BOARD OF STUDIES
NEW SOUTH WALES

2011 Industrial Technology: Electronics Technologies HSC Examination 'Sample Answers'

When examination committees develop questions for the examination, they may write 'sample answers' or, in the case of some questions, 'answers could include'. The committees do this to ensure that the questions will effectively assess students' knowledge and skills.

This material is also provided to the Supervisor of Marking, to give some guidance about the nature and scope of the responses the committee expected students would produce. How sample answers are used at marking centres varies. Sample answers may be used extensively and even modified at the marking centre OR they may be considered only briefly at the beginning of marking. In a few cases, the sample answers may not be used at all at marking.

The Board publishes this information to assist in understanding how the marking guidelines were implemented.

The 'sample answers' or similar advice contained in this document are not intended to be exemplary or even complete answers or responses. As they are part of the examination committee's 'working document', they may contain typographical errors, omissions, or only some of the possible correct answers.

Section II

Question 11

Sample answer:

A diode will be damaged if:

- a current exceeding the maximum forward current is allowed to pass through it
- reversed-voltage exceeds the peak inverse voltage.

Question 12

Answers could include:

Compared to filament globes LEDs:

- are small and reliable
- are cheaper to make
- are cheaper to operate
- are less fragile
- have long life
- have high operating speed
- use less current.

Question 13

Answers could include:

Loudspeaker operating properties that should be considered are:

- Impedance – must match the impedance (total opposition to ac) of the amplifier for maximum power transfer.
- Power rating – the maximum power that the speaker can apply above which permanent damage occurs.
- Frequency response – the range of frequencies the speaker can reproduce.

Question 14

Answers could include:

Operation:

Magnetic flux linkage – coupling or mutual inductance between two or more coils: the input coil or primary coil and the output coil or secondary coil. A step-up transformer increases the output voltage. A step-down transformer reduces the output voltage.

These coils are wound on either a common soft iron core or, in many instances, as overlapping layers to increase coupling.
An alternating voltage connected to the primary causes an alternating current, which produces an alternating magnetic field.

This filed links with the second coil and produces an induced emf through the core.
If a load is connected then an induced alternating current will flow through it.

Ratio of voltages is equal to the number of turns:

$$\frac{\text{primary voltage}}{\text{secondary voltage}} = \frac{\text{number of turns on the primary coil}}{\text{number of turns on the secondary coil}}$$

- step-up transformer $>$ emf
- step-down transformer $<$ emf

Question 15

Sample answer:

Equal branch currents = equal branch resistance

Left branch: $R_T = 50 + 20$

$= 70\Omega$

Right branch: $\frac{1}{R} = \frac{1}{60} + \frac{1}{120}$

$= \frac{3}{120}$

$\therefore R = 40$

$\therefore R_T = R_x + 40$

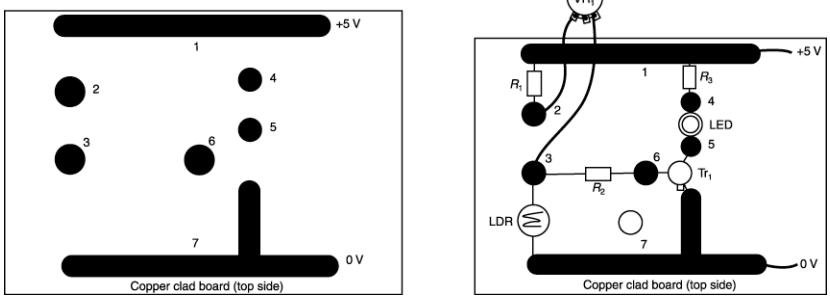
$\therefore R_x + 40 = 70$

$R_x = 70 - 40$

$= 30\Omega$

Question 16

Sample answer:



Issues to be considered in the design of the PCB track layout (mask):

- identification of pad's soldering components
- identification of tracks for joining pads (components) together
- identification of holes for attaching components
- identification of components that can stand off the PCB, eg LDR
- identification of components that can be mounted at the edge of the PCB, eg LDR.

Section III

Question 17 (a)

Answers could include:

Personal issues should include:

- a core of experienced staff, particularly HR manager
- someone
  - who fully understands the company's policies, ethos and procedures
  - has the authority to make decisions
- recruit locals to build local profile and teamwork
- employment

– local or transferred from old site/parent company
– travel interstate – cost, family, emotional/financial
– training, multiskilling
– facilities, provision, room, toilets, showers etc
– legislation, EEO etc
– low morale issue that could cause distress or concern
– change in staff dynamics
– communication between management and staff about the expansion.

Question 17 (b)

Answers could include:

Factors other than personnel:

- location
  - near to market for products (outlets, material, transport)
  - near to labour supply – skilled and unskilled, local or transferred old site
  - near to supply of raw/input materials
  - suitable geographic conditions considering heat/humidity/flood/fire/snow etc
  - positioned well to compete with opposition companies
  - positioned well for storage, logistics, distribution and waste management
- state and local legislation and their effect on operations, hours, zone etc
- ensure that same quality of production as at parent company plant
- need for company to be able to act with some autonomy and not have to constantly seek approval of decision from 'head office'
- competition, market share, opportunities for growth
- marketing of new facility
- need for new equipment and/or technology
- ability to act with autonomy rather than constantly seek approval from 'head office'.