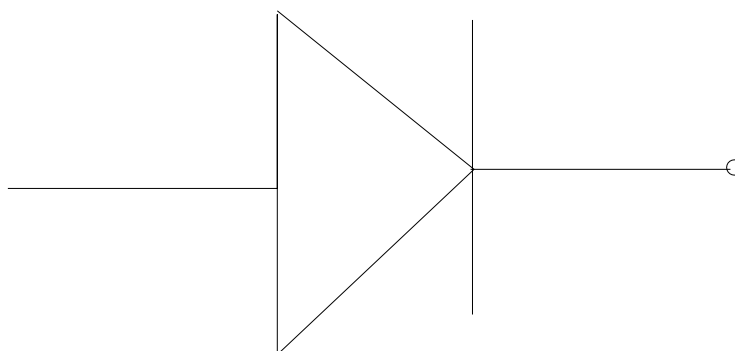


NATIONAL BUSINESS AND TECHNICAL EXAMINATIONS BOARD (NABTEB)
ELECTRONIC WORKS
MAY/JUNE 2007

(1) (a) Define a junction Diode.

A P-N junction is known as semiconductor diode. It is also known as “crystal diode” as it is grown out of a crystal. It is called junction diode.



Junction diode is a solid state two terminal device which conducts with zero resistance when

forward biased and appears an infinite resistance when reverse biased.

- (b) When is junction diode?
 - (i) Forward biased?
 - (ii) Reverse biased?

ANSWER

- (i) A junction diode conduct only when it is forward biased.
- (ii) A junction diode does not conduct when it is reverse biased.

QUESTION

- (c) List three types of Multivibrator.

ANSWER

- (i) A stable multivibrator
- (ii) Bi-stable multivibrator
- (iii) Micro-stable multivibrator.

- (2) (a) Draw and explain the block diagram of a regulated power supply.

ANSWER

A power supply which maintains constant output irrespectively of fluctuation in the AC input or in the load is called a regulated power supply.

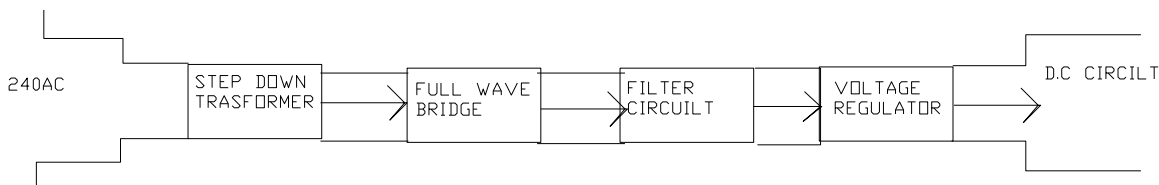


Fig 1. Block diagram of a regulated power supply. The combination of a transformer, a rectifier filter and voltage regulator constitutes power supply.

From fig 1. Single phase AC supply is available at 226 to 240v, while a small step down transformer is used to reduce the voltage level according to the needs. The next block is a

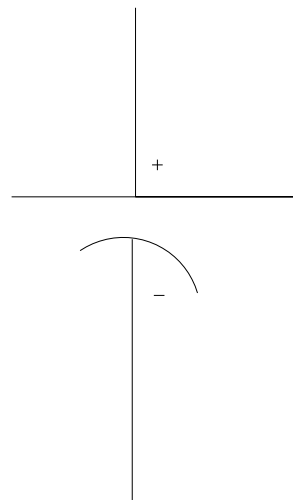
rectifier which converts the sinusoidal AC voltage into pulsating DC.

The third stage is a filter block which reduces (smooth, removes, filter out). The ripples (AC components) from the rectifier O/p voltage. The last stage is a voltage regulator block which maintain a constant output irrespective of fluctuations in the AC input or in the load.

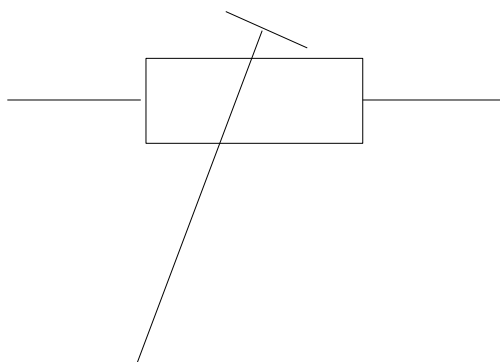
(b) What is the function of Fuse used in an electronics circuits?

(iii) Draw the symbol of the following

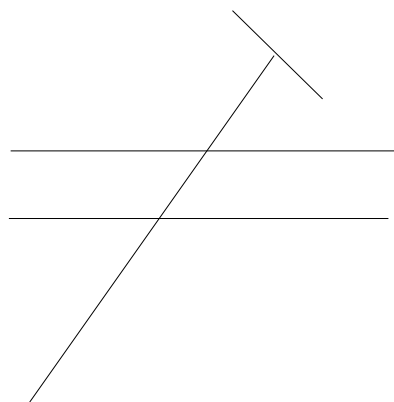
(i) Electrolytic capacitor



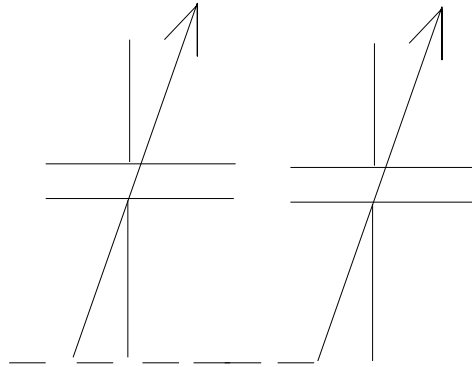
(ii) Preset potentiometer



(iii) Trimmer capacitor



(iv) Ganged capacitor



(3) (a) Explain the term super heterodyne radio receiver.

In electronics, the process of combining signals so that their frequencies add or subtract is called heterodyning. Thus, a superior receiver is a receiver that works by combining frequencies.

The mixer and local oscillator sections of super heterodyne receiver perform the input frequencies (RF & local oscillator). The two frequencies are combining (heterodyned) to produce a different frequency called intermediate frequency I. F.

(b) State TWO advantages of super heterodyne radio receiver.

1. It is the ability to provide any desired selectivity characteristics.
2. It has the ability to provide large amounts of amplification without oscillation.
3. Its sensitivity and selectivity remain almost constant as the receiver is tuned cover a band of frequencies

(c) A radio receiver having an intermediate frequency of 235 KHz is tuned to a station transmitting on 480KHz. Calculate the frequency of the local oscillator.

SOLUTION

$$F_o = F_s + F_i$$

$$F_o = (480 + 235) \text{ KHz}$$

$$F_o = 715 \text{ KHz Ans}$$

KEYS

F_o = Local oscillator frequency.

F_s = Station transmitting frequency.

F_i = Intermediate frequency.

(4) (a) Explain the following terms:

(i) **Modulation:** Modulation is the process of combining the low frequency signal with a very high frequency radio wave called carrier wave (cw).

The result wave is called modulated carrier wave. This job is done at the transmitting station.

(ii) **Demodulation:** It is the process of separating or recovering the intelligent (low frequency) signal from the modulated carrier wave.

(iv) **Unmodulated carrier:** When the characteristics of the carrier are yet to be varied in accordance with the signal or intelligence to be conveyed, it is referred to as unmodulated carrier.

(v) **Selectivity:** Is the ability of a receiver or reject unwanted signal and accept the desired signal.

(5) (a) Define the following terms.

(iii) **Negative Feedback:** Is when the voltage feedback is in opposite phase (ant phase) to the signal.

In other words: if the voltage is so applied as to reduce the amplifier input (i. e. it is 180° out of phase with it), then it is called negative feedback.

(iv) **Positive Feedback:** Is when the voltage feedback is in phase with the original signal.

(b) State advantage of negated feedback over positive feedback.

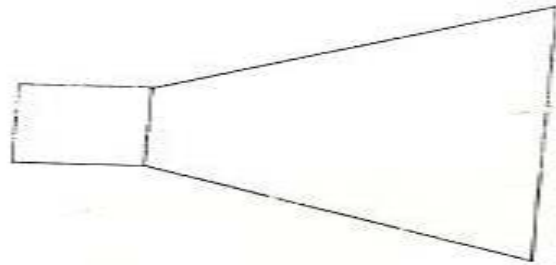
- (1) Higher fidelity i. e. more linear operation.
- (2) Increased band with i. e. improved frequency response.
- (3) Highly stabilized gain.
- (4) Less frequency distortion.
- (5) Less amplitude distortion.
- (6) Less phase distortion.
- (7) Reduced noise.
- (8) It increases input impedance.

(6) (a) Mention any five general safety precautions while working on a television set.

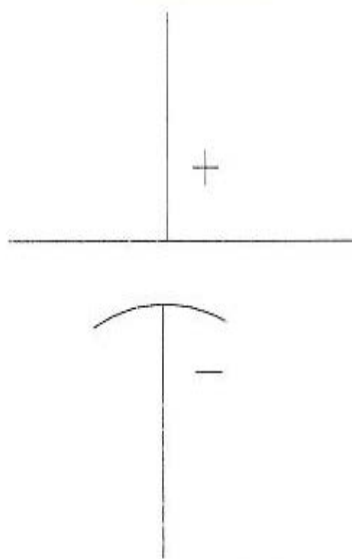
1. Do not scatter the screws after dismantle the T. V keep them well.
2. Carefully observe the symptoms and analyze the people causes before commencing repair.
3. Avoid taking unnecessary risk, make sure you wear safety shoes to avoid electric shock.
4. Disconnect the T. V. set from the main supply before soldering commence.
5. Do not allow the hot iron to have contact with any adjacent component.
6. Do not allow molten solder to spatter on any adjacent parts. This may result to short circuit.
7. Provide a metallic stand for the iron; on no account should you place it on the wooden materials.

(b) Sketch the symbol of the following device and state the applications of each

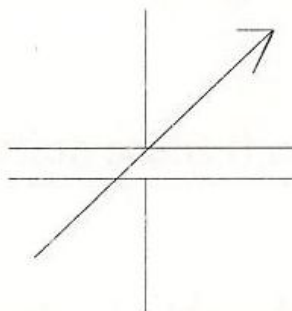
- i. **Loud speaker-** Used to conduct FM electrical signal to sound signal.



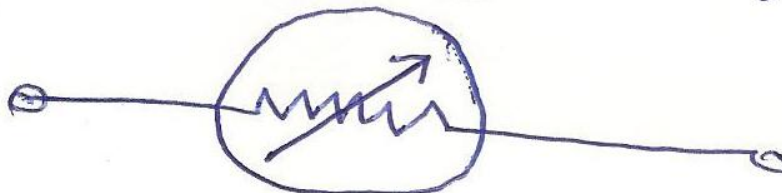
- ii. **Electrolytic capacitor-** Used as a filter circuit at the power supply storage of the T. V. set.



iii. **Variable Capacitor**



iv. **Photo cell-** One of the application of photo cell is as a voltage regulator. The voltage across the device will remain constant.



7 (a) State the purpose of the following section in a T. V. set.

- i. **High voltage power supply:** It provide enough high voltage to operate the beam of the cathode ray tube. E. g. black and the white needs 12kv while coloured TV require 25kv.
- ii. **Low voltage power supply:** It provide the initial voltage and currents needed for T. V. operation.
- iii. **Vertical deflection:** It deflects the focusing of cathode ray beam from the top of the screen to its bottom.
- iv. **Horizontal deflection:** This section scans the cathode ray beam from the left of the screen to the right end.
- v. **Video chain:** This section consists of video detectors & video amplifier. They detect video signals and amplified it to a certain strength that can drive the CRT. The contrast control is also associated with this stage. It controls the strength of the video signals.
- vi. **Sound chain:** Sound (audio) chain consist of sound if amplifier, limiter FM,

detector, audio amplifier and loud speaker. They also provide sound at 10.7MHz FM for TV.

- vii. **Synchronizing:** Is to keep in step the transmitter and receiver signal so that there will be agreement between the base board channel selection at the two ends.
- viii. **Colour:** It's responsible for the chrominance (live) of the colour TV.
- ix. **Cathode ray tube (CRT):** It is a vacuum tube whose function is that of a visual displaying device i. e. it is a transducer which converts the received electrical signal back into picture (light) signal on the T. V. screen.
- x. **Mixer.** The local oscillator (F_o) and RF (F_r) signal combined or heterodyned at the mixer to produce a different frequency called I. F.