P539/2 BIOLOGY PAPER 2 UACE

1. a) (i) Homoitherms

e.g birds and mammals

(ii) Slight fluctuations of body; temperature along the norm; body temperature relatively higher than environmental temperature; (2mks)

b) Homeostatasis; maintenance of CONSTANT internal environment; of organisms; thermo regulation; maintenance of internal body temperature. (3mks)

c) Body is trying to lower temperature; increased body temperature detected thermo receptors; in hypothalamus; which generates impulses; through efferent nerves; to affectors.

i) Superficial; arterioles dilate;

More blood comes near skin surface;

There is increased heat loss to the surroundings

Through radiation and convection

ii) Sweat glands; produce sweat; as water evaporates from the skin surface; it takes heat of vaporization from the body

Cooling the body;

Erector pili muscles relax

Hair flattens over skin surface;

To allow free circulation of air;

That carried away heat by convection;

Reduced metabolic rate; reduced production of heat

Behavioral

Go under a shade; to avoid gaining heat from direct radiation of the sun;

Burrowing

Go into water/swimming; to lose heat to water by conduction; and convection;

Thermogaping; losing heat from/panting the mouth through evaporation;

AESTIVATION; reduce generation of heat; fanning; increased loss can become nocturnal; to avoid gaining heat from solar radiation. (Max. 20mks)

They would adapt to high temperatures;

Reduced subcutaneous fat; reduces insulation;

Reduced skin hair/fur, reduced insulation

Increases air circulation around the body;

Increased size of extremities e.g larger germs, snouts, legs etc

To increase the surface area for losing heat;

Increased number of sweat glands

To allow greater evaporation from body surface

Migrate

Decrease B.M.R to generate less heat. (Max 12mks)

2. PHOTORECEPTOR

Has light sensitive pigment known as Rhodospin that easily breaks up when exposed to light

Lamella increases surface area for increased carriage of pigment, capturing light, increased sensitivity.

Numerous mitochondris; to provide ATP energy; for synthesis of the Rhodospin;

It has a foot in close contact with the bipolar neurone; (Max 10mks)

Trichromatic theory

Cones are of three types

Responding to three primary colours

Blue green and red

All colours produced by mixing the primary colours.

Depending on the relative degree of the stimulation of three types of cones; differential stimulation (Max 4mks)

c) Accommodation

Near object

Circular muscles of ciliary body; contract; the suspensor ligaments attain less tension less tension on the lens;

Which become thick and round; reducing the focal length of the lens; an image from a near object is focused on the retina.

**FAR OBJECT**

Circular muscles of ciliary body; relax

Suspensony ligaments become taut;

Pulling the lens outwards

Lens become thin and flat;

With increased focal length

Images from far objects are, focused on retina. (Max 6 mks)

3. a) Pollen and ovules

Pollen; pollen sacs of the anthers

Ovules in the ovary (4mks)

b) On the inside of an ovary

Develops a protuision known as the nucellus; (NUCELLUS attached to a placenta by a funicle enclosing a diploid embryo sac mother cell which undergoes meiosis;

To form 4 haploid cells; known as a tetral, 3 of the tetrad degenerate one remains as young embryos sac which enlarges;

The nucleus undergoes three mitotic divisions

To provide eight daughter nuclei

Four at each end of the embryo sac;

One from each end migrates to the center to form the polar nuclei

The remaining acquire cell walls;

3 at each pole

One cell near micropyle becomes an egg

The other 2 remain as synergids

The other three far from the micropyle are known as antipodal cells. (Max. 12mks)

c) Double fertilization

One male nucleus fuses with the egg cell to form a diploid zygote

The other male gamate fuses with the polar nuclei to form a triploid endospermic nucleus. (4mks)

4. Mammalian nephrone

Cup shape Bowman capsule to enclose the glomerulus

Different vessel larger than efferent

To create pressure within glomerulus

Glomerulus much coiled capillaries

To increase resistance to blood flow

U shaped loop of Henle to create a counter current multiplier effect

Distal convoluted tubule much coiled

To increase surface are for reabsorption of salts from urinal filtrate

Proximal convoluted tubule much coiled

To increase surface area for the reabsorption of glucose from renal filtrate

Proximal distal epithelial cells have microvilli to increase surface area

For reabsorption of substances

Tubule cells endowed with many mitochondria to provide ATP energy for active movement of salts

Long loop of Henle to increase surface area for reabsorption of water

To increase the multiplier effect

Leading to formation of a concentrated solution at the tip

Ascending limb thick and impermeable to prevent movement of water following the removal of salts

Have podocytes with minor processes in the Bowman’s Capsule wall to leave spaces/gaps through which filtrate passes.

Close proximity with capillaries allows reabsorption of substances from filtrate.

Small glomelular wall pores to allow filtration of only small molecules

Large collecting duct to receive renal fluids from many nephrons. (Max 20mks)

**5. a(i) Advantages of unicellular**

* Have large surface area to volume ratio
* Many processes therefore occur diffusion through the skin surface
* Gaseous exhcnage, excretion etc
* Small diffusion distance
* Can reproduce asexually rapid increase in numbers

**(ii) Advantages of multicellular**

* Enables organisms to increase in size
* There is increased specialization of cells
* Increased efficiency in all life processes
* Enables organisms to exploit a wide range of environment
* Enable organisms to survive extreme conditions. (8mks)

**b) CHALLENGES/OVERCAME**

Acquisition of O2, evolution of elaborate respiratory surface e.g gills and lungs with large surface area, vasalarised with efficient ventilation mechanisms;

**Food**: have evolved efficient digestive systems to consume complex organic matter which is easily digested absorbed into their bodies

**Transport**: the evolution of vascular system to transport materials to long distances. (Max 8mks)

c) diagram

*S.A*(5X5)X6 = 150cm2 *S.A*(10X10)X6 = 600cm2

Volume = 5x5x5 = 125cm3 Volume = 10x10x10 = 1000cm3

S.A = 150cm2 S.A = 600cm2

Volume  125cm3 volume  1000cm3

= 1.2cm2/cm3 = 0.6cm2/cm3

6. a) Skeletal muscles attached to the skeleton/bones

Smooth muscles tubular organs of the bitenal body structures e.g viscera; cardiac muscles makes up the heart. 3mks)

**b) CHARACTERISTICS**

* There are striated made up of actin any myosin fibres
* They are voluntary rapid neurogenic and quickly fatigue
* Fibres are multimidested
* Enclosed in a sarcolemma
* Units of muscles known as SARCOMERE
* Will respond when stimulation reaches threshold all or nothing law;
* A single contraction due to a single stimulation form a TWITCH
* Has indent period due to inertia
* Stimuli given continuously at a high rate leads to tetanus
* Summation: 2stimuli emerge into one
* Has resting potential
* Has action potential
* Have a refractory period. (Max 7mks)

c) When impulse reaches a mode fibre Ca2a are released from the sarcoplasma reticulum and come in contact with the actin filament

The troponin displaces the tropomysin

To enable the myosin filament

To bind with actin and form bridges

ATP becomes hydrolyzed to alter the shape of the myosin nodding head

This causes the actin to slide past the myosin

The bridge then detaches and attaches on another side of the actin further along;

This cycle of events in repeated; causing contraction of the muscle. (Max 10mks)