WEST BENGAL - 2016 BIOLOGICAL SCIENCE

Time: 3 hours and 15 minutes

Total Marks = 70

Part A

Q1. Answer the following questions: $(2 \times 5 = 1)$	< 5 = 10)
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a. What is polyembryony? Give an example. (1+1)

Ans. When two or more embryos develop from single egg that is fertilized.

E.g. – Brassica.

OR

What is fallopian tube? Write its function.

Ans. The fallopian tube is carrying the eggs to the uterus. It is also known as the oviduct or uterine tube.

Function – Fimbriae is the finger like branches on the fallopian tube, which stick out into pelvic cavity and receive the released egg.

b. What is incomplete dominance? Give an example. (1+1)

Ans. It is a process in which one allele for a specific character or trait is not completely expressed over its paired allele, an intermediate is formed. E.g. – Roses.

c. What do you mean by cloning vector? (2)

Ans. It is a small piece of DNA into which a foreign DNA fragment can be inserted for cloning purposes.

d. What do you mean by ringworm disease? (2)

Ans. It is a common infection which is generally occurs on the skin and nails, which is caused by fungus.

OR

Mention the causes of cancer.

Ans. Cancer is generally caused, when the mutations arises in the DNA within the cells. Misconception instruction can causes the cell to stop its normal function.

e. What is meant by silent valley movement? (2)

Ans. Silent valley movement is the people's movement that saved a forest. Just because of a silent valley movement peoples saved a pristine moist evergreen forest in kerala's Palakkad district from being destroyed by a hydroelectric project.

OR

Distinguish between birth rate and death rate.

Ans. Birth rate – Number of babies born in a particular area during a particular period of time.

Death rate – It is the number of deaths per one thousand people per year.

2. Answer the following questions: $(3 \times 9 = 27)$

a. Distinguish between allogamy and xenogamy. Give an example of artificial vegetative reproduction.

Ans. Allogamy – It is the resettlement of pollen grains from the anther of the one flower on the stigma of the another flower, either in the same plant or in a different plant of the same species.

Xenogamy- it is the process of shifting of pollen grains from the anther of one flower on the stigma of a hereditary different flower of the same species.

Example of artificial vegetative reproduction – Artificial insemination.

b. Mention any three properties of Genetic code.

Ans. Three properties of Genetic code are-

- 1. The code is a triplet.
- 2. The code is degenerate.
- 3. The code is universal.

OR

What do you mean by semi conservative replication? Mention the following in DNA replication:

a. RNA – primer b. SSB protein

Ans. In Semi conservative replication, at the time DNA replication, the two DNA strands separate and each act as a template for DNA polymerase, which are used to make the second strand of DNA. Each new DNA molecule has one original DNA strand and one newly synthesised strand.

a. RNA- primer – Primase is the enzyme which is synthesis in the RNA primer. This synthesis leads to the formation of okazaki fragments.

b. SSB protein it is synthesised by the DNA helicase. It helps in the binding of DNA strands. It serves as a template for new DNA synthesis.

c. What do you mean by mutation, natural selection and reproductive isolation?

Ans. Mutation – The changing or damaging of gene structure in such a way which altered the genetic message carried by that gene.

Natural selection – Natural selection is the process that results in the evolution of organisms. It is the process by which genetically traits increases chances of survival and reproduction in an organisms.

Reproductive isolation – Reproductive isolation refers to the situation where different species may live in the same area, but the properties of individual prevent them from interbreeding.

OR

Describe the double helical structure of DNA.

Ans. The double helical structure of DNA consists of two linear strands that are anti-parallel to each other. Each strand have backbone which is made up of sugar and phosphate. Each DNA strand within the double helix is a long, linear molecule made of smaller units called nucleotides that form a chain.

d. What are the components of honey? Name any one diseases of honey-bee and mention its cause.

Ans. Honey is consisting of sugar (nearly 76%), water (nearly 18%) and other ingredients that make up nearly 6 %. Sugar gives the main characteristics to honey.

Diseases- Nosema disease. Nosema apis is a microsporidian that invades the intestinal tracts of adult bees and causes nosema disease, also known as nosemosis.

OR

What are objectives of animal breeding? What do you mean by artificial insemination?

Ans. Objectives of animal breeding are:

- 1. The growth rate is increased by animal breeding.
- 2. Higher the Production of milk, meat, egg, wool etc.
- 3. The quality should be better
- 4. The animals should have longer productive life.
- 5. Rate of reproduction should be higher or optimum.

Artificial insemination – The process of transfer the male sperm inside the women and female animal, so they are get

pregnant and reproduce the babies and young ones without sexual activity.

e. Mention any three importance of tissue culture.

Ans. Importance of tissue culture:

- 1. It is a very fast technique. Thousands of plants can be produced in a few time from a small amount of plant tissue.
- 2. Disease free plants are produced by this technique.
- 3. By the technique of tissue culture very little space is needed for developing new plants.

f. What do you mean by Single cell protein? Give example. What is Bio – fortification?

Ans. Single – cell protein is describe as the edible proteins which are extracted from the pure microbial cultures, dried cell biomass. Single-cell proteins is also cure the problem of proteins deficiency. That's why it is used as the protein supplement for animals as well as for humans.

E.g – Cellulomonas, 'Alcaligenes etc.,

Bio-fortification – The process which is performed to increase the nutritional value of land. It helps us in the getting a good value of crop. This process is either done by selective breeding or genetic engineering.

g. Describe in brief how human insulin is produced by genetic engineering.

Ans. A small piece of circular DNA which is extracted from the bacteria or yeast. This section of circular DNA is called plasmid. Then by the help of restriction enzymes a small portion is cut and then this gap is filled by the genes of genetically modified human insulin. Then the new genetically modified plasmid is introduced into the bacteria or yeast cell. Then the cell divides rapidly and start making insulin. The insulin is then purified and packaged into bottles and insulin pens for distribution to patients with diabetes.

h. What do you mean by bio- piracy? what is patent?

Ans. Bio-piracy is defined as the use of biological resources without proper authorisation and compensatory payments. This process is generally done by the multinational companies. Examples basmati rice, turmeric, neem etc.,

Patent – A patent is given to the inventors the rights to own their inventions. A patent is granted by the U.S. patent and trademark office or USPTO.

OR

What is c-DNA? Mention the significance of it in biotechnology.

Ans. By the help of enzyme reverse transcriptase, Single stranded RNA catalysed a reaction in which DNA is synthesized. This DNA is called the Complementary DNA (c-DNA). c-DNA is often used to clone eukaryotic genes in prokaryotes.

Significance of c-DNA in biotechnology are:

- 1. DNA sequences which code mRNA are isolated by the use of c- DNA in biotechnology.
- 2. Isolation of homologous genes is an advantage in c-DNA library.
- i. Write a short note on desert adaptations of animals.

Ans. The animals of desert adaptations have the ability to concentrate its urine to conserve water. These adaptations occur in desert animals to prevent the loss of water. Some desert animals hide themselves from the sun's heat by digging the burrows. Kangaroo rat found in the desert never drinks water in its life.

OR

Write a short note on adaptations of xerophytes.

Ans. Xerophytes are those organisms that can live without water for a long period of time.

These type of organisms are found in the dry places like deserts etc.

They usually have secondary development of spines on their body which fulfil their body requirements with a litter water for a long period of time.

Examples of such species are cactus etc.

3. Answer the following questions: $(5 \times 3 = 15)$

a. Describe in brief, with labelled diagram, the histological structure of human testis. What do you mean by spermatogenesis?

Ans. Spermatozoa is produced by the pairs of testis. Semen is consists of fluid which is produced by the accessory glands. The long ducts collect and store the sperm then carry the sperm to the penis. Seminiferous tubules of the testis produced the spermatozoa.

Connective tissue stroma have the lobule which consists of one to four seminiferous tubules. Generally seminiferous tubules are 30-70 cm long. Formation of sperm is done by sertoli cells and leydig cells.



Spermatogenesis- Haploid spermatozoa is develop from germ cells in the testis. This process is known as spermatogenesis.

OR

Describe, with labelled diagram, the development of male gametophyte of flowering plants. What is the significance of seed.

Ans.



Significance of cell- plants are developed from the seeds. Seeds perform the several functions. Functions include the nourishment of the embryo, dispersal to a new location, and dormancy during unfavourable condition.

b- With help of Griffith's experiment, explain that DNA is the genetic material. What is the significance of DNA fingerprinting?

Ans. Griffith experiment-

Significance of DNA fingerprinting-

- 1. DNA fingerprinting is used as the verifying test in crime detection in case of murder and rape.
- 2. This technique is also used in the identification of dead body that is too damaged.

c. What is ozone hole? What are the causes of formation of ozone hole? Distinguish autecology and synecology.

Ans. Ozone hole- The ozone hole is the region or an area in which ozone is reduced in stratosphere. It start to formed in

spring over Antarctica because of ozone-depleting substances produced from human activities.

Causes- Chlorofluorocarbons is main constituent which affect the ozone layer. CFCs, halons and freons are also caused the formation of ozone hole.

Autecology- The study of individual organism or individual species is known as autecology. It is also known as population ecology.

Synecology- It is also called as the community ecology. the study of group of organisms of different species which are associated together as a unit form of a community.

OR

Distinguish between genetic and species diversity. Describe the causes of loss of biodiversity.

Ans. Genetic diversity-

Genetic diversity refers to the variety of species which shows at the genetic level which are shown by each individual in a species. Individuals which are related to same species is not exactly similar. If we take the example of human being species it shows a lot of biodiversity in comparison to one another.

Species diversity-

Species diversity is basically noticed within the community. Number of species in different area is depending upon the different environmental condition. In general term we describe the species diversity as the number and distribution of species.

The causes of loss of biodiversity-

- 1. Habitat loss and fragmentation
- 2. Over exploitation for commercialization.
- 3. Invasive species.
- 4. Pollution.
- 5. Global climate change.
- 6. Population growth and over consumption.
- 7. Illegal wildlife trade.
- 8. Species extinction.

Part B (Marks :18)

1. Find out the correct answer out of the options given against each question: $(1 \times 14 = 14)$

i. According to Lindeman's law, the amount of transferred energy from one trophic level to the next is

- a. 10%
- b. 90%
- c. 80%
- d. 20%

Ans. 10%. The 10% energy is transferred from one trophic level to the next. Rest of energy is lost in the metabolic processes as a heat.

ii. Which of the following scientists proposed the concept of ecological food pyramid?

- a. Blackman
- b. Odum
- c. Elton
- d. Tansley

Ans. Elton. Basically, ecological food pyramid is a graphical representation which shows relationship between the organism at various level in a food chain.

iii. In the process of plant ecological succession, the final stage is

- a. Seral stage
- b. Ecesis
- c. Climax community
- d. Competition

Ans. Climax community. It is the process of biological community which develop gradually over the time. It is divided into three types, first one is primary then secondary and last one is climax community.

iv. Green biotechnology means application of biotechnology is

- a. Industry
- b. Medicine
- c. Agriculture
- d. None of these

Ans. Agriculture. It is referring to the use of genetically modified plants and animals to give rise to more environmentally- friendly farming.

v. In the naming of pBR-322, 'p' stands for

a. Plasmab. Proteinc. Plasmidd. Polysaccharide

Ans. Plasmid. pBR-322 is a plasmid in which p stands for plasmid and BR stands for Bolivar and Rodriguez respectively.

vi. Which one of the following is an important breed of fowl?

- a. Nageswari
- b. Jersey
- c. Rhode island red
- d. Khaki Campbell

Ans. Rhode island red. Because it is easy to care for, and they will produce around 260 eggs per year.

vii. Which one of the following is the result of alcohol abuse?

- a. Liver cirrhosis
- b. Hypoglycaemia
- c. Gastritis
- d. All of these

Ans. Liver cirrhosis. Alcohol is harmful for the human health it have a short as well as long term effects also. For example

alcohol poisoning, sexual dysfunction and liver damage include brain damage, cirrhosis and an increased risk of heart diseases.

viii. Trisomy of chromosome no. 21 in humans creates a diseases syndrome which is

- a. Klinefelter's syndrome
- b. Down's syndrome
- c. Turner's syndrome
- d. AIDS

Ans. Down's syndrome. It is a genetic chromosome 21 disorder which delays the development of an individual.

ix. Charging or amino acylation of t-RNA is related to which of the following processes?

- a. DNA replication
- b. Transcription
- c. Translation
- d. Lac- operon

Ans. Translation. It is the term used to describe the process of protein synthesis by ribosomes in the cytoplasm or endoplasmic reticulum and it carries particular amino acids, which are linked by the ribosomes.

x. Exception to mendelian principle is/are

a. Co- dominance

- b. Linkage
- c. Incomplete dominance
- d. All of these

Ans. All of these. Co-dominance, linkage and incomplete dominance are the exception of mendelian principle because the mutation is transmitted stably from parents to their offspring.

xi. The genes responsible for haemophilia is

- a. Recessive and present in Y chromosome
- b. Dominant and present in X chromosome
- c. Dominant and present in Y chromosome
- d. Recessive and present in X chromosome

Ans. Recessive and present in X chromosome. Haemophilia is the condition in which blood is not able to clot.

xii. Which one of the following is a barrier method of contraception?

- a. Spermicidal jelly
- b. IUCD
- c. Diaphragm
- d. Contraceptive pill

Ans. Diaphragm. Diaphragm is the Barrier method which blocks the entry of sperms in uterus.

xiii. Corpus luteum secrets

a. LH b. FSH

- c. Estrogen
- d. Progesterone

Ans. Progesterone. It secretes the progesterone as well as the relaxin hormone. Relaxin is in charge of softening of pubic symphasis which helps in parturition.

xiv. The process of formation of gametophyte directly form sporophyte without meiosis is called

- a. Apogamy
- b. Apospory
- c. Parthenocarpy
- d. Parthenogenesis

Ans. Apospory. Apospory is refers to the maturing of development of 2n gametophytes, without meiosis and spores.

2. Answer the following question. $(1 \times 4 = 4)$

i. What do you mean by linked genes?

Ans. Linked genes are the genes which are inherited together because they are physically close to one another on the same chromosome.

ii. Name one synthetic greenhouse gas.

Ans. Hydro fluorocarbon (HFCs). Those gases which have the high global warming potential is known as the synthetic gases.

OR

Which gas is used in purification of drinking water.

Ans. Chlorine. Chlorine is a gas which is used in the purification of water because it have the strong oxidant ability which kills the microorganism very quickly.

iii. From where H.C.G. is secreted?

Ans. After the implantation placenta secretes the hormone known as HCG which is stands for human chorionic gonadotropin.

OR

What is chalazogamy?

Ans. Chalazogamy is referring to the process of fertilisation in which pollen tube go into the embryo through the tissues of chalaza.

iv. Name the organism responsible for filaria disease.

Ans. The organism which is responsible for filarial disease is roundworm of the filariodea type.