FORM 4 2022

Kenya Certificate of Secondary Education (K.C.S.E)

231/2
BIOLOGY
PAPER 2
(THEORY)
2 HOURS

1. a) Denature –change in protein structure so that some of its original properties /configuration stop functioning;
   b) i) Optimum temperature 36 ± 1;
   ii) At 45° C time taken is more than at 35°C because enzyme /pepsin is being denatured;
   c) i) Pepsinogen;
   ii) Digest stomach /digest lumen in its active form (pepsin) in absence of protein food;
   d) Epidermal tissue
   Parenchyma;
   Schlerenchyma;
   Xylem tissue;
   Collenchyma;
   e) Provides surface on which food /grass is pressed and cut:
2. Approximate population=

   $\frac{\text{No.of organisms in first catch X No. of organisms in second catch}}{\text{No. of marked organisms recaptured}}$

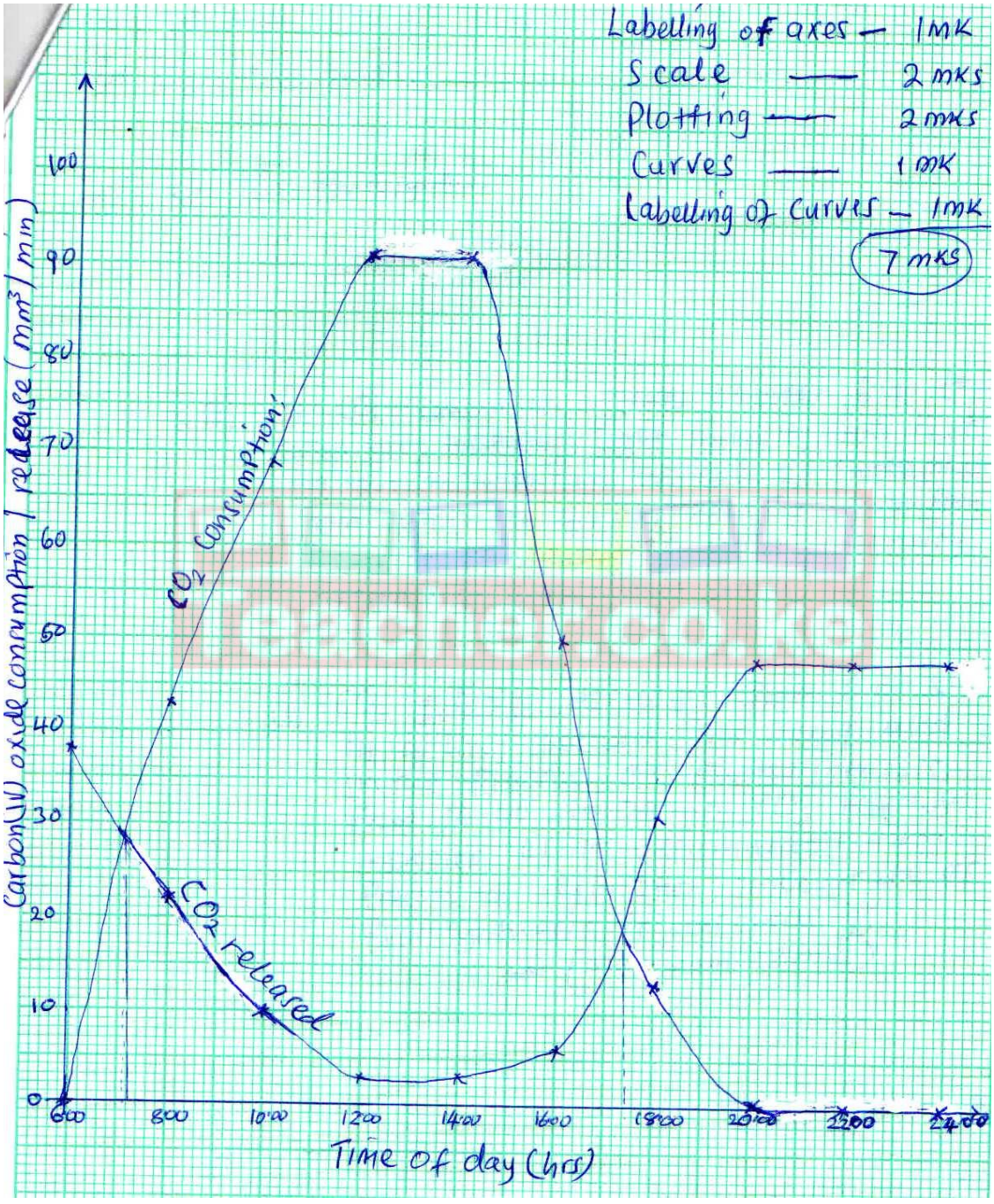
   i.e $P = \frac{FM \times SC}{MR}$ 1mk

   $= \frac{120 \times 90}{20} = 540$ 1mk

   b) - Does not consider migration of organisms into and out of study area;
   - Does not consider the effects of paint used on the animals behavior;
   - Released animals may not mix freely with the remaining population;
   - Marked organisms may not have adequate time to mix with the rest;
   - Does not consider the effects of weather on the organisms behavior; *any 4 @ 1mk each*

   c) - Quadrant method
   - Belt transect method
   - Line transect method *any 2@½mk each*
3. a) i) To find out whether energy /heat is released in anaerobic respiration /fermentation;
   ii) To investigate the gas produced during fermentation/anaerobic respiration. *2mks*
   b) i) (significant)rise in temperature ;color of bicarbonate indicator turns yellow. *2mks*
   ii) Yeast will respire aerobically releasing energy /and carbon dioxide gas that turn indicator yellow. *1mk*
   iii) Expel /drive out oxygen; *1mk*
   c) Use glucose solution without yeast cells/killed yeast cells. *1mk*
4. a) i) Absorb carbon (IV)oxide produced by germinating seedlings. *1mk*
   ii) Provide moisture /water for seeds to germinate. 1mk
   b) i) Towards Y; / X ⟶ Y;
   ii) Seeds use up oxygen in flask for respiration during germination; creating a vacuum in the flask; air is drawn in the tube at point A (causing the red dye to move towards Y) 3mks

5. a) Starch ; 1mk
   b) i) The covered part remained brown ;uncovered part turned blue-black 2mks
   ii) Starch formed in uncovered part of the leaf (because of light) 1mk
   Starch not formed in Covered part of the leaf (because of lack of light); 2mks
   c) i) To allow photosynthesis /manufacture of food;
   ii) To de-starch the leaf /remove starch from the leaf; 1mk
   d) Carbon dioxide concentration /soil water; 1mk
6. a) 08



   b) i) photosynthesis
   ii) Respiration
   c) i) CO_2 consumption increases between 6.00 to 14.00 hrs ;increasing light intensity ;leads to an increase in the rate of photosynthesis, from 16.00 to 24.00, as light intensity decreases;(maximum 3mks)
   ii) CO_2release decreases from 6.00 to 14.00 hrs, because its being used in the process of photosynthesis.

From 16.00 to 24.00 CO_2 release increases as it accumulates from process of respiration, since rate of photosynthesis is decreasing. (maximum 3mks)

d) i) 7.12 hrs ± 5 (7.07 - 7.17) and
17.24 hrs ± 5 (17.19 – 17.29)

ii) The point where the rate of carbon (IV) oxide consumption (during photosynthesis) is equal to rate of carbon (iv)oxide release (during respiration);

e) Low temperatures inactivate enzymes leading to low rate of photosynthesis /low rate of CO_2 consumption/photosynthesis is highest at optimum temperature; temperature above optimum denatures enzymes hence low rate of photosynthesis/ CO_2 3mks

7. a) Diffusion .
Transpiration/guttation;
Exudation;
Accumulation in old leaves /flowers/leaf fall
Storage in bark /wood;
Re-used e.g. in photosynthesis 6mks

b)

Excretory products	use
Caffein;	Central nervous system stimulant;
Papain	Meat tenderizer/treat indigestion;
Tannin	Leather tanning;
Nicotine	Heart stimulant/ insecticide /reduce stress
Latex	Manufacture of tire rubber products;
Quinine	Anti-malarial drug;
Atropine	Increase heart beat /drug up secretion/dilate eye pupil;
Morphine	Cancer treatment;

8. a) Pollination is the transfer of pollen grains from the other to the stigma in a flower;

b) Upon falling on the stigma, the pollen grain uses the nutrients from the stigma to germinate; and from a pollen tube; The pollen tube grows down the style ;The tube nucleus takes a leading position ;followed by the generative nucleus ;The generative nucleus divides by mitosis ;to form two male gamete nuclei; The nuclei passes through the micropyle into the ovary .On arrival at the embryo sac ,the tube nucleus degenerates one male gamete nucleus fuses with the polar nuclei to form a triploid primary endosperm .The other male gamete nucleus fuses with the functional egg to form a diploid zygote. This is known as double fertilization. The integument becomes the testa while the zygote is differentiated into plumule and radical. The primary endosperm becomes the endosperm tissue.