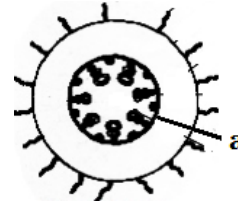


06. What is **correct** regarding cellular respiration?
1. The first step of cellular respiration is pyruvate convert into acetyl co-enzyme A.
 2. In oxidative phosphorylation the total number of ATP produce is 30.
 3. The final Hydrogen acceptor in Ethyl alcohol fermentation is Pyruvate.
 4. Energy compared to 18 ATP's is released in citric acid cycle.
 5. From substrate Phosphorylation 2 ATPs are made from a glucose molecule in Krebs' cycle.
07. Which incident happened after the evolution of dinosaurs and radiation?
1. Conifers (gymnosperms) are dominated.
 2. Mammalian radiation.
 3. Dominance of amphibians.
 4. Extinction of many marine organisms.
 5. Origin of most present day group of insect.
08. What is **true** from the following given statement?
1. A disadvantage of artificial classification is, it is unable to expand by adding more group.
 2. Morphological features are used in natural classification.
 3. Carolus Linnaeus was the first person who classified the organisms scientifically.
 4. Robert H. Whittaker introduced the taxon phylum.
 5. Mammalia is a taxon at the phylum level.
09. What is the **true** about fungus?
1. *Zygomycota* mycelium has incomplete septate.
 2. All fungal absorptive are decomposers.
 3. Fungus don't produce spores with flagella.
 4. In sexual reproduction of *Ascomycota* produce two different conidiopores.
 5. Basidiospores of *Basidiomycota* are endogenous.
10. Which is **true** about kingdom Plantae?
1. Only seedling vascular plants shows heterospory.
 2. Sperms of seed plants do not possess flagella or cilia.
 3. Vascular plants don't require external water for fertilization.
 4. All seed plants' gynoecium is present in ovary.
 5. Xylem tracheids and vessel elements are present in plants of phylum Coniferophyta.
11. Which is **false** about comparison of phylum Nematoda and phylum Annelida?
- | <u>Nematoda</u> | <u>Annelida</u> |
|--|----------------------------|
| 1. Live in marine, fresh and terrestrial | Not in marine |
| 2. Tough cuticle present | Some possess tough cuticle |
| 3. Segmented body | Segmentation absent |
| 4. True coelom absent | True coelom present |
| 5. Clitellum present | Clitellum present |
12. Which shows the similar characteristics of phylum *Chondrichthyes* and phylum *Osteichthyes*.
1. Internal fertilization
 2. Viviparity
 3. Presence of air sacs
 4. Rough scales
 5. Gills with operculum
13. Parenchyma cells are different from collenchyma cells because, collenchyma cell has,
1. Living even at maturity
 2. Thickened corners by lignin
 3. Large central vacuole
 4. Present right inside the epidermal cell layer in a cylinder or rays
 5. Flexible

14. Choose the **correct** statement about the following diagram,

1. Primary structure of typical dicot stem
2. Primary structure of typical dicot stem
3. Primary structure of typical monocot stem
4. Primary structure of typical monocot root
5. 'a' is pericycle



15. During the transport in plants,

1. Transport through cytoplasm of root cortex, osmosis is used.
2. Last check point of radial transport is pericycle.
3. Stomatal transpiration is important for vertical transportation.
4. Diffusion and bulk flow is used in water transportation of symplastic route.
5. Diffusion is used for the transportation of water in vessel elements and tracheids.

16. What is **correct** comparison between transpiration and guttation?

Transpiration

Guttation

- | | |
|--|--|
| 1. Water removed as vapour | water removed as liquid or vapour |
| 2. Happens only at day time | Happens only at night |
| 3. Mostly removes through stomata | Removes through hydrothodes or stomata |
| 4. Happens due to the water potential gradient | Happens due to the root pressure |
| 5. Pure water removed | Pure water removed |

17. What is the **true** comparison between nutrition in plants and examples?

Mode of nutrition

Example

- | | |
|-----------------------|---|
| 1. Mutualism | Coralloid roots of <i>Cycas</i> & <i>Anabaena</i> |
| 2. Commensalism | Lichens & host plant |
| 3. Semi parasitic | Cuscuta & host plant |
| 4. Total parasitic | <i>Loranthus</i> & host plant |
| 5. Carnivorous plants | <i>Utricularia</i> |

18. What is the **false** response given below about the structures of life cycle of Angiosperms?

Incident

Structure

- | | |
|-----------------------|----------------|
| 1. Microsporophyll | - Filament |
| 2. Megasporophylls | - Ova |
| 3. Male Gametophyte | - Pollen grain |
| 4. Female gametophyte | - Embryoac |
| 5. Megaspore | - Ovary |

19. Select the **correct** statement about responses of plants for different stimuli.

1. Plant trigger can be able to detect only wave length not for light intensity.
2. Green light is the most important colour regulating photo morphogenesis.
3. Hypocotyl elongation depends on by blue light.
4. Proportion of far red : red light are inhabit the vertical growth.
5. The sudden loss of turgor results thigmonasty.

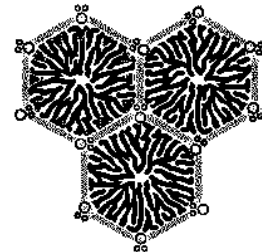
20. Which is **correct** regarding the tension of plants?

1. Plants synthesize Abscisic acid as response to the cold stress.
2. Cold stress results reduction of solute concentration in cytoplasm
3. Reasons for salt stress is high salinity in soil results toxic for plant.
4. Synthesis of alkaloids is induced chemical defense mechanism in plants
5. Synthesis of alkaloid compounds due to pest attacks are induced chemical defense mechanisms.

21. Type of animal tissue has these characteristics.
 A. All cells are spindle shape. B. All cells are uni-nucleated. C. Works involuntarily
 This tissue can be,
 1. The Areolar (Loose connective) tissue. 2. The dense connective tissue.
 3. Smooth muscle tissue. 4. Skeletal muscle tissue.
 5. Cardiac muscle tissue.

22. Which is a function of duodenum?
 1. Starts the digestion of protein.
 2. Absorption of alcohol and some drugs.
 3. Secreting the secretine hormone.
 4. Non specific defense.
 5. Secreting pepsinogen.

23. Following diagram represents the liver lobule. Select the **correct** statement.



1. It functions as endocrine as well exocrine.
2. It worked as defense against microbes.
3. Hepatic blood and bile mixed within the sinusoid.
4. In hormones needed to blood glucose regulation.
5. Hepatic blood circulate within the central vein.

24. Which is **correct** about respiratory pigments of organisms?

	Pigments	Types of Organisms
1	Hemoglobin	Some Annelids
2	Hemocyanin	Some Annelids
3	Hemerythrin	Marine Vertebrates
4	Myoglobin	Insects
5	Chlorocruorin	Some Arthropods

25. Select the **correct** statement about disorders of the respiratory system from below?

1. Excessive sweating is a symptom of pulmonary tuberculosis.
2. Anti-inflammatory drugs are used to control asthma.
3. Hydrogen cyanide in cigarette smoke causes cancer.
4. Oxygen transport through blood is reduced due to carbon dioxide.
5. Silicosis results lung cancer.

26. Which is **not** a way of acquired immunity?

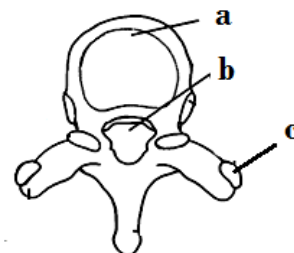
1. Keratinized cell layers are located in the human skin.
2. The mucous membrane which covers the body cavities.
3. Secretion of tears is a washing action of eyes.
4. Cell mediated immune response.
5. The permeability of the blood vessels near tissue damage is increased.

27. Which is **correct** about the animal excretion from the following?

1. Urea needs the lowest amount of energy to synthesize among excretory products.
2. Among excretory products, highest carbon loss occurs in urea extraction.
3. Some marine fishes excrete urea.
4. Green glands found in some insects.
5. Malpighian tubules are connected and open to the outside through an excretory duct.

28. Choose the **incorrect** answer about the central nervous system.
1. Human brain has two ventricles in the forebrain and hindbrain has one for each.
 2. Cerebrospinal fluid helps to circulate nutrients and hormones.
 3. Forebrain gives rise to the pineal body thalamus and hypothalamus.
 4. The outermost layer of meninges is the dura mater.
 5. The superficial part of cerebrum is consist of nerve cell bodies.
29. Which statement is **incorrect** about nerve impulses generation and transmission ?
1. Concentration of K^+ is lower inside the cell while non-conducting impulse.
 2. To maintain the net negative charge in the cell, there is more sodium channels open than potassium channels.
 3. To maintain the Na^+ and K^+ gradient across the membrane by transporting three potassium ions out of the cell for every two sodium ions.
 4. Depolarization results due to Na^+ inflow in response to stimulus.
 5. Refractory period allows the reverse conduction of an impulse in an axon.
30. Which is a function of a human skin?
1. It works as endocrine as well as exocrine organ.
 2. During high temperatures Krause bulb is used to regulate temperature.
 3. React against harmful damages caused by IR rays.
 4. Synthesis of vitamin A.
 5. Involve for excretion process.
31. Which one is true about endocrine disordered in human.
1. Type I diabetes → Glucose is deficient inside body cells.
 2. Type II diabetes → This is caused by the destruction of beta cells of Langerhans by the immune system.
 3. Hyperthyroidism → Due to lack of TSH production.
 4. Hypothyroidism → Treatment is surgical removal of part or all of the thyroid glands.
 5. Hyper thyroidism → Lead to bulging of eyes and goiter.
32. Steps given below related to spermtogenesis. Select the **correct** order.
- a. Primary spermatocytes are generated by mitosis.
 - b. Primordial germ cells are generated by mitosis.
 - c. Spermatids are generated by mitosis.
 - d. Secrete into cavity of seminiferous tubules.
 - e. Spermatogonial stem cells are generated by mitosis.
1. b, e, a, c, d 2. e, b, a, c, d 3. b, c, a, e, d
 4. c, d, b, e, a 5. d, e, b, a, c
33. Choose the correct statement about hormonal control of the human female reproductive cycle.
1. In the follicular phase, estradiol stimulates the secretion of FSH and LH.
 2. When the estradiol level are low, GnRH secretion increases.
 3. Mature follicle secretes progesterone and estradiol.
 4. After the ovulation, FSH stimulates the follicular tissue to transform into the corpus luteam.
 5. In the luteal phase, very low levels of LH and FSH prevent the maturation of another egg.

34. Select the **correct** statement regarding the diagram given below.
1. Anterior view of axis vertebra.
 2. Spinal cord goes through 'a'
 3. Blood vessels go through 'b'
 4. Facet for articulation with adjacent vertebra by c.
 5. There are 12 vertebrae in vertebral column.



35. Tall trees and green colour seeds are dominant traits. 'X' tree which is tall and has green seeds is bred with a 'Y' tree which is short. The F₁ generation shows following phenotypic ratio.

Tall, green seeds : Short green seeds
1 : 1

X and Y genotypes respectively are,

1. AaBb, AaBb 2. AaBb, aaBB 3. AABB, aabb 4. AaBb, aaBb 5. AaBB, aabb

36. Dimple on cheek is double recessive Mendelian trait can be seen in human. In a population 2.25% of total show this trait. The percentage of heterozygotes in that population for this trait is,

1. 25.5% 2. 97.75% 3. 74.5% 4. 72.25% 5. 85.00 %

37. What is **true** about gene expression?

1. The final production of gene is always a polypeptide.
2. m - RNA molecule is a copy of the other DNA which is not working as sketch.
3. There are 20 codons as the language of amino acid of a protein.
4. There are four termination cordons.
5. Genetic code is common for every eukaryotes and different from prokaryotes.

38. Steps given below are the process of a synthesis of a recombinant plant and animal.

- a. Transformation of the recipient cells
- b. *In vitro* modifications of the gene of interest
- c. Isolation and purification of the gene
- d. Amplification of modified gene by cloning

Select the correct order of the given steps.

1. b d c a 2. c d b a 3. c b d a 4. c a b d 5. a c b d

39. Select the **incorrect** statement about world's main biomes.

1. A prominent dry season of 6 – 7 months can be seen in temperate deciduous forest.
2. There are tall grasses and scattered trees in savanna.
3. There are venomous snakes, lizards scorpions birds and such kind of animals in desert.
4. The normal temperature is below – 10°C in winter season of chaparral and around 30°C in summer.
5. Tropical grass land's trees have special adaptations for fire.

40. Select the correct matching for the categories and examples of animal species.

	Threatened level	Example
1.	Critically endangered	Dumbara galpara madiga (marbled rock frog)
2.	Endangered	Small squirrel
3.	Extint	<i>Lingula</i> (Lampubella)
4.	Flagship	Sri Lankan Lion
5.	Migratory species	Thilapia

• Use the following instructions to answer the questions 41 through 50.

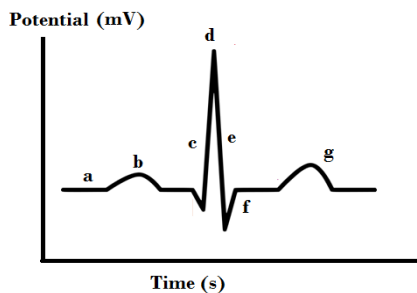
Only A,B,D correct	1
Only A,C,D correct	2
Only A,B correct	3
Only C,D correct	4
Any other answer/combination of answers correct	5

41. Which statement/statements is/ are **correct** about lipids

- A. Triacyl glycerols which have hydro carbons and double bonds are liquid in room temperature.
- B. Excessive use of Trans – unsaturated fats results thickening artery wall.
- C. Phospholipids shows amphoteric characters.
- D. Most animal lipids are baring unsaturated fatty acids.
- E. Some lipids are acting as macro molecules.

42. What is/ are **correct** statement/ statements about NAD^+ , NADP^+ and FAD ?
- NAD^+ and FAD are derivatives of vitamins.
 - All are oxidizing agents during respiration.
 - All are act as coenzymes.
 - All are derivatives of nucleic acids.
 - All are universal energy carriers.
43. What is/ are **correct** above geological eons and eras of evolution?
- Diversification of vascular plants was happened in Paleozoic era.
 - Origin of mammals was happened in Mesozoic era.
 - Amphibians dominated in Paleozoic era.
 - Extinction of dinosaur happened in Mesozoic era.
 - Primate groups originated in Mesozoic era.
44. Which statement/ statements is/ are similar to the life cycles of *Poganatum* and *Nephrolephis*
- Gametophyte is photosynthetic.
 - External water is needed for fertilization.
 - Cuticle is found on sporophyte.
 - Homospory.
 - Gametophytes are dioecious.

45.



The graph shows the electrical signal generated by the SA node as it travels throughout the heart. Choose the **false** statement/ statements.

- a shows the complete cardiac diastole.
 - b shows the atrial depolarization.
 - c shows the ventricular repolarization.
 - d shows the arterial repolarization.
 - This graph shows the electro cardiogram
46. What is/ are the false combination/ combinations of the functioning and the structure of human eye.
- Cornea - refraction of light rays.
 - Sclera - transports the nutrients to the eye.
 - Ciliary muscles - secretion of vitreous humor.
 - Iris - controls the amount of light entering the eye.
 - Suspensory ligament – sclera fixed to the eye orbit.
47. What is / are the **wrong** answer / answers about the hormones affect on reproductive system.
- FSH stimulates the legdig cells to nourish sperms.
 - Secretion of LH promotes the spermatogenesis
 - Secretion of GnRH from hupothalamus.
 - Estradiol stumlates the secretion of Gonadotropin hormone.
 - Secretion of HCG result the generation of corpus luteum.
48. Which is/ are **incorrect** statement/ statements about animal skeletons.
- Pseudo coelom acts as fluid filled skeleton in Cnidaria.
 - Exo skeleton of some Arthropods are made by cutine.
 - Exo skeleton of some Arthropods contained protein or CaCO_3 .
 - Some Reptiles have bony exo skeleton.
 - Endo skeleton of Echinodermata Made up of CaCO_3 .

49. Select the **correct** statement / statements.
- A. Chromosomes act as the physical unit of heredity.
 - B. Genetic materials of prokaryotes are also replicated.
 - C. Operons provides codes to few peptides.
 - D. Exons in Eukaryotes provide codons for polypeptides.
 - E. All DNA in chromosomes of prokaryotes are active.
50. Select the **correct** statement/ statements about biomes in world.
- A. The average annual rain fall in tropical rain forests is 1500 mm – 2000 mm.
 - B. Savanna biome can be seen in tropic of cancer region.
 - C. Desert biomes are absent in tropic of cancer region.
 - D. Tall conifers can be seen in chaparral.
 - E. Temperature at Tundra is always below 0 °C

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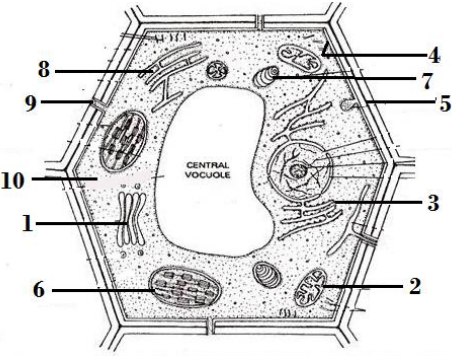
Second Term Test - Grade 13 - 2020

Index No : **Biology II** **Three Hours Only**

Impotent
Part A - Structured Essay. Answer all questions on the paper itself.
Part B - Essay, Answer four questions only. Give clearly labeled diagrams where necessary.
Part B - Essay, Answer four questions only. Give clearly labeled diagrams where necessary.

Part A (Structured Essay)

(01) A). Diagram given below represents the electron microscopic view of a plant cell.



- i. Name all parts labeled as 1-10 in the illustration given above.

- ii. State 3 features used for identification of the above illustration as plant cell.

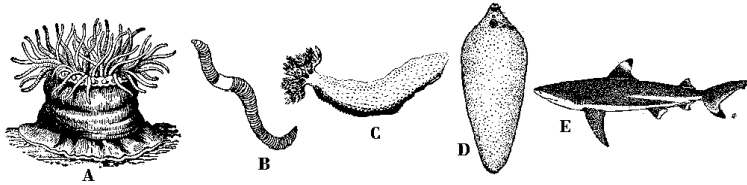
iii. What is ~~a~~the thin structural layer ~~is in~~ presence between cell walls of adjacent plant cells?

.....

iv. Write a cellular organelle which secretes the above mentioned structure and two functions of it.

.....

B) Complete the given dichotomous key using the organisms given below.



- i. Radial symmetry present
 Radial symmetry absent
- ii. Tentacles are found around the mouth
 Tentacles are absent around the mouth
- iii. Clitellum present
 Clitellum absent
- iv. Heterocercal caudal fin is present
 Heterocercal caudal fin is absent

C) i. Define "balanced diet".

.....

ii. a). Amino acids can be separated in to two types. State those two types of amino acids.

A
 B

b). Write two examples for each A and B types.

.....

iii. Write hormones which stimulate the given processes.

a) ~~a)~~ Release of bile from the gall bladder and digestive enzymes from the pancreas.

.....

iv. ~~ab)~~ Regulates digestion in the stomach. Stimulates the secretion of gastric juice.

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iv. Name two antioxidant vitamins.

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v. Write deficiency symptoms of following Vitamins.

Vitamin B₉ -

Vitamin C -

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02. Reproduction is a characteristic feature of organism.

A. i. Write two modes of reproduction of animals.

.....
.....

ii. a). According to the mode of reproduction mentioned in above (02.A. i.) above question, name a reproductive mode for the offspring produced as similar among each other as well as to the parents.

.....

b). List down the types of reproduction and examples for them which related to above (02.A ii.a) mentioned mode.

.....
.....

iii. Some structures of human male reproductive system are given below. Write the function of each structure.

a). Epididymis-

.....
.....

b). Seminal vesicle-

.....
.....

c). Prostate gland-

.....
.....

iv. List down parts of human female reproductive system.

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v. Name two hormones that secrete from anterior pituitary to continue oogenesis.

.....
.....
.....

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B. i. Write the main structures used for excretion of animals.

- a) Prawn-
- b) Spider-
- c) Earth worm-
- d) *Paramecium*-
- e) *Planaria*-

ii. Removal of excretory product from the body is essential. Explain why?

.....
.....
.....

iii. In which part of the nephron specialized for selective reabsorption of substances in glomerular filtrate?

.....
.....

iv. State the 3 processes involved in urine formation.

.....
.....

C. i. Name 2 specific defense responses mediated by diverse T lymphocytes and B lymphocytes in acquired immunity.

.....
.....

ii. Define following terms.

a. Antibodies –

.....
.....

b. Naturally acquired active immunity –

.....

iii. Write 2 factors affected to autoimmune disease.

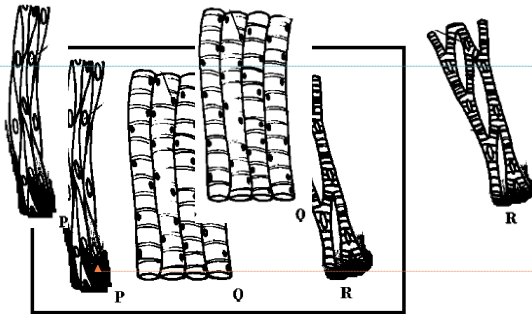
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iv. Name an example for autoimmune diseases.

.....

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03. A



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i. The above diagrams show 3 types muscle tissues. Identify ~~the~~ each

P –

Q –

R –

ii. Write the functions and locations of ~~each~~ above mentioned tissue types in given table.

Tissue	Location	Function
P
Q
R

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iii. List down 3 differences between structural features of P and Q mentioned above in 03.A (H)

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04. A. i. What is an animal hormone?

.....
.....
.....
.....

ii. Write the ~~the~~ main function and ~~hormone secreter locator~~ secretory locations of hormone for each hormones given below.

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Hormone	Location	Function
1. prolactin		
2. Growth hormone (GH)		
3. Thymosin		
4. Adrenaline		
5. T R H (Thyrotropin Releasing Hormone)		

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iii. Complete given table related to plant hormones.

Stimuli	Response	Example
<u>Light</u>	<u>Photo morphogenesis</u>	
<u>Touching</u>		
<u>Touching</u>		

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B. i. Write ~~State~~ 3 basic ~~characters-characteristics~~ of sensory receptors.

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ii. What are the main types of chemoreceptors in human?

.....
.....
.....

iii. Name the receptors important in following instances.

- a - Detect warmth -
- b - Black & white (night) -
- c - Sensitive to light touch -
- d - Pressure receptors -

iv. Mention the sensory receptors for animals given below.

- 1. *Planaria* -
- 2. Squid -
- 3. Grasshopper -

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C. i. Enzymes mentoned below are involved in DNA duplication. Write the function.

- a. DNA polymerase -
- b. Primase -
- c. Tropolisomerase -

ii. Define following terms.

- Gene -
- Gene expression -

iii. Δ Ppolypeptide synthesis is happening in two stagessteps. Name those two stagessteps.

.....

iv. Write two defects cause due to the changes in chromosomes.

.....

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Biology – Grade 13 Part II

Part B (Essay)

❖ **Answer four questions only.**

05.
 - I. Explain the fine structure of mitochondria.
 - II. Explain the process that happens through the mitochondrial inner membrane during cellular respiration

06.
 - I. Describe the structure of transverse section of dicotyledonous plant stem.
 - II. Describe the secondary growth of dicotyledonous plant stem.

07.
 - I. Describe the structure of human skin.
 - II. Explain the role of skin to regulate temperature.

08.
 - I. Describe the structure of human ovary.
 - II. Explain the delivery process and the hormone regulation.

09. Illustrate the non Mendelian inheritance by using appropriate examples.

10. Write short notes.
 - I. Silicosis
 - II. Genetically modified organisms (GMO)
 - III. Biomes

Second Term Test – 2020

Biology – Grade 13 Part I

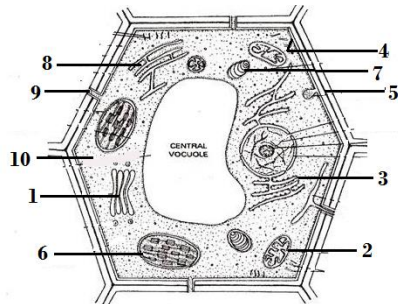
Qu. No	An. No	Qu. No	An. No	Qu. No	An. No	Qu. No	An. No	Qu. No	An. No
1	3	11	2	21	5	31	1	41	1
2	2	12	1	22	4	32	4	42	5
3	1	13	5	23	4	33	4	43	3
4	1	14	2	24	5	34	3	44	5
5	5	15	5	25	1	35	3	45	4
6	1	16	3	26	2	36	1	46	4
7	5	17	3	27	2	37	3	47	5
8	3	18	3	28	5	38	5	48	5
9	4	19	1	29	5	39	5	49	5
10	4	20	5	30	2	40	2	50	4

Biology – Grade 13 Part II

Structured Essay

Part A (Structured Essay)

(01) A). Diagram given below represents the electron microscopic view of a plant cell.



i. Name all parts labeled as 1-10 in the illustration given above.

1. Golgi apparatus
2. Mitochondria
3. R-ER
4. Plasma membrane
5. Middle lamella
6. Chloroplast
7. Ribosome
8. S-ER
9. Plasmodesmata
10. Cytoplasm

ii. State 3 features used for identification of the above illustration as plant cell.

Chloroplast
Central vacuole
Cell wall

iii. What is the thin structural layer presence in between cell walls of adjacent plant cells?

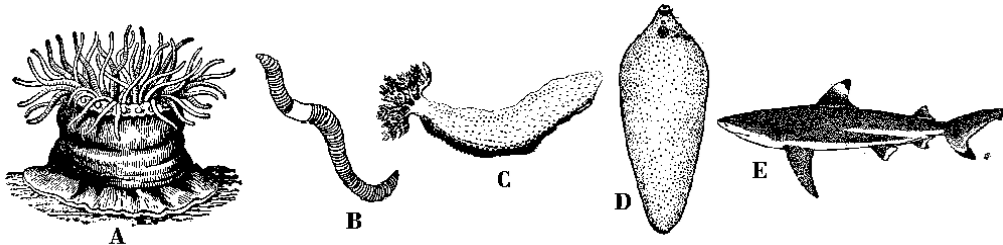
Middle lamella

iv. Write a cellular organelle which secretes the above mentioned structure and two functions of it.

Golgi apparatus

- Collecting, packaging and distribution of materials
- Manufacturing cellulose and non cellulose cell wall components such as pectin
- Produce lysosomes

B) Complete the given dichotomous key using the organisms given below.



1. Radial symmetry present2
Radial symmetry absent.....3
2. Tentacles are found around the mouth.....A
Tentacles are absent around the mouth.....C
3. Clitellum present.....B
Clitellum absent.....4
4. Heterocercal caudal fin is present.....E
Heterocercal caudal fin is absent..... D

C) i. Define “balanced diet”.

The balanced diet contains the all essential nutrients required for health in the appropriate proportions

ii. a). Amino acids can be separated in to two types. State those two types of amino acids.

A- essential amino acids.
B- non essential amino acids

b). Write two examples for each A and B types.

A- non essential amino acids e.g. Alanine, cystine,
B- essential amino acids e.g. lysine and histidine,

iii. Write hormones which stimulate the given processes.

a).Release of bile from the gall bladder and digestive enzymes from the pancreas.

Cholecystokinin

b). Stimulates the secretion of gastric juice.

Gastrin

iv. Name two antioxidant vitamins.

Vitamin C

Vitamin E

v. Write deficiency symptoms of following Vitamins.

Vitamin B₉- Anemia, birth defects

Vitamin C- Scurvy. delayed wound healing

40x2.5 = 100

02. Reproduction is a characteristic feature of organism.

A. i. Write two modes of reproduction of animals.

Asexual reproduction

Sexual reproduction

ii. a). According to the mode of reproduction mentioned in above (02.A. i.) question, name a reproductive mode for the offspring produced as similar among each other as well as to the parents.

Asexual reproduction

b). List down the types of reproduction and examples for them which related to above (02.A ii.a) mentioned mode.

Budding- Hydra

Fragmentation and regulation- some annelida / some Cnidaria

iii. Some structures of human male reproductive system are given below. Write function of each structure.

a) a).Epididymis- From the seminiferous tubules, the sperm pass into the epididymis.

b). **Seminal vesicle**- alkaline to protect the sperm /or provides most of the sperm's energy/ or helps semen coagulates after ejaculation

b) c). **Prostate gland**- secretion contains coagulants,anticoagulant enzymes and citrate which is a sperm nutrient

iv. **List down parts of human female reproductive system.**

Two ovaries
Two oviducts
Uterus
Vagina

v. **Name two hormones that secrete from anterior pituitary to continue oogenesis.**

FSH LH

B. i. **Write the main structures used for excretion of animals.**

- | | |
|-----------------------|-------------------------------|
| a) Prawn- | Green glands/ antennal glands |
| b) Spider- | Malpighian tubes |
| c) Earth worm- | Nephridia |
| d) <i>Paramecium-</i> | Body surface |
| e) <i>Planaria-</i> | Flame cells |

ii. **Removal of excretory product from the body is essential. Explain why?**

Metabolic substrates in the cells are carbohydrates, fats, proteins and nucleic acids. When carbohydrates are metabolized within the body cells when oxygen is available final excretory end products are CO₂ and water.

iii. **In which part of the nephron specialized for selective reabsorption of substances in glomerular filtrate?**

Proximal convoluted tubule

iv. **State the 3 processes involved in urine formation.**

Ultrafiltration
Selectively reabsorption
Secretion

C. i. **Name 2 specific defense responses mediated by diverse T lymphocytes and B lymphocytes in acquired immunity.**

Humoral immune response
Antibody mediated immune responses

ii. **Define following terms.**

a. **Antibodies** – antibodies are proteins secreted by plasma cells in response to specific antigens

b. Naturally acquired active immunity – Long lasting immunity developed in the body against various infectious diseases in response to natural infections to pathogens

iii. Write 2 factors affected to autoimmune disease.

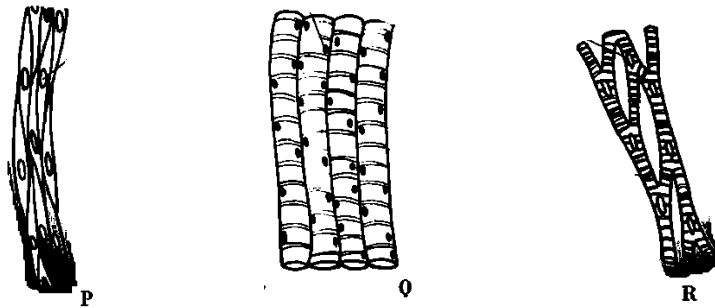
- Genetic factors
- Gender
- Unknown environmental triggers

iv. Name an example for autoimmune diseases.

- Type 1 diabetes
- Multiple sclerosis
- Rheumatoid arthritis

40x2.5 = 100

03. A



i. The above diagrams show 3 types muscle tissues. Identify each.

- P – Smooth muscle
- Q – Cardiac muscle
- R – Skeletal muscle

ii. Write the functions and locations of above mentioned tissue types in given table.

Tissue	Location	Function
P	Digestive track / urinary bladder, arteries and other internal organelles	Involuntary body functions
Q	Wall of the heart	Involuntary of heart contractions
R	Muscles generally attached to skeletal system	Voluntary body movements

iii. List down 3 differences between structural features of P and Q mentioned above in 03,A (i)

- | | |
|--|---|
| <ul style="list-style-type: none"> ● Spindle shape ● Sarcomeres absent | <ul style="list-style-type: none"> Q (Cardiac) Cylindrical Sarcomere present |
|--|---|

- Intercalated disks absent
- Cell not striated

Intercalated disks present
Striated

B. i. How many bones in the cranium in human skull.

ii. From the cranium,

a) Name types of pair of bones

Two parietal bones

Two temporal bones

b) Which bone has the foramen magnum?

The inferior surface of the cranium

c) Name the bone which located the inner ear?

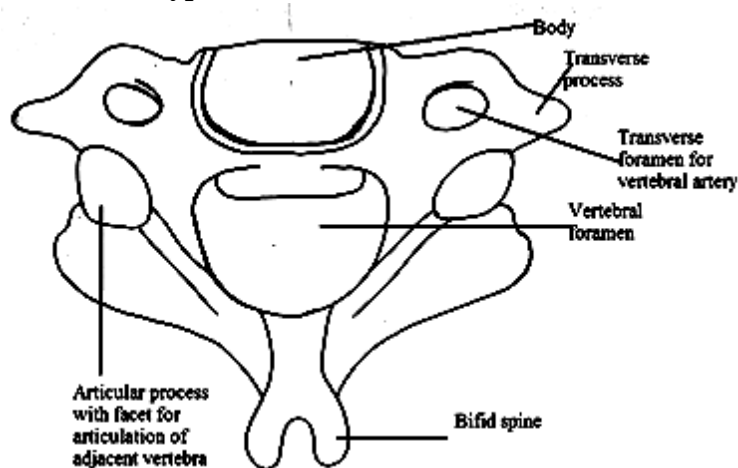
Temporal bone

iii. What are the fused bones in human vertebra?

Sacrum 5 fused bones

Coccyx – 4 fused bones

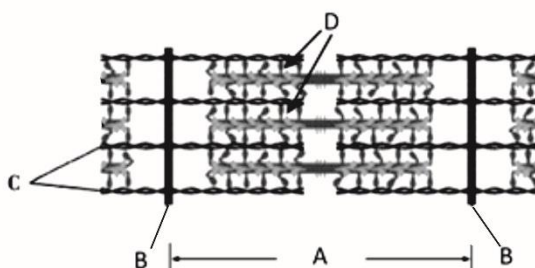
iv. Draw and label first typical cervical vertebra in human vertebra.



v. Name the surface which articulate with skull as “X / X” diagram which drawn above in (02, B, iv)

.....
diagram

C. Figure given below demonstrates the skeletal muscle fiber.



- i. Name A, B, C and D mentioned in the above diagram.
 A –Sarcomere
 B – Z line
 C – Actine filaments (Thin filaments)
 D – Myocin filaments (Thick filaments)
- ii. What are the variation happen in A and B during the contraction of muscle?
 A – Shorten
 B – Close
- iii. Name the theory which explain the above mentioned contraction.
 Sliding filament theory
- iv. What is the function of calcium ions (Ca^{2+}) in muscle contraction?
 Exposed the binding sites in myosin
- v. Briefly explain the nerves supply for skeletal muscle fiber.
 Voluntary and under control of somatic nervous system

40x2.5 = 100

04. A. i. What is an animal hormone?

1. Specific type of signaling molecule
2. Secreted by an endocrine glans
3. On distance cells
4. Acts on specific target cell
5. Changing the target cell functionary

ii. Write a main function and secretory locations of hormone for each hormones given below.

Hormone	Location	Function
1. prolactin	Anterior pituitary	Stimulate milk production
2. Growth hormone (GH)	Anterior pituitary	Stimulate protein synthesis Regulate metabolism promote tissue growth
3. Thymosin	Thymus gland	Regulates development & maturation of thymphocytes
4. Adrenaline	Adrenal medulla	Short term stress (heart beats & blood pressure
5. T R H (Thyrotropin Releasing Hormone)	Hypothalamic hormone	Secretes the TSH from thyroid gland

iii. Complete given table related to plant hormones.

Stimuli	Response	Example
Light	Photo morphogenesis	Plant growth towards the light
Touching	Thigmonasty	Mimosa pudica collapse its leaflets

B. i. State 3 basic characteristics of sensory receptors.

- A specialized structure (cell / organ / subcellular structure) designed to receive a specific stimuli.
- Detect the stimulus if the stimulus is at or above threshold level.
- Convert the energy of the stimulus (e.g. light energy, sound energy) into a changing membrane potential to be later transmitted as an action potential.
- Always connected with the nervous system.
- During the conversion of stimulus energy into the action potential, sensory signal can be strengthened which is called amplification.
- If the stimulation is continuous, many receptors show decrease in responsiveness which is called sensory adaptation (For example upon continuous exposure to a strong smell, perception of that smell gradually decreases and stops within few minutes).

Any 3

ii. What are the main types of chemoreceptors in human?

- Taste receptors
- Olfactory receptors

iii. Name the receptors important in following instances.

- a – Detect warmth Ruffini corpuscles
- b – Black & white (night) Cone cells
- c – Sensitive to light Merkel discs
- d - touch Pacinian corpuscles
- Pressure receptors

iv. Mention the sensory receptors for animals given below.

- 1. *Planaria* - eye spots
- 2. **Squid** - Simple eyes
- 3. **Grasshopper** - Compound eyes

C. i. Enzymes mentoned below are involved in DNA duplication. Write the function.

- a. **DNA polymerase** - Polymerization and continue
- b. **Primase** - Can initiate synthesis of RNA on a DNA template by adding ribonucleotides
- c. **Tropisomerase** -introduce breaks on one or both strands of DNA, twist the molecule to relieve the strain and then reseal the cut end

ii. Define following terms.

Gene - fundamental physical and functional unit of heredity

Gene expression - this is a process by which the information stored in a gene is used to make a functional gene product

iii. A polypeptide synthesis is happening in two steps. Name those two steps.

1. Transcription - Copying a sequence of DNA into mRNA
2. Translation - Converting the information in mRNA to a sequence of amino acids

iv. Write two defects caused due to the changes in chromosomes.

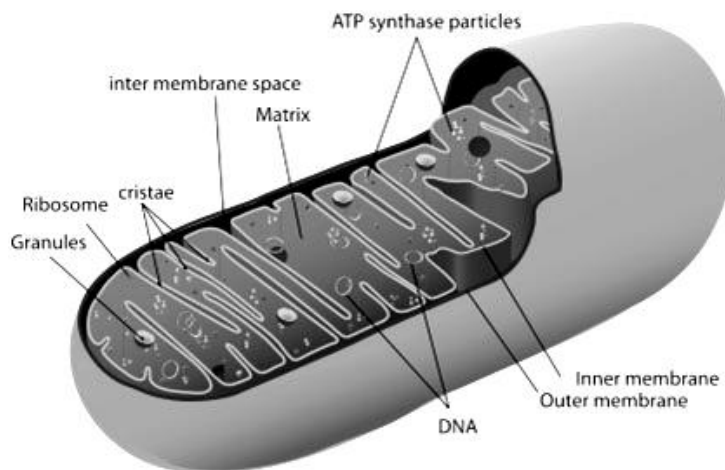
Down syndrome
Turner syndrome
Klinefelter syndrome

40x2.5 = 100

ESSAY- Answer sheet

05.

I. Explain the fine structure of mitochondria.



Fully labeled diagram- 10

Partially 05

None labeled 00

1. It is one of the most common organelles in eukaryotic cells.
2. It is an elongated
3. organelle with two enclosing membranes.
4. Outer membrane is smooth
5. but the inner membrane is convoluted to
6. form cristae.
7. Cristae increase the surface area
8. they contain stalk particles.
9. The gap/space in between inner and outer membranes of the mitochondrion is called intermembrane space.
10. The inner most part of the organelle is known as mitochondrial matrix,
11. which consists of 70 s ribosomes,
12. circular DNA molecule (mitochondrial DNA),
13. phosphate granules and
14. enzymes.
15. The matrix carries enzymes for the reactions in Krebs cycle (in cellular respiration).
16. Further, cristae composed of proteins and enzymes essential for electron transport chain and oxidative phosphorylation.

II. Explain the process that happen through the mitochondrial inner membrane during cellular respiration.

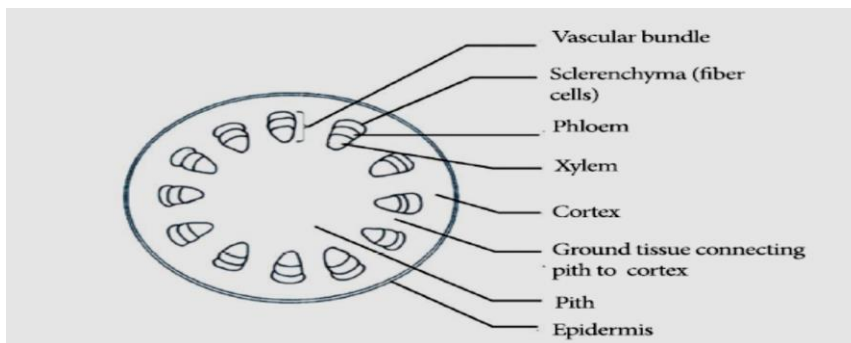
17. This step is taken place across the inner membrane (cristae) of mitochondria.
18. The folding of cristae increases surface area for oxidative phosphorylation.
19. NADH and FADH₂ products in the early stages of aerobic respiration are oxidized by transferring electrons, through the electron transport chain and
20. finally to molecular oxygen (O₂)
21. Therefore, the Molecular oxygen(O₂)is the final electron acceptor in aerobic respiration.
22. The electron transport chain is located in the inner membrane of mitochondrion and
23. composed of series of protein and non-protein molecules
24. involving in the movement of electrons and protons across cristae.
25. In the electron transport chain, ATP is synthesized by oxidative phosphorylation.
26. In this electron transport chain, energy is released progressively from NADH and
27. FADH₂ and
28. that energy is used to synthesize ATP.
29. one molecule of NADH is oxidized in the electron transport chain, 2.5 molecules of ATP in average are generated and
30. one molecule of FADH₂ is oxidized 1.5 molecules of ATP in average are produced
31. during oxidative phosphorylation molecules produced from one molecule of glucose,
32. 10 NADH
33. 2 FADH₂

34. Total number of ATP that is produced in this step is 28.
35. This is true in the active cells such as liver cells and
36. cardiac muscle cells
37. but not in other cells

$$\begin{array}{r}
 35 \times 4 = 140 \\
 + 10 \\
 \hline
 150
 \end{array}$$

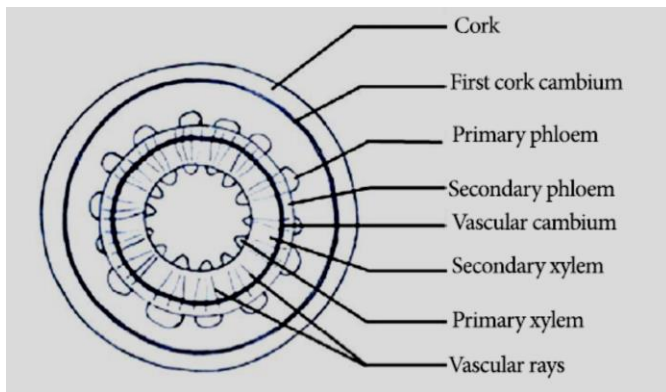
06.

- I. Describe the Primary structure of transverse section of dicotyledonous plant stem.
 1. The outermost epidermal cell layer protects inner parts from desiccation and infections.
 2. The epidermis is interrupted by pores called stomata.
 3. Interior to epidermis is cortex
 4. mostly containing parenchyma cells.
 5. Collenchyma cells may also be present just beneath the epidermis
 6. Sclerenchyma such as fibers are also present in the cortex
 7. Vascular bundles arranged as a ring.
 8. Vascular bundle contains primary phloem towards cortex
 9. primary xylem towards pith and
 10. in-between a cambium tissue.
 11. Outside vascular bundle, there is a cluster of sclerenchyma cell
 12. Inner to vascular bundles large pith
 13. which is also made up of parenchyma cells can be found.



- II. Describe the secondary growth of dicotyledonous plant stem.
 14. Lateral meristems, namely vascular cambium and cork cambium produce cells and tissues in the secondary growth.
 15. Secondary vascular tissue is produced by the action of vascular cambium.
 16. the vascular cambium consists of a continuous cylinder of undifferentiated cells of often only a single cell layer in thickness
 17. As these meristematic cells divide they increase circumference of the vascular
 18. cambium and
 19. also add secondary xylem to the inside of the cambium and

20. secondary phloem to the outside.
21. Viewed in a cross section, the vascular cambium appears as a ring of initials.
22. Some initials are elongated and are oriented with their long axis parallel to the axis of stem or root.
23. The other initials are shorter and oriented perpendicular to the axis of the stem or root.
24. They produce vascular rays-mostly
25. As the secondary growth continues over many years, layers of secondary xylem (wood) accumulate.
26. The walls of the secondary xylem cells are heavily lignified and account for the hardness and strength of wood
27. During early stages of secondary growth, the epidermis pushed outwards, causing it to split, dry and falls off the stem or root.
28. It is replaced by two tissues produced by cork cambium
29. Cork cambium produces cork cells to exterior.
30. Cork cambium and tissues it produces are collectively called periderm
31. As the cork cells mature, they deposit a waxy, hydrophobic material called suberin in their walls and they become dead cells.
32. For gaseous exchange small pores are present in the periderm known as lenticels which are formed by loosely arranged cork cells. They appear as horizontal slits.
33. Further growth of stem or root breaks the layer of cork cambium and it lacks its meristematic activity and its cells become cork cells
34. A new cork cambium is initiated inside which with produce a new layer of periderm.
35. Due to the tissue layers produced by vascular cambium and cork cambium, girth of the stem or root increases in secondary growth.

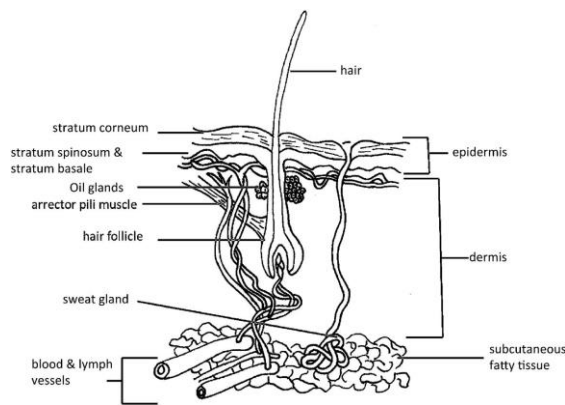


$$\begin{array}{r}
 34 \times 4 = 136 \\
 \text{Diagrams} = +6 \\
 = +8 \\
 \hline
 \end{array}$$

150

07.

- I. Describe the structure of human skin.



1. It consists of two main layers
2. which are the epidermis and
3. the dermis.
4. The layer underneath the skin is called subcutaneous layer
5. which is composed of adipose tissue and areolar tissue.
6. Epidermis is the outermost layer of the skin
7. which consists of stratified keratinized squamous epithelium.
8. Epidermis is not supplied with blood vessels
9. There are several layers of cells in the epidermis.
10. The deepest layer is the germinative layer from which epidermal cells are originated constantly.
11. The cells on the surface are flat, thin, non-nucleated and dead
12. Melanocytes in the deep germinative layer
13. Which secretes a dark pigment called melanin contribute to the skin colour
14. Dermis is composed of areolar connective tissue.
15. The structures present in dermis are blood and
16. lymph vessels
17. sensory nerve endings
18. sweat glands
19. sebaceous glands
20. hair,
21. arrectorpili muscles
22. sensory receptors (Meissner's corpuscle, Pacinian corpuscle, free nerve endings, bulb of Krause, organ of Ruffini, Merkle discs)

II. Explain the role of skin to regulate temperature.

23. The skin contributes to regulation body temperature as it provides passage through which heat can be lost or gained depending on the body requirements.
24. When body temperature is increased above the normal range
25. sweat glands secrete sweats onto the skin surface.
26. Evaporation of sweat cools the body surface.
27. When heat stressed, heat loss can be promoted by increasing the blood flow
28. through the skin capillaries
29. by dilating arterioles.
30. When the body temperature falls beyond the normal range heat

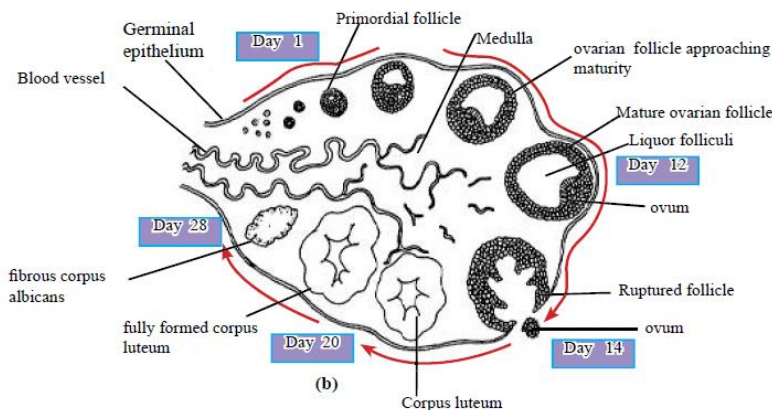
31. loss through the skin capillaries can be minimized
32. by constricting arterioles in the dermis.
33. When cold stressed, contraction of erector pili muscles attached to the hair
34. can generate body heat and
35. contribute to the heat production.

$$\begin{array}{r}
 34 \times 4 = 136 \\
 \text{Diagrams} \quad = 10 \\
 \hline
 150
 \end{array}$$

08.

I. Describe the structure of human ovary.

1. The female gonads are the two ovaries
2. They are found on either side of the uterus and
3. They are held in place in the abdominal cavity by ligaments.
4. In the ovary, female gametes are stored and developed prior to ovulation.
5. The ovaries have two tissue layers:
6. outer the cortex and
7. inner the medulla.
8. The outer layer of each ovary consists of connective tissues
9. covered by germinal epithelium.
10. The outer layer contains ovarian follicles in various stages of maturity.
11. Each follicle consists of an oocyte,
12. which is a partially developed egg surrounded by support cells.
13. Support cells protect and nourish the oocyte during its development.
14. outer cortex consist with,
15. Primordial follicle
16. ovarian follicle approaching maturity
17. Mature ovarian follicle
18. Ruptured follicle
19. It turn into Corpus luteum
20. corpus albicans it composed with fibrous tissue.



II. Explain the process of parturition and the hormone regulation.

21. The labor is a series of strong, rhythmic uterine contractions
22. push the fetus and placenta out of the body.
23. When labor begins, local regulators and
24. (prostaglandins)
25. hormones induce
26. (mainly estradiol and oxytocin) and
27. regulate further contractions of the uterus.
28. This is a positive feedback mechanism
29. uterine contractions stimulate secretion of oxytocin and it stimulates further contractions of the uterus.
30. The labor can be divided into three stages.
31. The first stage is the thinning and opening up (dilation) of the cervix.
32. The second stage is the delivery of the baby.
33. strong contractions continuous.
34. In this stage, continuous and strong contractions force the fetus out of the uterus and expel through the vagina.
35. Delivery of the placenta is the final stage of labor.

$$\begin{array}{r}
 35 \times 4 = 140 \\
 \text{Diagrams} \quad = 10 \\
 \hline
 150
 \end{array}$$

09. Illustrate the non Mendelian inheritance by using appropriate examples.

Examples for non-mendelian patterns

1. when alleles are not completely dominant or recessive (incomplete dominance and codominance),
2. when a particular gene has more than two alleles (polyallelism)
3. when a single gene produces multiple phenotypes (pleiotropy)
4. (epistasis
5. and polygenic inheritance)
6. gene linkage
7. genes which are located in sex chromosomes exhibit a different pattern of inheritance in
8. males and females due to the unequal distribution of genes in their sex chromosomes.

Incomplete dominance

9. at the heterozygous state, the phenomenon of expressing blend phenotypes from both alleles is called **incomplete dominance**.
10. Degree of expression of each allele in the blend phenotypes may vary based on the nature of the alleles.
11. This phenotypic ratio is 1:2:1(Diagram if necessary)
12. Eg; In *Mirabilis jalapa* (Four o'clock plant), there are several types of flowercolours.

Codominance

13. In certain traits, at heterozygote state, expression of both alleles contributes equally to the phenotype. Such phenomenon is called **co-dominance**.
14. the F₂ phenotype ratios in both incomplete dominance and co-dominance are 1:2:1.
15. For example, a person with AB blood group

Polyallelism (Multiple alleles)

16. Polyallelism refers to the presence of multiple alleles for a single genetic locus, a phenomenon where certain traits are determined by the combination of more than two types of alleles.
17. at different combinations determine ABO blood groups in humans.
18. E.g. there are three alleles called **IA**, **IB**, and **i** for a single genetic locus
19. the alleles **IA** and **IB** are in a co-dominant relationship.
20. However, the allele '**i**' results in lack of these carbohydrates on the red cell surface and it is recessive to both **IA**
21. and **IB** alleles.
22. The **ii** genotype will result in the recessive trait of not having either of the carbohydrates.

Epistasis

23. Epistasis is the phenomenon resulting from interactions between genes of different loci.
24. The alteration in the phenotypic expression of a gene at one locus is due to the interference of another gene at a different locus
25. Dominant epistasis
26. a dominant allele at a specific locus alters the expression of a separate gene at a different locus,
27. F₂ generation produced from a cross between these F₁ individuals consists of white and coloured fowls in the ratio of 13:3.
28. E.g. The colour of house fowl varieties
29. Recessive epistasis
30. When a homozygous recessive genotype of a particular chromosomal locus alters/ masks the expression of a separate gene at a different locus, it is referred to as **recessive epistasis**
31. Inter breeding of F₁ plants produced F₂ generation with purple and white flower plants in a ratio of 9: 7.
32. an example of recessive epistasis - flower colour of sweet pea plants

Polygenic inheritance

33. Inheritance of a phenotype such as quantitative characters; height, skin colour, intelligence quotient etc.
34. which results from a cumulative expression of two or more genes is called polygenic inheritance.
35. Skin colour in humans is determined by many genes
36. Data for a polygenic character representing a population may result in a normal distribution curve.

Genetic linkage

37. Some genes coding for particular characters are located on the same chromosome and also at a closer distance.
 38. Thus, they escape from crossing over and independent assortments occur during the meiotic cell division at gametogenesis and inherit together.
 39. This results in deviation from Mendel's law of independent assortment.
 40. In *Drosophila*, wild-type flies are found to have gray bodies and normal-sized wings. Both characters are determined by genes of autosomal chromosomes.
- Human sex linked characteristics

41. Certain characters of humans are carried on the genes located on the sex chromosomes. Those genes located on the sex chromosomes are called sex linked genes and the characters expressed by them are called sex linked characters.
 42. Characters expressed by or carried on the X chromosome are called X- linked characters and the genes expressing or carrying those characters are called X- linked genes.
 43. Characters which are expressed by or carried on the Y chromosome are called Y linked genes and the genes expressing or carrying those characters are called Y linked genes.
 44. Y chromosome carry only few genes other than those related to the sex.
 45. Some disorders carried on the Y-linked genes are transferred and expressed only through male progeny.
 46. In addition to sex related characters, X chromosomes carry many other characters which are not relevant to individual sex.
 47. E.g Red green colour blindness/ Haemophilia
- Pleiotropy**
48. having a recessive X-linked allele with disorder is sufficient for expression
 49. Cystic fibrosis is a disease condition causing thicker and stickier mucus than its normal nature and
 50. Sickle cell disease is caused by an alteration in the haemoglobin protein of red blood cells

$$50 \times 3 = 150$$

10. Write short notes.

I. Silicosis

1. This may be caused by long-term exposure to dust containing silica compounds.
2. High risk industries are,Quarrying granite, slate, sandstone, Mining hard coal, gold, tin, copper, Stone masonry and sand blasting, Glass and pottery work.
3. When silica particles are inhaled they accumulate in the alveoli.
4. These particles are ingested by macrophages,
5. some of which remain in the alveoli and
6. come out in to the connective tissue around bronchioles and blood vessels close to the pleura.
7. Progressive fibrosis is stimulated which eventually obliterates
8. the blood vessels and respiratory bronchioles.
9. Gradual destruction of lung tissue eventually leads to pulmonary hypertension
10. and heart failure.

II. Genetically modified organisms (GMO)

1. The term **transgenic** or **genetically modified organism (GMO)** is used to describe organisms that have been engineered to express a gene from another species.
The steps in the process making a genetically modified plant or an animal are as follows.
2. Identification of a suitable gene
3. Isolation and purification of the gene
4. Amplification of the gene by cloning

5. In vitro modifications of the gene of interest
6. Amplification of modified gene by cloning
7. Transformation of the recipient cells (microbial cells, cells or protoplasts of plants or fertilized eggs of animals)
8. Screening for expression of the inserted gene
9. Monitoring for stable integration of the modified gene
10. Backcrossing to introduce the new trait to other varieties of crops and breeds of animals
11. Some related terms are Genetically Engineered Microorganisms (GEMs), transgenic organisms and living modified organisms (LMOs).
12. GMOs in today's context are essentially the organisms derived as a result of rDNA technology.
13. The applications of gene technology can be found in many fields, including agriculture, medicine and industry.

III. Biomes

1. A biome is a large geographical area
2. which is classified based on the predominant vegetation adapted to that
3. particular environment.
4. The climate
5. and geography of a region determines what type of biome can exist in that region
6. Each biome consists of many ecosystems
7. whose communities have adapted to the small differences in climate, topography and soil conditions within the biome.

Major terrestrial biomes include

8. tropical forest,
9. savanna,
10. desert,
11. chaparral,
12. temperate grassland,
13. temperate broad leaf forest,
14. northern coniferous forest and
15. tundra.



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