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**Pacific
Senior
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Certificate**

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Level 5, Vanua House, Victoria Parade, Box 2083 Government Buildings, Suva, Fiji.

Telephone: (679) 3309622, 3315600, 3302141 Fax: (679) 3378598, 6793378599

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DESIGN UNDERSTANDING EXAMINATION

Question A1

(10 marks)

- | | |
|------|-------|
| 1. C | 6. A |
| 2. D | 7. A |
| 3. B | 8. B |
| 4. A | 9. A |
| 5. D | 10. A |

Question A2

(6 marks)

1. G
2. C
3. A
4. F
5. B
6. D

Question A3

(8 marks)

1. A statement about the need of a product and any expectations about the solution.
2. describes the problem, sets specifications and describe tasks.
3. It describes the things about the design which is fixed and also defines the things which are free to change.
4. To help the designer to determine a solution that is most accurate and closest to the needs of the client.
5. The producer might produce a wrong product thus client is not happy – Producer has also wasted his time, resources and money on a product not needed or wanted.
6. Producer talks to the client again to clarify the confusion before he can start working.

Question A4

(12 marks)

1. Design brief two (2) Because;-
 - It is more detail than the other two, example it states that (1) it is a hot local food dish. (2) it is for Tom and Mary who are diabetics (3) it is for their lunch.
2. The specifications will be :- 1) A diabetic dish, 2) It is a hot local food dish 3) It is for lunch

3. A closed design brief is more specific and detailed in its requirements.
An open design brief provides the designer with freedom to explore and create a wide range of possible outcomes.
4. -Internet
 - ✓ Library using text books
 - ✓ Visit local hospital
 - ✓ Interview a nurse, doctor or a diabetic patient
 - ✓ Research questionnaire
5. So that any mistakes along the stages are identified and fixed earlier than too late. If too late, will make things complicated and product will not be of quality.

Question 5

(5 marks)

1. A systematic problem solving strategy with criteria, constraints and tools used to develop many possible solutions to solve a problem or satisfy needs and to narrow down the possible solutions to one final choice.
2. Evaluation is to make judgement of the worth of something example, a product, a topic etc. When evaluating a product follow the designing process. After evaluation you make constructive decisions.
3. The answer to how you intend to develop your product as a result.

Question A6

(9 marks)

Answers will vary due to different projects evaluated in the different major areas. Here is just an example.

A product evaluated in textiles – A child's (3-6yrs) garment. A gathered skirt and a blouse.

1. Choice of material – Fabric used was not cotton but a manmade blend. Picked because of its bright floral colour and designs, not on quality fabric. As a beginner, should choose cotton even if it is dull, and unattractive but, easy to handle and work with. Also should use a matching thread to the colour of the fabric in order to hide crooked stitches.
2. Choice of equipment, tools and processes. -Choice were alright because they were the tools/equipments to use but it how you use them that will determine quality work. It takes practice to be good at something and confidence as well. Machine stitches were crooked due to wrong measurements, wrong pinning, uneven folding and then crooked stitching when not confident on the machine. More practice on the using the tools/equipment can be perfect on samples before working on the final product.

3. Quality on workmanship – Although the garment is completed, quality of work on the different processes still needs improvement. Hems are not evenly folded. Needs more trialing on even folding. The prints on the top blouse do not flow or match with the skirt prints. Laying out the patterns to cut should take extra care of the prints. Although it is using up more fabric but it is a skill to learn as well.
4. Do you think the product has a potential market. – Yes! But the weaknesses pointed out must be considered and applied for improvement. A client who may not notice these weaknesses because she knows nothing about sewing and may be a regular customer but others who sees these weaknesses will go somewhere else to buy. Quality is very important before you start a market so that it grows as well as the market you start is strong and can compete with others who give competition. Your market grows and you are consistent with your products.

SECTION B:

WOOD TECHNOLOGY

QUESTION B1

(19 marks)

1. Diagrams below show how end of timber shrinks when moisture evaporates, depending on how log are sawn.

- a) Name two common ways of sawing or cutting the log into timber. (2 marks)

One mark each for the correct name of the timber conversion



- i) Name: Plain sawn or Tangential sawn



- ii) Name: Quartersawn

- b) Draw the grains or growth rings on the diagram above to show how logs were cut. (2 marks)

One mark each for the correct draw of the growth/grain rings

- c) There are 2 common sources of defects in timber, natural defects and defects which arise once the tree is cut down, either through poor handling or poor seasoning of the tree. Briefly describe the following common defects and the cause of each defect. (4 mark)

- i) Checks: Separation of wood, fiber, along the length of the log – caused by uneven shrinkage.
- ii) Shakes: Separation of wood starting from the pith of the tree
- iii) Knot: Results from a branch being cut during or before conversion of timber

Two marks for the correct description and two marks for the correct courses of each defect

d) Warp is a type of timber defects. In the space below:

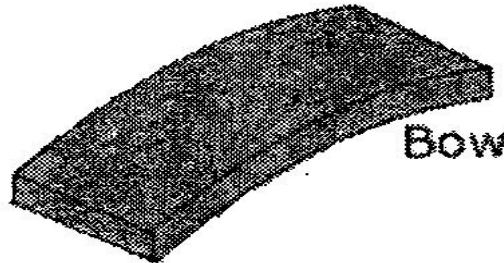
- i) Briefly explain the causes of the defect
- ii) Sketch the type of timber defect given

(2 marks)

(2 marks)

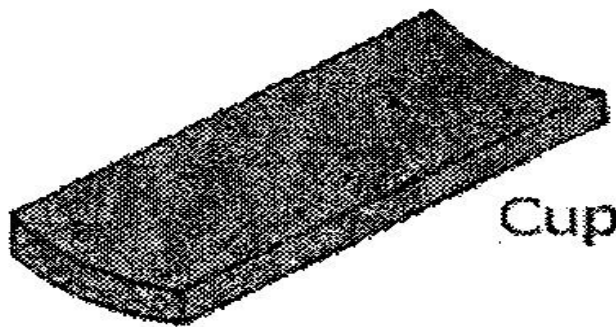
i. Bow Warp:

Variation of a piece of timber from its true surface in length, caused by uneven shrinkage (1mark) and right sketch (1 mark)



ii) Cup:

Variation of a piece of timber from its true surface in the length and width, caused by uneven shrinkage. (1 mark) and right sketch (1 mark)



One mark for the correct explanation of the cause of the defect and one mark for the correct sketch of defects

- e) Give ONE way of slowing down the shrinking of the width than the length of the board during seasoning

(2 marks)

Paint the end of the timber during seasoning to slow down its shrinkage

Put strip of metal or plastic at the end of timber during seasoning to slow down its shrinkage

One mark each

2. Identify and describe the 3 factors affect the strength of timber.

(3 marks)

i) Moisture content: Wood increases its strength as it dries

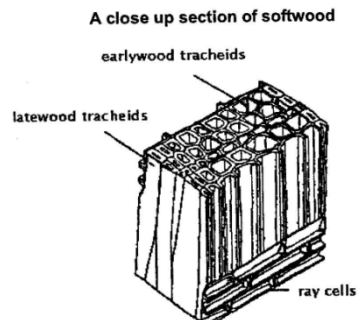
ii) Specific Gravity is an excellent index of the amount of wood substance a piece of dry wood contains, it is also a good indicator of the strength properties of wood.

iii) Temperature: In general, wood tends to become weaker when its temperature is raised and stronger when temperature is lowered.

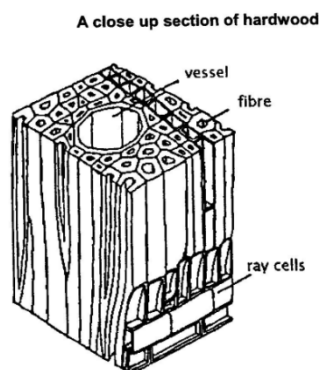
One mark each)

3. Briefly explain the differences between the hardwood and softwood in term of water-conducting cells. (2 marks)

Soft Wood: The wood of gymnosperms is commonly referred to as softwood, and sometimes as non-pored wood. The bulk of softwood is made of long narrow cells, or tracheids, that fit closely together.



Hard Wood: Broad-leaved trees, like vesi, are hardwood tress. The wood of these trees is made up of two distinct types of cells, vessels and fibre cells.



One mark each

QUESTION B2

(19 marks)

1. Briefly explain the processes of construction of the following manufactured materials and its application

Particle Board:

Particleboard is manufactured by mixing wood particles or flakes together with a resin and forming the mix into a sheet. The raw material to be used for the particles is fed into a disc chipper with between four and sixteen radially arranged blades. The particles are first dried, after which any oversized or undersized particles are screened out.

Application:

For interior use, weight and cheaper than hard wood

One mark each for the explanation of the manufactured of particle board and one mark for the application.

(2 marks)

ii) Plywood:

Plywood is a manufactured wood panel made from thin sheets of wood veneer. It is one of the most widely used wood products. It is flexible, inexpensive, workable, re-usable, and can usually be locally manufactured.

Application:

Plywood is used instead of plain wood because of its resistance to cracking, shrinkage, splitting, and twisting/warping, and its general high degree of strength.

One mark each for the explanation of the manufactured of plywood and one mark for the application.

(2 marks)

- c) Complete the table below with the material you selected for each components and the supported property of your chosen material. (4 marks)

PARTS	SUGGESTED MATERIAL(S)	PROPERTIES
TOP	Plywood	High strength
LEG	Hardwood	Tough
RAIL	Plywood	Little affect by environment
STRINGER	hardwood	Tough

One mark for suggested material and property of each part, there are also correct answers

- d) State 2 factors that considered when deciding the finishing for the storeroom step. (1 mark)

- i) Environment
- ii) What type of finishing is available

Half mark each, but there are also correct answers

- e) You are given a 150 mm x 25mm x 400 mm piece of timber to make one trend of the storeroom step.

List the correct steps with the correct hand tools you use to set out, cut and clean up the final shape of the tread. (3 marks)

CORRECT STEPS	REQUIRED TOOLS
1) Timber preparation	Straight edge, square, plane, pencil
2) Marking	Divider, pencil, square
3) Cut, Clean up and Test	Saw, Files, plane, square, radius gauge

One mark for the correct step and the correct tools for each step

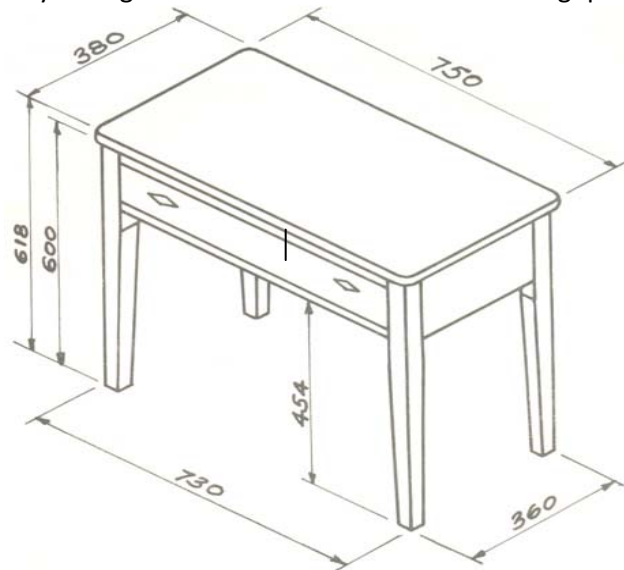
- f) Pick any 2 hand tools from part e) and state 2 safety precautions in using them. (2 marks)

Tools	Safety Precautions
1) File	1) Store it separately from other tools 2) Clean it with file card after use
2) Straight Edge	1) Do not store or mix straight edge with other tools as the edges may be damage and ruin its accuracy. 2) For storage apply a thin film of oil on the surfaces to avoid rusting

Half mark for each correct safety precaution

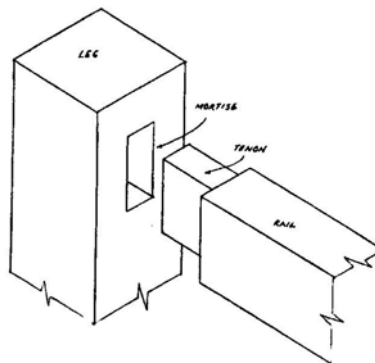
QUESTION B3:**(14 marks)**

1. Study the student's study desk given below and answer the following questions.

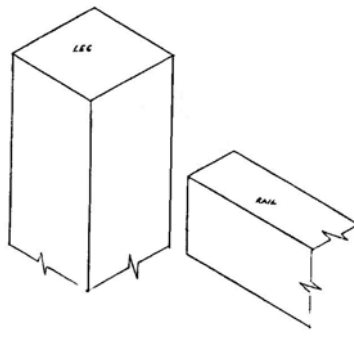


- a) Name and draw any 2 possible wood joint that could be used to join the leg and the rail (4 marks)

Possible Wood joint 1: Mortise and Tenon Joint

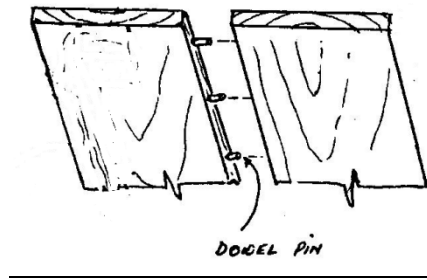


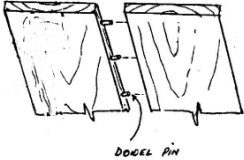
Possible Wood joint 2: Butt Joint



One mark each for the correct name of joint and one mark each for the correct sketch of the wood joint. There are other possible wood joint that could be used for this question.

- b) The table top will be made out of 4 x 100 mm x 25 mm x 750 mm hardwood. You need to join them using towel joint. Explain with the aid of diagrams the 4 main steps of doing towel joint with tools required for each step. (6 marks)



<u>STEP 1</u> Timber preparation	<u>TOOL REQUIRED</u> Straight edge, square, ruler, pencil, plane, marking gauge
<u>STEP 2</u> Marking	<u>TOOLS REQUIRE</u> Divider, pencil, ruler, marking gauge
<u>STEP 3</u> Drilling and Cutting	<u>TOOLS REQUIRED</u> Saw, drilling machine, ruler, pencil, measuring tape
<u>STEP 4</u> Assembling 	<u>TOOLS REQUIRED</u> Square, glue, clamp, straight edge, measuring tape

Half mark each for the correct steps, and one mark each for the correct tools required.

- c) Name another possible material that could be use for the table top instead of the 4 x 100 mm x 25 mm x 750 mm hardwood. Compare them by stating the advantage and disadvantage of each material. (2 marks)

Material 1: <u>Hardwood</u>	Material 2: <u>Plywood</u>
Advantage: It has a hard surface with good resistance to wear	Advantage: Easy, one piece of plywood to cover the table top
Disadvantage: Need more work, time and skills for towel joint	Disadvantage: It does not give the good natural appearance if the leg of the table is out of hard wood.

Half mark each for the advantage and disadvantage of the material. There are other correct answers.

- d) The legs for the Student Study desk will be made from 75mm x 75 mm softwood timber. The cost for the 75mm x 75mm is \$9.75 per meter. Calculate the cost for the leg of the Student Study desk. (2 marks)

Total Length = 2400 mm = 2.4 m	
Cost of Timber =	Cost per meter x Total Length
=	\$ 9.75 / meter x 2.4 m
=	23.4
Cost =	\$ 23.40

One mark for step 1 and 2 and one mark for step 3 and 4.

MAJOR 2: METAL TECHNOLOGY

QUESTION B4: Engineering Materials (10 marks)

- a) List and discuss three (3) mechanical properties of engineering materials. (3 marks)

- Ductility: The ability of a material to change shape without breaking or cracking. (example car body panel)
- Elasticity: The ability of material to return to its original shape having been deformed by being placed under load. (leaf and coil spring)
- Toughness: The ability of a material to withstand heat and impact. The tough material is neither soft nor hard. (example engine valve, crane hook)

One mark each for the correct property and explanation and half a mark if only one is correct. There are other property like Tensile strength, brittleness, hardness, malleability, fatigue and so forth.

- b) List and briefly discuss two (2) factors that are used as bases of materials classifications. (2 marks)

- Chemical composition of material
- Internal Structure of material

One mark each. There are other factors like mode of occurrence in nature, metal and non metal, raw and manufacturing material and so forth

- c) Briefly describe the following heat treatment processes: (3 marks)

	Heat Treatment Processes	Explanation
1	Quenching	Quenching is the heat treatment of material to become more resistant to penetration and abrasion.
2	Annealing	Annealing is a heat treatment which softens the material so it can be bent or formed (cold worked) allow the material to be easily machined
3	Tempering	Tempering is a secondary heat treatment process used to reduce the high hardness caused by quenching from high temperature

One mark each for the correct explanation

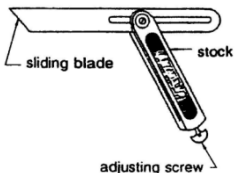
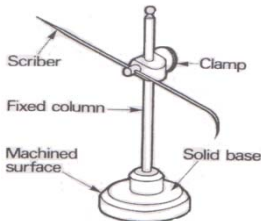
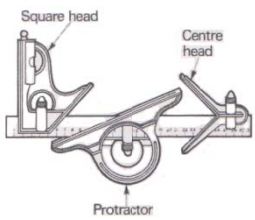
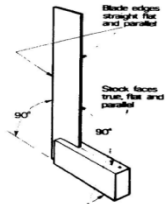
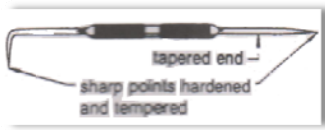
- d) Briefly explain with example the difference between Ferrous and Non-ferrous metal. (2 marks)
Ferrous are metal that compose chiefly by iron like mild steel, iron and cast iron while non-ferrous are pure metal that does not contain iron like aluminium, copper, tin and so forth
 One mark for the correct explanation of ferrous metal and one mark for the correct explanation of the non-ferrous metal.

QUESTION B5: Hand Tools and Machines

(16 marks)

1. Hand Tools

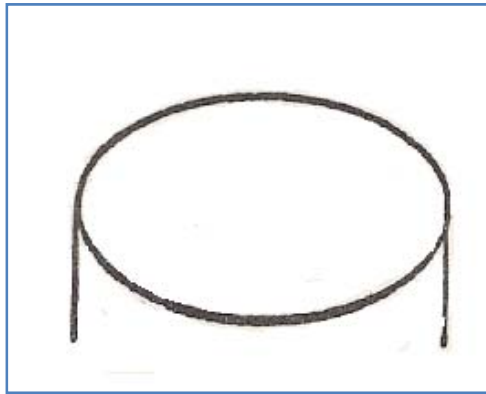
- i) Complete the table below by correctly name the hand tools and its use. (6 marks)

		Name	Use
1		Centre Punch	To provide witness marks on centre lines and reference lines
2		Bevel Square	For transferring angles
3		Scribing Block	To be used with a surface table to scribe parallel lines to the machines surface
4		Combination Square Set	To mark lines at any angle and to locate the centre of circular objects
5		Block Square or Try Square	For marking square lines off plate edges or existing lines and rolled steel sections.
6		Scriber	For making permanent scratched location or line on a job.

Half a mark for the correct name and half a mark for the correct use of one hand tool

2. Drilling and Drilling machine

Diagram below is an end of a mild steel cylindrical rod of 150 mm diameter and 100 mm in length that needs to be drill with a 12 mm diameter at the centre to a 50 mm depth.



- i) Briefly describe how you safely hold and support the cylindrical work piece under a bench drilling machine for drilling (1 mark)

A drilling vice that secure to the bed of the drilling machine with guide to cylindrical shape.

One mark

- ii) If the material of the drilling bit is High Speed Steel (HSS) and the work piece is Mild Steel. Use a cutting speed (V_c) of 20 m/min, what is the rpm (revolution per minute) of the drilling machine for drilling a 12 mm diameter (d) hole. (2 mark)

Formula:
$$RPM = \frac{V_c \times 1000}{d \times \pi}$$

$$RPM = \frac{20 \frac{m}{s} \times 1000 \frac{mm}{m}}{12 \text{ mm} \times 3.14}$$

Half a mark

$$RPM = \frac{20000 \frac{m}{s} \frac{mm}{m}}{37.68 \text{ mm}}$$

Half a mark

$$RPM = \frac{20000 \frac{m}{s} \frac{mm}{m}}{37.68 \text{ mm}}$$

Half a mark

Half a mark

$$RPM = 530/\text{min}$$

- iii) List four (4) general safety precautions that must be observed when using drilling machine. (2 marks)

1. Always wear safety glasses
2. One man one machine
3. Keep your working area clean and tidy
4. Secure clamping of tool and work piece.

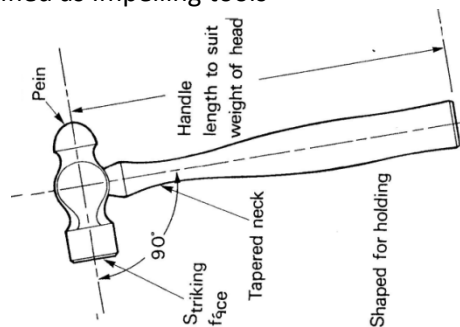
Half a mark each, but there are more correct answers about machine safety

- iv) Complete the table below by list the causes of the following faults that can occur when drilling:
(3 marks)

	Faults	Cause(s)
1	Oversize hole	<i>Unbalanced sharpening – tip not in centre</i>
2	Walls of hole rough	<i>Drill need to be sharpened</i>
3	Wobbling drill	<i>Point of drill not in centre or web too wide</i>
4	Drill squeaks and won't cut	<i>Insufficient lip clearance</i>
5	Drill has a chipped cutting edge	<i>Speed too high or harsh starts</i>
6	Hole is out of round	<i>Unbalanced or incorrect cutting angles, or metal too thin for bit diameter</i>

Half a mark for each correct cause listed. There are other possible causes

3. Engineering hammer are classified as Impelling tools



- i) There are 3 most common types of Engineering hammer, name 2 of them (1 mark)

- 1) Ball pein
- 2) Straight pein
- 3) Cross pein

Any two from the above three, half a mark each

- ii) Name 2 cares and safety on how you looking after engineering hammer (1 marks)

- 1) Never use a hammer without a wedge
- 2) Never hit two hammer faces together

Half mark each, but there are other correct answers.

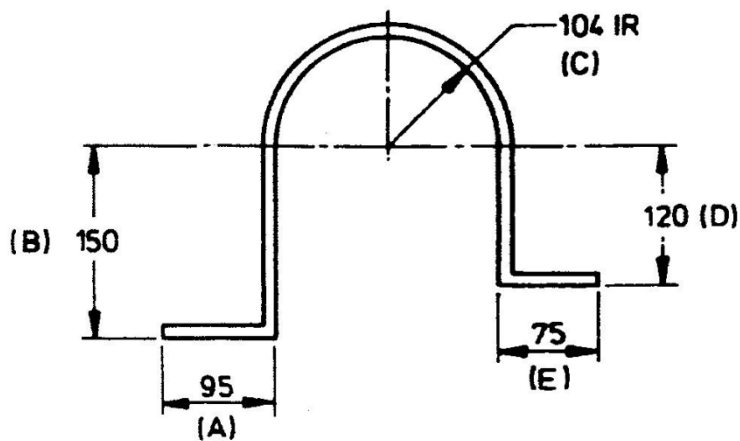
QUESTION B6: Form Work

(6 marks)

When calculating the material for formed work, the golden rule to remember is to take measuring to the inside of square sharp bends and to use the centre line material (MD) for all curved work.

- i) Calculate the length of the bar required to bend the pipe bracket in the diagram below. (4 marks)

Material: 75 mm x 10 mm flat bar



1 mark

1 mark

1 mark

1 mark

Length: = straight sections + curved section (allow for material thickness)

$$= ((95 - 10) + (150 - 10) + (120 - 10) + (75 - 10)) + \left(\frac{MD \times \Pi}{2} \right)$$

$$= (85 + 140 + 110 + 65) + \left(\frac{218 \times \Pi}{2} \right)$$

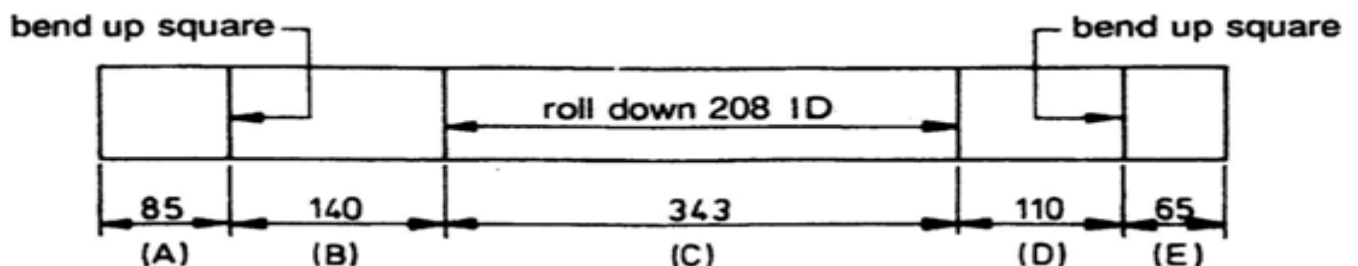
$$= 400 + \left(\frac{218 \times 3.142}{2} \right)$$

$$= 400 + \left(\frac{684.956}{2} \right)$$

$$= 400 + 342.478$$

$$= 742.478 \quad (\text{Round to 743 cut length})$$

- ii) The piece of flat bar given below for the pipe bracket, mark out with the dimension and label ready for forming and rolls. (2 marks)



One mark for correct marking and one mark for correct labelling

QUESTION B7: FASTENERS AND WELDING**(11 marks)****1. Fasteners**

- i) Complete the table below by stating one advantage and disadvantage of the following common fasteners if you need to join galvanised sheet metal for a funnel. (3 marks)

	Type of Fasteners	Advantage	Disadvantage
	Soldering	easy	Not for joint that expose to high temperature
	Rivets	strong	Should not be used where severe vibration occur
	Screws	Strong	Complicated features and head styles

One mark for each, there is also correct answers for the advantage and disadvantage of each fastener.

2. Welding

- i) Briefly explain the process of the following welding (3 mark)

1. Electric Arc Welding: The Electrical arc welding process is based on the principle of causing a low voltage, high amperage electric current to jump an air gap between the metal electrode and the base metal being welded.

The extreme heat that the arc generates melts the base metal in a small area, and at the same time melts the filler metal in the electrode. The arc is either shielded or unshielded; the purpose of this is to protect the weld metal from contaminations in the surrounding air.

2. Oxy-Acetylene Welding: The Oxy-Acetylene welding is where oxygen and acetylene mix together and produce flames that suitable for most applications. The flames from the oxy-acetylene can be controlled over wide ranges of temperature. The temperatures could use to melt most metals and joint together or for brazing purposes.

One and a half mark each

- ii) Give two (2) advantages of Arc Welding over other type of Welding. (1 mark)

1. Easy to take around hence no gas bottle
2. Can be use outside easy to set out for welding as long as electricity is available.

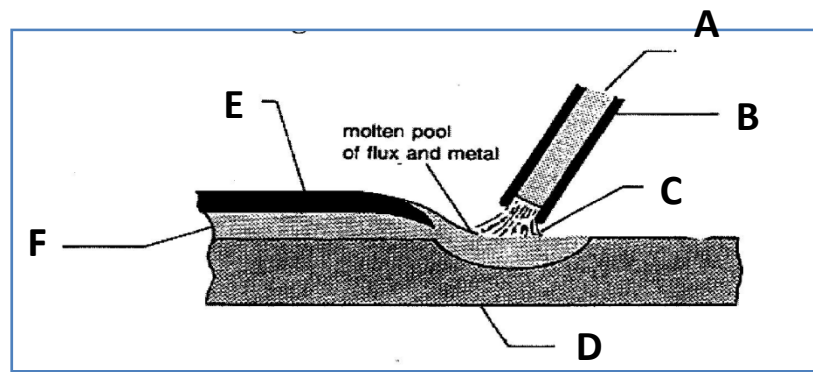
Half mark each but there are other advantages over other type of welding.

- iii) List two (2) substances that need to be removed from an area where Arc Welding is to be carried out because of the risk of fire or explosion. (1 mark)

1. _____
2. _____

iv) Label the diagram of an Arc Welding Process below.

(3 marks)



A: Electrode

B: Flux coating

C: Arc Stream 6000°C (molten globulets forced across the arc)

D: Parent metal

E: Solidified slag

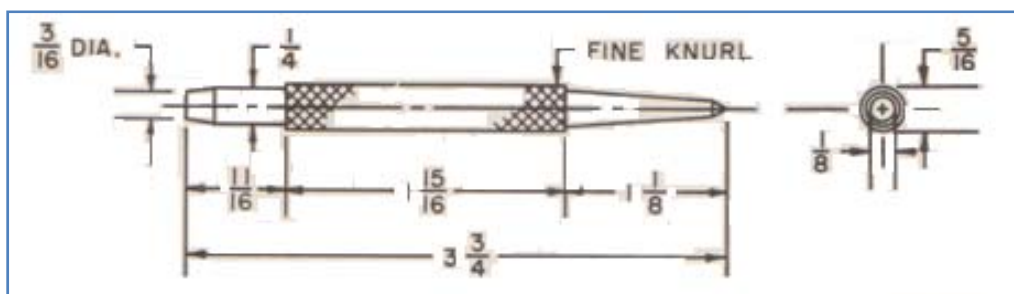
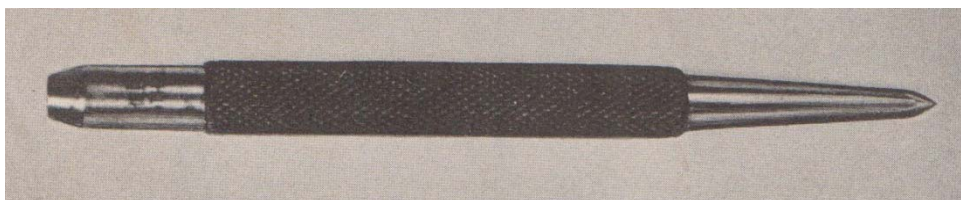
F: Deposited weld metal

Half a mark each

QUESTION B7: METAL TURNING PROCESSES

(7 marks)

1. Given below is the picture and a drawing of a centre or prick punch. You are asked to produce this centre punch using a centre lathe.



Material: High Carbon Steel

Dimension: $\frac{3}{8}'' \times 3 \frac{3}{4}''$

- a. Complete the order of how you make the centre punch on the centre lathe, first and last steps are given. (4 marks)

1. Facing work piece held in a chuck

2. Drilling center holes

3. Straight turning

4. Knurling

5. Taper turning

6. Hardening and Tempering

One mark for each step

- b. Work Piece can be held in one of the following chucks for machining in a lathe. Briefly describe how these 3 chucks work. (3 marks)

Three jaw self-centring chuck: Round and hexagonal work piece can be mounted quickly and conveniently in a three jaw self-centring chuck. The work is automatically centred to within 0.08 mm because all jaws move together to grip the work piece.

Four jaw independent chuck: Where a high degree of accuracy is required, the work is generally mounted in a four jaw independent chuck. Each jaw of the chuck can be adjusted independently. The jaws are reversible and permit a wide range of work to be gripped either externally or internally. The face of the chuck has a number of evenly spaced concentric grooves which permit quick and approximate positioning of the chuck jaws.

Collet Chuck: Generally, a collet chuck, considered as a unit, consists of a tapered receiving sleeve (often integral with the machine spindle), the collet proper (usually made of spring steel), which is inserted into the receiving sleeve, and (often) a cap that screws over the collet, clamping it via another taper. Each collet generally has only a narrow clamping range, which means a large number of collets are required to hold a given range of materials in the chuck, unlike with many other types of chuck that will generally cover a wide range of sizes.

MAJOR 3: FOOD AND NUTRITION

Question B9

(10 marks)

- | | |
|------|-------|
| 1. A | 6. A |
| 2. D | 7. D |
| 3. B | 8. C |
| 4. C | 9. B |
| 5. B | 10. D |

Question B10

(7 marks)

- | | |
|------|------|
| 1. C | 5. B |
| 2. D | 6. G |
| 3. F | 7. A |
| 4. H | |

Question B11

(6 marks)

1. Iodine - Sea foods, Milk, Spinach, Iodized salt.
Vitamin C - Citrus - (lemon, orange, grape fruit), Cabbage, Broccoli, Green pepper, Kiwi fruit, Straw berries, Brussels sprouts, Black currants.
2. To supply her own body and to provide the growing baby with a store of iron for the first few months after birth.
3. Increase the amount of fibre in her diet.
Take gentle exercise like walking and swimming.

Question B12

(12 marks)

1. Moulds, Yeast and Bacteria

2 Any one of these reasons.

- ✓ To avoid waste during the surplus
- ✓ To use up fruits and vegetables when they are cheap and plentiful and make available when they are not in season.
- ✓ To make full use of garden produce
- ✓ To introduce flavor and variety to the menu.
- ✓ To facilitate distribution and export of food on a commercial scale.

3.

1. Salting and drying	Adding a chemical preservative - Salt and then dehydration when drying to make the fish dry with no moisture - Store above fire place wrapped in banana leaves.
1. Roasting and drying	Dehydration - Roasting then getting rid of the skin, the seeds and the core. Cut them up into pieces and wrap in pandanus leaves and hang above fire place to get rid of moisture and make it dry.

4. Fish in coconut cream
5. Protein

6. Soak in water for one hour to get rid of saltiness. Cook in coconut milk with vegetables like capsicum, carrot and beans. Serve with a starchy like taro and raw vegetables like cucumber and tomato. This is to add more colour to it, improve the taste and texture at the same time making it more nutritious for my family to have.

Question B13

(7 marks)

1. To ensure food safety and prevent spreading of infected diseases.
2. **Any two of these answers.**
 - ✓ Wash hands under the tap with soap from the elbow up to the tips of the fingers and dry well
 - ✓ Cover mouth with handkerchief or hand when coughing or sneezing then wash hand before continuing work
 - ✓ Finger nails should be short and clean
 - ✓ Long hair should be tied to the back
 - ✓ -Remove excess jewellery on the hand – can harbor germs
 - ✓ Wear clean clothes and apron and use clean tea towels and dish cloths
 - ✓ Use clean equipments
 - ✓ Work in a clean kitchen
3. High Risk Foods are foods that make a very good breeding place for harmful bacteria's. When working with these foods, they need extra care in storing, preparing and cooking.

Examples – Any two of these. Poultry, Fish, Eggs, Meat, Milk, Cream, Left over foods, Vegetables, Custards, Open canned food, Foods at Barbecue, salads.

4. When foods are frozen bacteria are not destroyed, they become inactive or they sleep because it is too cold for them. When these foods are thawed, the bacteria's wake up and multiply very fast when the temperature increases or become warm. If they are refrozen again the number of bacteria has increased twice or triple and so the raw food now harbours more. If it is cooked but not cooked well, it can cause food poisoning to the consumer which if serious can lead to death.

Question B14

(8 marks)

1. **Answers will differ – But some examples here;-**
 - ✓ A Packed lunch for a 10 year old boy
 - ✓ A balance meal for a breast feeding mother
 - ✓ A Meal for a diabetic patient
2. **Any two of these as examples:**
 - ✓ Investigate what diabetic patients should eat
 - ✓ Research suitable foods and possible dishes
 - ✓ Modify and copy a suitable recipe
 - ✓ Produce presentation concepts, work plan and order
 - ✓ Produce and evaluate dish
3. It is balanced
 - ✓ Quantity is sufficient for one person
 - ✓ Is attractive and appetizing
4. **Any two of these examples:**
 - ✓ Watch and concentrate when slicing the meat using sharp knife
 - ✓ Mopped spill water on the floor before it can cause a fall
 - ✓ Switch off blender as soon as finished from it
 - ✓ Turn off gas bottle when complete cooking

- ✓ Handle glass bowls with care, do not drop them
- ✓ Wash sharp knives alone from other dirty cutleries used

5. Any three points similar to these examples

- ✓ Foods that are suitable for a diabetic patient
- ✓ The cooking method to use is suitable for the client
- ✓ Amount is enough for one person
- ✓ The equipments to use are available
- ✓ The different colours of the ingredients chosen and when combined should stimulates the client's appetite – example, green, red, orange, white and brown.

MAJOR 4:

TEXTILE AND GARMENT CONSTRUCTION

Question B15

(10 marks)

1. C
2. B
3. A
4. C
5. D
6. A
7. C
8. B
9. D
10. A

Question B16

(7 marks)

1. D
2. E
3. H
4. F
5. A
6. B
7. C

Question B17**(8 marks)**

1.

Explanations	Examples
1. Symmetrical – balance is where each half of the design is exactly like the other.	The answers might vary as long as they have something explained along the example below. 1. A jacket with two breast pockets and two hip pockets. 2.
2. Asymmetrical - is the opposite, two halves of a whole design are different.	3. A jacket with a breast pocket on one side may be balance by a hip pocket of the opposite side.

(4 marks)

- 2 a) Makes a figure look tall and slim
b) Makes a figure look shorter and wider
c) Makes a figure look bigger

(3 marks)

3. Accessories are additional items that are worn with clothes to complement the out fit.

Examples, belts, shoes, bags, scarves, hats, jewelleryes.

(1 marks)

Question B18**(11 marks)**

1. Making your own patterns at home based on body measurements taken, calculations done and then patterns are drawn following the style of the garments

2.

Patterns	Advantages	Disadvantages
1. Commercial	<i>Any of the following:</i> ✓ Details instructions to follow both on the envelope and inside. ✓ Saves time to draft your own pattern ✓ Has the picture of the style ✓ Contains more than one size	✓ Not easily available, e.g., Vanuatu not sold in the shops ✓ Need to recheck measurements before use for alterations ✓ No choice – follow what is in the pattern – no creativity ✓ Expensive ✓ May not have the knowledge and skills in how to read and implement the information.
2 Home Pattern drafting	✓ Cheap to produce ✓ No alterations on pattern since your own	✓ Not much information on it ✓ Not easy to find resources

	measurement so it will fit you nicely ✓ Become creative in producing own styles	to use ✓ No picture of style ✓ Only one size in an envelope ✓ May not have the knowledge and skills of how to make own.
--	--	--

(4 marks)

3.

Symbols	Names	Purpose
1. 	To lengthen or shorten here	It is where to increase or decrease the length either of bodice or the skirt
2. 	Cutting line	Where you will cut out the pattern pieces on fabric
3. 	Place on strait grain of fabric	Place pattern pieces on grain or direction of warp yarns

(6 marks)

Question B19

(4 marks)

1. Weaving Loom

2. Plain

3. a) So that layout pattern correctly on the fabric according to the symbols. This is to avoid wasting material and time spent in doing something wrong.

b) So that cutting out is done accurately. This way you don't waste material money and time.

Question B20

(5 marks)

1. *Any one of the following:*

- ✓ Waist band to add on the waist of the skirt.
- ✓ Fastenings to use could be zip and button and button at the center back of the skirt
- ✓ It would have waist darts on the front and on the back of the skirt
- ✓ Two side plain seams and a plain open at the back with a slit to allow for easy movement
- ✓ Hem at the edge of the skirt.
- ✓ Can add in seam pockets on the sides

2. Fabric, thread, Zip, Button, can be hook and eye, Knob and well.

4. Scissors, iron, Needle, Sewing Machine, Tape Measure, Pins, Unpicker,

5. For Materials:- I'll use plain fabric only not floral because fitted skirts look nice in plain colours, and one colour only –eg. black.

Also the fastening will be the same size and length of zip and just button and button hole

So the machine can help out here.

For tools:-

I would use a machine that can make button holes as well as sew on buttons so to work faster

I would use an over locker to neaten the raw edges faster much faster and neaten and would all look the same – as a decoration too.

Question 21

(6 marks)

1. Answers will vary depending on what the students did. This is just an example:-

Design and print a shirt that you will wear to the up coming school's island night

2. -Investigate different shirt styles, designs and prints on the internet

- ✓ -Research local designs in the library
- ✓ -Interview local artist who paint and women who dye and print garments
- ✓ -Visit local handicraft and have a look
- ✓ -Talk to the organizers of the school island night
- ✓ -Find out what fabric absorbs dye easily and if it is available in the market

3. Solution - 3 ideas – 1. a) "t' shirt, b) a long sleeve shirt, c) a short sleeve island shirt.

The solution chosen is short sleeve island shirt.

Reasons for picking the third idea over the other two because:-

- ✓ It's an island night this shirt will suit the night, t shirt will not look formal, long sleeve will be too hot since we live in the tropics.
- ✓ Has slits on the sides so will be easy for movement in it
- ✓ Students are asked to dress in something comfortable and locally made – shirt is dyed and hand printed
 - o -Has designs on it related to the local environment – Blue back ground – the sea with coconut palm trees swaying and local flowers.

4. Examples:-

- ✓ -That fabrics have different characteristics
- ✓ -Once you know the type of fabric then you will use it correctly and it can last.
- ✓ -You should not buy fabric because of it colour or design on it, you must know what it is and if it will look good on you.
- ✓ -Not all styles will look good on you, therefore, must know your figure type and what colour suits you best so that what you make and wear looks good on you, not the opposite.

MAJOR 5: TECHNICAL GRAPHICS

Question B 22

(12 marks)

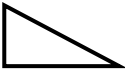
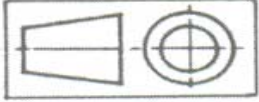
a) Complete the Table below with the missing drawing examples and applications.

Line Description	Drawing Example	Application
<i>Continuous thick line</i>		To indicate centre lines, pitch lines, path movement, developed view, material for removal and features in front of a cutting plane
<i>Thin double-dashed chain line</i>		<i>To indicate adjacent parts, alternative and extreme positions of moving parts, centroidal lines and tooling profiles</i>
Thick chain line		<i>To indicate surfaces that must comply with certain requirements such as heat treatment or surface finish</i>

½ mark for the blank ones

(3 marks)

b) Complete the Table below with the name(s) of the following symbols and scale.

Symbols	Name(s)
Scale of 1: 1	<i>Full Size</i>
R	<i>Radius</i>
	<i>Slope</i>
	<i>First Angle Projection</i>
	<i>Square</i>
	<i>Counter bore or Spot face</i>

½ mark each

(3 marks)

c) Use the projection of the triangle ABC given below to determine the:

i. True shape of triangle ABC *true shape is the triangle A''B''C''* (2 mark)

1 mark for correct shape, 1 mark correct construction lines

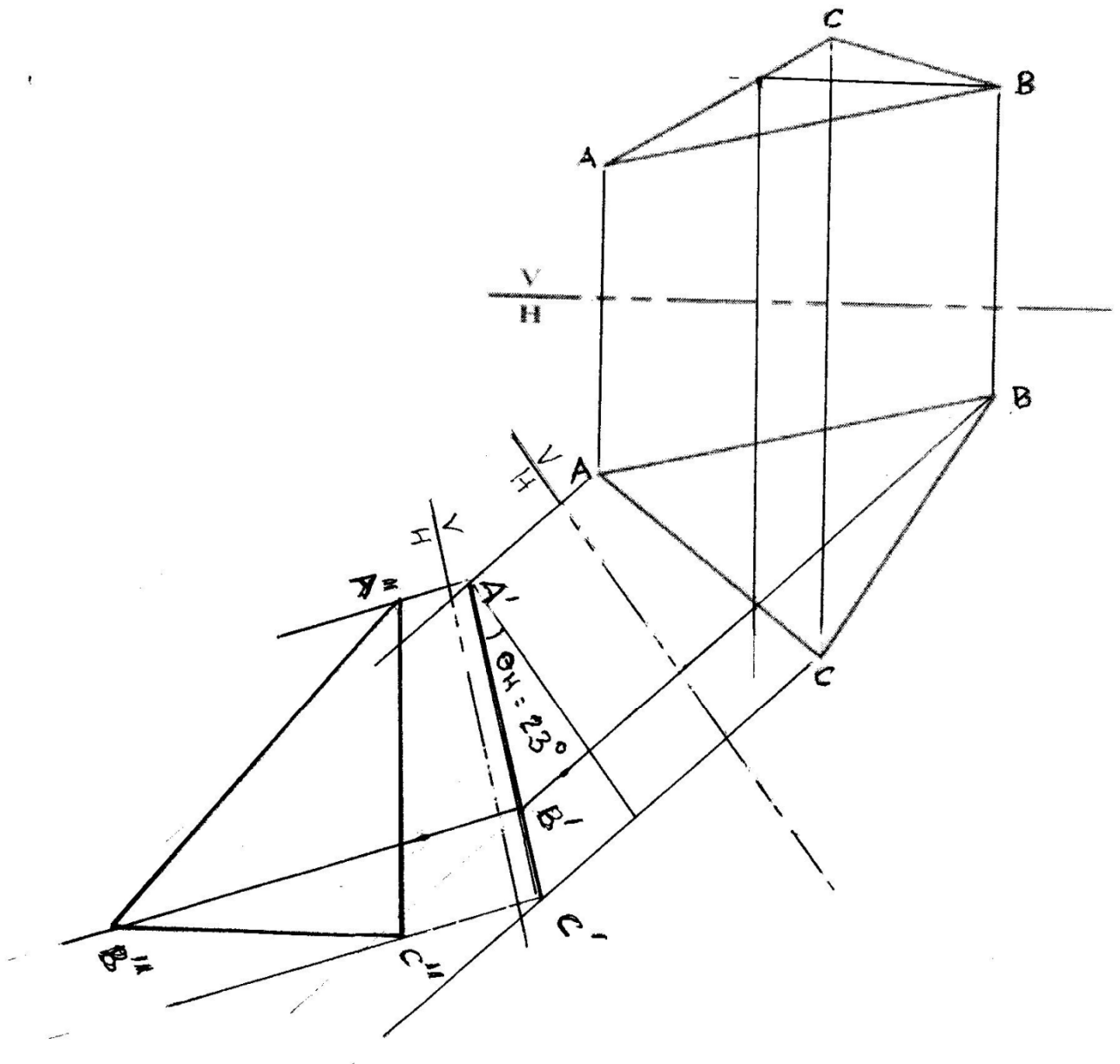
ii. The true length of the two sides (2 marks)

AB: 55 mm ± 1mm

BC: 40 mm ± 1mm

iii. The true angle of inclination of the triangle ABC to the horizontal plane (2 marks)

ϕ_H : 23° ± 2°



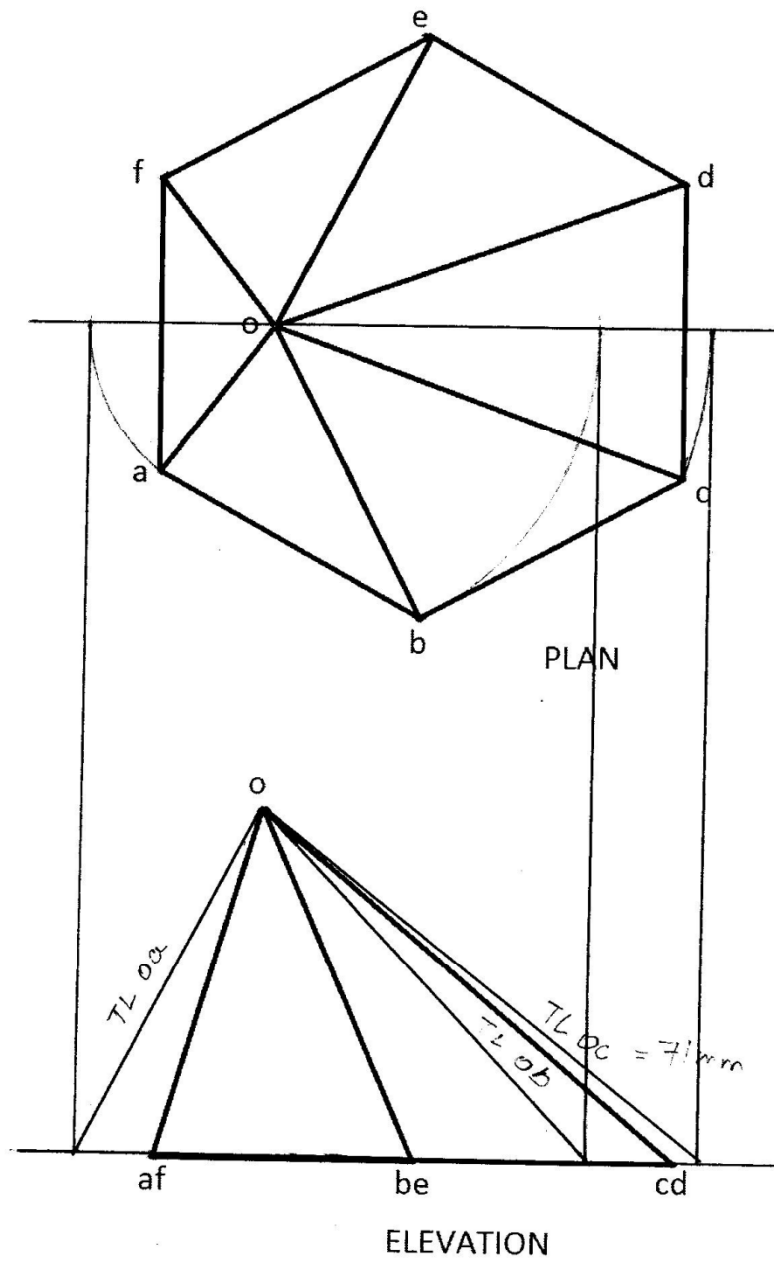
QUESTION B 23

(18 marks)

a) Study the given Oblique hexagonal pyramid and answer the following questions

i) Find the true length of the given sides of the hexagonal pyramid.

(2 marks)



oa =

49mm

ob =

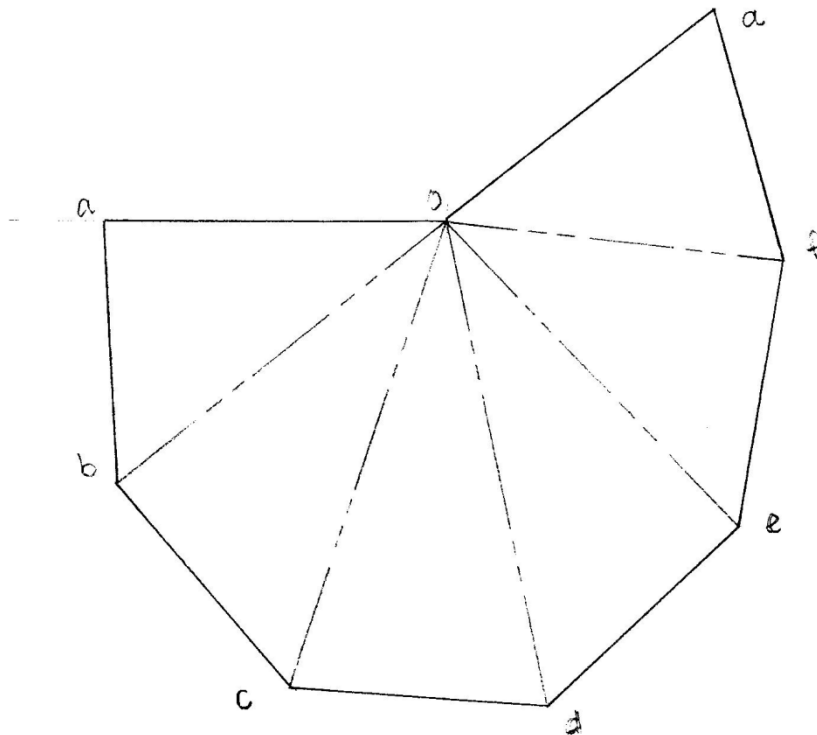
60mm

1 mark each ± 2 mm

(2 marks)

ii) Develop the given hexagonal pyramid using any method of your own choice.

(3 marks)

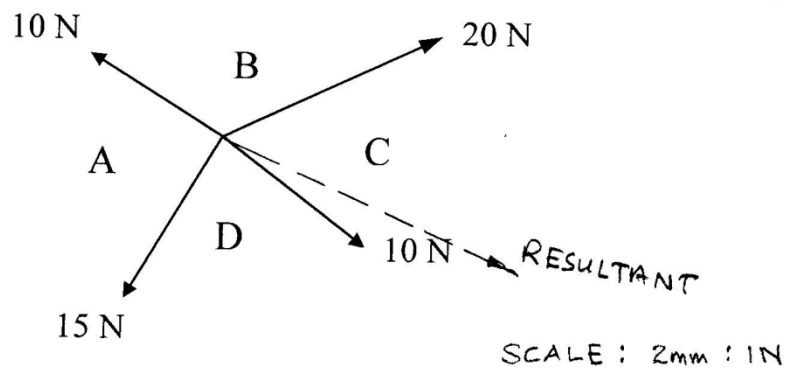


2 marks accuracy
1 mark neat line work

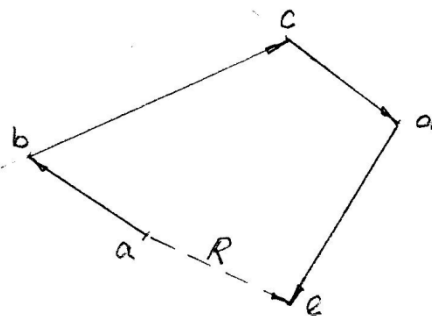
b) Vector Diagrams and Force in Beams

i) Determine the resultant force and point of application of the given co-planar, concurrent force system.

(3 marks)



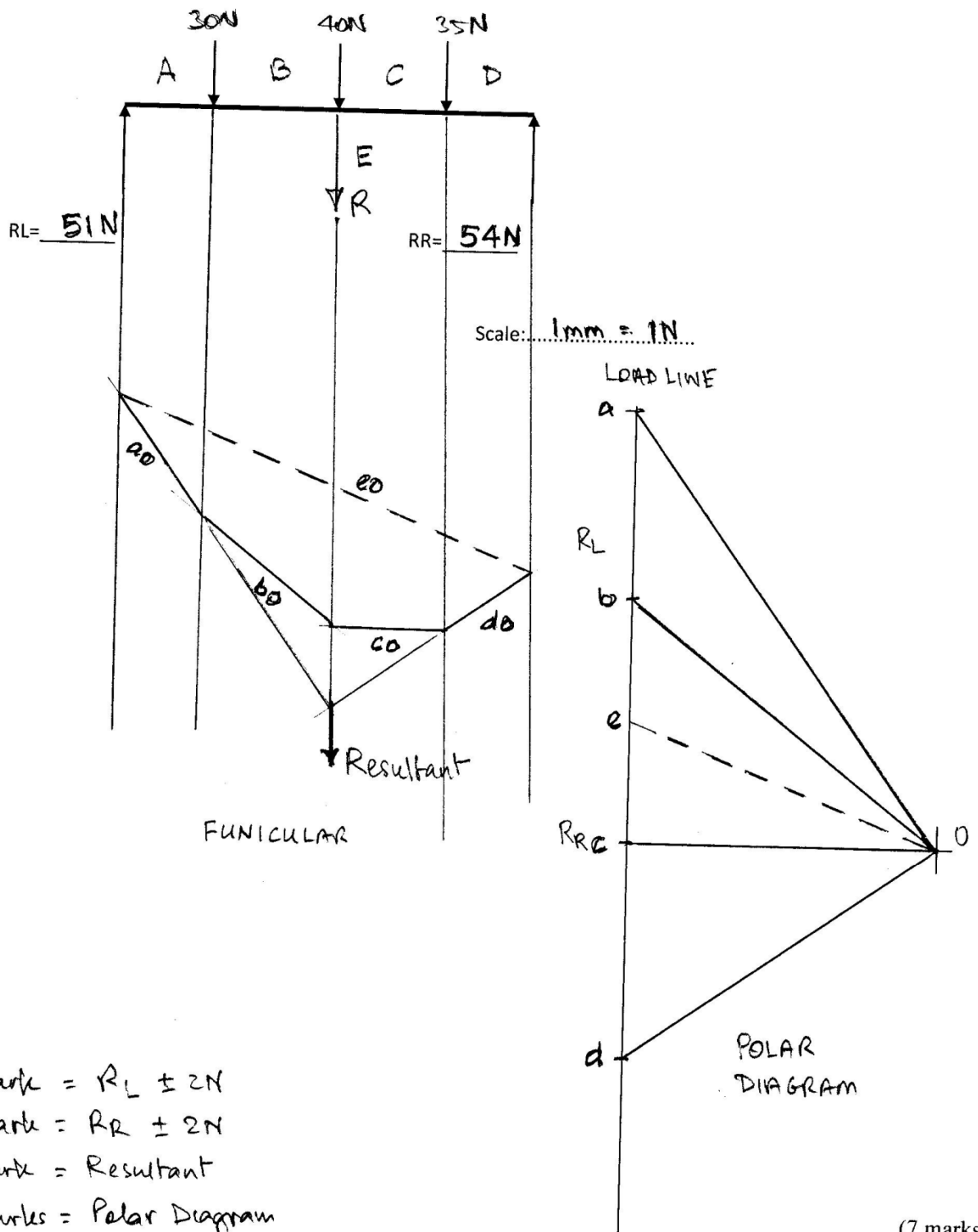
2 marks = accuracy
1 mark = resultant $\pm 2N$



RESULTANT = 44N

ii) Given below is the Space diagram of parallel forces acting on a beam. Use the Funicular, Force and Polar diagram to determine the: (7 marks)

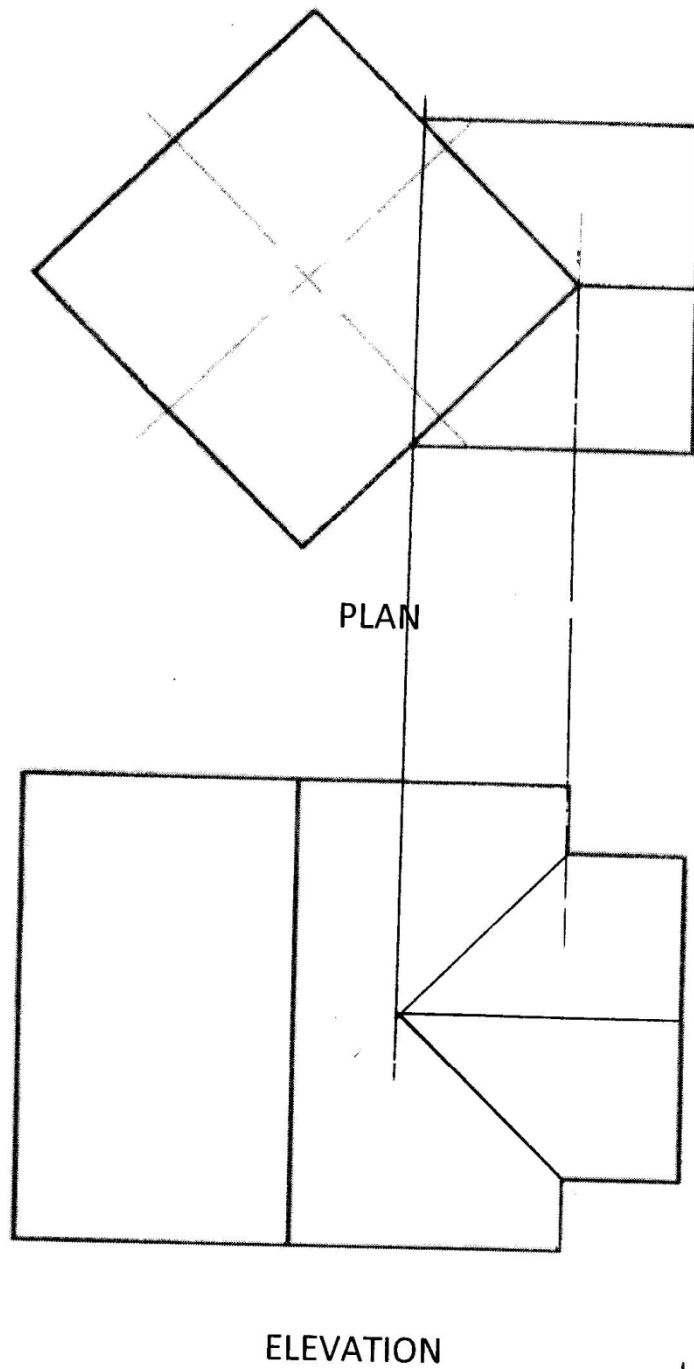
- 1) The Position of the resultant force
- 2) Reactions R_L and R_R at the supports



1 mark = $R_L \pm 2N$
 1 mark = $R_R \pm 2N$
 1 mark = Resultant
 2 marks = Polar Diagram
 2 marks = Funicular Polygon

(7 marks)

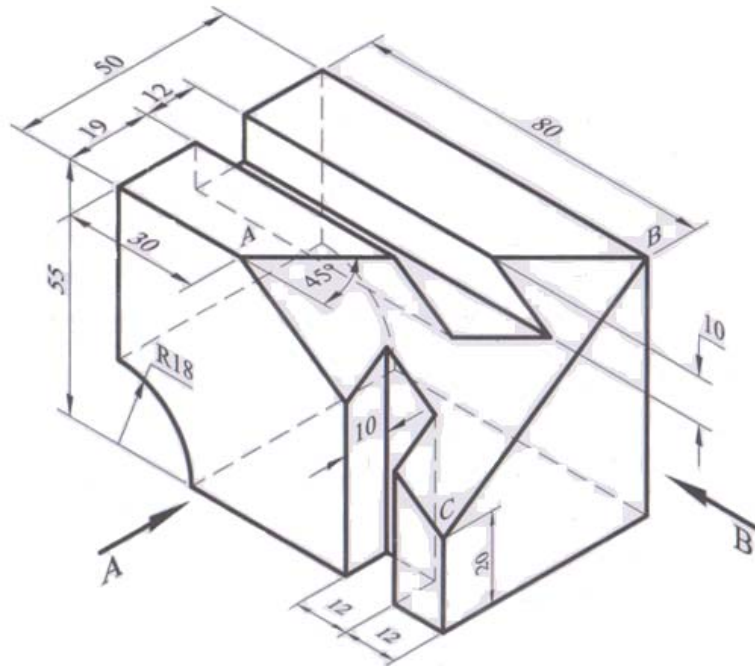
- c) Given are the plan and incomplete elevation of interpenetrating prism. Complete the Elevation by drawing the lines of intersection. (3 marks)



interpenetration = 1 mark
 lines of intersection = 1 mark
 accuracy, neat & tidy = 1 mark .
 (3 marks)

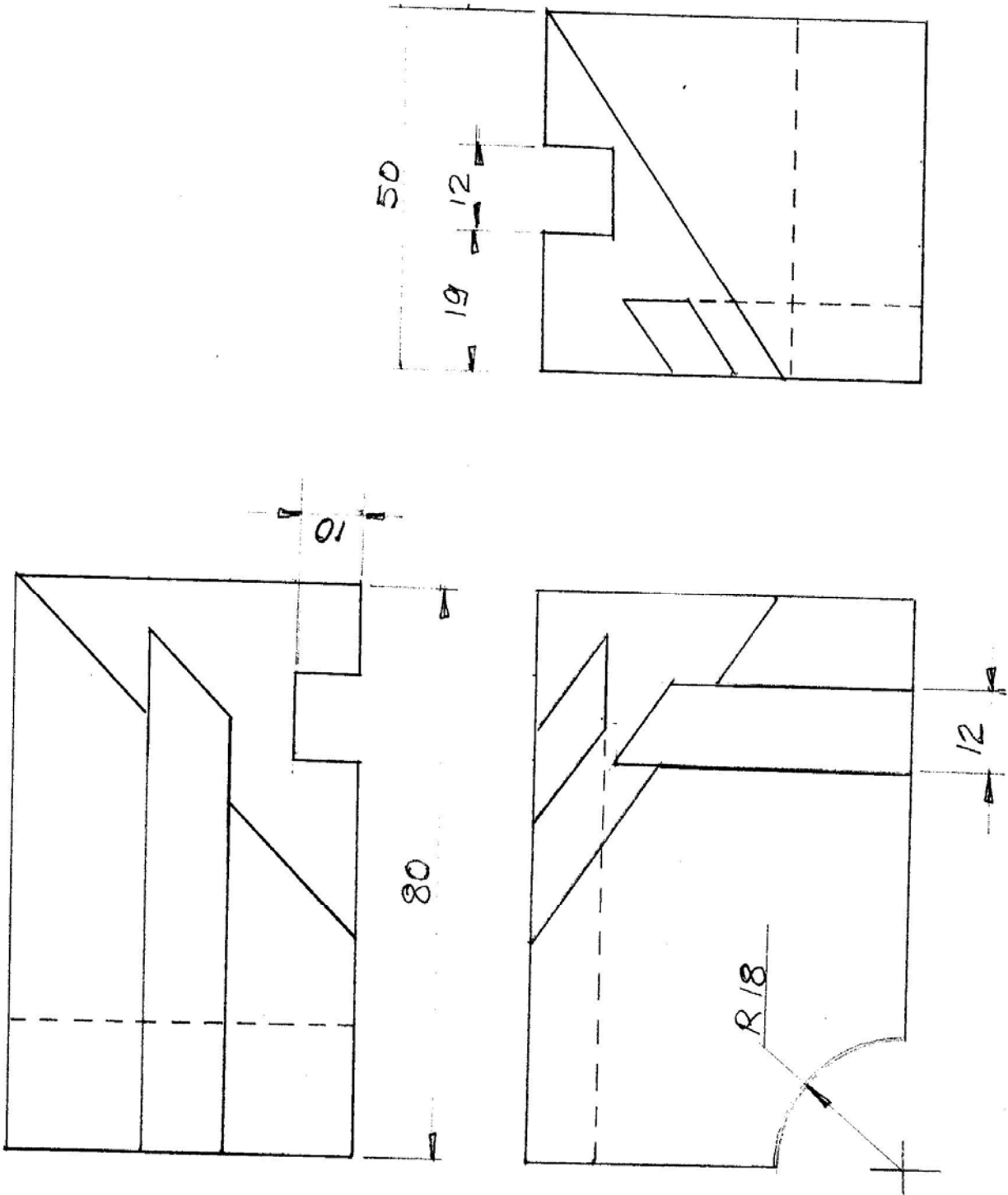
(20 marks)

- ## SUPPORT BRACKET

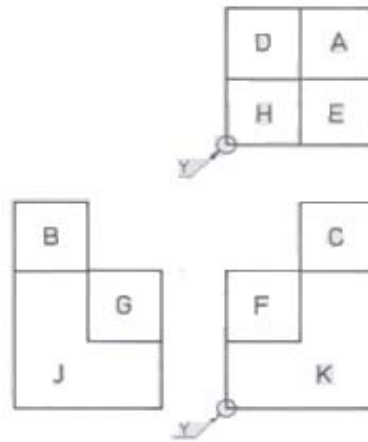


- 31

DO QUESTION B ____ Part a) here (SUPPORT BRACKET)

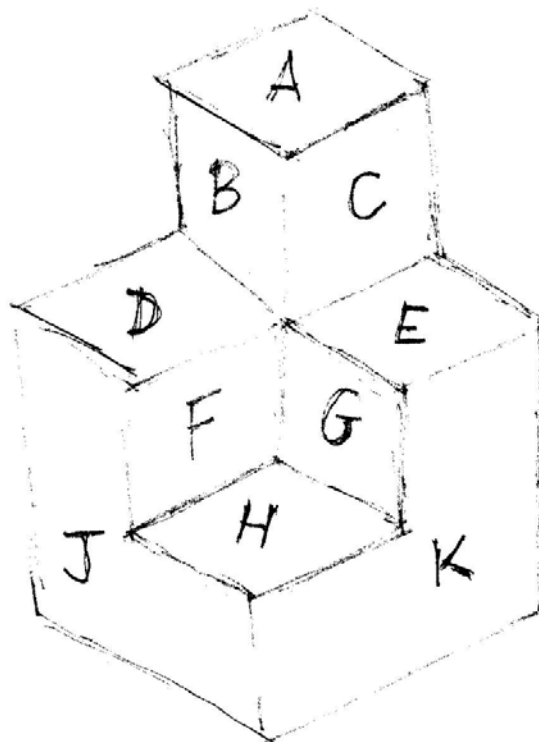


b) Study the diagram below and answer the following questions



Sketch:

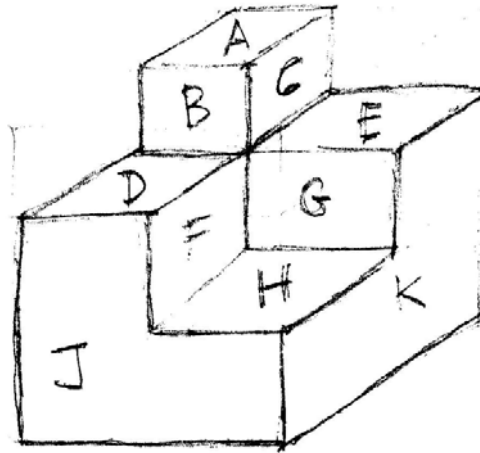
- 1) An Isometric view with corner Y nearest the viewer in the space below. Print the correct letter on each face. (2 marks)



1 mark for correct oblique shape, 1 mark for correct print of letter to correct face

2) An Oblique view. Print the correct letter on each face.

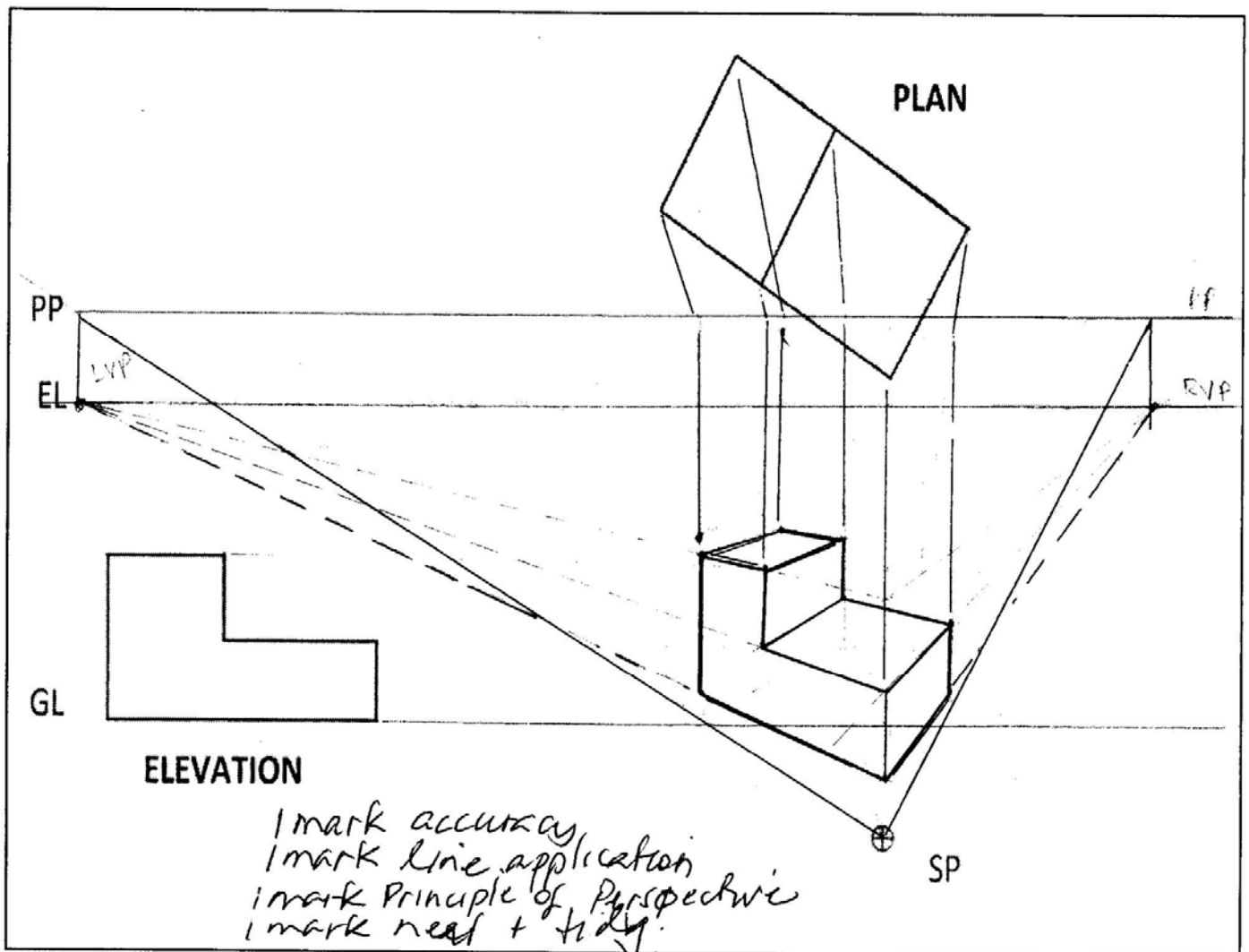
(2 marks)



1 mark for correct oblique shape, 1 mark for correct print of letter to correct face

c) Draw the given shaped block in two point perspective. Show all construction lines.

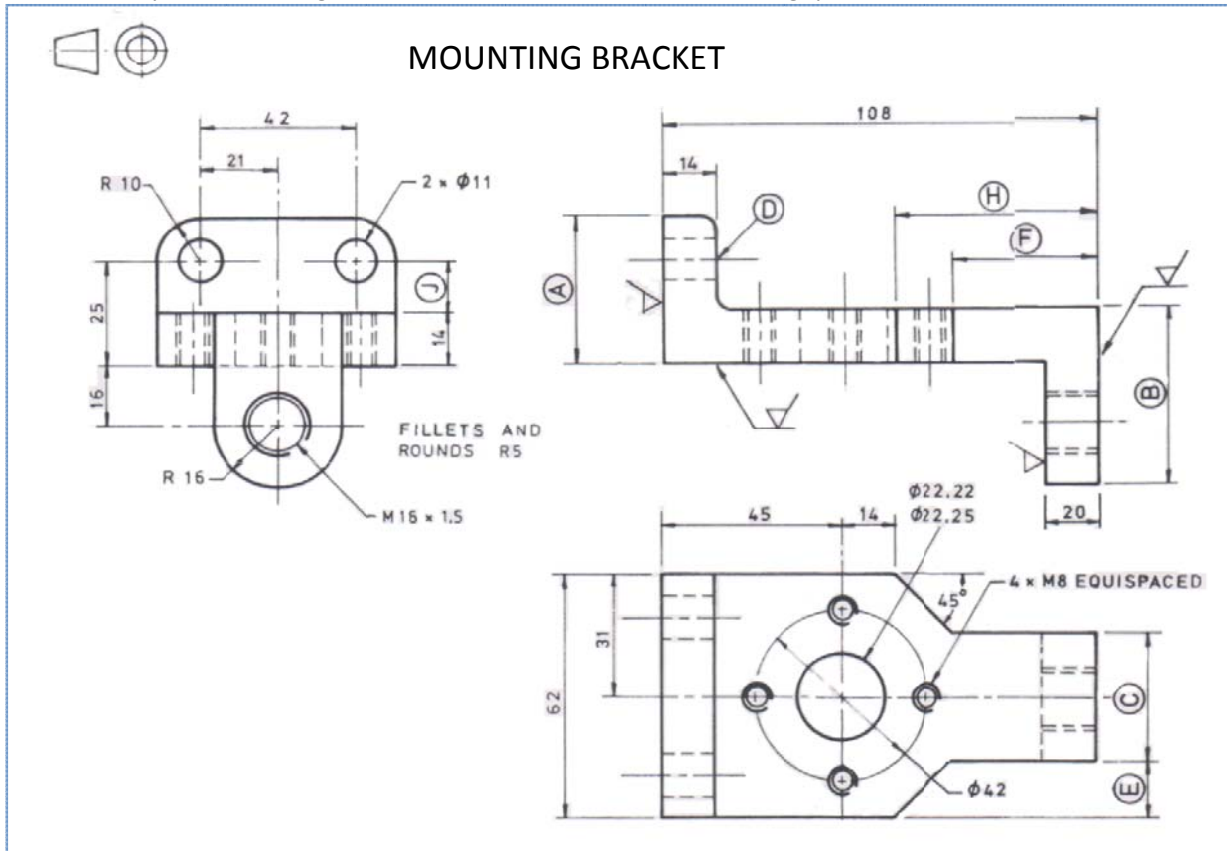
(4 marks)



(4 marks)

d) Study the Mounting Bracket above and answer the following questions

(5 marks)



1	How many holes require drilling?	8 holes (include those for thread cutting)
2	What is the overall height of the Mounting Bracket?	67 mm
3	What is the dimension A in mm?	35 mm
4	What is the dimension B in mm?	46 mm
5	What is the dimension C in mm?	32 mm
6	What is the specified diameter of hole D?	11 mm
7	What is the tolerance of the large hole?	0.03 mm
8	What is the radius of fillets and rounds?	5 mm
9	How many threaded holes are on the Mounting Bracket?	5 holes
10	What dihedral angle is used for projection of views?	First Angle Projection

Half mark each

MAJOR 6:

SMALL ENGINE AND AUTOMOTIVE MECHANICS

QUESTION B 25

(10 marks)

1. D
2. C
3. A
4. A
5. D
6. D
7. B
8. B
9. A
10. C

QUESTION B 26

(5 marks)

1. Where should shop solvents and combustible materials be stored?
 in marked storage rooms (1 mark)
2. What level of eye protection is required when using an oxy-acetylene torch to cut mild steel?
 goggles with a #5 filter (1 mark)
3. Why should an incandescent trouble light never be used in the shop floor?
 explosion hazard (1 mark)
4. What tailpipe emission requires you to vent tailpipe gas to the shop exhaust extraction system any time an engine is run in a garage?
 Carbon Monoxide (1 mark)
5. Name the type of fire extinguisher that can be safely used to put out class A, B, C and D category fires?
 Dry Chemical (1 mark)

QUESTION B 27

(15 marks)

1. Explain the purpose of the primary winding in an ignition system.

The purpose of the primary winding is to induce current into the secondary winding to fire the spark plug.

(2 marks)

2. How many valves are there on a two cylinder 4-stroke-cycle small engine?

2

(1 mark)

3. Define Backlash

End to end movement of two gears on a shaft

(1 mark)

4. The figure below is a picture of a Two-Stroke diesel engine.
Which letter represents the:

- | | |
|-------------------|----------|
| i. Oil | <u>E</u> |
| ii. Fuel Injector | <u>B</u> |
| iii. Air Intake | <u>C</u> |
| iv. Piston | <u>D</u> |
| v. Crank Case | <u>F</u> |
| vi. Exhaust Valve | <u>A</u> |

(6 marks)

5. In a paragraph explain how the Two-Stroke Engine works. You may use the figure above in your answer.

When the piston is at the top of its travel, the cylinder contains a charge of highly compressed air. Diesel fuel is sprayed into the cylinder by the injector and immediately ignites because of the heat and pressure inside the cylinder.

The pressure created by the combustion of the fuel drives the piston downward. This is the **power stroke**.

As the piston nears the bottom of its stroke, all of the exhaust valves open. Exhaust gases rush out of the cylinder, relieving the pressure.

As the piston bottoms out, it uncovers the air intake ports. Pressurized air fills the cylinder, forcing out the remainder of the exhaust gases.

The exhaust valves close and the piston starts traveling back upward, re-covering the intake ports and compressing the fresh charge of air. This is the **compression stroke**.

As the piston nears the top of the cylinder, the cycle repeats with step 1.

QUESTION B 28**(20 marks)**

1. Atmospheric pressure affects the operation of small gasoline engine at various altitudes. What is atmospheric pressure at sea level?

14.7 psi

(1 mark)

2. Explain the function of the following components of a small engine:

i. Muffler

Small gas engines, especially two-stroke engines, are noisy when they operate. A muffler reduces the sound of the exhaust gases by passing them through baffles.

ii. Spark Plug

A spark plug is an insulated electrode that is screwed into the top of the engine cylinder. High-voltage timed electricity from the magneto travels by wire to the spark plug. The base of the plug has an air gap of about 0.030 inch (30 thousandths of an inch), which the current must jump.

iii. Throttle

The throttle controls the amount of fuel-air mixture that enters the engine from the carburetor. The throttle thus controls the speed of the engine.

(6 marks)

3. What should be done to a battery after performing a hydrometer test and cell 1 has a specific gravity of 1.279 and cell 2 has a specific gravity of 1.225.

Replace battery

(1 mark)

4. What is the most likely problem if an old carbureted car starts fine but quickly begins running rough and blowing black smoke out the tailpipe?

Black smoke is caused when the mix of fuel and air becomes un-balanced. Normal mixture is 14.5 parts air to 1 part fuel. When the fuel to air mixtures change because of a malfunction the mixture can go as high as 14.5 to 2 or 3, two to three times the proper amount. The black smoke is the excess fuel generated from the rich mixture and can be caused by one of the following:

- Plugged Air Filter
- Shorted or stuck fuel injector
- Failed fuel pressure regulator
- Vacuum leak
- Shorted Computer Sensor

(2 marks)

5. Explain how to clean carburetor parts.

Use carburetor cleaner and lint free cloths or paper towels to remove all built up brown or green gunk, varnish, and other contamination from the metallic parts. Pay particular attention to the machined passages and metering holes.

WARNING: Carburetor cleaner is both flammable and the fumes are toxic. Do all cleaning away from open flames and outdoors if possible. Wear eye protection. The stuff will also eat plastics including some plastic eyeglass lenses.

Take care where non-metallic parts are still in place as extended contact with harsh solvents may degrade their properties (inlet seat and primer bulb, if present). Low pressure compressed air may be used to blow out passages but only use this on the fuel line from inside the carburetor body - else you may end up with the inlet seat clear across the driveway never to be found again.

DO NOT use wires or metal instruments to clear any of the passages as their size is critical. The small hole in the hollow bolt on the bottom is most critical. Make sure it is cleaned down to the shiny brass and that this hole is unblocked and fully open:

(3 marks)

6. Your friend is interested in learning auto repair. Advise on what would be an easy first project.

When you look at an auto repair diagram or service manual the first step in most auto repairs is to disconnect the vehicle's battery.

The preferred procedure is to disconnect the negative side of the battery first, and I also like to disconnect the positive side as well. Just in case the ground side should contact a solid ground by accident. A lot of do it yourself auto repair mechanics get so anxious to dive into the repair that they forget this first step. If you are replacing an alternator or starter and forget to disconnect the battery, the sparks are going to fly.

(2 marks)

7. When changing a tire explain the best procedure.

Install all the nuts finger tight, and then tighten them in a four – or five pointed star pattern to one half of the torque specification found in the owner's manual, and then again in sequece to the full value. And use a proper torque wrench.

(2 marks)

8. What is the main challenge facing automotive industry today?

Government regulations regarding fuel efficiency and emission controls.

(1 mark)

9. What two things do your car's brakes use to multiply the force of your foot depressing the brake pedal and stopping the car?

Different braking components use mechanical advantage and hydraulic force multiplication to translate the force of your foot on the pedal to stopping power for the car.

(2 marks)