



# ST. LAWRENCE HIGH SCHOOL



A JESUIT CHRISTIAN MINORITY INSTITUTION  
**SELECTION EXAMINATION-2018**

**Sub: LIFE SCIENCE**

**Class: X**

**F.M: 90**

**Duration: 3 hours 15 Minutes**

**Date: 12.11.2018**

(ANSWER KEY)

## Group-A

(Answers to all questions is compulsory)

Write the answers in complete sentences by choosing the correct answer for each question with respective serial number: 1x15=15

- i) Oestrogen is secreted from  
(1) Testis                      **(2)Ovary**                      (3)Pancreas                      (4)Hypothalamus
- ii) Which is an in-correct pair?  
(1) **Planaria- Multiple fission**    (2)Rhizopus- spores    (3)Spirogyra- fragmentation  
(4)Amoeba - binary fission
- iii) In the F<sub>2</sub> generation of a dihybrid cross , the following is the ratio  
(1) **9:3:3:1**                      (2)9:3:1:3                      (3)9:3:2:1                      (4)9:8:3:1
- iv) How many chromosomes are present in the cells of the ovary in normal human being?  
(1) **46**                      (2)47                      (3)23                      (4)24
- v) DNA synthesis takes place in  
(1) G<sub>1</sub> phase                      (2)**S phase**                      (3)G<sub>2</sub> phase                      (4)G<sub>0</sub> phase
- vi) Coacervate theory was proposed by  
(1) Fox                      (2)Haldane                      **(3)Oparin**                      (4)Miller
- vii) The stimulus for geotropic movement is  
(1) **Gravity**                      (2)Light                      (3)Heat                      (4)Touch
- viii) The scientific name of modern horse is  
(1) **Equus**                      (2)Mesohippus                      (3)Eohippus                      (4)Merychippus
- ix) The number of gametes from AaBb is  
(1) 2                      (2)3                      **(3)4**                      (4)8
- x) Which gas was not present in the earth initially?  
(1) **Free Oxygen**                      (2)Nitrogen                      (3)Carbon dioxide                      (4)Sulphur Dioxide
- xi) The part of the brain that maintains balance of the body is  
(1) Cerebrum                      **(2)Cerebellum**                      (3)Medulla                      (4)Pons
- xii) The nature of lens in human beings is  
(1) Plano-concave                      (2)Plano-convex                      (3)Biconcave                      **(4)Biconvex**

xiii) The ratio of the products in the Urey- Miller 's experiments of Methane:Hydrogen:Ammonia is

- (1) 2:2:1                      (2)1:2:2                      (3)2:1:2                      (4)1:1:2

xiv) Which of the following absorbs the gas of swim bladder in bony fishes?

- (1) Red gland                      (2) Anterior chamber                      (3) Gastric gland                      (4) Retia mirabilia

xv) Algal bloom is called

- (1) Global warming                      (2) Biodiversity                      (3) Eutrophication                      (4) Acid rain

### Group-B

2.1 Fill in the blanks with proper words in the following sentences (any five):- 1x4=4

- i) Alternative forms of a gene are called **alleles**.
- ii) Evolution occurs only when **mutations** are present in a population.
- iii) Asthma is common chronic **respiratory/lung** disease.
- iv) The example of a purine nitrogenous base is **adenine/guanine**.
- v) There are **31** pairs of spinal nerves in the human body
- vi) The wings of bats and forelimbs of cheetah are **homologous** organs.

2.2 State whether the following statements are True or False (any five) : 1x5=5

- i) PBR is a documented register. **TRUE**
- ii) There are thirty seven biodiversity hotspots in the world. **FALSE**
- iii) Tendril is an adaptive feature in *Opuntia*. **FALSE**
- iv) Myopia is corrected using concave lens. **TRUE**
- v) Insulin enhances the blood glucose level. **FALSE**
- vi) Offset is a stem modification. **TRUE**

2.3 Match the words in column A with those which are most appropriate in Column B and re-write the correct pair mentioning the serial numbers of both the columns (any five): 1x5=5

#### Column A

- i) Petals-
- ii) Cancer
- iii) Greenhouse gas
- iv) Survival of the fittest
- v) Cryopreservation
- vi) Genome

#### Column B

- g)individual members of corolla
- d)Uncontrolled cell division
- e)Carbon Dioxide
- b)Darwin
- c)-196<sup>o</sup>C
- f) Haploid set of gene in gamete

2.4 Answer in a single word or in a single sentence (all six): 1x6=6

- i) Name a mixed nerve.- **VAGUS NERVE**
- ii) Which layer of eye contains melanin. **IRIS**
- iii) Name a water pollinated flower **HYDRILLA**
- iv) Why males are called heterogametic? **Due to the presence of X and Y chromosomes**
- v) Write the functions of air sacs in pigeon. **Stores warm air which makes the body light in weight that helps to increase buoyancy for flight**
- vi) What is the chemical component in auxin called? **Indole group /(C,H,O)**

### Group- C

3. Answer any 12 questions in 2-3 sentences out of the 17 questions given below: 2x12=24

3.1 Define biodiversity hotspot. Give example of any one biodiversity hotspot in India.

*The geographic areas that contain high level of species diversity but are endangered to extinction are known as biodiversity hotspots.*

*One biodiversity hotspot in India is- The Eastern Himalayas/ Indo-Burma/The western ghat/Sundaland.*

3.2 Mention two significance of fossils in evolutionary studies.

*Fossils are significant in evolutionary studies-(Any two)*

- 1) *Identifying rock's strata*
- 2) *Gives us evidence of steps of evolution*
- 3) *Age of fossils reflects the age of evolution*
- 4) *Reflects the idea and structure of pre-historic organisms*
- 5) *Provides idea about the possible causes of extinction of prehistoric organisms.*

3.3 Write the scientific names of Crocodile and Indian Lion.

*The scientific name of Crocodile is **Crocodylus porosus**.*

*The scientific name of Indian Lion is **Panthera leo persica**.*

3.4 What is the importance of genetic counselling?

*Importance of genetic counselling is that it helps in premarital precaution and prevention of major genetic diseases (like thalassemia) to get transmitted to the next generation.*

3.5 What is waggle dance?

*For a food source found at a greater distance from the hive, the worker bee performs the waggle dance in a figure-eight (8) pattern. It involves a shivering side-to-side motion of the abdomen.*

3.6 What is denitrification? Write any one significance of nitrogen cycle.



The process involves reduction of soil nitrate to nitrogen gas by bacteria like *Pseudomonas*, *Thiobacillus*, etc.

One significance of Nitrogen cycle is

- 1) To maintain Nitrogen balance in nature.
- 2) Nitrogen is an essential component of all protein. The cell which is the unit of living organism is made up of protein. Hence life cannot exist without nitrogen.

3.7 Write any two functions of adrenaline.

Two functions of adrenaline are:

- 1) constriction of blood vessels
- 2) Contraction and relaxation of heart, cardiac output is increased.
- 3) Increase in heart beat
- 4) Increase in blood pressure
- 5) Dilation of bronchioles
- 6) Increase in the rate of respiration
- 7) Increases excitability and contractility and tone of the skeletal muscle.
- 8) Increases renal circulation

3.8 Write two differences between karyokinesis and cytokinesis.

KARYOKINESIS	CYTOKINESIS
1. Process of division of nucleus	1. Process of division of cytoplasm
2. It occurs before cytokinesis	2. It occurs after karyokinesis.
3. It does not increase the cell number.	3. It increases the cell number
4. Two daughter nuclei are formed through this complex process.	4. Cytoplasm is divided into two parts by this simple process.

3.9 Why are the X-linked diseases expressed in human males?

**Human males have only one X-chromosome. If the disease is present on that X-chromosome, the disease gets infested.**

3.10 Write the origin and one function of Gibberellins.

**Origin of Gibberellin-Gibberella fujikuroi (fungus)**

**Functions are –**

- 1) Breaks bud and seed dormancy
- 2) Promotes intermodal elongation
- 3) Promotes leaves, flowers and fruits to increase in size.

3.11 Write any two environmental problems of sunderbans.

**Two environmental problems of sunderbans are-**

- 1) Destruction of mangroves
- 2) Fresh water crisis
- 3) Destruction of habitat
- 4) Pollution
- 5) Submergence of islands due to rising sea level
- 6) Misbalance in prey predator number.

3.12 round seeds in Mendel's Dihybrid cross?

*The genotypes are – RRYy, RrYy, RRYy, RrYY*

3.13 What is biomagnification?

***Biomagnification-The process by which highly stable (persistent) toxic substance (like DDT) enters the food chain and its concentration gradually increases through successive higher trophic level.***

3.14 What is the role of centrosomes in cell division?

- 1) ***Contains two centrioles oriented at right angles to each other.***
- 2) ***Microtubules grow out from each centrosomewith their ends growing towards the metaphase plate. The microtubule spokes radiate from a central site occupied by the centrosome, which is the primary microtubule organizing centre.(MTOC)***
- 3) ***Help in the movement of chromosomes in the anaphase.***

3.15 What is the main aim of JFM?

***The main aim of JFM is participation of common people in the protection and management of forests.***

3.16 Differentiate between in-situ and ex-situ conservation techniques. Give one example of each.

3.17

<b><i>IN-SITU CONSERVATION</i></b>	<b><i>EX-SITU CONSERVATION</i></b>
<b><i>The method of conservation in their natural habitat of the organism. Example- reserve forests</i></b>	<b><i>The method of conservation outside their natural habitat. Example-Zoological garden</i></b>

3.18 How are the sundari plants adapted to the sunderbans?

***Sundari plants are adapted to the sunderbans due to***

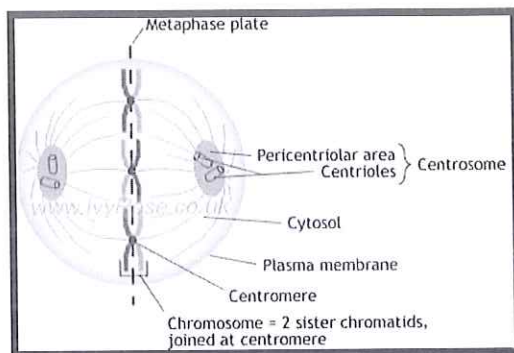
- 1) ***Salt exclusion***
- 2) ***Salt storage***
- 3) ***Salt secretion***
- 4) ***water conservation***

**Group- D**

(Long answer type question)

4. Write the 6 questions or their alternatives given below. The mark allotted for each question is 5 (the division of marks is either 3+2, 2+3 or 5):

4.1 Draw a neat diagram of the metaphase of mitosis. Write any two important features of this phase



**Features of the mitotic metaphase: -**

- *The chromosomes migrate towards the equator of the spindle.*
- *Each chromosome becomes more compact and short and its two chromatids separate except at the centromere which has not divided so far.*
- *Kinetochores microtubules align the chromosomes in one plane to form the metaphase plate.*
- *Centromeres lie on the equatorial plane while the chromosome arms are directed away from the equator called auto-orientation.*

Or

What are the functions of choroid and vitreous humor? Draw the vertical section of the eyeball of the human eye and label these parts.

2+3=5

**Functions of choroid are :**

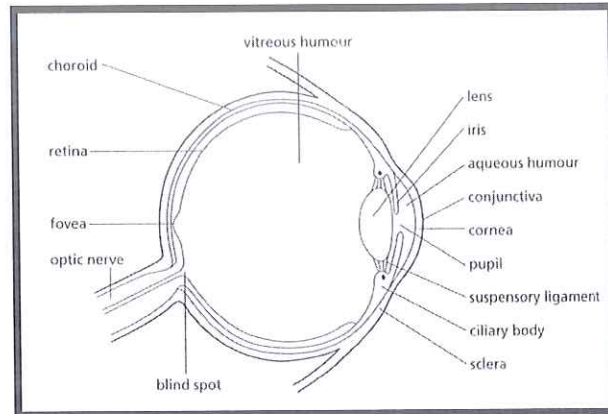
- 1) *The blood vessels supply nutrition to the eyeball*
- 2) *The melanin pigment prevents the reflection of extra light within the eye by absorbing it*

**Functions of vitreous humor are :**

- 1) *It acts as refractive medium for light rays*

**2)It maintains intraocular pressure of eyeball**

**3)It also gives proper shape of eyeball**



**4.2** Write any two significance of cell division. Describe the crossing over in meiosis.

**Two significance of cell division are-**

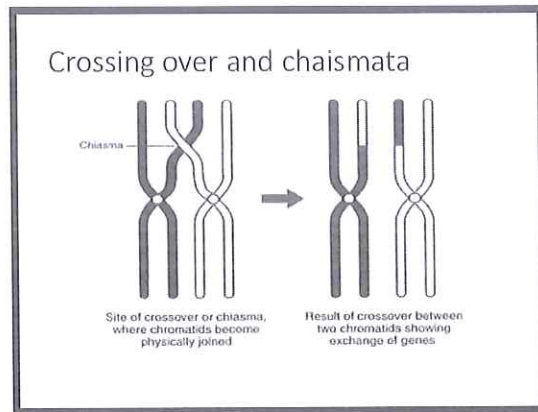
**1) Growth- the number of cells increases (hyperplasia) which results into overall growth and development of organs.**

**2) Reproduction- Unicellular organisms reproduce by this process.**

**3) Repair- by cell division, old decaying dead cells are replaced by new cells. At every moment, millions of cells are dying and millions of cells are forming by cell division to compensate the loss.**

**During prophase I of meiosis, non-sister chromatids of the homologous chromosomes may exchange their segments reciprocally known as crossing over. So there may be mixture of paternal and maternal genes that will result into a genotype, which is partly paternal and partly maternal. However crossing over is a matter of chance that may occur or may not. Crossing over of non-sister chromatids results into an X-shaped structure called chiasma. Hence crossing over is the cause and chiasma is the effect.**





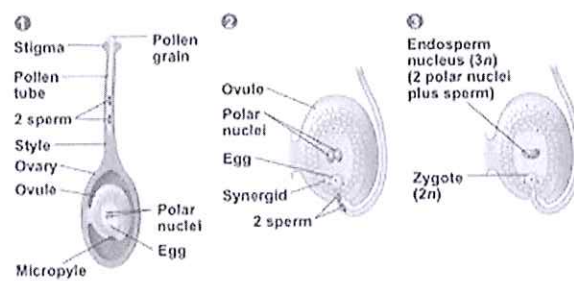
Or

What are the advantages of micropropagation. Describe the process of fertilization in angiosperms.

**The advantages of micropropagation are-**

- 1) the process ensures rapid production of desired varieties of plants.**
- 2) this method allows us to grow whole plant from cells or tissues collected from different parts of the plant body.**

*An ovary contains at least one ovule. Inside an ovule, cells divide to produce an egg and two other cells called polar nuclei. These three cells are haploid, which means they have one set of chromosomes, and is designated by n. Most cells in angiosperms are diploid, or have two sets of chromosomes. In diploid (2n) cells, one set of chromosomes comes from the male parent and the other set comes from the female parent. In addition to eggs and polar nuclei, sperm cells from a pollen grain are also haploid. Once the pollen tube reaches the micropyle, or the opening of an ovule, it releases two haploid sperm cells into the ovule. One sperm cell will fuse with the egg, resulting in a diploid zygote. The other sperm cell will fuse with the two polar nuclei, creating a triploid (3n) structure that will grow rapidly into the endosperm. After double fertilization, a seed and fruit develop.*



4.3 What are the causes and symptoms of thalassaemia?

2+3=5



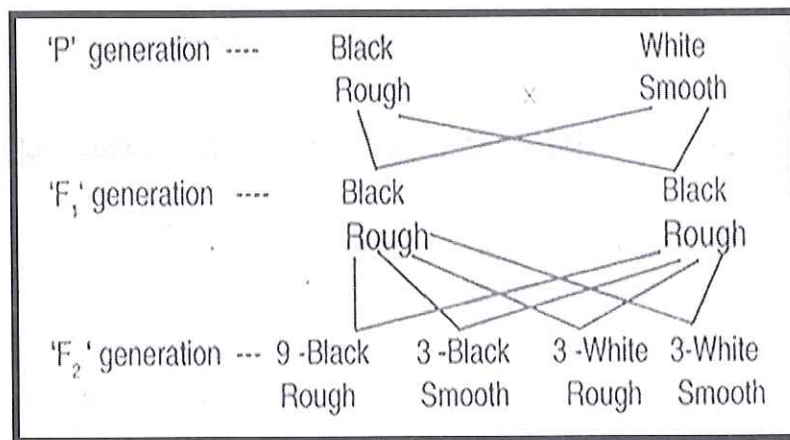
*Causes of thalassaemia-genetic disorder where haemoglobin is produced in decreased amount. The decreased amount of haemoglobin in the blood causes anaemia, which reduces oxygen carrying capacity of blood . RBC becomes fragile and breaks down easily.*

*Symptoms of thalassaemia-*

- *Slow growth in children*
- *Wide or brittle bones*
- *Enlarged spleen (an organ in your abdomen that filters blood and fights disease)*
- *Fatigue*
- *Weakness*
- *Pale or yellow skin*
- *Dark urine*
- *Poor appetite*

Or

If black is dominant over white and rough is dominant over smooth, then what will be the results of F<sub>1</sub> and F<sub>2</sub> generations when a black and rough pig is crossed with a white and a smooth one ? (Explain with checkerboard)



4.4 Write the evolutionary significance of vestigial organs with example. Explain 'ontogeny recapitulates phylogeny'.

**Nictitating membrane** – It is the rudimentary structure present in the inner corner of the eye. It is another example of a vestigial structure in man. This is the remnant of the fully functional nictitating membrane of other vertebrates. These structures however have no function in man.

**Other examples-** Vermiform appendix, vestigial tail, coccyx, etc.

*'Ontogeny recapitulates phylogeny'*

*Ontogeny signifies embryological history of an organism, whereas phylogeny signifies ' evolutionary history of an organism'. The theory proposed that different stages of the embryological development of an organism actually reflect various evolutionary steps. It seems as if zygote in ontogeny parallels to porifera in phylogeny and so on. Thus close parallelism exists between stages of ontogeny with stages of phylogeny of animals and plants.so an organism repeats its ancestral history during its development.*

Or

How does the comparative study of the structure of heart, trace an evolutionary relationship?

*Heart shows interesting homologies.*

*i) In fish – Two chambered heart of fish consists of one auricle and one ventricle. It is transformed into four –chambered heart in birds and mammals through intermediate forms like amphibians and reptiles. The two-chambered heart of fishes is not only simple but also adapted to the aquatic environment.*

*ii) In amphibian- with the change of habitat, the amphibian heart became three chambered to prevent the mixing of the oxygenated and deoxygenated blood.*

*iii) In reptiles – the heart of reptiles is basically three chambered, but the single ventricle is partially partitioned by a vertical septum.*

*iv) In birds and mammals- the ventricular septum is complete, thus the heart is completely four chambered. Due to the arrangement, the heart is completely four chambered. Due to this the arterial and venous blood fully remain separated..*

*In birds and mammals, have greater advantage due to the separation of oxygenated and deoxygenated blood and they become warm blooded or homoeothermic.*

4.5 How is bronchitis caused? What are the aims of the Red Panda Project?

*Bronchitis is a respiratory disease in which the mucus membrane in the lungs' bronchial passage gets inflamed. As the irritated membrane swells and grows thicker, it narrows or shuts off the tiny airways in the lungs, resulting in coughing spells that may be accompanied by accompanied by phlegm and breathlessness.*

*It is caused due to –*

*1) Smoking cigarettes or other forms of tobacco*

*2) Chronic inhalation of air pollutants or fumes or dusts (from occupational hazards) such as coal mining, grain handling, textile industry, farming of livestock, metal moulding, etc*

Or

Write any five causes of biodiversity loss?

*The causes of biodiversity loss are (any five)–*

- 1) Destruction of habitat due to change in land use pattern.*
- 2) Hunting and poaching*
- 3) Global warming and climate change*
- 4) Pollution*
- 5) Overexploitation*
- 6) natural calamities*
- 7) Introduction to exotic species.*

5

4.6 What are SPM<sub>10</sub> and SPM<sub>2.5</sub>? What are their effects?

*SPM<sub>10</sub> and SPM<sub>2.5</sub> means Suspended Particulate Matter of diameter 10 micron and 2.5 micron respectively liberated from automobiles, building exhaust, etc.*

*The effects of SPM<sub>10</sub> and SPM<sub>2.5</sub> are:*

- 1) Reduce visibility*
- 2) Prevents sunrays from entering the atmosphere reducing photosynthetic productivity.*
- 3) Cause chronic lung diseases like chronic obstructive pulmonary diseases and other respiratory distresses like apnoea, dyspnea or difficulty in breathing*
- 4) Damage the surfactant in the inner lining of the alveoli and induces respiratory distress syndrome.*

Or

Name any one crocodile conservation Programme and what were the aims of the project?

What was their greatest achievement?

*The UNDP/FAO Crocodile Breeding and Management Project is a crocodile conservation programme .*

*The aims of this project were:*

- 1) To boost reproductive output by collection of wild-laid eggs with subsequent incubation and rearing of young until of a size (less vulnerable to predation) suitable for release in the wild.*
- 2) To locate, establish and manage a series of crocodile rehabilitation centres and sanctuaries in suitable habitats.*

*Their greatest achievement was the re-establishment of viable gharial breeding populations in Chambal and Satkosha sanctuaries.*

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