

Time : 2 Hours

Total : 120

INSTRUCTIONS

- Answer all the questions
- Take time to read the questions carefully before answering
- Write neatly and legibly
- All drawings must be done in pencil

SECTION A

Question 1.

Choose the correct answer and write only the letter (A-D) next to the question number.

1.1. Dynamic forces and change.

- A. Move
- B. Relax
- C. Jump
- D. Sit

(1)

1.2. An even load is when the weight is distributed in a structure.

- A. Unevenly
- B. Evenly
- C. Smoothly
- D. Roughly

(1)

1.3. This type of bridge is only supported at the one end.

- A. Arch bridge
- B. Suspension bridge
- C. Beam bridge
- D. Cantilever bridge

(1)

1.4. A measure of the amount of the mass of an object compared to its size.

- A. Density
- B. Hardness
- C. Flexibility
- D. Stiffness

(1)

1.5. are used to guide a designer to complete a drawing.

- A. Centre lines
- B. Construction lines
- C. Outlines
- D. Dashed lines

(1)

1.6. Grooved wheels attached to each other by a rope or cable is known as

- A. Cams
- B. Pulleys
- C. Gears
- D. Levers

(1)

1.7. Which of the following does not form part of a systems diagram.

- A. Input
- B. Device
- C. Process
- D. Output

(1)

1.8. Which of the following is not an output device.

- A. Bulb
- B. Motor
- C. Light dependent resistor
- D. Buzzer

(1)

1.9. An ammeter is used to measurein a circuit.

- A. Energy
- B. Resistance
- C. Voltage
- D. Current

(1)

1.10. A process whereby wood or a metal could be given the same coating to keep out moisture and oxygen that could cause wood to rot or metal to rust.

- A. Electroplating
- B. Varnishing
- C. Painting
- D. Galvanising

(1)

SECTION B.

Question 2.

2.1. Define the following terms and give one example : Dynamic force and Static force.

(4)

2.2. Give the three types of strain.

(3)

2.3. Our school has had a food fair. Each grade was required to sell certain foods. They had to set up their own stalls made of various materials. In table form list three materials that can be used and the effect of different weather conditions.

(6)

2.4. List down two factors that must be considered when choosing materials for a purpose.

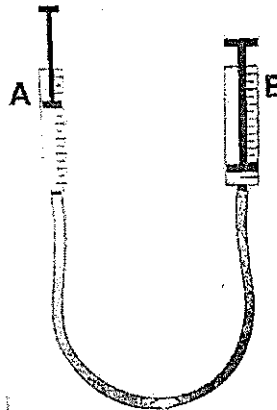
(2)

2.5. Explain the following properties of materials : Flexibility , Hardness ,and Ductility.

(6)

Question 3

3. Two syringes are connected to make a model of a hydraulic system. Syringe B has four times more the cross-sectional area than syringe A.



3.1. If A is the master cylinder and B is the slave cylinder, what force will be experienced at B if a force of 50N is applied to the plunger in cylinder A? (2)

3.2. If plunger A moves a distance of 8cm, how far will plunger B move? (2)

3.3. If 3ml of water is forced out of cylinder A, how much water will enter cylinder B? (2)

3.4. An air bubble is carelessly allowed into the hydraulic system. What effect will be presence of an air bubble have on the amount of force transferred by water from A to B? (2)

Question 4.

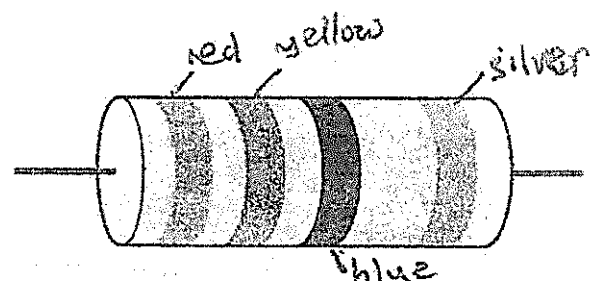
4.1. What is electricity? (2)

4.2. Give the two types of electricity and state which one do you use at home. (3)

4.3. A 12V battery is used in a circuit and a 4A current is flowing through that circuit. How much resistance is the circuit offering. (3)

4.4. Look at the following colour code chart and work out the resistance of the resistor below.

Colour	1 st band	2 nd band	3 rd band zeroes								
Black	0	0									
Brown	1	1	0								
Red	2	2	0	0							
Orange	3	3	0	0	0						
Yellow	4	4	0	0	0	0					
Green	5	5	0	0	0	0	0				
Blue	6	6	0	0	0	0	0	0			
Violet	7	7	0	0	0	0	0	0	0		
Grey	8	8	0	0	0	0	0	0	0	0	
White	9	9	0	0	0	0	0	0	0	0	0



- 4.4.1. What is the resistance of the resistor next to the colour code chart. (2)
- 4.4.2. What is the function of resistors in a circuit. (2)
- 4.4.3. State the colours found in a 50Ω resistor. (3)
- 4.5.1. Draw a labelled symbol of a logic gate. (3)
- 4.5.2. Complete a table for an OR gate with two inputs. (4)

7. Copy and complete the table below.

Process	Advantages	Disadvantages	example
Pasteurising			
Drying			
Freezing			

(9)

SECTION C

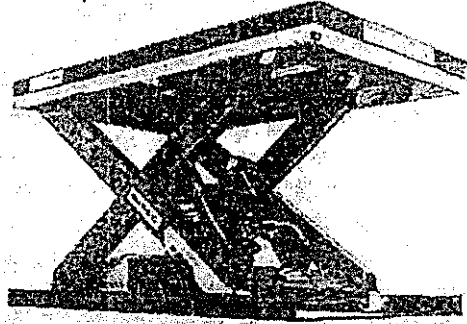
8. Orange River claims another life.

A person was reported drowned in the Orange River late yesterday afternoon. This is the third person to be drown in the river this year. There is yet unnamed drowning victim thought to have been trying to get to his workplace. The emergence rescue services told reporters that the river is much deeper and wider than people think and swimming across is not a safe option.

We have to find ways to get residents safely to and from work.

- 8.1. Write down a design brief for a solution to the scenario above. (3)
- 8.2. Specify details for the following aspects for a solution to the scenario above.
- 8.2.1. People (Who is it for?) (2)
- 8.2.2. Purpose (What will it be used for?) (2)
- 8.2.3. Appearance (What does it look like?) (2)
- 8.2.4. Safety (Is it safe to use?) (2)
- 8.2.5. Cost (How much will it cost?) (2)
- 8.2.6. Impact (How will it affect the environment?) (2)
- 8.3. Neatly draw two free hand sketches of different ideas that will help you find a solution. Choose one of your initial ideas and state a reason for selecting it next to the sketch. (16)
- 8.4. Using your drawing instruments draw a 3-D drawing of your solution as chosen in question 8.3. (12)

9. Study the picture below and answer the question that follow.



9.1. Name two systems which could be used to operate the lift. (2)

9.2. The listed steps below are part of making process of the lift.
Arrange the steps in the correct order for making. (5)

- Prepare the different parts of the lifting device by cutting it out
- Attach the hydraulic system to the base
- Assemble the hydraulic system
- Test the lifting device
- Join the different parts together

