5% Yeast Solution

You are provided with solutions **K**, **L** and **M**. You are required to determine the nature of the solutions. 1% Starch Solution

5% pure Sucrose Solution

(a) Carry out tests in Table 1 and record your observations and deductions in the table.

Table 1 REJ: TURBID SOLUTION FOR K; ACC: COLOURLESS SOLUTION FOR BOTH K AND L (10 marks)

Tests	Observations	Deductions	
(i) To 1 cm^3 of solution **K** in a test tube, add 2 drops of iodine solution.	Colourless solution; ✓ turns to brown solution; ✓ ACC: YELLOW	Starch ~~present~~ absent; ✓	01½
(ii) To 1 cm^3 of solution **L** in a test tube, add 2 drops of iodine solution.	Colourless / Turbid / milky solution; turns to blue / black / blue-black solution ✓	Starch present; ✓	01½
(iii) To 1 cm^3 of solution **K** in a test tube, add 1 cm^3 of Benedict's solution and boil for 1 minute.	Colourless solution; ✓ turns to blue solution; ✓ and remains blue solution; ✓	Reducing sugars absent; ✓	02
(iv) To 1 cm^3 of solution **L** in a test tube, add 1 cm^3 of Benedict's solution and boil for 1 minute.	Colourless / Turbid / milky solution; turns to blue solution; ✓ and remains blue solution; ✓	Reducing sugars absent; ✓	02
(v) To 1 cm^3 of solution **K** in a test tube, add 3 drops of dilute HCl (aq) and boil. Cool and add 3 drops of dilute NaOH (aq) followed by 2 cm^3 of Benedict's solution and boil again.	Colourless solution; ✓ remains colourless solution. The colourless solution; ✓ turns to blue solution; ✓ to green solution; ✓ to yellow ppt to ~~orange~~ ppt to brown; ✓ precipitate.	Non-reducing sugars present; ✓ ACC: Non reducing sugars hydrolysed to reducing sugars. REJ: Reducing sugars present	03

10 MARKS

(b) Boil 2 cm^3 of **M** and then allow it to cool for 2 minutes and label it boiled **M**. Label three test tubes as **1**, **2** and **3** then add contents to each test tube as shown in Table **2**.

Table 2

Test tube	Contents
1	Add 2 cm^3 of **K** followed by 1 cm^3 of **M**.
2	Add 2 cm^3 of **L** followed by 1 cm^3 of **M**.
3	Add 2 cm^3 of **K** followed by 1 cm^3 of boiled **M**.

1. K+M
2. L+M
3. K+B.M

Incubate the three test tubes with their contents in a water bath maintained between (37 – 40) °C for 20 minutes.
(*Meanwhile you may proceed with other work.*)

After 20 minutes, remove the test tubes from the water bath and carry out tests in Table **3**. Record your observations and deductions in the table.

06
(06 *marks*)

Table 3

Tests	Observations	Deductions
(i) To 1 cm^3 of solution from test tube **1**, add 1 cm^3 of Benedict's solution and boil for 1 minute.	Turbid / Creamy / cloudy / milky solution; turns to blue solution; to green solution to yellow ppt to orange ppt to brown; ppt	Reducing sugars present; ACC: Non reducing sugars hydrolysed to reducing sugars;
(ii) To 1 cm^3 of solution from test tube **2**, add 1 cm^3 of Benedict's solution and boil for 1 minute.	Turbid solution; turns to blue solution; to green solution to yellow ppt to orange ppt to brown ppt OR Turbid solution; turns to blue solution; and remains blue solution;	Reducing sugars present; OR Reducing sugars absent;
(iii) To 1 cm^3 of solution from test tube **3**, add 1 cm^3 of Benedict's solution and boil for 1 minute.	Turbid / Creamy / cloudy / milky solution; turns to blue solution; and remains blue solution;	Reducing sugars absent;

02
02
02

06 MARKS

(c) From your results, state the identity of solution **M**. (01 mark)

Enzyme; ✓ Acc: Biological Catalyst, organic Catalyst
REJ: Active substance

(d) State **two** characteristics of solution **M** that were investigated. Give a reason in each case. REJ: denatured by heating (4½ marks)

(i) Characteristic of **M** An enzyme is denatured by boiling or by high temperatures or by a lot of heat ✓ 01

Reason Unboiled M catalysed the hydrolysis of K to reducing sugars; while boiled M did not catalyse the breakdown of K to reducing sugars; ✓ 02

(ii) Characteristic of **M** NOT APPLICABLE

Reason ....

20 MARKS

okra/castoroil/cannalily
Beanpod Desmodium

2. You are provided with specimens **D**, **E** and **F** which are plant structures.

(a) State the observable features common to all the specimens. (02 marks)

Both have 2 scars; REJ: All have scars | Both have scars
Both have pericarps; Acc: Fruit walls
- Both have lines of weakness | sutures. Any 2 = 02 MARKS

(b) Identify each of the specimens giving a reason in each case. (4½ marks)

(i) Identity of **D** Capsule; ✓ REJ: Capsules

Reason Has more than two lines of weakness ✓ or sutures | Has 3/4/5/6 lines of weakness (sutures);

(ii) Identity of **E** Legume; ✓ REJ: Legumes

Reason Has 2/two lines of weakness (sutures); ✓

(iii) Identity of **F** Schizocarp | Lomentum; ✓

Reason Has Compartments / Segments / Loments / mericarps each containing a seed; ✓
- Has many transverse lines of weakness

04½ MARKS

(c) Describe the adaptations of each of the specimens **D** and **F** for dispersal.

(04 marks)

(i) Specimen **D**

The pericarp has lines of weakness (sutures); along which it splits open; when dry or mature; to scatter or release the seeds away from the parent plant; 02MKS

(ii) Specimen **F**

The pericarp has sticky hairs; that stick or attach; on the body / fur / hair / clothes; and are later picked or fall off elsewhere; 02MKS

(d) Cut specimen **D** transversely and open specimen **E** longitudinally.

(i) Describe the difference in seed arrangement in specimen **D** and specimen **E**. *(01 mark)*

The seeds in D are arranged radially / Circular / around the Centre / Central axis while in E, the seeds are arranged along the marginal placenta / linearly on the marginal placenta; 01mark

(ii) Describe the differences in the pericarps of specimen **D** and specimen **E**. *(02 marks)*

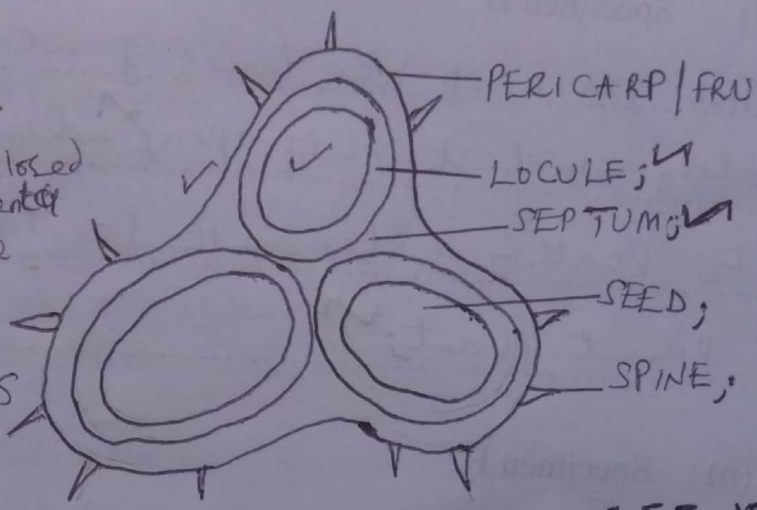
D	E
- Has many / more than 2 sutures	Has two (2) sutures only.
- Has hairs / spines	Has no hairs / no spines
- Has rough pericarp	Has smooth pericarp

ANY 2 = 02 MARKS

(iii) Draw and label a transverse section of specimen **D**.

DRAWING OF A TRANSVERSE SECTION OF SPECIMEN D; ✓ (6½ marks)

CASTOR OIL



MG: X0.5 TO X5 ✓

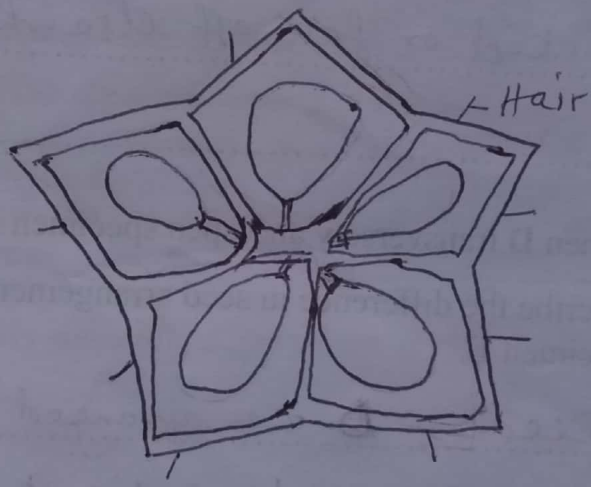
DRAWING POINTS

1. SEED: Continous outline closed from funicle and placenta
2. PERICARP: Complete outline with double lines

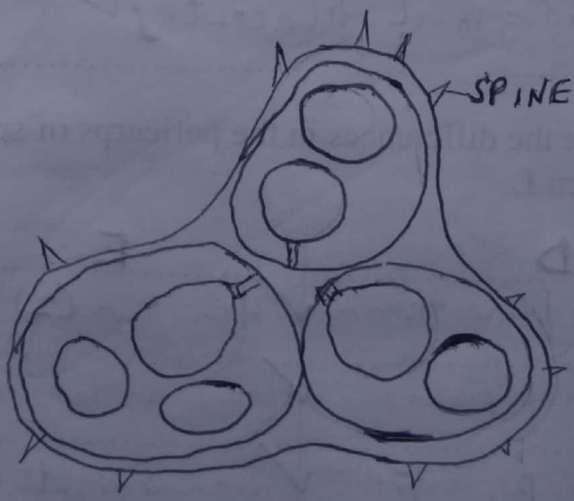
ACCURACY: Should be ATS

NEATNESS:
- clear line drawing
- Sharp pencil for uniform lines
- Any shaded parts should not be seen
- No Coloured Pencils

OKRA



CANNA LILY



3. You are provided with specimens **W**, **X** and **Y** which are from the same animal. Quill feather of a bird / Radius-Ulna bones of a bird / Humerus of a bird

(a) State the part of the body from which each specimen was obtained. *(03 marks)*

(i) Specimen **W** Wings / Fore limb; ✓

(ii) Specimen **X** Wings / Fore limb; ✓ 03 MARKS

(iii) Specimen **Y** Wings / Fore limb; ✓

(b) State **three** adaptations of specimen **Y** to its function. *(4½ marks)*

ANY 3 POINTS
Feature = ½ mark
role/function of feature = 0/mark

In this part, the feature should/must be described in order to earn a mark and the corresponding role should be correct

- Has a long quill; for deep insertion / firm attachment into the body; ✓
- Has a hollow quill; to reduce weight during flight; ✓
- Has a thick / rigid / solid rachis or shaft; to resist breakage during flight; ✓ ANY 3, 1½@ = 04½ MARKS
- Has a large / broad / expanded vane; to increase the surface area for flight;
- Has a long rachis; to increase the surface area for attachment of barbs;
- Has a curved rachis; to create aerofoil shape;

REJ: Interlocking barbules, glossy vane

(c) Give **two** adaptations of each of the specimens **W** and **X** to their functions. *(06 marks)*

(i) Specimen **W**

In this part, the feature may or may NOT be described to earn a mark but the corresponding role of feature should be correct

- Rounded head; to fit into the glenoid / Head cavity of scapula / for articulation with scapula; ✓
- Hard / rigid shaft; for support; ✓ REJ: It is rigid / hard for support
- Has deltoid ridge / greater tuberosity / lesser tuberosity / Projections; for muscle attachment;
- Has Condyles / Trochlea; to fit in the Sigmoid notch / cavity of ulna / for articulation
- Long shaft; for muscle attachment;

ANY 2 POINTS 1½MKS@ = 3 MARKS

(ii) Specimen X – Hard/rigid shaft; for support;

– Has Projections; for muscle attachment; ANY 2 POINTS = 03 MARKS

– Long shaft; for muscle attachment;

– Has Olecranon Process; for muscle attachment/to Prevent the joint from being overstreched

– Has a sigmoid notch/cavity; into which condyles and trochlea of W fit for articulation with the humerus;

(d) Describe the type of joint formed between specimen **W** and specimen **X**.

The Condyles and Trochlea of W fit into the Sigmoid cavity/notch of X; which allows movement in one plane/one direction; (01 mark) 01 MARK

(e) Place specimen **Y** on a flat surface with its point of attachment facing you. Using a razor blade, carefully remove all structures along one side of the main axis (shaft). ACC: DRAWING OF THE REMAINING PARTS OF SPECIMEN Y.

Draw and label the remaining parts of specimen **Y**. State the magnification of your drawing. (5½ marks)

DRAWING SHOWING ALL STRUCTURES ALONG ONE SIDE OF THE MAIN AXIS (SHAFT) OF SPECIMEN Y;

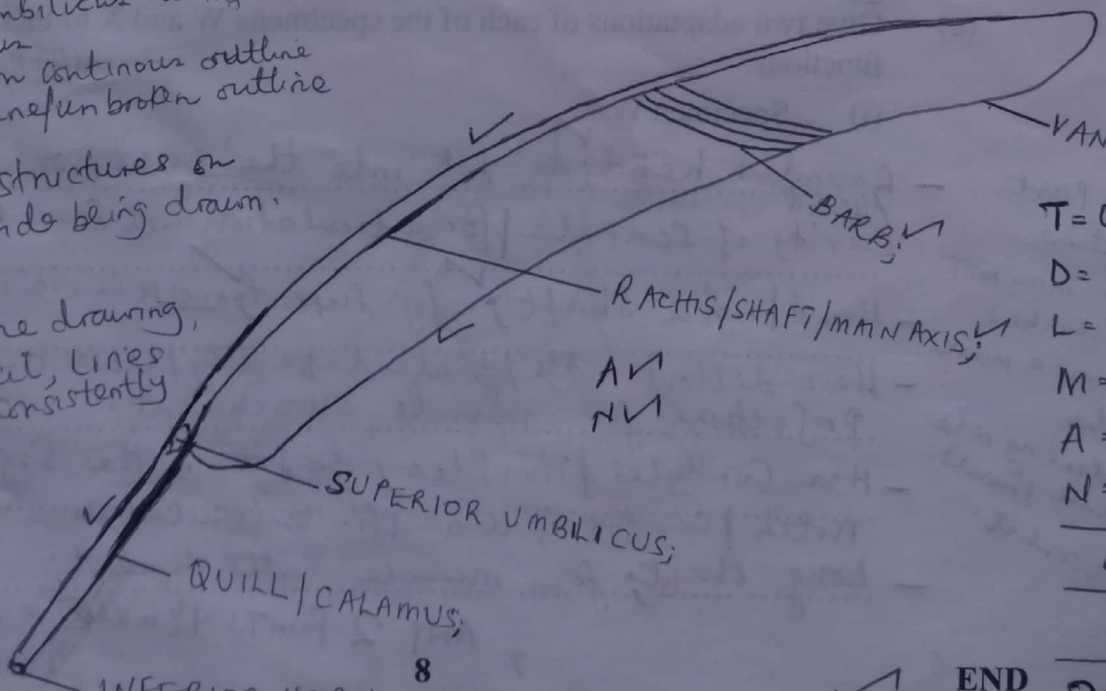
DRAWING POINTS

1. Well drawn tapering shaft from superior umbilicus to the tip
2. Well drawn quill tapering from superior umbilicus to inferior umbilicus
3. Well drawn continous outline of the vane/un broken outline

ACCURACY: structures on only one side being drawn.

NEATNESS

A clear line drawing, Sharp pencil, Lines should be consistently the same.



T = 0½
D = 02 ANY 2
L = 01½ ANY 3 &@
M = 0½
A = 0½
N = 0½
05½

X 0.5 To X 2;

END 20 MARKS