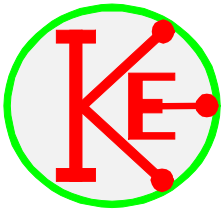
Essential Knowledge and formulae AS & A2 Electronics

The following list of topics is essential knowledge that may be needed in the Electronics Module Examinations.

- ☺ means that it is very essential,
☺☺ means that it is absolutely essential.

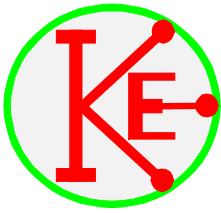
Foundation Module.

- ☺ Basic Truth tables
- ☺ Use of ohm's Law
- Calculation of power
- Resistors in parallel
- Resistors in Series
- ☺ Calculation of series resistor for LEDs and zener diodes
- ☺ Voltage divider calculations
- ☺ Op-amp comparator formulae
- Capacitors in series
- Capacitors in parallel
- Time constants
- ☺ 555 monostable circuit diagram
- ☺☺ Explanation of how 555 monostable works
- ☺ Calculation of 555 monostable period
- ☺ 555 astable circuit diagram
- ☺☺ Explanation of how 555 astable works
- ☺ Calculation of 555 astable period.



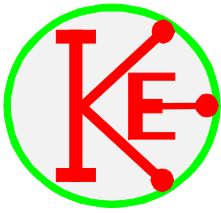
Further Module

- Karnaugh maps
- 😊 Circuit diagram for NAND gate latch
- 😊😊 Explain how a NAND gate bistable latch works
- Circuit diagram for a D-type shift register
- Explanation of how a D-type shift register works
- 😊 Circuit diagram for a NAND gate monostable
- 😊😊 Explanation of how a NAND gate monostable works
- 😊 Calculation of period of a NAND gate monostable
- 😊 Circuit diagram for a NAND gate astable
- 😊😊 Explanation of how a NAND gate astable works
- 😊 Calculation of period of a NAND gate astable
- Modulo N up/down counters
- Hexadecimal notation
- 😊 Circuit diagram of an inverting op-amp amplifier
- 😊 Calculation of the voltage gain of an inverting op-amp amplifier
- 😊 Circuit diagram of a non-inverting op-amp amplifier
- 😊 Calculation of the voltage gain of a non-inverting op-amp amplifier
- 😊 Circuit diagram of a summing op-amp amplifier
- Calculation of the output voltage of a summing op-amp amplifier
- Calculation of the reactance of a capacitor
- Circuit diagram of high pass and low pass filters
- Calculation of filter circuit break points
- 😊 Circuit diagram of a push pull amplifier
- 😊😊 Effects of saturation distortion
- 😊😊 Effects and cures for cross-over distortion
- 😊 Calculation of output power from a push pull amplifier
- 😊😊 Features of efficient heat sinks.



Electronic control systems

- The features of open and closed loop control systems examples
- The features of negative and positive feedback
- 😊 The structure of a basic microcontroller
- The features of memory mapping and I/O mapping
- The basic architecture of a PIC/AVR
- 😊 Simple Flow charts.
- 😊😊 Simple QBasic programming
- 😊 The features of hardware interrupts and software polling
- The basic features of Neural networks
- 😊 The features the use of tri-state buffers
- 😊 The features of data latches.
- The features of an 8-bit DAC based on a summing amplifier
- A block diagram of an 8-bit digital ramp ADC
- 😊 Explanation of how an 8-bit digital ramp ADC works
- A block diagram of a flash ADC
- Explain how a flash ADC works
- Relative merits of flash and digital ramp ADCs
- Circuit diagram of Schmitt trigger.
- Calculation of switching levels
- 😊 Optical shaft encoders
- 😊 Stepper motors



Communication Systems

- ☺ Block diagram of a generalised communications system
- Features of transmission media
- Features of Multiplexing Time and Frequency
- Features of noise, distortion and crosstalk
- Signal to noise ratio
- ☺☺ AM and FM and their frequency spectrum
- ☺ Block diagram of a simple radio receiver
- ☺ Features of a simple radio receiver
- Calculation of wavelength and aerials
- Features of tuned circuits and resonance
- Calculation of resonant frequency and Q
- ☺ Block diagram of a superhet radio
- ☺☺ Features of the superhet receiver
- Calculations of local oscillator frequencies
- Features of mobile cellnet telephones
- ☺ Features of pulse modulation PAM, PWM, PCM
- Features of sample rate
- ☺ Features of serial transmission
- Calculation of bit and baud rate
- Features of Shift registers
- Features of Multiplexers
- Features of optical fibres TIR
- Features of Laser diodes and PIN diodes
- ☺ Comparison of optical fibres and wired systems