**JINJA JOINT EXAMINATIONS BOARD**

**Uganda Advanced Certificate of Education**

**BIOLOGY MOCK EXAMS 2019**

**(THEORY)**

**Paper ONE**

**Proposed guide for biology P530/1**

**SECTION A (40 MARKS)**

1 B 11 B 21 B 31 A

2 A 12 C 22 D 32 A

3 C 13 A 23 D 33 D

4 B 14 B 24 B 34 C

5 D 15 A 25 A 35 D

6 A 16 D 26 D 36 B

7 C 17 A 27 A 37 A

8 B 18 D 28 D 38 C

9 D 19 C 29 C 39 D

10 C 20 B 30 B 40 A

**SECTION B ( 60 MARKS)**

1. (a) (i) 1. Elderly/older people above 50 years; 1

2. Babies/Children/ infants/young below 6 years; 1

3. Pregnant women

4. Those with chronic diseases; e.g. heart conditions/ lung onditions/asthma/diabetes

5. Those with compromised immune system; e.g. with AIDS/HIV/ on immunosuppressant drugs/cancer

6. Healthy workers

7. Poultry workers/ pig farmers/ veterinary doctors

**Any 2** **2 max**

(ii) 1. Virus mutates each year producing new different strains of viruses; 1

2. with new different anigens; 1

3. previous original antibodies may not match new antigens/strains;

**2 max**

(b) (i) 1. Secondary response, starts earlier/ has shorter delay before response; 1

2. Secondary response more rapid/ faster/ bigger/steeper; 1

3. Secondary response produces more antibodies

**2 max**

(ii) 1. Primary response lacks memory cells; ½

2. secondary response has enough memory cells which will quickly recognize antigens; ½

3. memory cells quickly divide by mitosis repeatedly to form a large clone of antibody producing cells; ½

4. which respond rapidily and greatly compared to the slow and small primary response; ½

OR

Primary response is to new antigen previously unknown to the body;

antibodies cannot be produced quickly enough to prevent illness;

and it takes time for B-cells to be produced and differentiate into effector/plasma cells and memory cells.

**2 max**

(iii) 1. Recognize,virus/antigen/pathogen; 1

2. undergo rapid repeated mitotic cell division to; 1

3. produce a large clone of identical memory cells; 1

4. Some change into plasma cells which produce antibodies against virus/antigen; 1 5. responsible for secondary response / which destroy virus before symptoms appear; 1

1. (a) (i) 1. DNA codes for protein/polypeptide; ½

2. by transcription and translation (or described); ½

3. Sequence of DNA bases/triplets; determines the sequence of amino acids; ½ 4 in the primary structure of polypeptide; ½

5. Primary structure is coiled into alpha-helix; or folded into beta-pleated ½ sheet;

6. to form a particular secondary protein structure; ½

7. Enzyme is globular protein; secondary protein structure side groups; ½ 8. determine the folding and bonding in a tertiary structure; ½

9. 3-dimension structure is tertiary structure with surface specific shapes ½ 10. called active sites; ½

5 **max**

(b) Any **three** from:

1

1

1

|  |  |
| --- | --- |
| Starch | Cellulose |
| Polymer of α-glucose  No rotation of adjacent glucose units  Straight chains with cross linking due to hydrogen bonds  OH-groups project inside/inwards  α -1-4 and 1-6 glycosidic bonds  does not form microfibrils | Polymer of β-glucose;  Glucose units (monomers) rotate alternately at1800 to each other;  Coils into helix or branched ;  OH-groups project outwards  β-1-4 glycosidic bond  forms microfibrils |

Any **two** from:

(c) 1. Insoluble (in water); so doesn’t affect water/osmotic potential; 1

2. Branched / coiled / (α-)helix, so makes molecule compact; 1

OR

Branched / coiled / (α-)helix so can fit many (molecules) in small area;

3. Polymer of many (α-)glucose so provides glucose for respiration;

4. Branched / more ends for fast breakdown / enzyme action;

5. Large (molecule), so can’t cross the cell membrane

**2 max**

1. (a) 1. Water lost from leaf because of transpiration / evaporation of water (molecules) / diffusion from mesophyll / leaf cells; ½

OR

Transpiration / evaporation / diffusion of water (molecules) through stomata / from leaves; ½

2. Lowers water potential of mesophyll / leaf cells; ½

setting up a water potential gradient between xylem with a higher water potential ½ and mesophyll cells with lower water potential ½

3. Water enters mesophyll cells by osmosis from xylem ½

4. Water pulled up xylem (creating tension); ½

5. Water molecules cohere / ‘stick’ together by hydrogen bonds; ½

6. (forming continuous) water column; ½

7. Adhesion of water (molecules) to walls of xylem; ½

**5 max**

(b) 1. end walls of Xylem vessels broken down to provide uninterrupted flow of water from roots to the leaves; 1

In tracheids with end walls, large perforations reduce resistance/provide uninterrupted flow of water

2. bordered pits in lignified cell walls of tracheids and vessel elements allow lateral flow of water between adjacent cells; 1

3. lignin thickenings on inside of walls of tracheids and vessels in form of annular or spiral rings increases adhesion of water to rise by capillarity; 1

4. lumen of tracheids and vessels are narrow increasing capillarity; 1

5. vessels and tracheids are joined end to end to form continuous columns, to allow water flow in continuous column.; 1

6. cell walls of cells impregnated by lignin, making them rigid to prevent them from collapsing under large tension tension forces set up by the transpiration pull 1

**5 max**

1. (a) 1.(sodium Ion) channel proteins open; ½

2. Sodium ions rapidly diffuse in; ½

3. Changes membrane potential/makes inside of axon lessNegative/positive/; ½ 4. depolarization /reaches threshold; ½

5. More channels open/positive feedback;

**2 max**

(b) 1. (When action potential reaches peak); Sodium channels close slowly; ½

2. sodium ions stop diffusing into axon/cell ½

3. Potassium channels open; ½

4. Potassium diffuse out more rapidly; ½

5. making the inside of the axon/cell less positive/ more negative; (causing the membrane potential to drop);

**2 max**

(c) Leads to no change in potential difference across axon membrane/ only slight decrease in resting potential; 1

Slight change would be insufficient to reach the threshold value to produce action potential; 1

**2 max**

(d) (sodium-potassium) Pump actively transports/transports; ½

sodium ions sodium outof axon and potassium in against concentration gradient; ½

Axon membrane also more permeable to potassium ions than sodium ions; ½

more potassium ions diffuse out resulting into net negative charge with in membrane; ½

**2 max**

(e) larger axons transmit impulses faster than smaller axons; ½

resistance of axoplasm decreases with increasing axon diameter; ½

this is due to increase in length in distance between adjacent depolarizations ½

(leading to increase in speed of conduction); ½

**2 max**

1. (a)

1

1

1

|  |  |
| --- | --- |
| Sperm | Egg cell |
| Has flagellum  Streamlined shape/elongated  more mitochondria  acrosome present  lacks jell coat  has no cortical granules  has food stores  smaller in size | Lacks flagellum  Circular shape  Few mitochondria  No acrosome  Has jelly coat/ zona pellucida  Has cortical granules  Has food reserves/stores  Larger in size |

(b) egg undergoes second meiotic division; male and female nuclei fuse; 1

cortical granules release enzymes that cause zona pellucida to thicken and harden; 1 forming the fertilization membrane; 1

which prevents entry of other sperm to penetrate the egg cell from polyspermy;

**3 max**

(c) (i) concentration of progesterone hormone gradually/slightly increases in the first 24 weeks; 1

and rapidly increases between 24 and 32 weeks; 1

**2 max**

(ii) Stimulates development of milk (mammary) glands in breasts ready for lactation; 1

Prevents menstruation and maintains the endometrium of uterus; 1

Inhibits contraction of uterine wall to prevent miscarriage; 1

Inhibits prolactin release and therefore lactation;

3 **max**

1. (a) Aabb -- Blue; ½

aaBB -- white; ½

**1 max**

(b) Allele B is epistatic/promoter gene; which codes for protein/ enzyme; 1 which changes structure of pigment / makes more pigment; 1

OR

Allele B is epistatic/promoter gene which codes for protein/enzyme; that increases transcription/expression of gene A resulting into purple colour;

**2 max**

(c) Parents’ phenotype; blue X white ½

Parents’ genotype (2n); AAbb X aaBB ½

Meiosis; ½

Gametes(n); Ab X aB ½

Fertilization; ½

Offspring genotype (2n); AaBb ½

Offspring phenotype; all purple flowers ½

**Selfing F1 offspring**

Parents’ phenotype; purple X purple ½

Parents’ genotype (2n); AaBb X AaBb ½

Meiosis;

½

½

½

Gametes (n);

Fertilization;

Offspring genotype (2n);

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| ♀ ♂ | AB | Ab | aB | ab |
| AB | AABB | AABb | AaBB | AaBb |
| Ab | AABb | AAbb | AaBb | Aabb |
| aB | AaBB | AaBb | aaBB | aaBb |
| ab | AaBb | Aabb | aaBb | aabb |

Offspring phenotype ; 9 purple flowers3 blue flowers4 white flowers ½

Phenotypic ratio; 9 : 3 : 4 ½

**7 max**