

Leaving Certificate Technology

Draft sample questions

Higher Level

Structure of the examination paper

Recommended total marks: 200 marks

Recommended duration of examination: 2½ hours

Core: Question 1 [72 marks]

Candidates are required to answer any 12 out of 15 items (6 marks per item).

Core: Questions 2 and 3 [24 marks each]

Both questions to be attempted, with parts (a) and (b) in each question compulsory. Candidates have a choice between parts (c) and (d) in each question.

Options: Questions 4 - 8 [40 marks each]

Candidates are required to answer any two questions in this section. In each question, parts (a) and (b) are compulsory, while candidates may choose between parts (c) and (d).

Q.1 Core - Answer any 12 of the following 15 items (a) to (o) in the space provided. Each item is worth 6 marks.

- (1) An emergency road-side sign such as the one illustrated uses solar panels to provide power. State one advantage and one disadvantage to using solar power in this situation.



Advantage: _____

Disadvantage: _____

- (2) Outline three safety features you would expect to find in an electronic toy suitable for use by a 3–5 year old child.

(i) _____

(ii) _____

(iii) _____

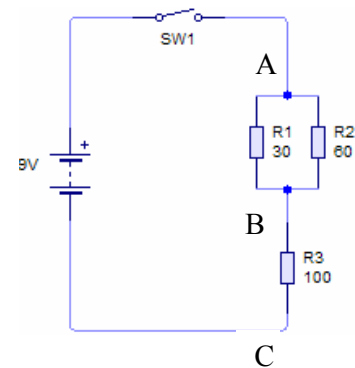
- (3) In the circuit shown, calculate the following:

(i) The combined resistance of R1 and R2

(ii) The total resistance between A and C

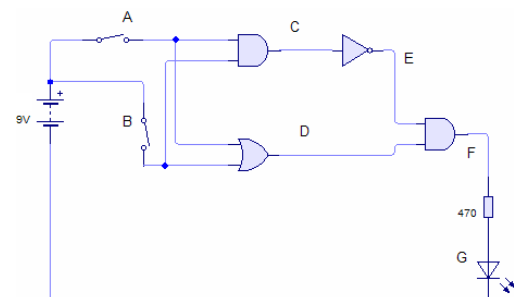
(iii) The current supplied by the battery

(iv) The potential difference across A-B



- (4) Complete the given truth table and identify one arrangement of switches A and B which causes the LED to switch on.

A	B	C	D	E	F	G Output
0	0	0	0			
1	0	0	1			
0	1	0	1			
1	1	1	1			



Answer: _____

(5) The graphic illustrates a network diagram node associated with an individual task.

EST		EFT
Activity Name		Duration
LST		LFT

Explain the following abbreviations shown on the above node:

EST: _____

EFT: _____

LST: _____

LFT: _____

(6) Outline two ways a computer could get infected by a virus

(i) _____

(ii) _____



(7) Name two materials now used in the manufacture of a bicycle and give two properties of each that makes it suitable for this purpose.

Material 1: _____

Properties: _____

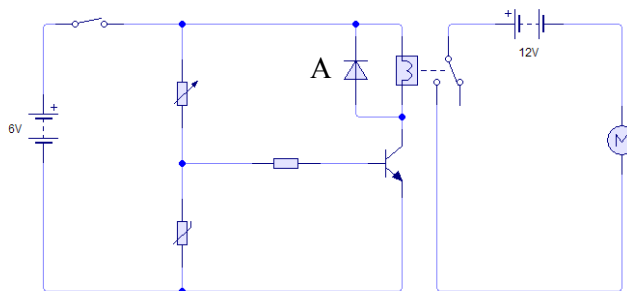
Material 2: _____

Properties: _____

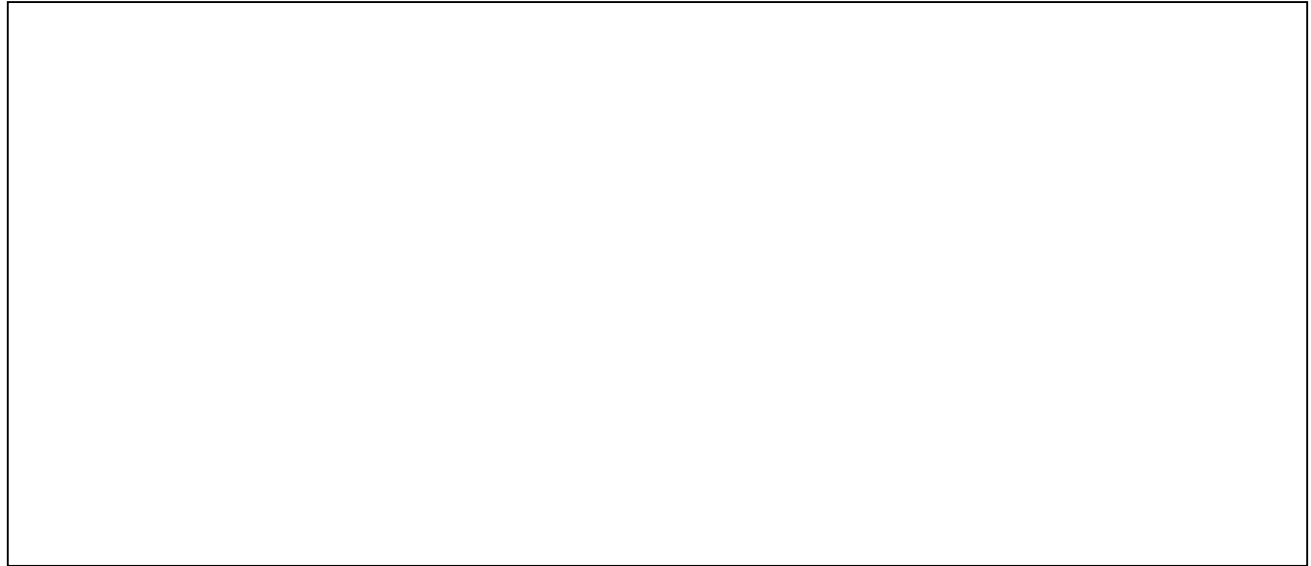
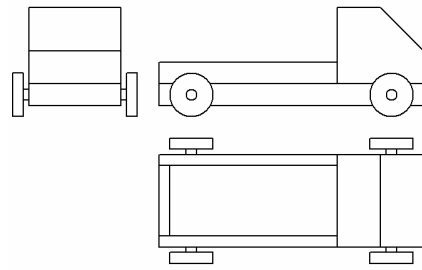


(8) (i) Why is a relay used in the circuit below? _____

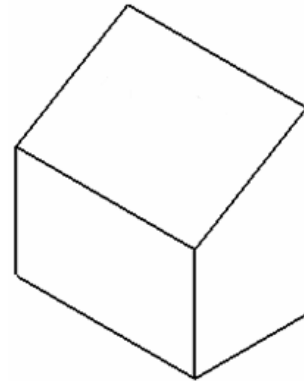
(ii) What is the function of component A? _____



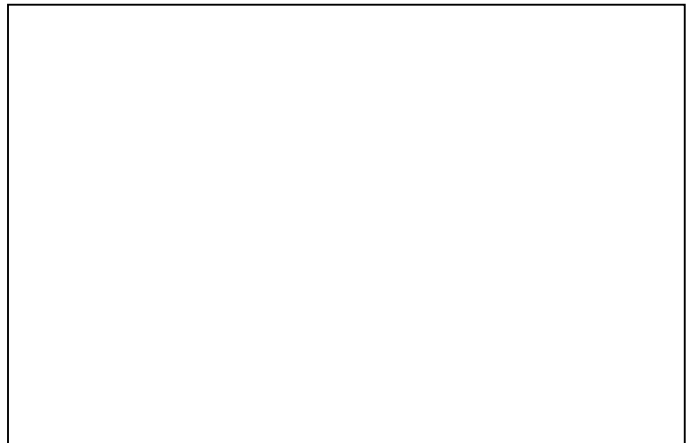
- (9) Shown is a plan, elevation and end view for a toy truck.
In the space provided sketch a 3D view of the truck.



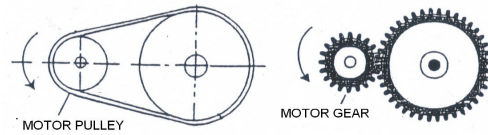
- (10) (i) Render the image on the right to show that the block is made from wood.



- (ii) The block of wood is to be used to make a pencil holder.
Sketch a suitable design in the space provided.



- (11) The diagram illustrates a motorised pulley system used in a washing machine and a motorised gear system used in a toy car.



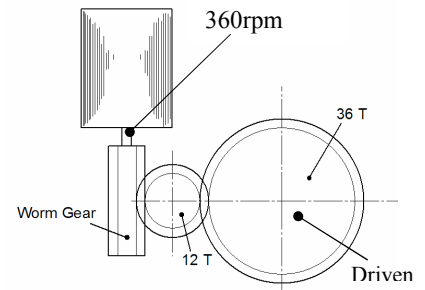
- (i) State one advantage to using each system.

Advantage of a pulley system: _____

Advantage of a gear system: _____

- (ii) Calculate the speed of the final driven gear if a worm gear is connected to the driver as shown.

Answer



- (12) Identify one hazard and one appropriate precaution that could be taken to guard against the hazard in each of the following situations:

- (i) Soldering a transistor into a circuit board.

Hazard: _____

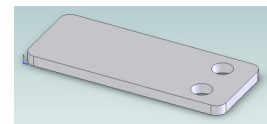
Precaution: _____



- (ii) Drilling a hole near an edge in a piece of acrylic.

Hazard: _____

Precaution: _____

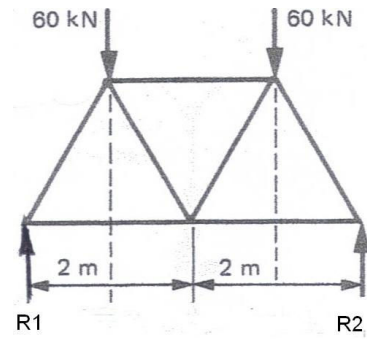


- (iii) Using a CNC machine

Hazard: _____

Precaution: _____

- (13) The simple structural framework illustrated opposite has to carry the external loads shown. By calculating their values, show that the reaction forces R1 and R2 required to support the structure at each end are equal.



Calculations

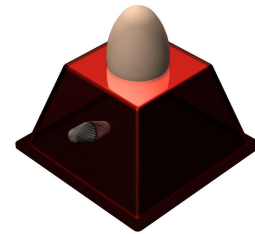
- (14) In designing a safety helmet a designer must consider ergonomics. Describe two areas on a safety helmet which are ergonomically designed.



(i) _____

(ii) _____

- (15) Draw a work breakdown structure identifying four main processes in manufacturing the egg timer shown.



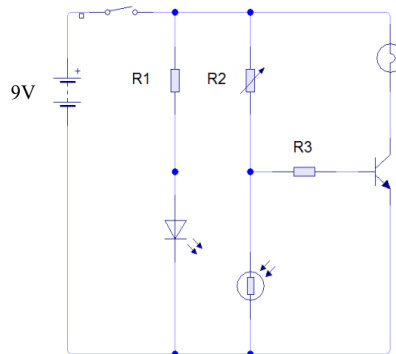
Q2 Core - Answer (a) and (b) and either (c) or (d)

The image shown below is of a student's design for a child's bedside novelty light. The light comes on when it is dark.

- (a) Outline the steps involved in producing one of the side pieces in the light-shade, including the cut out design.



- (b) (i) What steps would you take to ensure all pieces are the required size?
(ii) A difficulty arose when gluing the light-shade to the base. The shade would not remain in place. Using sketches suggest an alteration to the gluing process or to the structure of the design to make this joint more robust.
- (c) (i) The diagram shows a circuit which could be used for the above night light. Indicate what values you would expect R1 and R3 to have.
(ii) Why is R2 a variable resistor?
(iii) The filament lamp shown has a watt rating of 1.2W. What is the maximum current that could flow through it using a 9volt supply?



OR

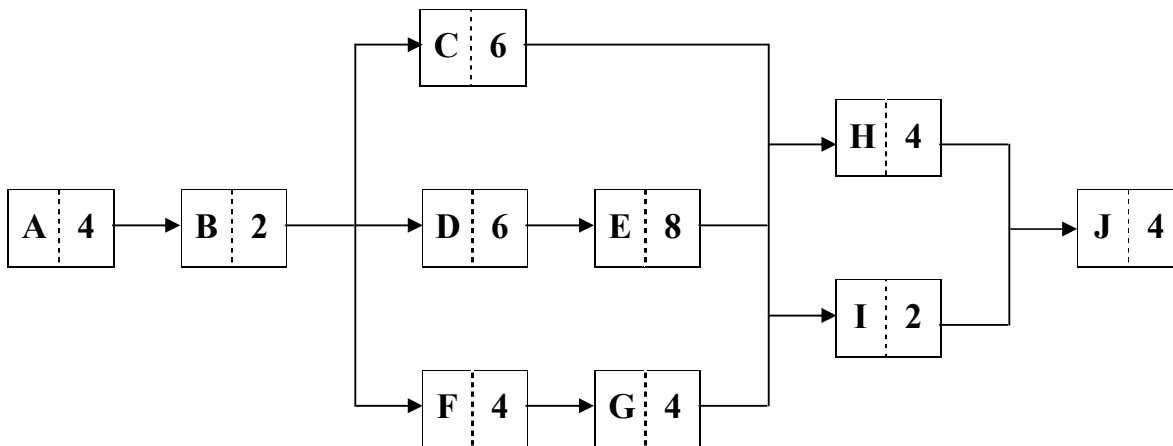
- (d) When the circuit was built it was found not to be very sensitive. Redraw the circuit indicating two changes you could make so that it is more sensitive to changing light levels.

Q3 Core - Answer (a) and (b) and either (c) or (d)

- (a) (i) What do you understand by the term ‘quality’?
 (ii) Briefly describe the relationship between quality, manufacturing costs and market share.

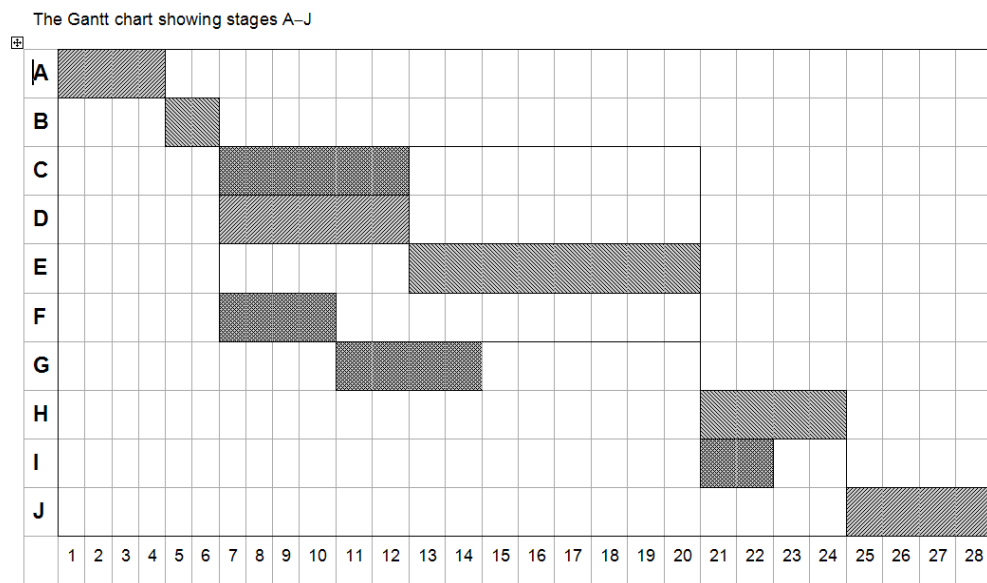
(b) The network diagram below lists the tasks from A to J required for the production of an artefact, with the number of days for each task indicated.

- (i) Identify the critical path in the process and name one non-critical task/step. Why is this task/step a non-critical one?
 (ii) What days might act as appropriate milestones for this project? Explain your answer.



(c) The number of workers required for each stage is given in the table below. If the maximum number of people available to work on the project is 5, explain how the given Gantt chart could be re-arranged to take this constraint into account.

A	B	C	D	E	F	G	H	I	J
2	1	3	1	2	4	3	3	2	2



OR

(d) (i) Complete the following table for the list of tasks A to J described in the network diagram above at part (b).

	A	B	C	D	E	F	G	H	I	J
EST										
EFT										
LST										
LFT										

(ii) Identify the component which has the greatest slack time. Explain your answer.

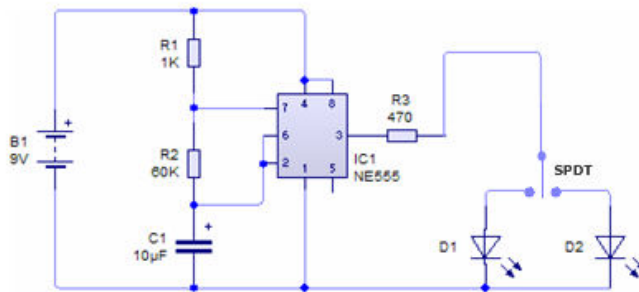
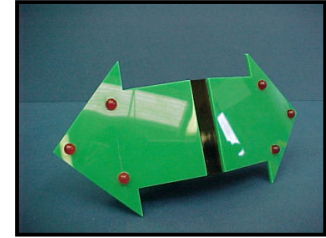
Greatest slack time: _____

Explanation: _____

Q4 Option – Electronics and Control
Answer (a) and (b) and either (c) or (d)

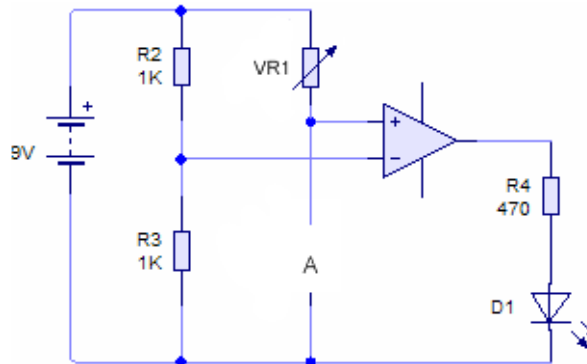
- (a) (i) Explain the difference between prototype and batch production of PCBs
 (ii) Outline the steps you have followed in producing a PCB in the Technology room and identify two safety precautions that should be taken.

- (b) A student's design for a direction indicator is shown opposite, which uses LED's to indicate when turning left or right. The circuit below outlines details of an astable circuit which formed part of the design solution.



- (i) Explain what 'astable' means.
 (ii) Why would a monostable configuration not be appropriate here?
 (iii) What is the function of R2 and C1 in this circuit? If a smaller value resistor is used at R2 how will this affect the operation of the circuit?

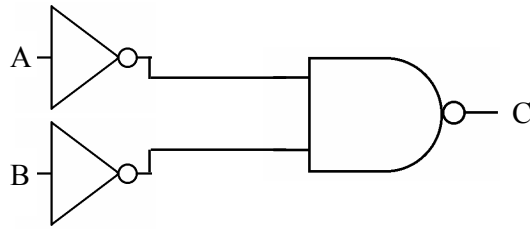
- (c) The circuit below is designed to be used in a frost detection/warning unit.



- (i) Draw and name the missing component required at A?
 (ii) Explain the purpose of R2 and R3 in the circuit.
 (iii) This circuit configuration can be described as a 'sensing comparator'. Explain what this means.
 (iv) What is the value of the reference voltage in this circuit?

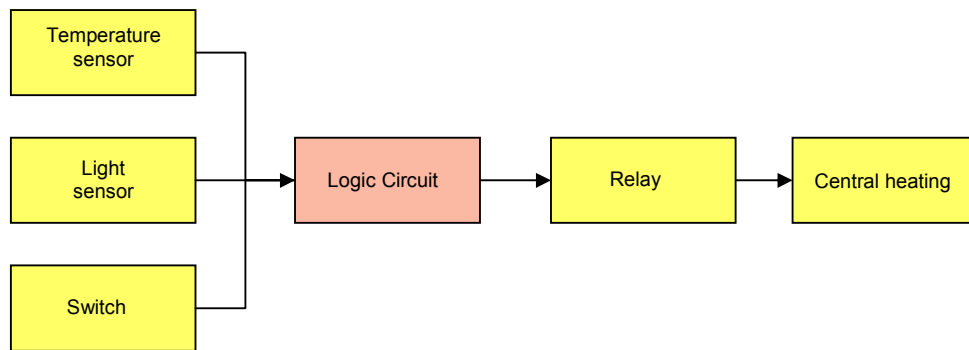
OR

(d) (i) Draw a truth table for the arrangement shown below.



(ii) Name and draw the symbol of a logic gate that will give the same result for the arrangement in (i) above.

(iii) The system below is used to turn on a central heating system in the home of an elderly person when it is dark and cold. The switch allows the user to control when the system is on or off. Draw a logic circuit that will turn on the central heating system at the correct time.

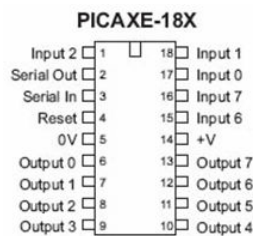
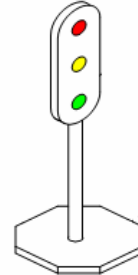


(iv) Electronics have made a major contribution to technological advances in recent years. Outline 2 reasons for this.

Q5 Option – Applied Control Systems
Answer (a) and (b) and either (c) or (d)

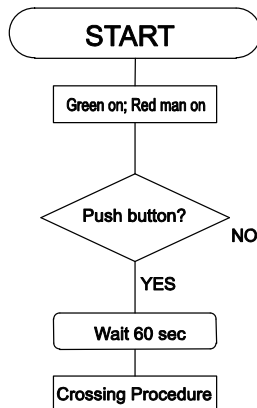
(a) Your class has been asked to design and make a model of a pedestrian road traffic crossing for your local primary school. A Peripheral Interface Controller (PIC) will be required to control the system.

- (i) Identify three advantages of using a PIC for this project.
- (ii) Pins 5 and 14 are connected to the PIC's power supply. Outline two important considerations to take when building the power supply circuit for the PIC.

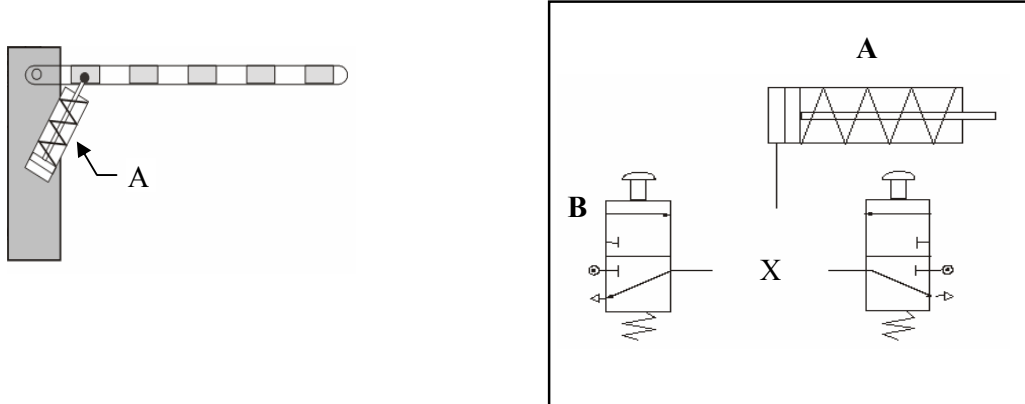


(b) An outline program to control the pedestrian road traffic crossing is shown below.

- (i) Identify the outputs that control the green traffic light if it is connected to pin 13 and the red pedestrian light if it is connected to pin 6 of a PICAXE 18X.
- (ii) Two return loops are missing from the flow chart. Redraw the chart to include the missing loops and describe how the 'Push button?' command operates.
- (iii) The pedestrian crossing is located at a school and required to operate during day time only. Redraw the PICAXE 18X chip above showing how to connect an LDR to input 1. Describe how the PICAXE may be programmed to respond to changes in light level.



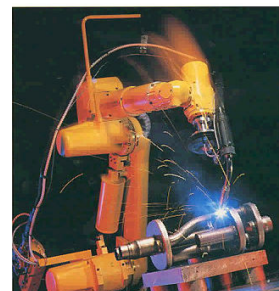
- (c) A shopping centre car park has a pneumatically operated barrier system which allows cars enter or leave the car park automatically. Part of the pneumatic control circuit used to control the barrier is also shown.



- (i) Identify components A and B
- (ii) Explain why a T-piece or T-connector would not be a suitable component to use at position X.
- (iii) Identify the correct component to use at position X.
Redraw the pneumatic circuit diagram to include this component and describe how the pneumatic circuit operates.
- (iv) Explain the significance of the following in relation to pneumatics: -
 - Flow control
 - Actuators

OR

- (d) Robotic applications now feature extensively across many areas of automated production systems. Modern robot anatomy now provides a wide range of possibilities.



- (i) Describe any two of the robot configurations listed below.
 - Cartesian
 - Cylindrical
 - Polar
 - Scara
- (ii) Discuss a suitable application for each of your chosen robot configurations in (i) under the following headings: -
 - Degrees of freedom
 - Work envelope
 - Suitability for task
 - Safety consideration
- (iii) Differentiate between a DC server and stepper motor as a robotic drive system.

Q6 Option – Information and Communications Technology

Answer (a) and (b) and either (c) or (d)

(a) A school wants to set up a client-server network in its technology room with eight computers, a server and a printer.



- (i) Identify two advantages of connecting a group of computers in the school using a computer network.
- (ii) Describe the main functions of a server.

(b) When a student logs onto a computer on the LAN, they enter their username and password. The password has to be at least 8 characters long and must be changed every three months.

- (i) State two reasons why rules are set for user passwords?
- (ii) Identify two other restrictions that could be placed on the user's log-in.

(c) The images below show an ergonomic computer workstation in front and plan view.



- (i) List 4 ergonomic factors which must be considered in this design.
- (ii) List 4 essential design specifications for a computer workstation and justify your choice.
- (iii) Describe 3 precautions that should be taken into account when disposing of old computers.

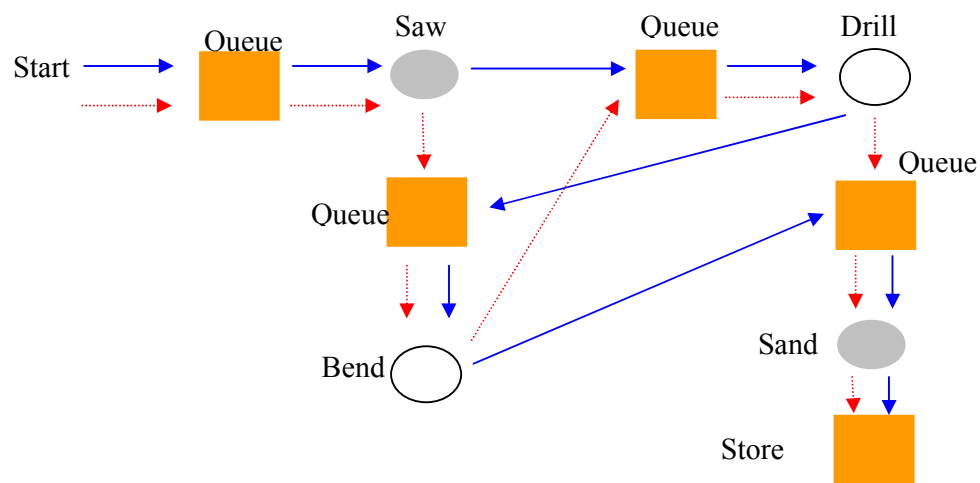
OR

- (d) (i) Explain what is meant by the term Multimedia.
- (ii) Name and compare any two image formats used in multimedia applications.
- (iii) List the hardware and software requirements for Video Conferencing
- (iv) List two advantages of Video Conferencing

Q7 Option – Manufacturing Systems
Answer (a) and (b) and either (c) or (d)

- (a) (i) Explain the term just-in-time (JIT).
(ii) Outline 3 benefits of JIT manufacture.
- (b) (i) What is outsourcing?
(ii) Manufacturers are constantly looking at updating and improving their manufacturing processes. What role has value-engineering in this process?
(iii) Which manufacturing systems most often use the Kanban process? What are the main features and benefits of this process?

(c) Outlined below are the stages in the production of two simple products (full line and dashed line)



- (i) Set up a revised cellular plant layout for manufacture.
(ii) Outline how simple scheduling systems can be developed to improve production time.

OR

- (d) A manufacturer wants to provide quality assurance on the company’s product. Full testing is put in place at the output stage and all items that fail the quality test are withdrawn. Some parts are re-cycled in the production line.
- (i) What are the benefits and disadvantages of this approach?
(ii) What alternative approach might have been adopted to provide quality assurance?
(iii) What advantage(s) would the alternative approach have?

Q8 Option – Materials Technology
Answer (a) and (b) and either (c) or (d)

- (a) (i) Identify two composite materials you have worked with and describe their properties.
(ii) List one use you have made of this material.
- (b) Various materials have been used in the manufacture of the climbing frame below.



- (i) Explain the following terms:
- compressive strength
 - tensile strength
 - toughness
 - thermal expansion
- (ii) Name a suitable wood, metal and plastic which may be used in the production of the climbing frame above. With reference to the terms listed in (i) above justify the materials selected.
- (iii) For one of the selected materials suggest a suitable treatment to prevent the effects of environmental conditions. Outline 2 reasons for this treatment.
- (c) (i) List two tests you would carry out on one of the materials before making the climbing frame to determine its suitability for the unit.
(ii) Describe in detail listing the equipment required how you would carry out the test.

OR

- (d) It is intended that the climbing frame be batch produced.
- (i) Explain the term batch production.
- (ii) What modification is required to facilitate batch production for the export market. Use sketches to illustrate your solution.
- (iii) Discuss the social and economic impact of outsourcing manufacturing to developing countries.