

SHRI SWAMI VIVEKANAND SHIKSHAN SANSATHA, KOLHAPUR
Vivekanand College, Kolhapur (Autonomous)
Home Assignment -2019-20 (B.Sc.-II) Semester-III

Index

Sr. No.	Title	Page No.
1	Notice	1
2	Attendance	2 - 4
3	Marksheet	5 - 7
4	Sample copy	8 - 30



Date – 20/09/2019

NOTICE

All students of B.Sc. II hereby informed that, submit Home Assignment for Continuous Internal Evaluation (CIE) of B.Sc. II Semester III up to 30/09/2019 at Zoology Department (Lab.49). The question for home Assignment is given bellow. Submission is mandatory to all.

Q. 1. Select correct alternative and rewrite the sentence

4M

- 1).....Hormone is secreted by pituitary gland
 - a) Thyroxin b) Estrogen c) Testosterone d) Follicle stimulating Hormone
- 2) may be defined as the oxidation of fatty acid on the β - carbon atom.
 - a) Glucogenesis b) β - oxidation c) Gluconeogenesis d) Lipid peroxidation
- 3) Starch is digested by enzyme.....
 - a) Lipase b) Protease c) Amylase d) Nuclease
- 4) Structural and functional unit of kidney.....
 - a) Nephron b) Neuron c) Cell d) Gene

Q.2. Long Answer (Attempt any One)

8M

- 1) Describe structure of adrenal gland and function of its hormones
- 2) Explain the process of digestion in stomach and intestine

Q.3. Short Note (Attempt any Two)

8M

- 1) Explain Malpighian Capsule
- 2) Explain ultrastructure of nerve cell or neuron
- 3) Gluconeogenesis

For *Gaupally*
Head,
Department of Zoology
Vivekanand College,
Kolhapur (Autonomous)

SHRI SWAMI VIVEKANAND SHIKSHAN SANSATHA, KOLHAPUR
Vivekanand College, Kolhapur (Autonomous)
Home Assignment -2019-20 (B.Sc.-II) Semester - III

Attendance

Sr No.	Roll No.	Name of the Student	Attendance
1.	7501	BARADE ASHWINI BAJIRAO	P
2.	7502	BIRANJE SONALI UTTAM	P
3.	7503	CHAUS RIJWAN SHABBIR	P
4.	7504	CHAWLA SIMRAN SUNIL	P
5.	7505	GAIKWAD DIVYANI RAMESH	A
6.	7506	GHATAGE HRUTIK AVINASH	P
7.	7507	GHORPADE HARSHAWARDHAN AJITSINGH	P
8.	7508	GURAV RUSHIKESH BALKRISHNA	P
9.	7509	KADAM GOURI DATTATRAY	P
10.	7510	KAMBLE AKSHATA PRAFULL	P
11.	7511	KAMBLE PRATIKSHA ANANDA	A
12.	7512	KAMBLE SANGRAMSHING KIRAN	P
13.	7513	KATKAR PRIYANKA INDRAJIT	P
14.	7514	KATLE KAVITA ANANDA	P
15.	7515	KAZI TABASUM ARIF	P
16.	7516	KHOT VAISHNAVI NIJAPPA	P
17.	7517	KUMBHAR PRAJAKTA RAGHUNATH	A
18.	7518	LOKHANDE KETKI KISAN	P
19.	7519	MALAVI SAYALI GAUTAM	A
20.	7520	MASUTE KOMAL KIRAN	P
21.	7521	MASUTE MANASI UDAY	P
22.	7522	MHETRI BHAKTI SUKUMAR	P
23.	7523	MULLA JABIULLA ABUBAKAR	P
24.	7524	MULLA SAMIYA ISAK	P
25.	7525	MULLA YASMIN NASARUDDIN	A
26.	7526	NAIKAWADI FIRDAUS ANJUM	P
27.	7527	NAKATE SHIVANI SANJAY	P
28.	7528	PATIL DHANASHREE SHANKAR	P
29.	7529	PATIL OMKAR VILAS	P
30.	7530	PATIL ONKAR NARAYAN	P
31.	7531	PAWAR HIRNAKSHI PRALHAD	P
32.	7532	PUJARI PRIYANKA MUTTAPPA	P
33.	7533	PUNDE BHAKTI ASHOK	P
34.	7534	PUNDE SHRUSHTI ASHOK	P
35.	7535	PUNDE TRUPTI ASHOK	P
36.	7536	SATPUTE SURAJ TUKARAM	P
37.	7537	SAWANT ROHINI VITTHAL	P

38.	7538	SAWAT MRUNAL KRISHNAT	P
39.	7539	SHAIKH YASIN SAMAD	P
40.	7540	SURVANSHI SHUBHANGI SARDAR	P
41.	7541	SWAMI ATHRAV GAJANAN	P
42.	7542	UPADHYE SUYOG SAGAR	P
43.	7543	VADINGEKAR POONAM MAHIPATI	A
44.	7544	WADKAR RUSHIKESH DHONDIRAM	P
45.	7545	WAGARE SAMADHAN BANDOPANT	P
46.	7546	WARAKE PRATIKSHA NAMDEV	P
47.	7547	YADAV ABHILASHA AVINASH	A
48.	7548	KAMBLE SAURABH SANJAY	P
49.	7549	SHINDE ARATI DAMODAR	A
50.	7577	ARALEKAR SHRIYA SANTOSH	P
51.	7578	CHOUGALE TEJASWINI BAJIRAV	P
52.	7579	DAVARI PRATHAMESH RAJAN	P
53.	7580	DESAI PRADNYA RAMESH	P
54.	7581	GAIKWAD SAMRUDHI VIJAYKUMAR	P
55.	7582	HAJARE SNEHAL SATAPA	P
56.	7583	HEGADE ADITI ARUN	P
57.	7584	KARADE AISHWARYA ANANDA	P
58.	7585	KATKAR ANIKET ASHOK	P
59.	7586	KOLI VIVEK DILIP	P
60.	7587	KSHIRSAGAR SHARDHA VIKAS	P
61.	7588	KUMBHAR VRUSHALI SAGAR	P
62.	7589	MADAKE PRATHAMESH KRISHNAT	P
63.	7590	MITAKE NISHA SUNIL	P
64.	7591	MUJAWAR SANIYA ABDULGANI	P
65.	7592	NAIK SUDSHMITA PRAKASH	P
66.	7593	NANGARE VRUSHALI PANDURANG	P
67.	7594	OMBASE TEJAS BAJIRAO	P
68.	7595	PATIL BHAGYASHRI BALASAHEB	A
69.	7596	PATIL BHAGYASHRI BHIMRAO	P
70.	7597	PATIL PRATIK DHANAJI	P
71.	7598	PATIL SANDHYARNI NAMDEV	P
72.	7599	PATIL SUCHTA DATTATRAY	P
73.	7600	POWAR SAKSHI SANTOSH	P
74.	7601	RAMANE SURAJ BALAVANT	P
75.	7602	RASAL PRAJWAL BABASO	P
76.	7603	REDEKAR SNEHAL RAMCHANDRA	P
77.	7604	SUTAR MONICA GORAKHNATH	P
78.	7605	TATE DEEPAK PANDURANG	P
79.	7657	ANGRE SRUSHTI PANDURANG	P
80.	7658	AYARE SHRUTIKA UMESH	P
81.	7659	CHAVAN SAYALI SHANKAR	P

82.	7660	CHOUGALE OMKAR SHASHIKANT	P
83.	7661	GURAV PRAJAKTA CHANDRAKANT	P
84.	7662	HAVALE MANASI ANIL	P
85.	7663	HIRDEKAR MRUNAL RANGRAO	P
86.	7664	HUMBE PRIYANKA VIJAY	P
87.	7665	JADHAV ROHAN RAMDAS	P
88.	7666	KAMBLE ARUNDHATI AVINASH	P
89.	7667	KHAIRMODE RUCHITHA CHANDRAKANTH	P
90.	7668	KOLI KRUTIKA RAJENDRA	P
91.	7669	LAD SUPRIYA ANANDA	P
92.	7670	MAGADUM PRATIKSHA MAHIPATI	P
93.	7671	MALAP SHITAL KRUSHNAT	P
94.	7672	MORE NIKITA DILIP	P
95.	7673	MORE SHRADDHA PRAKASH	P
96.	7674	MUNDE RAMESHWAR BALAJI	P
97.	7675	NAIKWADI FIZA AFTAB	P
98.	7676	PATIL ABHAY BAJIRAO	P
99.	7677	PATIL AKSHATA KUBER	P
100.	7678	PATIL ANUSHKA DHANAJI	A
101.	7679	PATIL RAJASHRI PRAKASH	P
102.	7680	PATIL VAISHNAVI MILIND	P
103.	7681	PATIL VAISHNAVI VYANKATESH	P
104.	7682	POWAR NITA TANAJI	P
105.	7683	POWAR RAVINA KIRAN	P
106.	7684	SHINDE TEJASWINI SUBHASH	P
107.	7685	SUTAR SHREYA SUNIL	P
108.	7686	SUTAR SHWETA BAJIRAO	P
109.	7687	THANEKAR SHWETA VISHNU	P
110.	7688	TORASE SAYALI TUKARAM	P
111.	7689	VARUTE NILAM ANANDA	P
112.	7690	LAD SAYALI BHAUSAHEB	P

113. 7870 KAJUGADE SOURABH R. P

114. 7874 KHARASE RUSHIKESH D. P.

For Head
 Department of Zoology
 Vivekanand College,
 Kolhapur (Autonomous)

SHRI SWAMI VIVEKANAND SHIKSHAN SANSATHA, KOLHAPUR
Vivekanand College, Kolhapur (Autonomous)
Home Assignment -2019-20 (B.Sc.-II) Semester - III
Marksheet

Sr No.	Roll No.	Name of the Student	Marks
1.	7501	BARADE ASHWINI BAJIRAO	19
2.	7502	BIRANJE SONALI UTTAM	19
3.	7503	CHAUS RIJWAN SHABBIR	16
4.	7504	CHAWLA SIMRAN SUNIL	19
5.	7505	GAIKWAD DIVYANI RAMESH	Ab
6.	7506	GHATAGE HRUTIK AVINASH	18
7.	7507	GHORPADE HARSHAWARDHAN AJITSINGH	18
8.	7508	GURAV RUSHIKESH BALKRISHNA	16
9.	7509	KADAM GOURI DATTATRAY	18
10.	7510	KAMBLE AKSHATA PRAFULL	17
11.	7511	KAMBLE PRATIKSHA ANANDA	Ab
12.	7512	KAMBLE SANGRAMSHING KIRAN	18
13.	7513	KATKAR PRIYANKA INDRAJIT	19
14.	7514	KATLE KAVITA ANANDA	19
15.	7515	KAZI TABASUM ARIF	19
16.	7516	KHOT VAISHNAVI NIJAPPA	19
17.	7517	KUMBHAR PRAJAKTA RAGHUNATH	Ab
18.	7518	LOKHANDE KETKI KISAN	18
19.	7519	MALAVI SAYALI GAUTAM	Ab
20.	7520	MASUTE KOMAL KIRAN	19
21.	7521	MASUTE MANASI UDAY	18
22.	7522	MHETRI BHAKTI SUKUMAR	19
23.	7523	MULLA JABIULLA ABUBAKAR	19
24.	7524	MULLA SAMIYA ISAK	19
25.	7525	MULLA YASMIN NASARUDDIN	Ab
26.	7526	NAIKAWADI FIRDAUS ANJUM	19
27.	7527	NAKATE SHIVANI SANJAY	19
28.	7528	PATIL DHANASHREE SHANKAR	17
29.	7529	PATIL OMKAR VILAS	18
30.	7530	PATIL ONKAR NARAYAN	19
31.	7531	PAWAR HIRNAKSHI PRALHAD	19
32.	7532	PUJARI PRIYANKA MUTTAPPA	18
33.	7533	PUNDE BHAKTI ASHOK	19
34.	7534	PUNDE SHRUSHTI ASHOK	19
35.	7535	PUNDE TRUPTI ASHOK	19
36.	7536	SATPUTE SURAJ TUKARAM	16

37.	7537	SAWANT ROHINI VITTHAL	15
38.	7538	SAWAT MRUNAL KRISHNAT	15
39.	7539	SHAIKH YASIN SAMAD	15
40.	7540	SURVANSHI SHUBHANGI SARDAR	19
41.	7541	SWAMI ATHRAV GAJANAN	18
42.	7542	UPADHYE SUYOG SAGAR	19
43.	7543	VADINGEKAR POONAM MAHIPATI	Ab
44.	7544	WADKAR RUSHIKESH DHONDIRAM	19
45.	7545	WAGARE SAMADHAN BANDOPANT	17
46.	7546	WARAKE PRATIKSHA NAMDEV	16
47.	7547	YADAV ABHILASHA AVINASH	Ab
48.	7548	KAMBLE SAURABH SANJAY	15
49.	7549	SHINDE ARATI DAMODAR	Ab
50.	7577	ARALEKAR SHRIYA SANTOSH	18
51.	7578	CHOUGALE TEJASWINI BAJIRAV	19
52.	7579	DAVARI PRATHAMESH RAJAN	19
53.	7580	DESAI PRADNYA RAMESH	18
54.	7581	GAIKWAD SAMRUDHI VIJAYKUMAR	18
55.	7582	HAJARE SNEHAL SATAPA	18
56.	7583	HEGADE ADITI ARUN	15
57.	7584	KARADE AISHWARYA ANANDA	19
58.	7585	KATKAR ANIKET ASHOK	18
59.	7586	KOLI VIVEK DILIP	18
60.	7587	KSHIRSAGAR SHARDHA VIKAS	17
61.	7588	KUMBHAR VRUSHALI SAGAR	18
62.	7589	MADAKE PRATHAMESH KRISHNAT	17
63.	7590	MITAKE NISHA SUNIL	18
64.	7591	MUJAWAR SANIYA ABDULGANI	18
65.	7592	NAIK SUDSHMITA PRAKASH	19
66.	7593	NANGARE VRUSHALI PANDURANG	19
67.	7594	OMBASE TEJAS BAJIRAO	18
68.	7595	PATIL BHAGYASHRI BALASAHEB	Ab
69.	7596	PATIL BHAGYASHRI BHIMRAO	18
70.	7597	PATIL PRATIK DHANAJI	18
71.	7598	PATIL SANDHYARNI NAMDEV	18
72.	7599	PATIL SUCHTA DATTATRAY	19
73.	7600	POWAR SAKSHI SANTOSH	17
74.	7601	RAMANE SURAJ BALAVANT	18
75.	7602	RASAL PRAJWAL BABASO	17
76.	7603	REDEKAR SNEHAL RAMCHANDRA	16
77.	7604	SUTAR MONICA GORAKHNATH	15
78.	7605	TATE DEEPAK PANDURANG	19
79.	7657	ANGRE SRUSHTI PANDURANG	19
80.	7658	AYARE SHRUTIKA UMESH	19

81.	7659	CHAVAN SAYALI SHANKAR	14
82.	7660	CHOUGALE OMKAR SHASHIKANT	18
83.	7661	GURAV PRAJAKTA CHANDRAKANT	18
84.	7662	HAVALE MANASI ANIL	19
85.	7663	HIRDEKAR MRUNAL RANGRAO	17
86.	7664	HUMBE PRIYANKA VIJAY	19
87.	7665	JADHAV ROHAN RAMDAS	19
88.	7666	KAMBLE ARUNDHATI AVINASH	19
89.	7667	KHAIRMODE RUCHITHA CHANDRAKANTH	18
90.	7668	KOLI KRUTIKA RAJENDRA	19
91.	7669	LAD SUPRIYA ANANDA	20
92.	7670	MAGADUM PRATIKSHA MAHIPATI	19
93.	7671	MALAP SHITAL KRUSHNAT	19
94.	7672	MORE NIKITA DILIP	19
95.	7673	MORE SHRADDHA PRAKASH	18
96.	7674	MUNDE RAMESHWAR BALAJI	18
97.	7675	NAIKWADI FIZA AFTAB	18
98.	7676	PATIL ABHAY BAJIRAO	19
99.	7677	PATIL AKSHATA KUBER	19
100.	7678	PATIL ANUSHKA DHANAJI	Ab
101.	7679	PATIL RAJASHRI PRAKASH	17
102.	7680	PATIL VAISHNAVI MILIND	17
103.	7681	PATIL VAISHNAVI VYANKATESH	16
104.	7682	POWAR NITA TANAJI	19
105.	7683	POWAR RAVINA KIRAN	19
106.	7684	SHINDE TEJASWINI SUBHASH	18
107.	7685	SUTAR SHREYA SUNIL	16
108.	7686	SUTAR SHWETA BAJIRAO	17
109.	7687	THANEKAR SHWETA VISHNU	20
110.	7688	TORASE SAYALI TUKARAM	19
111.	7689	VARUTE NILAM ANANDA	18
112.	7690	LAD SAYALI BHAUSAHEB	17
113.	7870	KAJUGADE SOURABH R.	19
114.	7874	KHARASE RUSHIKESH DAYANAND	17

Dr. Ganpat
 Head,
 Department of Zoology
 Vivekanand College,
 Kolhapur (Autonomous)



Shri Swami Vivekanand Shikshan Sanstha's
VIVEKANAND COLLEGE (Autonomous), KOLHAPUR

Class B.Sc. II Div _____ Roll No. 7501

19

Suppliment No. _____ Subject Zoology

Test / Tutorial No. Assignment

Q.1. select the most correct alternative from the following.

1) Estrogen hormone is secreted by pituitary gland.

2) β -oxidation may be defined as the oxidation of fatty acid on the β -carbon atom.

3) starch is digested by enzyme Amylase.

4) structural and functional unit of kidney is Nephron.

03

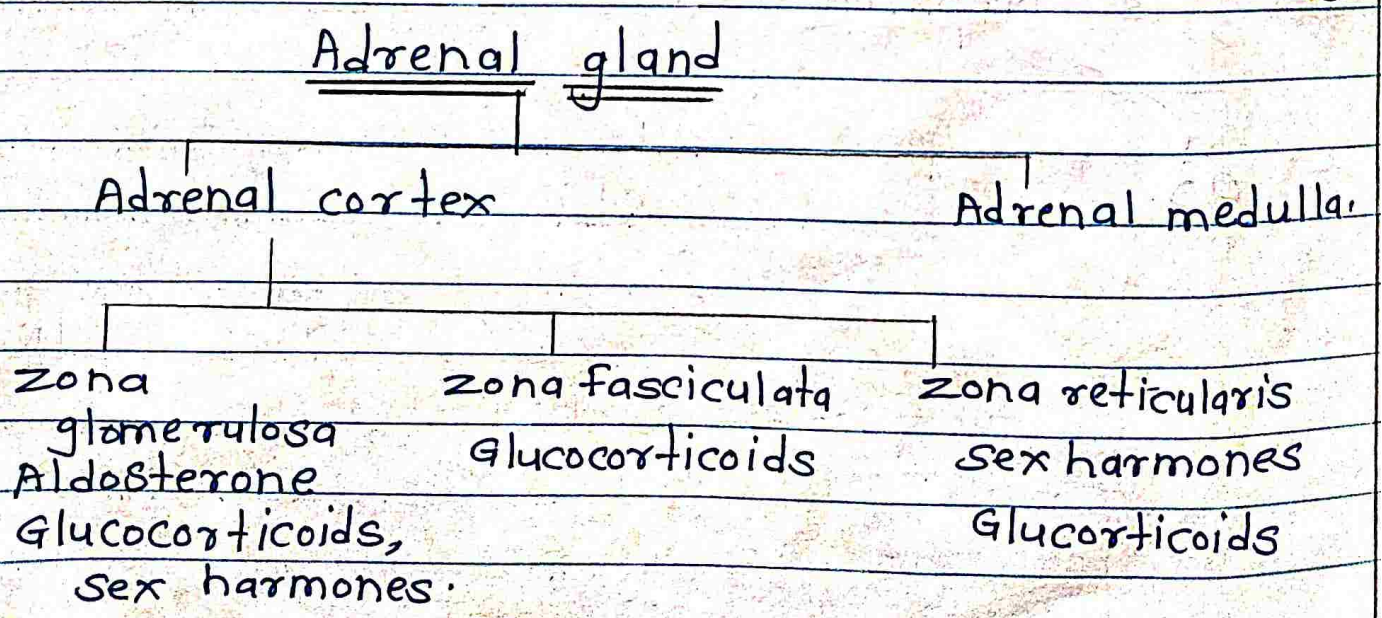
Q.2.

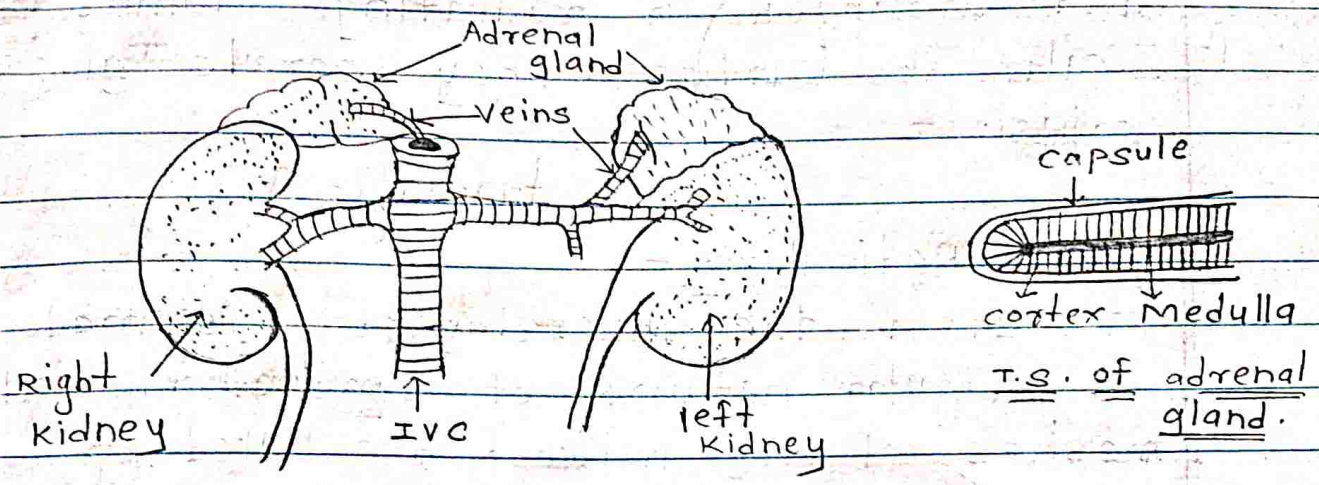
1) Describe structure of Adrenal gland & function of it's hormones.

→ Humans contain two adrenal gland. They are situated on the top of each kidney. Hence they are also called supra renal glands. The right gland is smaller & look like a cooked hat & the left one is roughly crescentic & larger.

Each gland is about 5-9 gms in the adult. But at birth the weight of gland will be 16-20 times greater than in adults. They gradually decrease in size as age increases.

Each gland is enclosed by a capsule. The gland consist of a peripheral part called cortex & a central part called medulla. The two parts are structurally, embryologically & functionally different.





Adrenal glands

Adrenal cortex:-

Cortex is the peripheral part of the adrenal gland. It is derived from mesodermal coelomic epithelium. The adrenal cortex consist of three layers of cells:

- 1. zona glomerulosa.
- 2. zona fasciculata
- 3. zona reticularis

1) zona glomerulosa

It is the outer layer formed of 1. columnar cells. The cells are small & thickly set with their long axis parallel to the surface. They secrete mainly Aldosterone & a small amount of glucocorticoids & sex hormones.

2) zona fasciculata-

It is the middle layer & is the widest layer. The cells are polyhydral, larger

and arranged in radiating columns perpendicular to surface. They secrete glucocorticoids.

3) zona Reticularis -

It is the inner layer. It is made up of an irregular network of rows of cells. The meshes of the network are filled up with sinusoids lined by reticulo-endothelial cells. zona reticularis secretes sex hormones & small amount of glucocorticoids.

Hormones of Adrenal cortex :-

The hormones secreted by the adrenal cortex are called corticosteroids. They are the derivatives of steroid & are synthesized from acetyl co-A & cholesterol.

The corticosteroids can be classified into 3 groups:

- 1. Glucocorticoids.
- 2. Mineralocorticoids
- 3. sex steroids

1) Glucocorticoids

- 1. Glucocorticoids are a group of steroid hormones secreted by the adrenal cortex.
- 2. They contain 21 carbon atoms.
- 3. There are four types of glucocorticoids, namely
 - a. cortisol
 - b. Cortisone
 - c. 17 - Hydroxy corticosterone
 - d. 11 - Dehydroxy corticosterone.

- 4. The main role of glucocorticoids is concerned with carbohydrate metabolism & hence the name glucocorticoids.
- 5. They stimulate the formation of glycogen in the liver (similar to insulin) through glycogenesis.
- 6. They increase gluconeogenesis in the liver especially from protein.
- 7. They depress glucose uptake & oxidation by tissues.
- 8. They help in the absorption of glucose from intestine & nephron.
- 9. They increase the rate of deamination & breakdown of tissue proteins.
- 10. They stimulate absorption of lipid from the intestine. Lipid is mobilised from fat depot & are broken to ketone bodies in liver.
- 11. They have an antigonadotrophic action. They protect the body against stress.

2) Mineralocorticoids:-

- 1) Mineralocorticoids are steroid hormones secreted by the adrenal cortex.
- 2) They contain 19 carbon atoms.
- 3) There are 3 types of mineralocorticoids, namely
 - a) Aldosterone
 - b) Deoxycorticosterone or Deoxycortone.
 - c) Hydroxy-deoxycorticosterone.
- 4) The main function of mineralocorticoid is concerned with the metabolism of minerals &

hence, the name mineralocorticoid.

5) Total loss of adrenocortical secretion usually causes death with 3 days to two weeks unless the person receive extensive salt therapy or mineralocorticoid therapy. Therefore, mineralocorticoids are described as life-saving hormones.

6) They help to reabsorb NaCl & H₂O from the renal tubules.

7) They cause increased excretion of K.

8) They lower intercellular K but raise Na.

9) Mineralocorticoids provide resistance against various stress such as low temp, low O₂ pressure, mental & physical strain, etc.

10) They increase the volume of extracellular fluid & blood.

11) They greatly enhance the absorption of Na by the intestine.

12) They influence the gland to retain Na but secrete K through sweat.

Adrenal medulla -

Adrenal medulla is the central part of adrenal gland. It is derived from neural crest. It is formed of polyhydral cells. They can be stained with chromic acid & hence they are called chromaffin cells. Adrenal medulla secretes two types of hormones which are chemically catecholamines. They are:

1) Adrenaline (Epinephrine)

2) Noradrenaline (Norepinephrine)

1) Adrenaline or Epinephrine

1. Adrenaline is secreted by the adrenal medulla.
2. Chemically, adrenaline is a catecholamine & is closely related to tyrosine & phenylamine (amino acids).
3. This hormone is produced & effective under emergency, threatened dangers, etc. Its secretion makes the individual ready for fight. Hence, medulla is called the gland of flight, fright & fight.
4. It promotes glycogenolysis resulting in an increase in blood glucose level.
5. It raises O_2 consumption.
6. The rate of heart beat & cardiac output increase.
7. It constricts the veins & arteries of the skin.

2) Noradrenaline or Norcypinephrine

1. Noradrenaline is secreted by the adrenal medulla.
2. Chemically, it is a catecholamine & is closely related to tyrosine & phenylamine.
3. It is the immediate precursor of adrenaline.
4. Like adrenaline, noradrenaline is also secreted under emergency conditions. Hence, it is called an emergency hormone.
5. Most of its actions are similar to those of adrenaline. Some actions are just the reverse of those of adrenaline.
6. It slightly increases the heart beat & the cardiac output is not increased.
7. It increases blood pressure.
8. It stimulates the constriction of blood vessels.

Q. 3.

1. Malpighian Capsule -

These are found only in the cortex of kidney. It measures about 200 microns in diameters. The capsules consist of two parts.

i) Glomerulus :-

It is the capillary tuft with invaginated Bowman's capsule. The afferent arteriole breaks up into fifty capillary loops & form a glomerulus tuft which lies within Bowman capsule, A double walled epithelial sac. Each nephron starts with a tuft of 6-8 epithelial sac renal blood capillaries invaginated into end of tubule. This structure is named as glomerulus. Although these glomerular capillaries are not homogenous loops, but they make up freely branching anatomy network. These are about 20-25 capillary loops in all. Just before entering the glomerulus, the media the afferent arteriole is found to contain a thick of large modified muscle cells. the juxtaglomerular cells. The capillary tuft reunites & forms the efferent arteriole which pass out of the glomerulus. The afferent vessel is short & wide whereas the efferent vessel narrow & long. This arrangement makes the glomerular blood pressure much higher (70mm Hg) than the capillary bed elsewhere & filtration. The total surface area of all the glomerular capillaries in two kidneys. (i.e. the total filter bed) is about 1.73 m^2 .

ii) Bowman's Capsule :-

It is a dilated blind end of the nephrons, invaginated by the glomerular tuft - the vascular end of the pole. It consist of two layers - parietal & visceral. The parietal layer

is made up of the pole. It con typical squamous epithelium of flat polygonal cells. [It's gradually becomes continuous with the tubular epithelium at the tubular end of the Bowman's capsule.

The filtering membrane of the malphigian corpuscle, consist of the following layers.

- a) The endothelial cell layer of the capillaries
- b) The basement ~~bran~~ membrane
- c) The epithelial cell & the visceral layer of Bowman capsule.

The cell of the visceral layer during development undergoes extensive modification & are known as podocytes (glomerular epithelial cells).

04

2. Gluconeogenesis -

Glucose occupies a key position in the metabolism & it's continuous supply is absolutely essential to the body for a variety of functions.

1) Brain & central nervous system, erythrocytes, testes & kidney medulla are depended on glucose for continuous supply of energy. Human brain alone requires about 120g of glucose per day, out of about 160g needed by the entire body.

2) Glucose is the only source that supplies energy to the skeleton muscle, under anaerobic conditions.

3) In Fasting even more than a day, gluconeogenesis must occur to meet the basal requirements of the body for glucose & to maintain the intermediate of citric acid cycle. This is essential for the survival of humans & other animals.

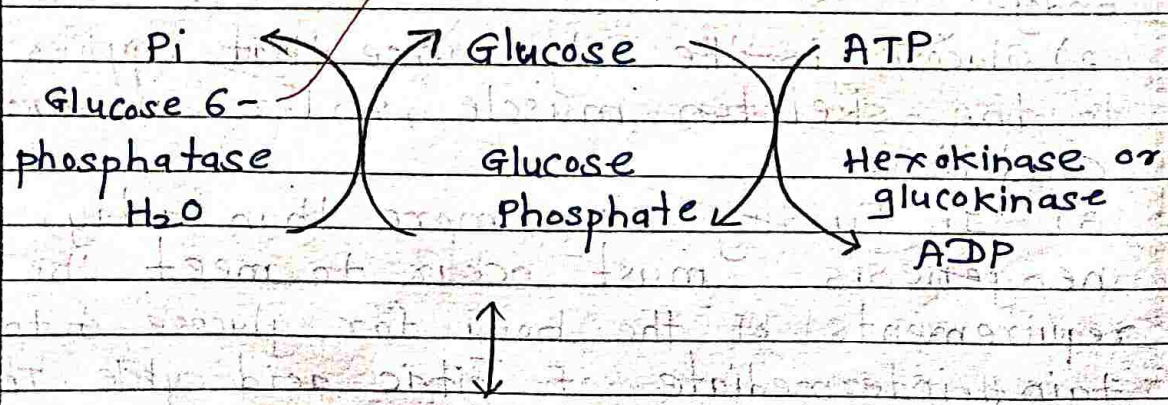
4) certain metabolites produced in the tissues accumulated in the blood. e.g. - lactate, glycerol, propionate, etc. Gluconeogenesis effectively all are taken from the blood.

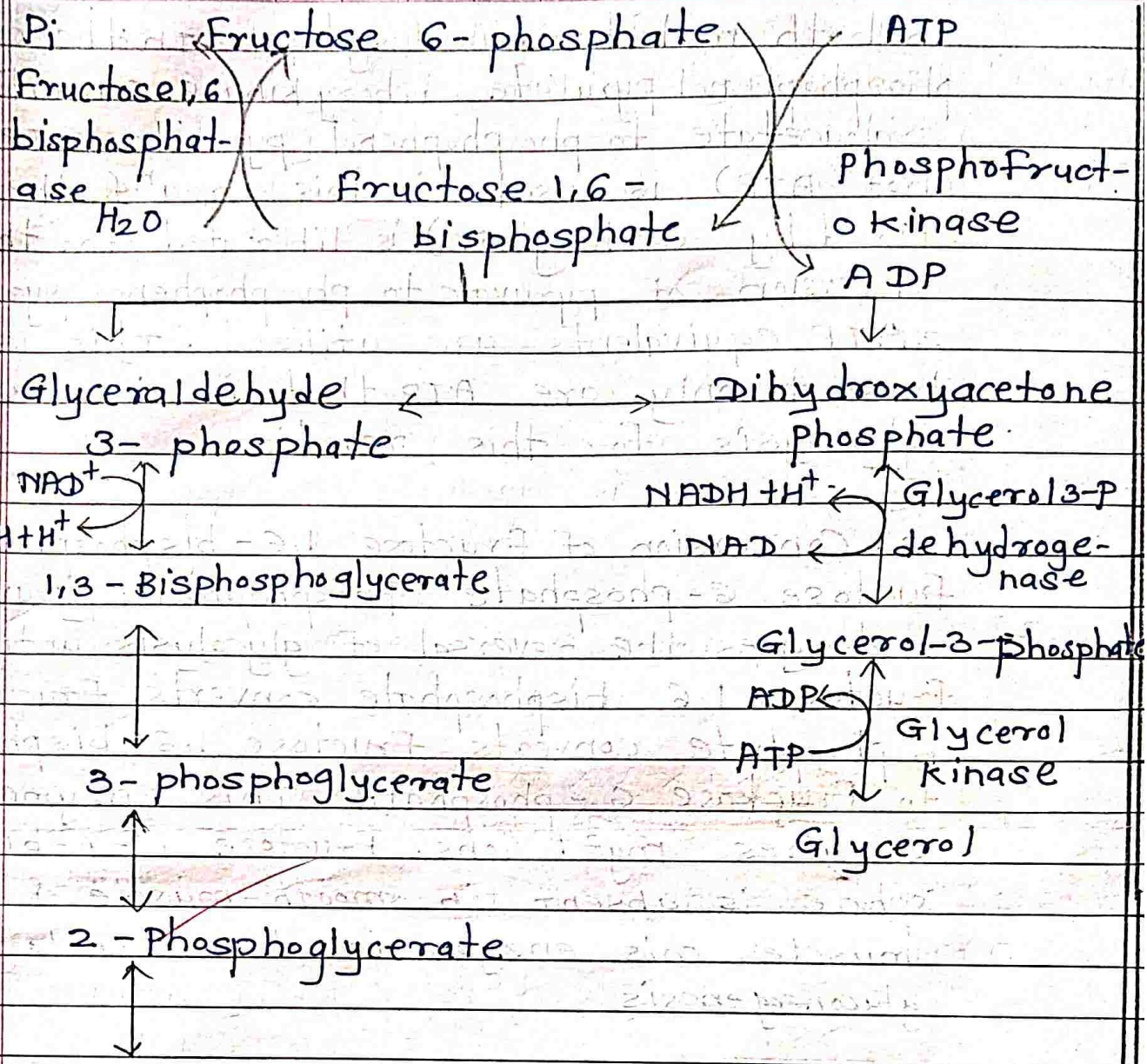
Reaction of gluconeogenesis:-

Gluconeogenesis closely resembles the reversed pathway of glycolysis, although it is not the complete reversal of glycolysis. Essentially 3 (out of 10) reactions of glycolysis are irreversible. The seven reactions are common to both glycolysis & gluconeogenesis. The three irreversible steps of glycolysis are catalysed by the enzymes, namely hexokinase, phosphofructokinase & pyruvate kinase. These three stages by passed by alternate enzyme-specific to gluconeogenesis are discussed.

1. Conversion of pyruvate to phosphoenolpyruvate

This takes place in two steps. Pyruvate carboxylase is a biotin dependent mitochondrial enzyme that converts pyruvate to oxaloacetate in presence of ATP & CO₂. This enzyme regulates gluconeogenesis & requires acetyl Co-A for its activity.





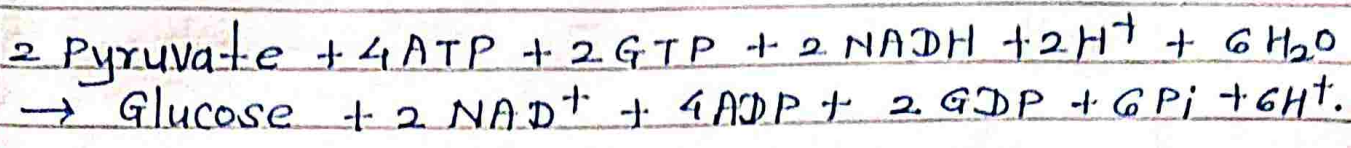
oxaloacetate is synthesized in the mitochondrial matrix. It has to be transported to the cytosol to be used in gluconeogenesis, where the rest of the pathway occurs. Due to membrane impermeability oxaloacetate cannot diffuse out of the mitochondria. It is converted to malate & then transported to the cytosol within the cytosol, oxaloacetate is regenerated. The reversible conversion of oxaloacetate & malate is catalysed by malate dehydrogenase, an enzyme present

in both mitochondria & cytosol. In the cytosol, phosphoenol pyruvate carboxy kinase converts oxaloacetate to phosphoenol pyruvate. GTP or ITP (not ATP) is used in this reaction & the CO_2 (fixed by carboxylase) is liberated. For the conversion of pyruvate to phosphoenol pyruvate, 2 ATP equivalents are utilized. This is contrast to only one ATP that is liberated in glycolysis for this reaction.

2. Conversion of fructose 1,6-bisphosphate to fructose 6-phosphate. Phosphoenol pyruvate undergoes the reversal of glycolysis until fructose 1,6-bisphosphate converts fructose 1,6-bisphosphate to fructose 6-phosphate. This enzyme requires Mg^{2+} ions. Fructose 1,6-bisphosphate is absent in smooth muscle & heart muscle. This enzyme is also regulatory in gluconeogenesis.

3. Conversion of glucose 6-phosphate to glucose. Glucose 6-phosphate catalyses the conversion of glucose 6-phosphate to glucose. The presence or absence of this enzyme in a tissue determines whether the tissue is capable of contributing glucose to the blood or not. It is mostly present in liver & kidney but absent in muscle, brain & adipose tissue.

The overall summary of gluconeogenesis for the conversion of pyruvate to glucose is shown below:-



Gluconeogenesis from amino acids:-

The α skeleton of gluconeogenic amino acids (all ^{carbon} except leucine & lysine) results in the formation of pyruvate or the intermediates of citric acid cycle which, ultimately result in the synthesis of glucose.

Gluconeogenesis from glycerol

Glycerol is liberated mostly in the adipose tissue by the hydrolysis of fats (triacylglycerols). The enzyme glycerokinase (found in liver & kidney, absent in adipose tissue) activates glycerol to glycerol 3-phosphate. The latter is converted to dihydroxyacetone phosphate by glycerol 3-phosphate dehydrogenase. Dihydroxyacetone phosphate is an intermediate in glycolysis which can be conveniently used for glucose production.

04



Shri Swami Vivekanand Shikshan Sanstha's
VIVEKANAND COLLEGE (Autonomous), KOLHAPUR

Class BSc II Div B Roll No. 7532

Suppliment No. _____ Subject Zoology

Test/Tutorial No. Home Assignment

Q.1 Select correct alternative.

1) ~~Estrogen~~ hormone secreted by pituitary gland.

2) β -oxidation may be defined as the oxidation of fatty acid on the β carbon atom.

3) Starch is digested by enzyme amylase.

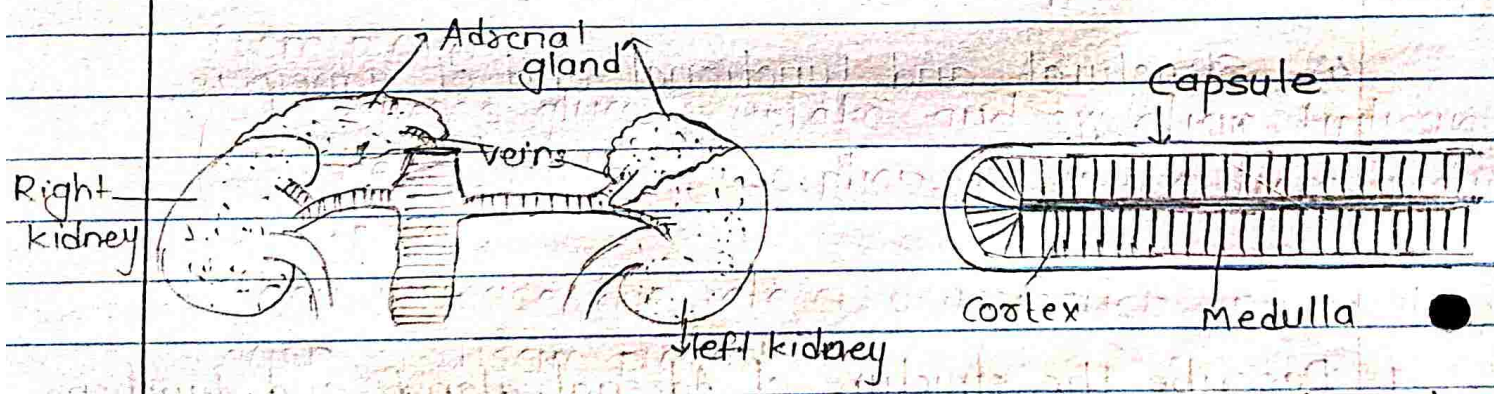
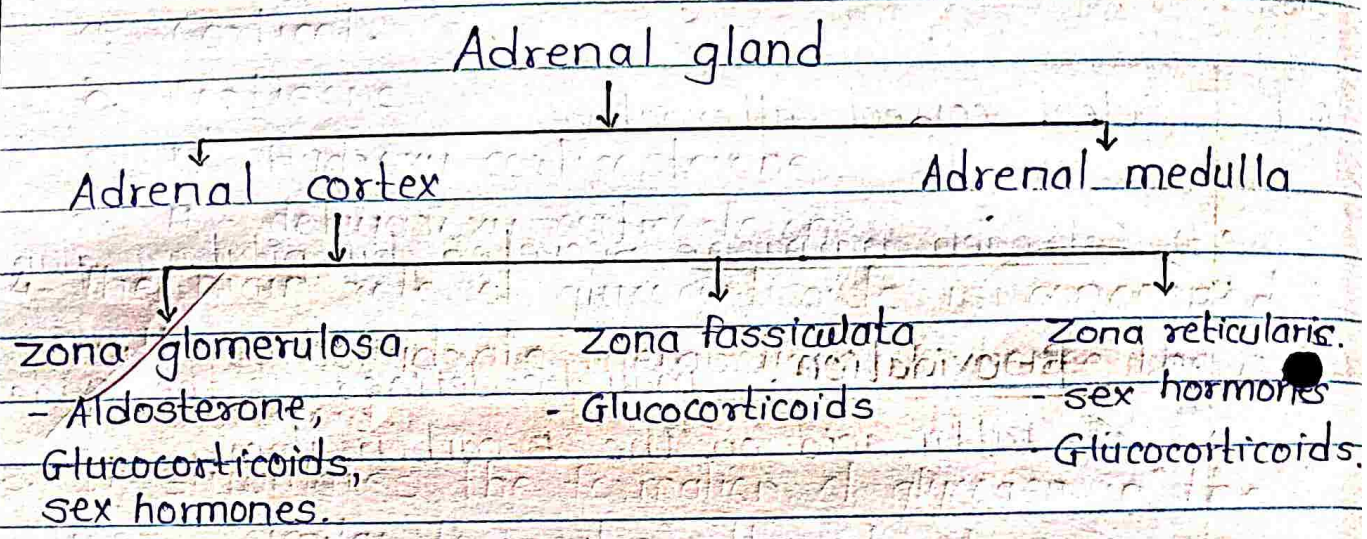
4) Structural and Functional unit of kidney is Nephron.

Q. 1. Describe the structure of Adrenal gland and functions of its hormones?

Human contains two Adrenal glands. They are situated on the top of each kidney. Hence they are also called "supra renal glands". The right gland is smaller and looks like a cocked hat & the left one is roughly crescentic and larger.

Each gland is about 5 to 9 gms in the adult. But at birth the weight of gland will be 16 to 20 times greater than in adults. They gradually decreases in size age increases.

Each gland is enclosed by a capsule. The gland consists of a peripheral part called cortex and a central part called medulla. The two parts are structurally, embryologically and functionally different.



Adrenal glands

T-S of Adrenal gland

Adrenal cortex -

Cortex is the peripheral part of the adrenal gland. It is derived from mesodermal coelomic epithelium. The adrenal cortex consist of these layers of cells :

1. Zona glomerulosa.
2. Zona fasciculata.
3. Zona reticularis.

1. Zona glomerulosa :

It is the outer layer formed of columnar cells. The cells are small and thickly set with their long axis parallel to the surface. They secrete mainly Aldosterone and a small amount of glucocorticoids and sex hormones.

2. Zona Fasciculata:

It is the middle layer and is the widest layer. The cells are polyhedral, layer and are arranged in radiating columns perpendicular to surface. They secrete glucocorticoids.

3. Zona Reticularis :

It is the inner layer. It is made up of an irregular network of rows of cells. The meshes of the network are filled up with sinusoids lined by reticulo-endothelial cells. Zona reticularis secretes sex hormones and small amount of glucocorticoids.

• Hormones of Adrenal cortex :

The hormones secreted by the adrenal cortex are called corticosteroids. They are the derivatives of steroid and are synthesized from acetyl co-A & cholesterol.

The corticosteroids can be classified into 3 groups:

1. Glucocorticoids.

2. Mineralocorticoids

3. Sex steroids.

① Glucocorticoids -

1. Glucocorticoids are a group of steroid hormones secreted by the adrenal cortex.
2. They contain 21 carbon atoms.
3. There are four types of glucocorticoids, namely
 - a. Cortisol.
 - b. Cortisone
 - c. 17-hydroxy corticosterone
 - d. 11-dehydroxy corticosterone
4. The main role of glucocorticoids is concerned with carbohydrate metabolism & hence the name glucocorticoid.
5. It stimulates the formation of glycogen in the liver (similar to insulin) through glycogenesis.
6. It increases glyconeogenesis in the liver especially from protein.
7. It depresses glucose uptake and oxidation by tissues.
8. It helps in the absorption of glucose from intestine & nephron.
9. They increase the rate of deamination and breakdown of tissue proteins.
10. They stimulate absorption of lipid from the intestine. Lipid is mobilised from fat depot and are broken to ketone bodies in liver.
11. They have an anti-sinophilic action, they protect the body against stress.

② Mineralocorticoids -

1. Mineralocorticoids are steroid hormones secreted by the adrenal cortex.
2. They contain 19 carbon atoms.

3. There are three types of mineralocorticoids namely

- a. Aldosterone.
- b. Deoxycorticosterone or Deoxycortone
- c. Hydroxy-deoxycorticosterone

4. The main function of mineralocorticoid is concerned with the metabolism of minerals and hence the name mineralocorticoid.

5. Total loss of adrenocortical secretion usually causes death within 3 days to two weeks unless the person receives extensive salt therapy or mineralocorticoid therapy. Therefore, mineralocorticoids are described as life saving hormones.

6. They help to reabsorb NaCl and H_2O from the renal tubules.

7. They cause increased excretion of K .

8. They lower intercellular K , but raise Na .

9. Mineralocorticoids provide resistance against various stress such as low temperature, low O_2 , pressure, mental & physical strain etc.

10. They increase the volume of extracellular fluid & blood.

11. They greatly enhance the absorption of Na by the intestine.

12. They influence the glands to retain Na but to secrete K through sweat.

• Adrenal Medulla :

Adrenal medulla is the central part of Adrenal gland. It is derived from neural crest cells. It is formed of polyhedral cells. They can be stained with chromic acid and hence they are called chromaffin cells. Adrenal medulla secretes two types of hormones which are chemically catecholamines. They are :

- 1) Adrenaline (Epinephrine)
- 2) Noradrenaline (Norepinephrine)

I) Adrenaline or Epinephrine :-

1. Adrenaline is secreted by the adrenal medulla.
2. Chemically, adrenaline is a catecholamine and is closely related to tyrosine and phenylal amine (amino acids)
3. This hormone is produced and effective under emergency hormone. It is secreted in times of stress, emotion, threatened dangers etc. Its secretion makes the individual ready for fight. Hence, medulla is called the gland of flight, fright & fight.
4. It promotes glycogenolysis resulting in an increase in blood glucose level.
5. It raises O_2 consumption.
6. The rate of heart beat & cardiac output increases.
7. It constricts the veins & arteries of the skin.
- 8.

II) Noradrenaline or Norepinephrine :-

1. Noradrenaline is secreted by adrenal medulla.
2. Chemically, it is a catecholamine & is closely related to tyrosine & phenylamine.
3. It is immediate precursor of adrenaline.
4. Like adrenaline, noradrenaline is also secreted under emergency condition. Hence, it is called an emergency hormone.
5. Most of its actions are similar to those of adrenaline some actions are just the reverse of adrenaline.
6. It slightly increases the heart beat & the cardiac output is not increased.
7. It increases blood pressure.
8. It stimulates the constriction of blood vessels.

6

Q. 3

1. Malphigian capsule: [Malphigian body or Renal capsule].

These are found only in the cortex of the kidney. It measures about 200 microns in diameter. The capsules consist of two parts.

① Glomerulus:

It is the capillary tuft which is invaginated into Bowman's capsule. The afferent arterioles break up into about 50 capillary loops & form the glomerular tuft which lies within Bowman's capsule as a double-walled epithelial sac. Each nephron starts with a tuft of 6 to 8 renal blood capillaries invaginated into the end of the tubule. This structure is named as glomerulus.

Although these glomerular capillaries are not homogeneous loops, but they make up a freely branching anastomotic network. There are about 20 to 50 capillary loops in all. Just before entering the glomerulus, the media of the afferent arteriole is found to contain a thick cuff or large modified muscle cells.

• The juxtaglomerular cells -

The capillary tuft reunites & forms the efferent arteriole which passes out of the glomerulus. The afferent vessel is short & wide whereas the efferent vessel is narrow & long. This arrangement makes glomerular blood pressure much higher (70 mmHg) than the capillary blood elsewhere & facilitates filtration. The total surface area of all the glomerular capillaries in two kidneys (i.e. two total filter beds) is about (1.73 m^2) .

② Bowman's capsule:

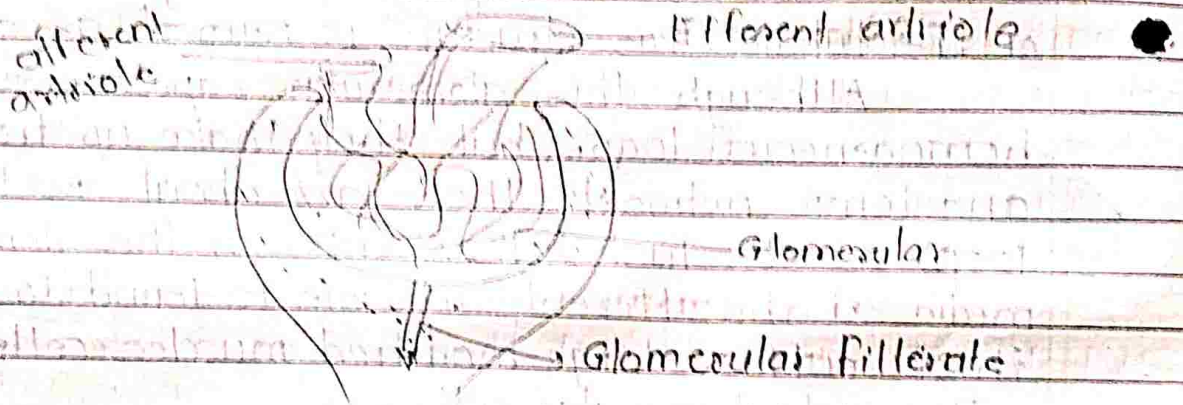
It is the dilated blind end of the nephron invaginated by the glomerular tuft at the vascular end of the pole. It consists of two layers: parietal & visceral. The parietal layer is made up of typical squamous epithelium of flat polygonal cells.

It is gradually becomes continuous with the tubular epithelium at the tubular end of Bowman's capsule

The filtering membrane of the malphigian capsule consist of the following layers,

- a). The endothelial cell layer of the capillaries.
- b). The basement membrane
- c). The epithelial cell of the visceral layer of the Bowman's capsule.

The cell of the visceral layer during development undergoes extensive modification and are known as podocytes (glomerular epithelial cells).

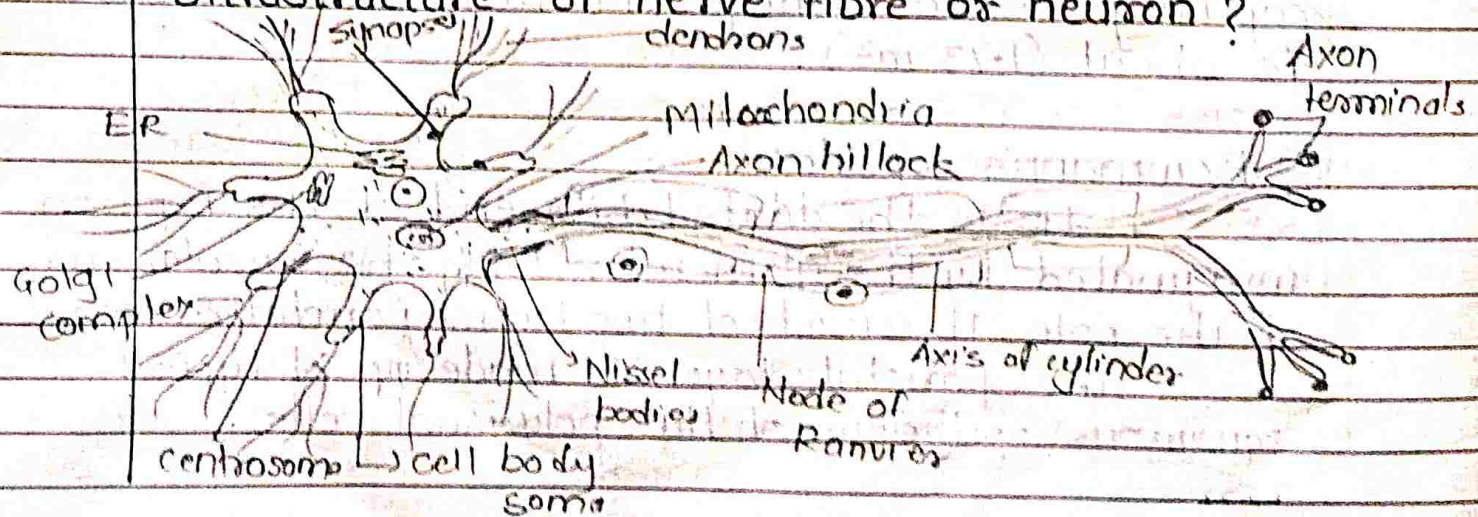


Malphigian Capsule

or

Malphigian body

2. Ultrastructure of nerve fibre or neuron ?



Structure of Neuron.

A nerve cell with its various process is called neuron. It is the structural & functional unit of nervous system. Neuron consist of many nerve cell of body, or soma & two types of processes

- 1) Axon
- 2) Dendrites or dendron

* Structure of cell body:

The nerve cell consist of following structures:

- Cell membrane -

The surface of plasma membrane of a nerve cell appears to be basically similar to that of cells in general

- Nucleus -

The nucleus is commonly large, spherically or slightly ovoid & centrally placed & with its state of activity.

- Neuroplasm -

The neuroplasm or cytoplasmic matrix of the nerve cell contains filamentous, membranous & granular organelles. They are arranged more or less concentrically around the nucleus.

These organelles are neurofibrills, Nissel bodies, (grannules), Mitochondria, Golgi apparatus, Centrosome, Ribosome, E.R, Neurosecretory material.

① Neurofibrills :-

These are fine filaments passing through the nucleoplasm from the dendrite to the Axon.

② Nisselle bodies (grannules) :-

Angular grannules which are present in scattered from through the cytoplasmic ocean of the cell & dendrite except the Axon. Hillock from which axis cylinder arises. There is no Nissel grannules in the axon. Their function is definately not known but some how related to the activity of the cell. It has been suggested that Nissel grannules participate with conduction of nerve impulses. They releasing minut quantity of iron which acts as catalysing agent in increasing the metabolic activity of the cell.

- ③ Mitochondria :- They are numerous & distinct. They are rod shaped, spherical & widely distributed.
- ④ Golgi body :- It is highly developed & complex, intra-cellular reticular network.
- ⑤ Centrosome :- There is a spherical centrosome which contains a pair of centrioles. The centrosome is often found in the cytoplasm. Even though the neuron will never divide it's role in neuron is therefore not clear.
- ⑥ Neurosecretory material :- The neurosecretory material is present in the cell body as well as in their axon.

- * Axon :
- ① Axon is the process of a nerve cell body that carries impulse away from it. nerve fibers which carry impulses the C.N.S. are named afferent & those carries impulses from the C.N.S to peripheri. are called as Efferent nerve fibres. The axon are efferent to nerve fiber. The peripheral nerve contains both sensory & motor fibers.
 - ② They arise from the part of the nerve cell called the axon hillock.
 - ③ It is generally long with few branches.
 - ④ It contains no nissel grannules
 - ⑤ Axis cylinder contains Axoplasm which is semifluid substance. It is essential for nutrition & growth of the nerve fiber, it also contains neurofibrils & mitochondria
 - ⑥ At the axon last end as here neumerous terminal buttons or Axon terminals.

- * Dendrite or Dendron :
- 1. Dendrite or dendron is the process that carries impulse towards the cell body. It collects impulses from other neurons & carries them towards the cell body.
 - 2. It is generally short with many branches which contains Nissel grannules.
 - 3. They are few to numerous in number.
 - 4. They donot conduct impulse, but they are the part of receptor membrane of the neuron.