

KARPAGAM COLLEGE OF ENGINEERING, COIMBATORE

B.E. ELECTRICAL & ELECTRONICS ENGG

CIA - 3 ANSWER KEY

12E605 - POWER ELECTRONICS

PART-A

A1:

SCR not preferred for inverters:

* Since input supply is DC natural commutation cannot take place

* Requires forced commutation circuits making/ increasing the complexity and cost.

A2:

Current source Inverter

Input is current source
so requires large reactor

Shoot through fault
donot occur.

Freewheeling diodes are
not required

Voltage waveform depends
on load

Voltage source Inverter

Input is voltage source
so donot require large
reactor

Possibility of occurrence
of shoot through fault.

Freewheeling diodes are
required in case of inductive
load.

Current waveform depends
on load.

A3: Condition to be satisfied in selection of L & C in series inverter.

$$R^2 < \frac{4L}{C}$$

A4: AC voltage controller Cycloconverter

* can vary output voltage by varying ~~the~~ firing angle / by phase angle control

can vary output voltage and output frequency by proper switching of devices.

A5: Amplitude modulation Index.

$$M = \frac{A_r}{A_c}$$

Modulation Index is defined as ratio of amplitude of reference signal to carrier signal wave.

A_r \rightarrow Amplitude of reference wave
 A_c \rightarrow Amplitude of carrier wave

A6. To operate the device within its upper temperature limit, the heat produced by losses in a device must be dissipated sufficiently & effectively.

Therefore, heat sink & cooling arrangement for devices are employed.

A7. Thermal failure

It is a failure caused by inaccurate design of the heat sink or inadequate cooling arrangements.

Electrical failure.

A short circuit, which occurs when there is a junction breakdown because the device ratings are exceeded due to flaws in fabrication, results in electrical failure

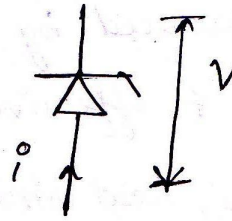
A8. Conditions for over current fault.

- ✓ Output short circuit
- ✓ Internal faults in a thyristor circuit.
- ✓ Inversion failure in a forced-commutation circuits
- ✓ Short circuit between one of the phases of mains and the bridge.

A9. Two types of Selenium Voltage limiter

a) Polarized

b) Non-polarized,



Circuit Symbols.

A10. Necessity of heat sink.

Power dissipation in electrical components raises the internal temperature & affects performance and reliability.

A high internal temperature may be detrimental to the physical structure of the component.

Thus heat sink is necessary for the removal of heat & internal temperature of the electrical components.