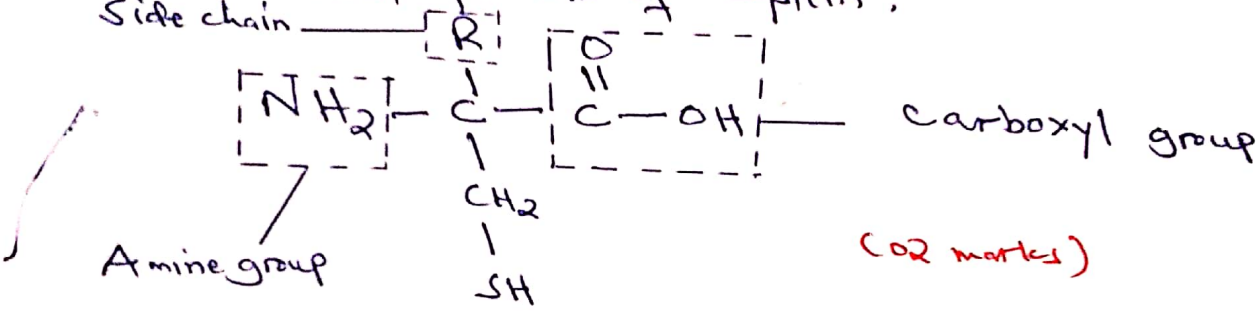
PRE - NATIONAL EXAMINATION

BIOLOGY 1

MARKING SCHEME

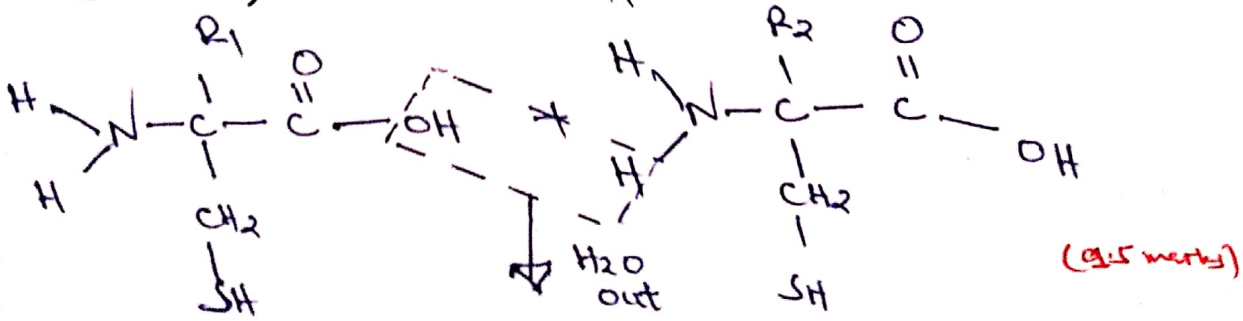
1(a) (i) Peptide bond is the bond formed when carboxyl group (-COOH) of one amino acid reacts with an amino group ($-NH_2$) of another amino acid with the removal of water. (02marks)

(ii) Structural formula of cystein.

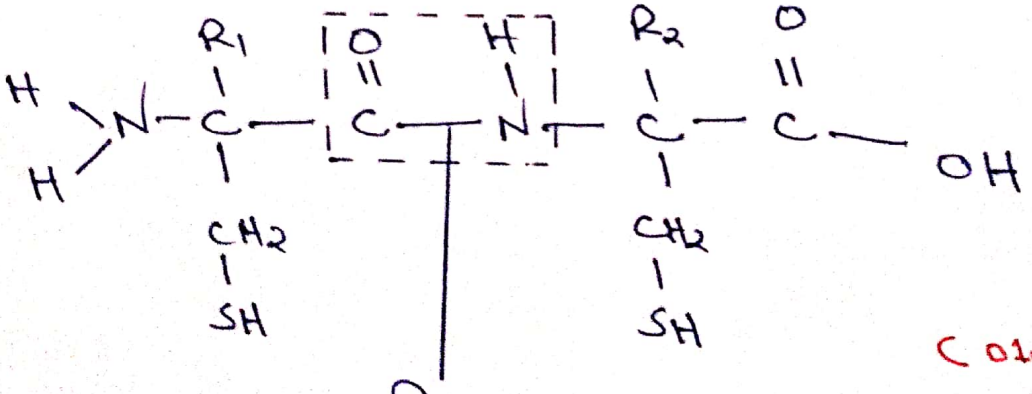


(02 marks)

(b) (i) Peptide bond is formed when polymers of amino acid join together by the removal of water.



(01.5 marks)



(01.5) marks

1(b) c(i) Significance of "R" groups.

— Aids in the formation of the tertiary protein structure.

— Forms hydrophobic interactions that lead or cause protein to fold as hydrophobic side group are shielded from water.

— Make building blocks of proteins.

(Any 3 points 1@ mark = 03marks)

GT = 10 marks.

2 (a)

THE DIAGRAM OF ANIMAL CELL

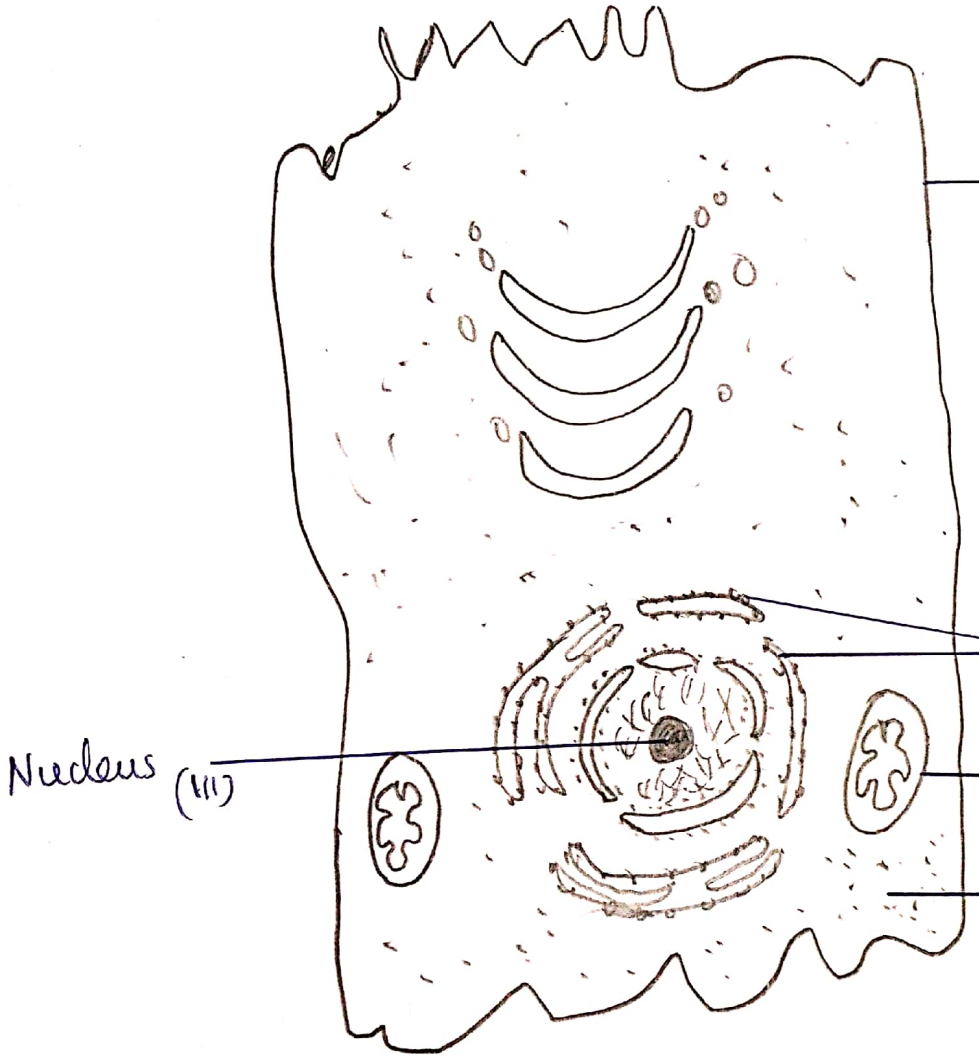


Diagram (well drawn) = 0½ marks
Caption = 0½ marks
Labelling (5) Labels
1 @ = 05

(b) The evidence that show the chloroplast and Mitochondria are prokaryotic cell inside the eukaryotic cell are

(I) Double membrane as cell membrane
(II) Circular DNA
(III) 70's ribosomes
(IV) Synthesis enzymes.

(½ mark @ = 02 marks)

2(c) (i) To allow an excretion of waste and other unwanted substances out of the cell by the process of exocytosis

(ii) To allow regulation of concentration of cytoplasm

(iii) To allow the cell obtain useful materials from surrounding via process like phagocytosis which would fuel the metabolism of the cells.

(Any 2 points. 1@ = 02)

CT = 10 marks.

3 @ From old equation / Traditional equation of photosynthesis

$$6CO_2 + 6H_2O \xrightarrow[\text{Chlorophyl}]{\text{sunlight}} C_6H_{12}O_6 + 6O_2$$ — 1 mark

(Equation for photosynthesis)

The product of traditional photosynthesis are the raw materials for respiration as glucose and oxygen oxidize inorder respiration to occur. (03 marks)

$$C_6H_{12}O_6 + 6O_2 \longrightarrow 6CO_2 + 6H_2O + \Delta \text{ Ener}$$

(Equation for respiration) (— 1 marks)

3(b) (i) Villi are finger like structure that absorb the nutrients from digested food in the intestine.

- Are present in the small intestine bcse it is a place where absorption of food takes place.
- They are not found in the stomach bcse food is still yet to be completely broken down for ~~mass~~ absorption

(ii) Bile helps in the emulsification of fats and also activates lipase enzyme which break down fats into fatty acid and glycerol.

(iii)
- Dietary fibre (cellulose) help to protect the body against constipation
- Increase the rate at which food moves through the intestine
- It reduce the risk of developing colon cancer as cellulose prevent toxins to have much time during digestion process.

(iv) To separate faeces from gas in order to prevent simultaneous passage of faeces and gas.

(v) This makes the cyclic photophosphorylation important to balance the ATP deficit without increasing NADPH. (1 mark @ = 05 marks)

(@T = 10 marks)

4 @ (i) Release of transmitter substance at pre-synaptic membrane

(ii) Location of receptor sites on the post synaptic membrane

(iii) Enzymes for degrading neurotransmitter are found only in the post-synaptic membrane

(iv) The mitochondria the energy production center is found at the pre-synaptic membrane.

(Any 2 reasons · 1 mark @ = 02 marks)

(b) The adaptive feature of nervous tissues

(i) They have nerve cells that receive information from sensory parts and send it to CNS for interpretation and then to the effector for a response.

(ii) The cells of the nervous tissues are tightly packed for effective working of the tissue.

(iii) The nervous tissues have larger number of mitochondria which help to generate energy for efficient functioning

(iv) They have neuroglia cells that provide protection and support to the tissues.

(v) The cells in the PNS are capable of regenerating themselves.

(vi) The cells in the nervous tissues produce neurotransmitter chemicals which act as conveyor that carry impulse from one neurone to another across synaptic gap

(Any 4 points 1 mark @ = 04 marks)

4 (c) (i) The Na^+/K^+ are carrier substances located in the cell membrane

(ii) They increase membrane permeability. (1 mark@ = 2 marks)

(iii) Differences between positive and negative phototropisms

The positive phototropism is growth response of shoots growing towards lights while negative phototropism is the growth response of roots away from source of light (2 marks)

5(a) (i) – Cockroach — ½ mark
– Binomial nomenclature — ½ mark

(ii) – Scientific name should be binomial name (ie) should have two parts generic (genus) name and specific (species) name
– A scientific name should be in italics if printed and underline if hand written.
– When writing the scientific name, generic name should start with capital letter and specific name with small letter
– A scientific name should be in Latin or Linized
– A scientific name should not be legitimate unless it is accompanied by suitable description and a diagnosis which reflects only the unique characteristics
(Any 4 points 1 mark@ = 04 marks)

5(b) 1(a) With wings ..... Locust
(b) Without wings ..... go to 2

2(a) With segmented body ..... go to 3
(b) With un segmented body ..... Snail

3(a) With legs ..... Spider
(b) Without Legs ..... Earth worm

05 marks

(CeT = 10 marks)

6(a) (i) Carbon monoxide is fatal poisonous gas because it has more affinity to Hb than O2. It is readily combining with Hb to form a stable compound known as Carboxy haemoglobin which reduces the combining power of Oxygen gas to Hb as the result the tissue suffer from oxygen starvation which in extreme cases may lead to death of an individual if an immediate solution is not made. (2marks)

(b) (ii) This is because pure oxygen can not stimulate the respiratory center in the medulla to increase the respiratory rate which flashes CO out of the Lungs. A victim require to be administered with pure Oxygen – Carbondioxide mixture so that to have very high partial O_2 level to dissociate CO from Hb. (2 marks)

(iii) Oxygen loading refer to binding (association) of O_2 to Hb in the RBCs (Red blood cells) in the Lungs to make haemoglobin

While

Oxygen unloading the dissociation of Oxyhaemoglobin in the body tissue which have Low partial pressure of O_2. (2 marks)

6 (b) Factors that influence the variation of BMR

(I) Body size

Small organisms have larger surface area to volume ratio, Hence larger BMR than large organisms

(II) Body Composition

Fat tissue has a lower metabolic activity than muscle tissue. As lean muscle mass increases, the metabolic rate increases.

(III) Sex

The basal metabolic rate of females is lower than that of males. The difference is that, women possess more body fat and less muscle mass than men of similar size.

(IV) Age

The Basal metabolic rate decreases with Age (Aging) A decrease in lean muscle muscle during adulthood results in a slow, steady decline in BMR.

(V) Health status

Fever, illness or injur may increase resting metabolic rate Therefore, a sick person has higher rate of metabolism than a health person (Any 4 points; 1 mark ea = 04 marks)

GT = 10 marks.

7 @ From biological knowledge the sex in human being is determined by male organism, not the female, as male gives XY chromosome in fertilization X or Y chromosome will be given, if Y will results to male embryo when fertilized with X from female as female give XX Chromosomes. Thats gametes from male is one which determine female or male child (daughter). (02 marks)

(b) (i) Corpus Luteum : This is formed from the ruptured graafian follicle. It secretes Progesterone hormone and allow the endometrium of the uterus to proliferate and prepare itself for implation.

(ii) Endometrium — It prepare itself for implantation of the embryo incase of successful fertilization.

(iii) Acrosome — It hydrolyse the outer membrane of an egg (ovum) since it contain hyaluronidase enzyme thus helping the sperm to penetrate the egg at the time of fertilization

(iv) Sperm tail — It facilitates the movement of the sperm towards the ovum in female reproductive tract.

(v) Fimbriae — Help in collection of the ovum after ovulation which is facilitated by the beating of cilia.

1 mark @ = 05 marks

7 c) THE DIAGRAM OF MALE GAMETOPHYTE

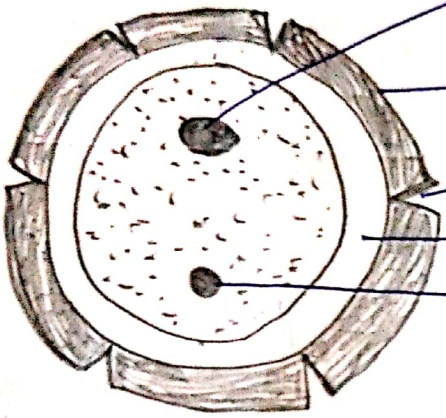


Diagram — 0½ mark
Caption — 0½ mark
Labelling any 4 @ 1/2 mark @ = 02 marks

(QT = 10 marks)

SECTION B (30 Marks)

8 (a) c(i) Follicle stimulating Hormone (FSH)
c(ii) Oestrogen
c(iii) Progesterone
c(iv) Luteinizing Hormone.

½ marks @ = 02 marks

(b) Capacitation are important to acrosome reaction as the results for fertilization of egg.

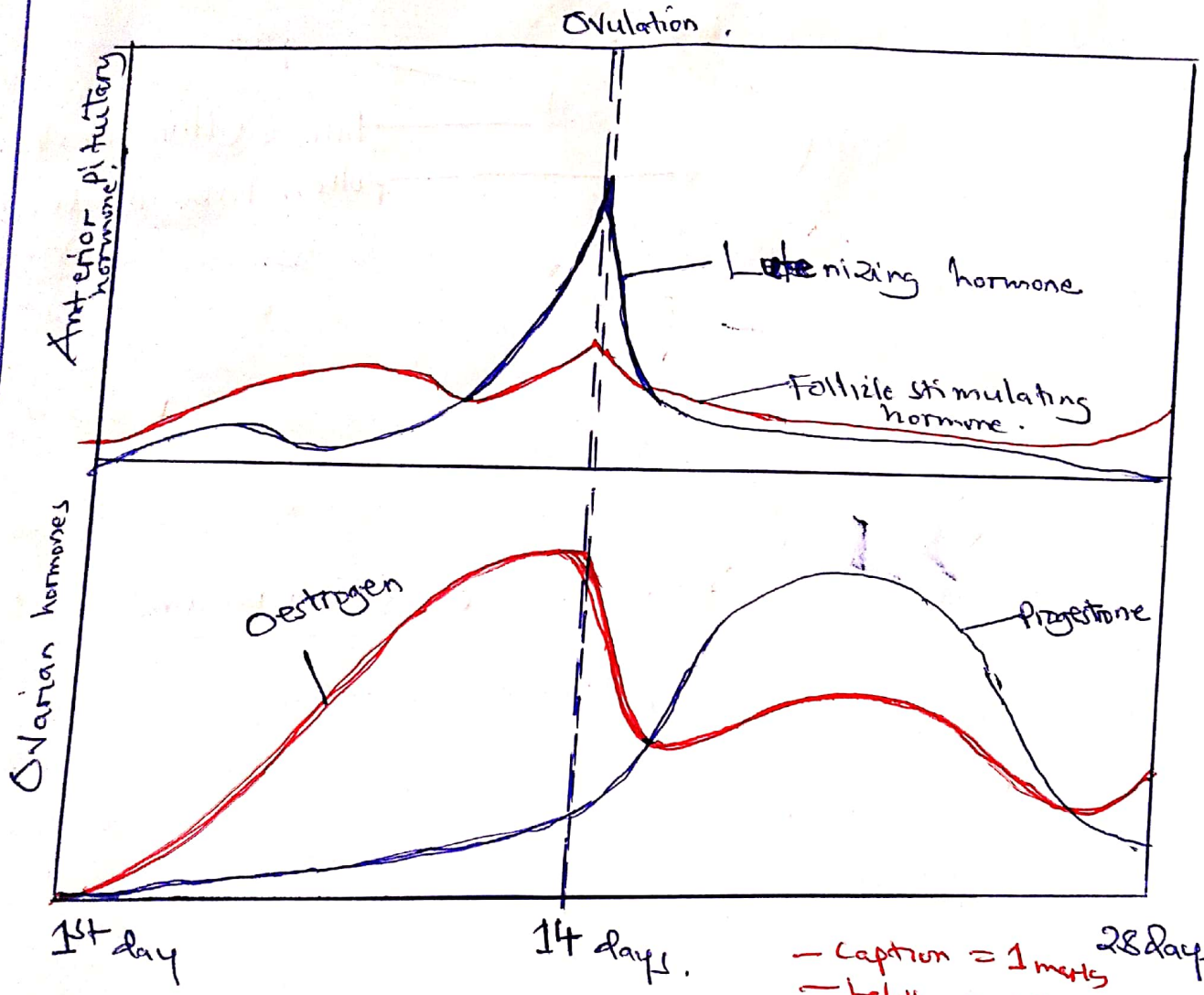
The Spermatozoa must Undergo Capacitation in the female track and results the changes involved in Capacitation finaly seem to permit the influx of Ca^{2+} required for onset of acrosome reaction for the eggs fertilization.

02 marks

GRAPH SHOWING HORMONAL CHANGES AT MENSTRUAL CYCLE

Pg. (111)

(b) (c)



- Caption = 1 marks
- Labelling any 6, ½@ = 03 marks
- drawing graph = 02 marks.

Changes of the levels of hormones

- The level of LH increase from 1st – 14 day to facilitate ovulation of an ovum.
- LH decrease after 14th day of ovulation and finally it is kept constant
- FSH increases from 1st to 14 day to stimulate the development of ovarian cycle and decrease from 15th – 28 days. This is due to secretion of Oestrogen.
- Oestrogen rise from 1st – 13th day and decrease after ovulation

1@ = 01 marks

- Progesterone decrease at 1st – 13th and rise to prepare the environment supportive of endometrium if there is successful fertilization.

9 (a) Structural difference between Xylem and phloem

Xylem	phloem
(i) Contain wood fibres ie sclerenchyma fibres with much thicker walls and overlapping ends	(i) misses sclerenchyma fibres with much thicker walls and overlapping ends
(ii) The main conducting cells are vessels are dead cell (Non-living)	(ii) The main Conducting cells are sieve tubes which are Living cells.
(iii) Only one types of cells that is xylem parenchyma	(iii) Has three Living cells which are sieve tube, Companion cell and phloem parenchyma.

1@ = 03marks

Functional difference between Xylem and phloem

Xylem	phloem
(i) Conduct water and Minerals salts from roots	(i) Translocate prepared food from leaf.
(ii) provide mechanical support / strength of plant body.	(ii) Does not provide mechanical support.

1@ = 02marks

9 (b) Adaptation of Cardiac muscles to their functions

(I) The muscle is made up of striated fibres, which make it tough and strong to withstand the pumping activity of the heart.

(II) The muscle is highly suplied with blood vessels for perfusion of nutrients and oxygen.

(III) The cardiac muscle contains many connective tissues that add up to its strength, and the inner surface of muscle has a fluid, which acts as a lubricant, to protect it from tearing

(IV) The cardiac muscle contract more slowly than the skeletal muscles and thus, does not fatigue as easily as the skeletal muscles.

(V) The cardiac muscle is myogenic.
That is, it has ability of self-stimulation without the assistance of neurone. 1 mark @ = 05 marks)

9 (c) Function of Caspanian strip for movement of water in higher plants.

(I) Has simple pits in the lignified walls that allow lateral movement of water and minerals salts.

(II) Has long cells joined end to end to allow the flow of water and dissolved minerals salts through the plant in a continous Colum.

(III) They consist of dead cells thus materials pass through them passively and minimizes energy consumption

(IV) Narrowness of the Lumen of vessels and tracheids to increases the capillarity forces.

(V) presence of perforation allow effectively movement of water upward.

(VI) pointed end to end to form long Colum for continous transportation of materials.

(VII) Loss of protoplast in the vessels and tracheids leaves an empty Lumen which form a continous tube as one cell to rests on top of the other, for effective transportation of water and minerals.

(Any 5 points 1@ = 03 marks)

GT = 15 marks.

10(a) Events of transition stage between glycolysis and Krebs cycle.

1st Before pyruvic acid is formed during glycolysis enters the Krebs cycle, It is decarboxylated to form a two carbon molecule called acetic acid.

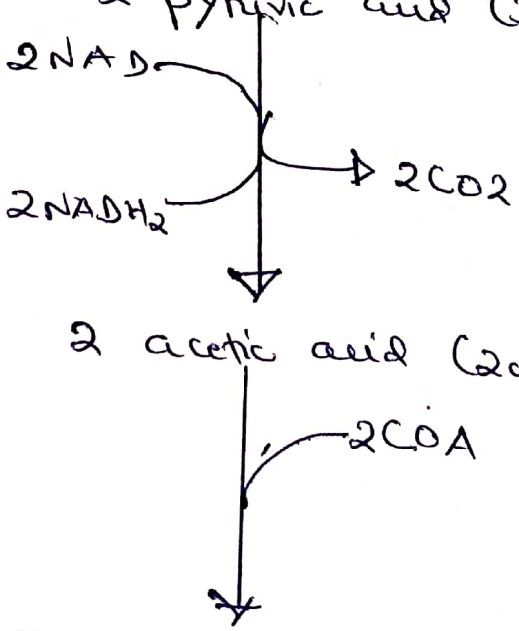
2nd During the process of decarboxylation, a pair of hydrogen atom is removed (dehydrogenation)

3rd The hydrogen removed combines with NAD to form $NADH_2$.

4th Acetic acid then combines with a compound called Co-enzyme "A" to form Coenzyme A which then enters mitochondria for Krebs cycle to proceed.

(1 mark @ — 04 marks)

(i e)



1 marks.

(b) Respiration is generally assumed to be a catabolic process because during respiration, various substrates are broken down for deriving energy. Carbohydrates are broken down to glucose before entering respiratory pathways. Fats get converted into fatty acid and glycerol, where as fatty acid get converted into acetyl CoA before entering the Krebs cycle. In similar way proteins are converted into amino acid, which enter respiration after deamination. Therefore respiration is termed as amphibolic pathway bcz it involve both anabolism and catabolism. — 5 marks

(b) The process of aerobic respiration is divided into four phases which are glycolysis, TCA cycle, ETS and oxidative phosphorylation. The process of respiration and production of ATP in each phase take place in step-wise manner in such a way that if could be in blast way (Combustion) it could lead to emission of huge heat/energy that will result to collapsing of cytoplasmic contents. This step-wise release of energy makes the system effitient in extracting and storing of energy. ATP gets utilized where ever required and enzymatic rates are generally controlled. — 5 marks

CCT — 15 marks