RATU NAVULA COLLEGE

# YEAR 12 TERM THREE TRIAL EXAMINATION 2020

# APPLIED TECHNOLOGY

**Time allowed:** 3 Hours
*(An extra 10 minutes is allowed for reading this paper.)*

## INSTRUCTIONS

1. Write **all** your answers in the **Space** provided in the **Answer Booklet**.
2. Write your **Name, Level & Index Number** on the front page of the **Answer Book**.
3. If you require more paper, ask the supervisor for extra sheets. Have these stapled to the **Answer Book** at the appropriate places.
4. There are **three** sections in this paper. **Sections A and B are compulsory. Note the choices in Sections C.**

## SUMMARY OF QUESTIONS

| SECTION | GUIDELINES | MARK | SUGGESTED TIME |
|---|---|---|---|
| A | There are **twenty** multiple-choice questions. **All the questions are compulsory.** | 20 | 36 minutes |
| B | There are **six** questions. **All the questions are compulsory.** | 60 | 108 minutes |
| C | There are **three** questions. **Answer any one question.** | 20 | 36 minutes |
| | **TOTAL** | **100** | **180 minutes** |



**SECTION A** **[20 marks]**
**MULTIPLE – CHOICE QUESTIONS COMPULSORY** **(20 marks)**

1. Safety goggles should be used when one is
   A. Cutting a piece of timber with a saw.
   B. Painting a piece of work.
   C. Operating power tools.
   D. Using a jack plane.

2. To provide easy movement, the fittings used on the legs bases of furniture are
   A. Castors.
   B. Lid support.
   C. Shelf brackets.
   D. Handles and pulls.

3. The cambium layer is normally located between
   A. The heartwood and the pith.
   B. The heartwood and the sapwood.
   C. The inner bark and the sapwood.
   D. The sapwood and the outer bark.

4. The first thing to do when the workshop is suddenly filled with smoke is to
   A. Locate the source of the smoke.
   B. Look for a fire extinguisher.
   C. Get everybody to a safe place.
   D. Get everybody to extinguish the fire.

5. The welding position of the torch usually used for joining thin metal is called
   A. up hand welding.
   B. forehead welding.
   C. back head welding.
   D. down hand welding.

6. Portable power tools should be well maintained to
   A. Shorten their life span.
   B. Keep them neat and tidy.
   C. Maximize their working capacity.
   D. Satisfy the requirements stated in the manuals.

7. When using a butt hinge to hang a door to a cabinet, it is best to
   A. Cut the recess on the stile.
   B. Reduce the width of the door.
   C. Cut the recess to the side of the cabinet.
   D. Cut the recess on both the cabinet and the stile.

8. In the course of turning a lamp stand a student would periodically stop the machine and measure the diameter of the stand. Which of the following measuring tools would he use?
   A. Steel rule.
   B. Measuring tape.
   C. Inside caliper.
   D. Outside caliper.

9. The process of cutting external thread is known as
   A. Tapping.
   B. Reaming.
   C. Tapering.
   D. Threading.

10. In oxy-acetylene welding, an oxidizing flame contains
   A. No oxygen.
   B. No acetylene.
   C. An excess of oxygen.
   D. An excess of acetylene.

11. The process of softening a metal by heating it above a critical temperature and cooling it slowly is called
   A. Annealing.
   B. Tempering.
   C. Normalizing.
   D. Case- hardening.

12. Spring dividers are used for
   A. Spacing out equal distances.
   B. Checking internal diameters.
   C. Checking the depths of holes.
   D. Finding the centers of round bars.

13. Brass which is used to make medals, plaques and trophies, is an alloy of
   A. Tin and zinc.
   B. Zinc and lead.
   C. Copper and tin.
   D. Copper and zinc.

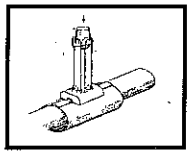
14. The crankshaft of an engine is used to
   A. Start the engine.
   B. Speed up the engine.
   C. Convert rotary motion into reciprocating motion.
   D. Convert reciprocating motion into rotary motion.



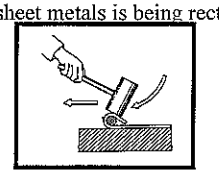
15. The quickest and easiest way to cut sheet metal is by
   A. Grinding.
   B. Shearing.
   C. Reduction.
   D. Compression.

16. The mixing of petrol and air in correct proportions takes place in
   A. The combustion chamber.
   B. The carburetor.
   C. The fuel pump.
   D. The filter.

17. The tool being used to close down the joint on the right is
   A. The set and snap.
   B. The seaming tool.
   C. The hollow punch.
   D. The grooving punch.



18. Which type of fault in the wire edging of sheet metals is being rectified as shown in the diagram?
   A. Short fold.
   B. Thick plate.
   C. Excess of material.
   D. Over- size wire gauge.



19. The best tool to use when extracting cotter pins and rivet is
   A. A centre punch.
   B. Bell punch.
   C. Dot punch.
   D. Pin punch.

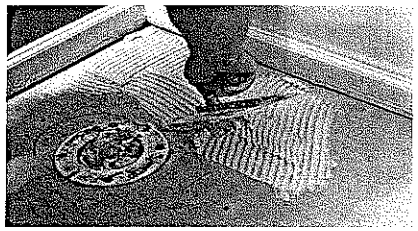
20. Which of the following machines has a part called a depth stop?
   A. The lathe.
   B. The power saw.
   C. The band saw.
   D. The drilling machine.

**SECTION B** **[60MARKS]**

There are **six** questions in this section **are all compulsory.** Each question is worth **10 marks.**

**QUESTION 1** **BASIC HOME IMPROVEMENT** **(10 marks)**

**a.** Describe the tiling process shown in the diagram below.

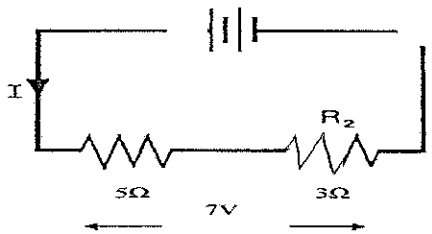


**(2 marks)**

b. State **one** hand tool used in tiling. **(1 mark)**

**c.** Name **two** main components of a septic system **(2 marks)**

**d.** The diagram given below shows a circuit diagram. Study the diagram carefully and answer the questions that follow.




A power dissipated of 7V is applied to two resistors (5Ω and 3Ω) connected to the series. Calculate the following:

1. The combine resistance. **(1 mark)**
2. The current flow. **(1 mark)**
3. Power dissipated across the 5Ω resistor. **(1 mark)**

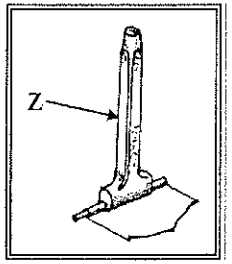
e. Sketch the electrical symbol of the following:

(i) Distribution board
(ii) Earth **(2 marks)**



**QUESTION 2** **FABRICATION** **(10 marks)**

a. The diagram below shows a tool being used to lock a joint in sheet metalwork.




(i) Name the tool labelled **Z.** **(1 mark)**

(ii) Define the term notching used in sheet metalwork. **(1 mark)**

b. There are numerous types of edges used in sheet metalwork.

(i) State one reason why edges are formed on a job in sheet metalwork. **(1 mark)**

(ii) Define the term **allowance** used for wire edging? **(1 mark)**

(iii) Differentiate between **Groove Seam** and **Standing Seam Joint** in sheet metalwork. **(2 marks)**

c. In workshops where machinery is not available, there is often occasion to bend sheets of metal of varying widths at an angle.

(i) State the first procedure of bending sheet metal in sheet metal work. **(1 mark)**

(ii) Use freehand sketches to show the edges formed in sheet metal work below.

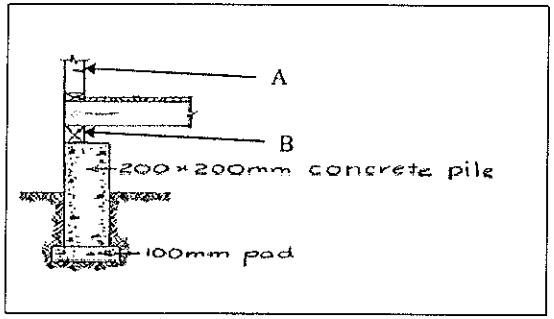
(a) Single Hem Edge

(b) Double Hem Edge

(c) Wire Edge **(3 marks)**

**QUESTION 3** **CARPENTRY** **(10 marks)**

a. Study the diagram carefully and answer the questions that follow.




Name the members labeled **A** and **B**. **(1 mark)**

b. Explain the importance of putting damp proof course (d.p.c) before pouring the concrete for the concrete floor. **(2 marks)**

c. Sketch a cross section of an **Eave** detail of a wooden building. **(4 marks)**

d. Explain the following terms:

i. Reinforcing

ii. Boxing **(2 marks)**

e. State **one** responsibility of an architect in building construction. **(1 mark)**



**QUESTION 4** **WELDING** **(10 marks)**

(a) Welding is a process in which heat and electricity is used to join pieces of metal.

(i) Explain briefly the difference between acetylene and oxygen equipments. **(2 marks)**

(ii) Name the protective equipment worn to prevent sparks and spatter from entering into your safety boots. **(1 mark)**

(iii) Briefly explain how a gas welding torch is lit up. **(1 mark)**

(iv) Define the term **oxidizing flame**. **(1 mark)**

(v) Briefly explain what may be the problem if there is excessive black smoke emitting from the gas welding flame. **(1 mark)**

(b) Electric arc welding setup needs to have heavy leads and good connections to complete a welding circuit.

(i) State the function of an earth lead in an arc welding setup. **(1 mark)**

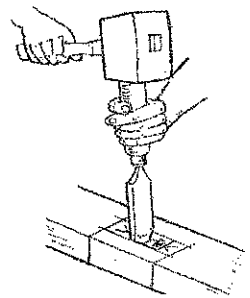
(ii) Name the alloy used in brazing. **(1mark)**

(iii) Explain the purpose of the slag formed during arc welding. **(1mark)**

(iv) Explain the reason for having a poor fusion in arc welding. **(1mark)**

**QUESTION 5** **JOINERY** **(10 marks)**

(a) Study the diagram of a woodworking process given below and answer the questions that follow.

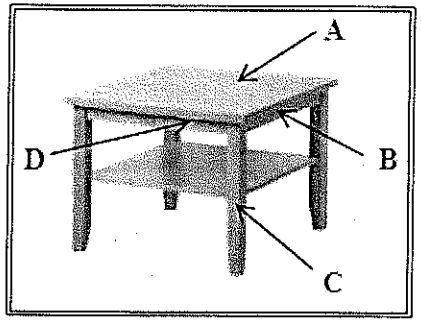


(i) Name the tools being used in the diagrams. **(2 marks)**

(ii) Explain the process being carried out. **(2 marks)**

(iii) Make a freehand sketch to show a tool that can be used for holding the piece of timber to the bench. **(2 marks)**

(b) Study the diagram given below and answer the questions that follow.




(i) Draw the exploded view of member **B** and **C**. **(2 marks)**

(ii) Sketch how the part labelled **A** is connected to the frame. **(2 marks)**



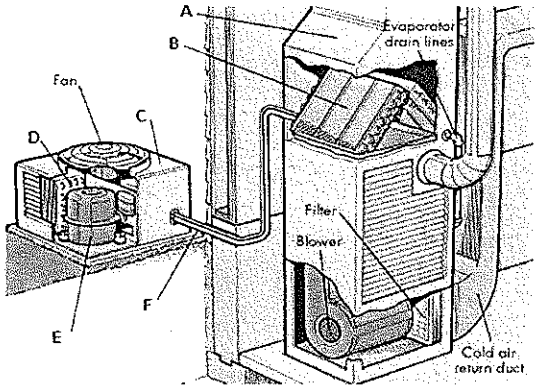
**QUESTION 6** **AIR CONDITION AND REFRIGERATION** **(10 marks)**

(a) Define the terms:

(i) refrigeration

(ii) air conditioning **(2 marks)**

(b) Study the diagram of the given refrigeration system below and answer the questions that follow.




(i) Name the parts **A, B, C, D, E** and **F** of the air condition unit above **(3 marks)**

(ii) Explain **one** safety precaution observed in the servicing of refrigeration and air conditioning unit. **(2 marks)**

ii) Name **one** hand tool used in both refrigeration and air conditioning. **(1 mark)**

(i ) Explain the meaning of the term **refrigeration effect.** **(2 marks)**

**SECTION C** **DESIGNING** **(20marks)**

There are **three** questions in this section. Answer **only one** question.
Each question is worth **20 marks**.

**QUESTION 1**

**Design Brief:**
Design a storage cabinet for keeping magazines and newspapers.

**Design Problem:**
Magazines and newspapers are always found lying around in the house which is a burden when cleaning the house. It is also very difficult to locate older newspapers and magazines.

**Specifications:**

The cabinet should be:

- made of timber and metal, while plastic and glass can also be used.
- portable so that it can be moved to any place in the house.
- reasonable size and not to take a lot of space in the house.

**Requirements:**

a) Produce pictorial freehand sketches of **two** possible solutions and label the parts. **(5 marks)**

(b) Draw a pictorial rendered freehand sketch of the final solution taking ideas from the two possible solutions. **(4 marks)**

(c) Make a detailed drawing to show the joint between any two members. **(3 marks)**

(d) List the materials needed for the cabinet. **(2 marks)**

(e) Evaluate your final solution under the following headings:

(i) Cost
(ii) Functionality
(iii) Availability of materials

**(6 marks)**



**QUESTION 2**

**Design Problem**

In a school, due to lack of eating and seating facilities, students usually stand or sit on the ground and crowd the corridors during recess and lunch breaks.

**Design Brief**

Design an exterior combined bench and table that can be used by students outside as well as in the corridor. This combined bench and table can be moved outside in good weather and moved back in the corridor during rainy days.

**Specification**

The system should:

- Cater for at least six students;
- Hygienically designed;
- be strong, safe and easy to use;
- relatively cheap to construct;
- be light enough to be carried outside and inside easily; and
- be made from the combination of the three main materials (wood, metal and plastic).

**Requirements**

(a) Produce pictorial freehand sketches of **two** possible solutions and label the parts. **(5 marks)**

(b) Draw a pictorial rendered freehand sketch of the final solution taking ideas from the two possible solutions. **(4 marks)**

(c) Make a detailed drawing of one component. **(4 marks)**

(d) List the materials needed for the construction of the combined bench and table. **(1 mark)**

(e) Evaluate your final solution under the following headings:

(i) Cost
(ii) Functionality
(iii) Availability of materials

**(6 marks)**

**QUESTION 3**

**Design Problem**

Drafting students usually find it difficult to complete homework and assignments at home as proper drafting tools are not available.

**Design Brief**

Design a Drafting table for home use to support drafting paper and other drawing instruments for the student.

**Specification**

The furniture should:

- have a light holder for working at night;
- be portable so that it can be moved to any place in the house;
- be of reasonable size and not to take a lot of space in the house;
- be made of timber and metal, while plastic and glass can also be used;
- have a provision for the top surface to be inclined and locked in place at the required angle.

**Requirements**

(a) Produce pictorial freehand sketches of **two** possible solutions and label the parts.
**(5 marks)**

(b) Draw a pictorial rendered freehand sketch of the final solution taking ideas from the two possible solutions.
**(4 marks)**

(c) Make a detailed drawing to show the joint between any two members.
**(4 marks)**

(d) Explain one of the mechanical components of the device. **(1 mark)**

(e) Evaluate your final solution under the following headings:

(i) Cost
(ii) Functionality
(iii) Availability of materials

**(6 marks)**