

**231/2 BIOLOGY (2017)**  
**PAPER 2(Theory)**

**MARKING SCHEME**

1. (a) Albinism; sickle cell anaemia; Haemophilia; colour blindness;

**b) (i) Inversion**

Occurs when chromatids break at two places; and when rejoining the middle piece rotates and joins in an inverted position;

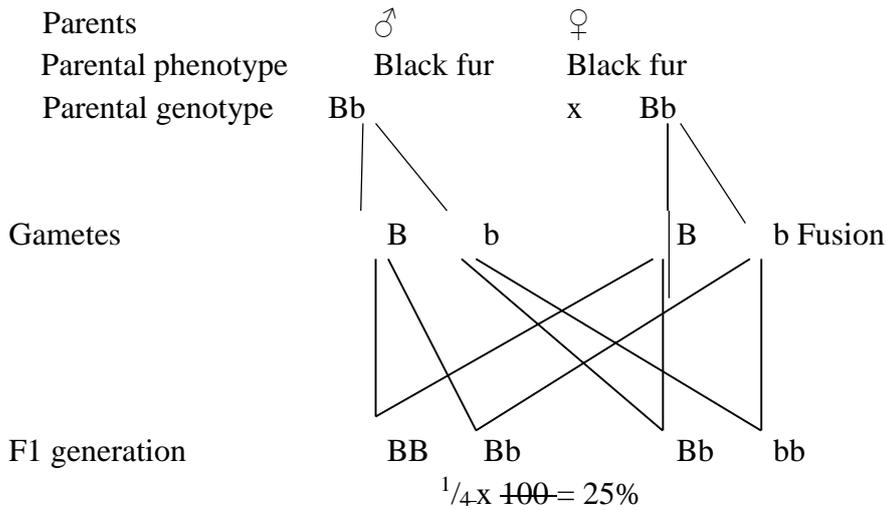
**(ii) Translocation**

Occurs when a section of chromatid breaks off; and becomes attached to another chromatid of another chromosome;

c) Parents

Parental phenotype

d) Parental genotype



OR

Genotype	Male Bb	x	Female Bb
	♀ B		b
	♂ B		Bb
	b		bb

$\frac{1}{4} \times 100 = 25\%$

*\*Penalise at parental genotype if other letters are used.*

*\*Maximum of 1 mark if wrong symbols used for correct crossing.*

2. (a) A – Cortex  
B – Pith
- (b) C – Transports soluble manufactured food/translocation from leaves the other parts of plant; D – Leads to secondary growth/manufacture xylem/phloem;  
E – Transport water and mineral ions from root to other parts of the plant;

(c)	<u>Stem</u>	<u>Root section</u>
	Has pith	Lacks pith;
	Has cambium ring	Lacks cambium ring;
	Vascular bundles are phloem in cambium ring	Xylem is star-shaped and at the centre with in between the arms of xylem;
	Lacks root hairs	Has root hairs; (any 3)

3. (a) i) Insecta;

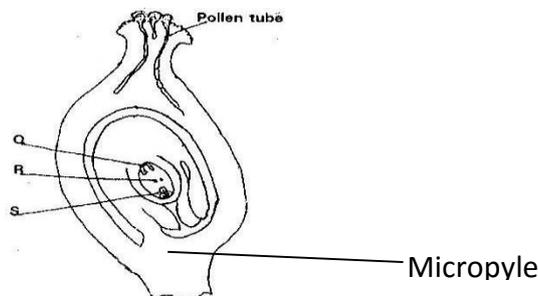
ii) Segmented body;

Presence of three body parts Three pairs of jointed appendages; Presence of exoskeleton.

- b) i) **Q** Antipodal cell(s);

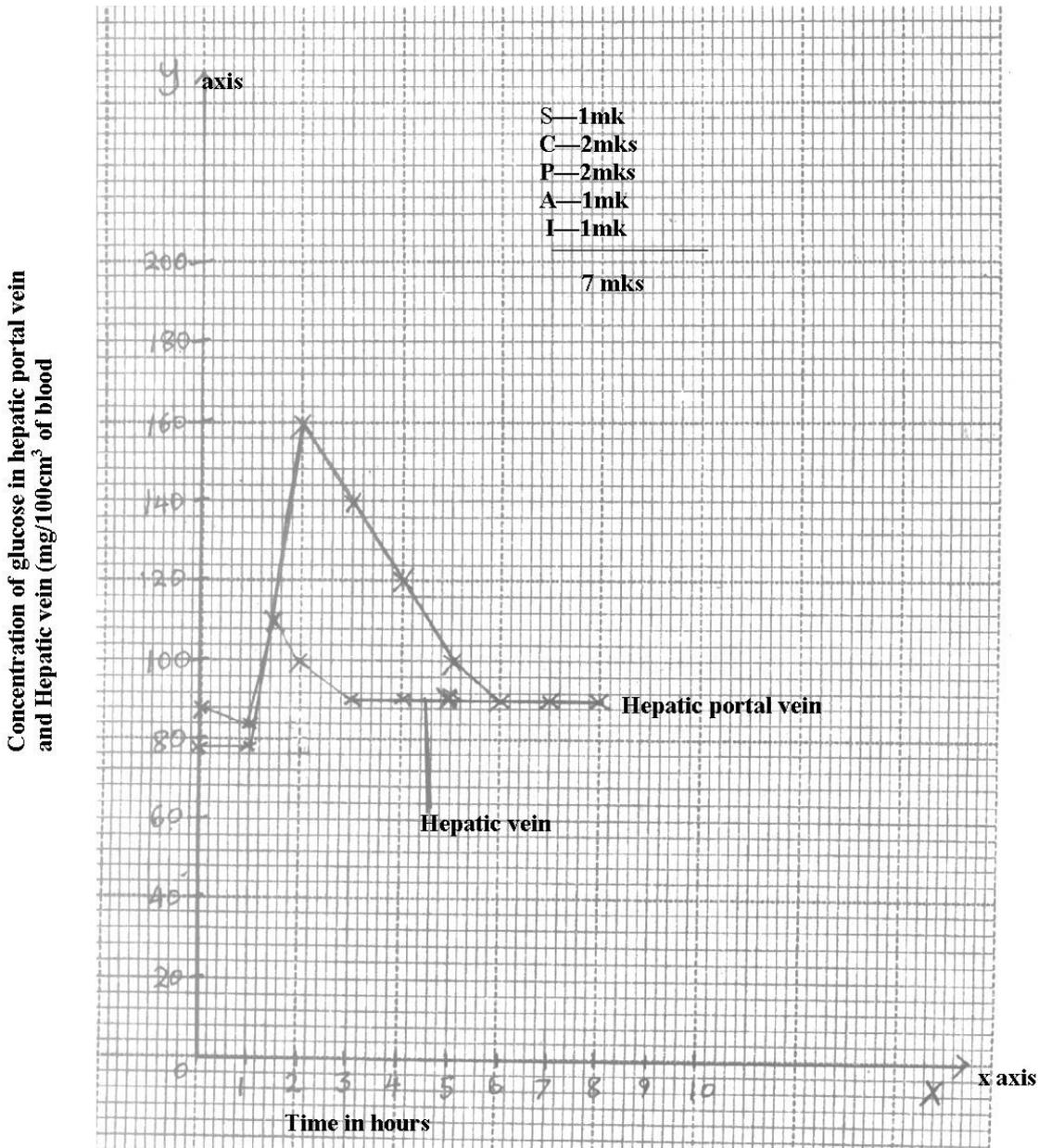
**R** Polar nucleus/nuclei:

- ii) Secretes enzymes that digest the stigma/style/ovary tissue;  
Offer passage for male nuclei to ovum and polar nucleus/embryo sac;
- iii) On the diagram, label the micropyle.



4. (a) Broad and flat to absorb maximum light;  
- Have chloroplasts with chlorophyll to trap light;  
- Transparent cuticle to allow light to pass through;
- (b) x - Carbon (iv)  
oxide; y –  
Oxygen;
- (c) (i) xylem;  
(ii) Phloem;
- (d) Starch is insoluble in water, hence osmotically inactive; This reduces effect on absorption of water;

5. (a) Solution A;
  - (b) Solution B;
  - (c) Arrow from A Pointing B;
  - (d) Cell membrane / Plasma membrane;
  - (e) - Absorption of water from the soil;
  - Osmoregulation in the kidneys;
  - Opening and closing of stomata;
  - Feeding insectivorous plants
  - (f) -Diffusion
  - Active transport
6. (a)



(i) Between 0-1hours.

Blood sugar level in hepatic portal vein is lower than that in hepatic vein.

-Its lower in hepatic portal vein because of no absorption of glucose, glucose that was present in blood has been used up by cells; for respiration (max 2 marks)

- Its higher in hepatic vein due to regulation / effect of glucagon in the liver by

\*Breakdown of glycogen to glucose.

\*Breakdown of fats to glucose.

(ii) Between 2-4 hours.

-Very high level in hepatic portal vein due to absorption of glucose in ileum.

-Level lower in hepatic vein due to regulation / effect of insulin hormone in the liver by:-

\*Oxidative breakdown of glucose to release energy.

\*Conversion of glucose to fats glycogen for storage.

\*Inhibit breakdown of fats. Non carbohydrates sources to glucose.

(max 5 marks)

(b) (i) Proteins digestion takes longer time. Absorption of proteins by active transport

Require energy thus takes longer time to begin (max 1 mark)

(ii) Its higher in hepatic portal vein due to absorption of amino acids in ileum Its lower in hepatic vein due to deamination in the liver.

(c) Lipase (1 mark)

## 7. Wind dispersal;

Small and light; to float in air/blown by air; Have wings; to increase buoyancy;

Have hairs/parachute shaped; to increase buoyancy in air.

### Animal dispersal;

Are succulent; to attract animals; Scented; to attract animals.

Have small and hard seeds resistant to digestive enzymes; to prevent digestion once swallowed; Have hooks; to attach to fur/hair of animals;

Brightly coloured; to attract animals;

### Water dispersal;

Water proof epicarp; to prevent entry of water or soaking;

Fibrous mesocarp; with air spaces to increase buoyancy in water; **Self-explosive mechanism;**

Have lines of weakness; where they break to release seeds;

Have rings of pores; through which seeds are released;

(Max 20marks)

8a)

- It is muscular//Has cardiac muscles which are myogenic;//capable of contracting and relaxing without nervous stimulation to ensure the heart beat without stopping;
- Supplied by vagus and sympathetic nerves; which control the rate of heart beat depending on body's physiological requirement;
- Has tricuspid and bicuspid valves//arterial ventricular valves; to prevent back flow of blood into wrong directions;
- Has semi lunar valves at the base of pulmonary artery and aorta; to prevent back flow of blood into right and left ventricles respectively;
- Presence of valve tendons attached to the walls //arterial ventricular walls; prevent arterial ventricular valves // tricuspid and bicuspid valves from turning inside out;
- Supplied by coronary artery; to supply food and oxygen t the cardiac muscles for their pumping action;
- Coronary vein; draws away metabolic wastes;
- Heart is enclosed by pericardial membrane; which secrete fluids which lubricates//reduces friction on the walls as it pumps;
  - Pericardial membrane is lined with a layer of fat to act as shock absorber; hold the heart in position; checks over dilation of the heart;
  - The heart is divided into two by (atrio ventricular) septum; which prevents mixing of oxygenated and deoxygenated blood;
  - The sino-atria node// pace maker; initiates a wave of excitation leading to contraction and relaxation of cardiac muscles;
  - The atrio-ventricular node; in the heart spread out waves of excitation throughout

the heart The structure tied to function wrong function cancel the mark of the structure. Correct structure minus function do not qualify for a mark

### **b) Phototropism**

This is a growth curvature in response to direction and intensity of light Shoots are positively phototropic while roots are negatively phototropic

### **Chemotropism**

This is a growth curvature in response to a gradient of chemical concentration; developing pollen tubes grow towards chemicals secreted by the embryo sac;

### **Geotropism**

This is a growth curvature in response to gravity; Shoots are negative geotropic while roots are positively geotropic;

### **Hydrotropism**

This is a growth curvature in response to water/moisture; Roots are positively hydrotropic;

### **Thigmotropism**

This is a growth curvature in response to contact with solid objects; shown by tendrils/climbing stems which twine around objects;

### **Survival values of tropic responses**

- Phototropism exposes the leaves in position to maximum light absorption thereby enhancing photosynthesis;
- Chemotropism enables pollen tubes to grow towards the embryo sac to facilitates fertilization;
- Geotropism enables plant roots to grow deep into the soil thus offering firm anchorage to the plant;
- Hydrotropism enables the roots of the plant to seek water;
- Thigmotropism enables the plants to obtain mechanical support, especially plants lacking woody stems;