



KARNATAKA ICSE SCHOOLS ASSOCIATION

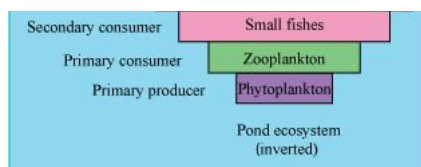
ISC STD. XII Preparatory Examination 2024

Subject: BIOLOGY PAPER I (THEORY) ANSWER KEY

SECTION A

Question 1

- (i) 10% law- Only 10 per cent of the energy is transferred to each trophic level from the lower trophic level, rest 90% is lost as heat. [1]
- (ii) *Entamoeba histolytica* [1]
- (iii) BOD- The amount of oxygen consumed by aerobic bacteria for the process of decomposition of the organic matters in one litre of water. [1]
- (iv) *Erythroxylyum coca*. It interferes with the transport of the neuro-transmitter dopamine [1]
- (v) Divergent evolution
- (vi) $NPP = GPP - R$ [1]
- (vii) Replicate, structurally and chemically stable, mutability. [1]
- (viii) GFC, Sun [1]
- (ix) b. Nonspecific [1]
- (x) Fully developed foetus, placenta [1]
- (xi) (a) [1]
- (xii) (d) [1]
- (xiii) (c) C [1]
- (xiv)



- (xv) The Abingdon tortoise in Galapagos islands which became extinct within a decade after goats were introduced on the island due to greater browsing efficiency of the goats. [1]
- (xvi) Answer the following questions: [2]
 - (a) Edward Wilson.
 - (b) MALT- mucosa associated lymphoid tissue.
- (xvii) A- acrosome [1]

- (xviii) (a) Genetic code is degenerate
(b) Bt is a biocontrol agent

SECTION B

Question 2 [2]

Natural methods work on the principle of avoiding chances of ovum and sperms meeting. Periodic abstinence is one such method in which the couples avoid or abstain from coitus from day 10 to 17 of the menstrual cycle when ovulation could be expected. As chances of fertilisation are very high during this period, it is called the fertile period. Therefore, by abstaining from coitus during this period, conception could be prevented.

Withdrawal or coitus interruptus is another method in which the male partner withdraws his penis from the vagina just before ejaculation so as to avoid insemination.

Question 3 [2]

The methods involved two major approaches.

One approach focused on identifying all the genes that are expressed as RNA (referred to as Expressed Sequence Tags (ESTs)).

The other took the blind approach of simply sequencing the whole set of genome that contained all the coding and non-coding sequence, and later assigning different regions in the sequence with functions (a term referred to as Sequence Annotation)..

Question 4 [2]

IPM- integrated pest management is an eco-friendly strategy that focuses on long term prevention of pests or their damage through a combination of techniques such as biological control, habitat manipulation, modification of cultural practices, and use of resistant varieties.

Question 5 [2]

- (a) B- tapetum
(b) A- diploid and B- polyploid.

OR

- (a) Endosperm. Nutrition of the developing embryo in monocots.
(b) Triple fusion is a fusion that involves a male gamete and two polar nuclei which occurs in the double fertilization in a seed-bearing plant that results in the endosperm formation.

Question 6 [2]

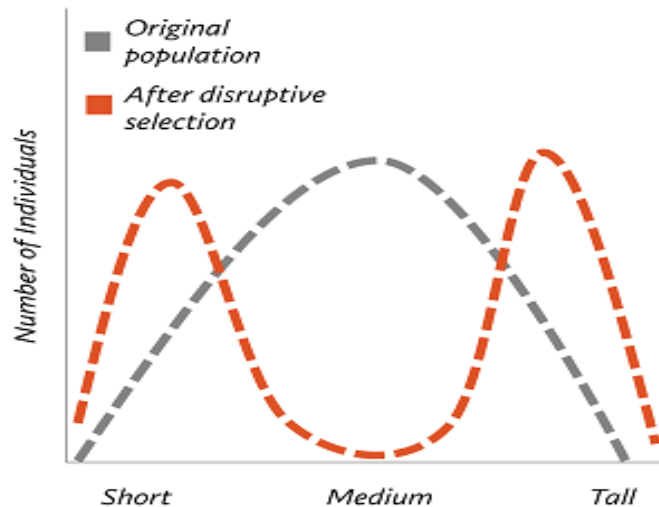
Since DNA is a hydrophilic molecule, it cannot pass through cell membranes. In order to force bacteria to take up the plasmid, the bacterial cells must first be made 'competent' to take up DNA.

This is done by treating them with a specific concentration of a divalent cation, such as calcium, which increases the efficiency with which DNA enters the bacterium through pores in its cell wall. Recombinant DNA can then be forced into such cells by incubating the cells with recombinant DNA on ice, followed by placing them briefly at 42°C (heat shock), and then putting them back on ice. This enables the bacteria to take up the rDNA

Question 7

[2]

Disruptive natural selection: (or diversifying natural selection) a mode of natural selection in which extreme values for a trait are favoured over intermediate values.



Question 8

[2]

Tissue culture- The development of a whole plant from an explant in sterile conditions in the lab.

Cryopreservation- Preservation of germplasm at -196 degree celsius in liquid nitrogen to maintain viability.

SECTION C

Question 9

[3]

- a) Ovulation, LH
- b) Graafian follicle, FSH.
- c) Corpus luteum. Secretion of progesterone.

Question 10

[3]

- (a) The **palindrome** in DNA is a **sequence** of base pairs that reads same on the 2 strands when orientation of reading is kept the same.
- (b) ECoRI- Its first letter came from the **Escherichia** genus, and the second one from the species **coli** of the prokaryotic cell from which the enzyme is isolated and the letter **R** is derived from the name of the strain, Roman number indicates the order in which the enzyme was isolated.

Question 11

[3]

- (i) Appendix.

- (ii) Vestigial organ
- (iii) Ear muscles, coccyx

Question 12

[3]

1. protein
2. 'B' – reverse transcriptase.
3. Macrophage

Question 13

[3]

- (a) Streptococcus- clot buster
- (b) Monascus purpureus- blood cholesterol lowering agent
- (c) Aspergillus oryzae- in detergents ,removes oily stains

Question 14

[3]

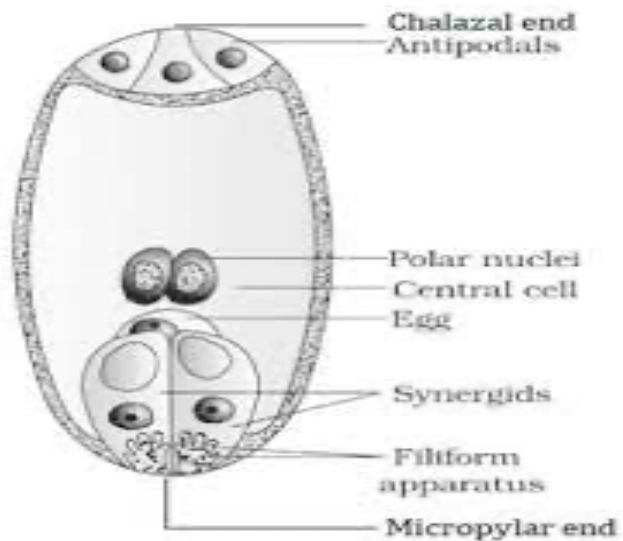


Fig. Mature embryo sac

Question 15

[3]

- a) ZIFT- the zygote or the embryo up to 8 blastomere stage is transferred into the fallopian tube.
IUT- the embryo above 8 blastomere stage is transferred into the uterus.
- b) Hormone releasing IUD makes the uterus unsuitable for implantation and makes the cervix hostile to the sperms.

SECTION D

Question 16

[5]

- (i) Down's syndrome, 21 trisomy. Mental retardation, epicanthal folds [1.5]
- (ii) Aneuploidy [0.5]
- (iii) Frameshift mutations occur by insertion or deletion 1 or 2 of nucleotides. It alters the reading frame of a particular gene. [1]
- (iv) SCA- It is a blood disorder caused when GAC is replaced by GUG in the mRNA and glutamic acid is replaced by valine in the sixth position of the beta globin chain. The RBCs become sickle shaped and leads to anaemia. [2]

OR

- (i) The rho-independent termination signals consist of stable hairpins followed by U-rich regions. The mechanism of intrinsic termination includes pausing of the transcription elongation at the termination point and formation of the hairpin inside RNA polymerase.[2]
- (ii) Capping- adding a 7- methyl guanosine cap at the 5' end, splicing- removal of introns and joining of exons , tailing- adding a poly adenylate tail at the 3' end. [3]

Question 17

[5]

Population Density can be defined as the number of individuals per unit space. [1]
Birth rate, Death rate, Immigration and Emigration.[2]

Total count is one method where we count the number of organisms per unit area.
Counting the number of colonies in the case of microbial colonies is another method of measuring population density.[2]

Question 18

[5]

- a) Biological products: Transgenic animals that produce useful biological products can be created by the introduction of the portion of DNA (or genes) which codes for a particular product such as human protein (α -1-antitrypsin) used to treat emphysema . In 1997, the first transgenic cow, Rosie, produced human protein-enriched milk (2.4 grams per litre). The milk contained the human alpha-lactalbumin and was nutritionally a more balanced product for human babies than natural cow-milk. [2]

b) Polymerase Chain Reaction (PCR), probes and Enzyme Linked Immuno-sorbent Assay (ELISA) are some of the techniques that serve the purpose of early diagnosis.

PCR is used to detect HIV in suspected AIDS patients. It is being used to detect mutations in genes in suspected cancer patients too. It is a powerful technique to identify many other genetic disorders.

Probes- A single stranded DNA or RNA, tagged with a radioactive molecule (probe) is allowed to hybridise to its complementary DNA in a clone of cells followed by detection using autoradiography. The clone having the mutated gene will hence not appear on the photographic film, because the probe will not have complementarity with the mutated gene.

ELISA is based on the principle of antigen-antibody interaction. Infection by pathogen can be detected by the presence of antigens (proteins, glycoproteins, etc.) or by detecting the antibodies synthesised against the pathogen. [3]
