BIOLOGY

SOLUTION

SECTION-A

[1 × 16]

Q.	1	2	3	4	5	6	7	8	9	10
A.	A	A	C	A	C	C	D	A	A	D
Q.	**11**	**12**	**13**	**14**	**15**	**16**				
A.	D	A	D	B	D	B				

SECTION-B

17. The fimbriae are the finger-like projections present on the edges of infundibulum (fallopian tubes). They help in collection of ovum after ovulation. **[2]**

18. The dual function of AUG codon : **[2]**

(a) It codes for amino acid methionine.

(b) It is an initiation codon.

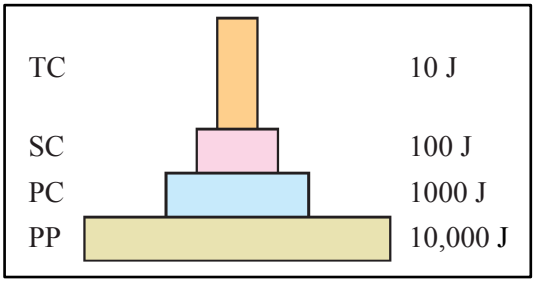
The sequence of bases from which it is transcribed is TAC. Its anticodon is UAC.

19. **[1+1]**

	Host	Site of occurrence
(a) Formation of gametocytes	Human	Red blood cells
(b) Fusion of gametocytes	*Anopheles* mosquito	Intestine

20. The proteins produced by genetically altered gene in a host are called recombinant proteins. Bioreactors are considered as vessels in which raw materials are biologically converted into specific products by microbes. It provides optimum growth conditions such as temperature, pH, substrate, vitamins, oxygen and salts. **[1+1]**

21. The first pyramid of biomass corresponds to a terrestrial ecosystem. Second pyramid refers to a small standing crop of phytoplankton supporting a large standing crop of zooplankton or an aquatic ecosystem. **[1+1]**



OR

In aquatic system, detritus food chain and in terrestrial ecosystem, grazing food chain are responsible for flow of larger fraction of energy. **[1+1]**

Grazing Food Chain (GFC)	Detritus Food Chain (DFC)
(i) It starts with green plants called producers as first trophic level.	It begins with dead organic matter and decomposers called saprophytes as first trophic level.
(ii) Energy for food chain comes from the Sun.	Energy for the food chain comes from organic remain or detritus.

SECTION-C

22. (i) Regeneration of endometrium. **[1+1+1]**

(ii) Uterus gets highly vascularized, ready for embryo implantation

(iii) Disintegration of the endometrium leading to menstruation

23. Chorionic villi appear implantation on the trophoblast. **[2+1]**

It becomes interdigitated with uterine tissue to form the placenta and increase the surface area for exchange of material between the mother and the embryo.

24. (a) Contraceptive pills contain progestogen or progestogen-estrogen combination They act by either of the following way : **[2+1]**

(i) inhibit ovulation

(ii) inhibit implantation

(iii) alter quality of cervical mucus to prevent or retard entry of sperms.

(b) Contraceptive pills should be taken daily for a period of 21 days starting within first five days of menstrual cycle (to be repeated after a gap of 7 days).

25. When DDT was used for the first time, maximum mosquitoes died but few survived due to variation in a population. These mosquitoes show resistance to DDT and survived to reproduce successfully in the presence of DDT and gradually such mosquito population become DDT resistant within a time span of few years. **[2+1]**

According to Hugo de Vries, evolution is caused by sudden large differences in the population and not minor variations.

26. Aerobic and anaerobic bacteria or fungi exist in sewage water. **[2+1]**

After the primary treatment of water, aerobic bacteria are added in aeration tanks. Growth of these bacteria reduces BOD as they consume organic matter. Anaerobic bacteria are added in anaerobic sludge digestors, where these digest the sludge and form biogas, etc.

27. (a) A—Recognition site of the restriction endonuclease. **[1+1+1]**

B—Origin of replication.

(b) A—Coding strand.

C—Template strand.

(c) PCR stands for polymerase chain reaction.

PCR is used to amplify DNA segments to a large number within a short span of time.

OR

Gel electrophoresis: The DNA fragments are negatively charged molecules and they can be separated by forcing them to move towards the anode under the influence of an electrical field through a medium or matrix. The DNA fragments separate according to size, i.e., smaller the size the farther it moves. The separated DNA can be seen only after staining the DNA by ethidium bromide (EtBr) followed by exposure to UV radiation. The separated bands of radiation are cut out and extracted from the gel piece by elution. **[2+1]**

28. *Ex situ* is a desirable approach to protect the wild cat. The organism is protected outside their natural habitat where special care is taken to protect them. By using cryopreservation techniques, gametes of threatened species can be preserved under very low temperature. **[2+1]**

***In situ* Conservation**	***Ex situ* Conservation**
(i) It is conservation and protection of biodiversity in its natural habitat.	It is conservation of selected rare plants and animals in places outside their natural habitat.
(ii) Ecologically unique and biodiversity-rich regions are legally protected as biosphere reserves, national parks and sanctuaries.	Zoological parks, botanical gardens and wildlife safari parks serve this purpose.

SECTION-D

29. (a) Insulin was extracted earlier from the pancreas of slaughtered pigs and cattle animals insulin obtained from these sources caused some allergy or some other reactions to the foreign protein

(b) Recombinant DNA technology **[2+1+1]**

OR

Insulin and human growth hormones.

(c) An extra stretch called C-peptide is removed from pro-insulin during maturation.

30. (a) Cuscuta has lost its chlorophyll and leaves during evolution and thus it derives its nutrition from host plant, thus, it is a parasitic plant.

(b) Mode of interaction between two species in which one species (parasite) depends on the other species (host) for food and shelter is called parasitism. In this one organism is benefitted and the other is harmed.
For example, Human liver fluke.

OR

The female mosquito is not considered as a parasite because it needs blood for reproduction and not for nutrition. It bites human so that it can nourish the developing fertile eggs.

(c) Koel is a parasitic bird (which has lost the instinct to make its own nest to lay eggs), has evolved the technique of laying eggs in the nest of a crow.
Its eggs bear resemblance to those of crow. **[1+1+2]**

SECTION-E

31. **[1+1+1+1+1]**

S.No	Device	Use of mode	Function
1	Vaults	Inserted into the female reproductive tract to cover the cervix during coitus.	They prevent conception by blocking the entry of sperms through the cervix.
2	Lippes loop	Intra Uterine Devices.	IUDs increase phagocytosis of sperms within the uterus
3	*Saheli*	Oral contraceptive for the females.	It inhibit ovulation and implantation as well as alter the quality of cervical mucus to prevent/ retard entry of sperms
4	Coitus interruptus	The male partner withdraws his penis from the vagina just before ejaculation.	Avoid insemination
5	Vasectomy	A small part of the vas deferens is removed or tied up through a small incision on the scrotum.	Surgical intervention blocks gamete transport and hereby prevent conception.

OR

S.No	Method	Process
1	Amniocentesis	To check genetic disorder in foetus.
2	*In vitro* fertilisation	Fertilisation outside the body in almost similar conditions as that in the body.
3	Medical Termination Of Pregnancy	To get rid of unwanted pregnancies either due to casual unprotected intercourse or failure of the contraceptive used during coitus or rapes.
4	Periodic abstinence	Couples avoid or abstain from coitus from day 10 to 17 of the menstrual cycle when ovulation could be xpected.
5	IUI – intra-uterine insemination	The semen collected either from the husband or a healthy donor is artificially introduced either into the vagina or into the uterus of the female.

[1+1+1+1+1]

32. Cancer can be detected at early stages and early detection is essential. Following are a few can diagnosis and detection areas :

Tests for increases cell counts(blood cancer)

Histo-pathological and biopsy of blood/tissues/bone marrow

Radiography, CT, MRI to detect cancer of internal organs

Identification of cancer-specific antigens

Application of molecular biology techniques to detect genes with inherited susceptibility to a few cancers

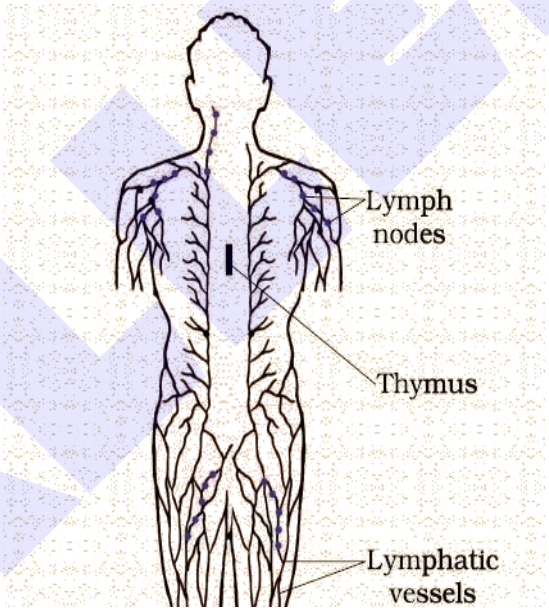
Treatment of cancer :

Listed below are a few approaches that can be used to treat cancer.

- Surgery to remove the tumour
- Immunotherapy to boost the killing of cancer cells
- Radiotherapy to kill cancerous cells
- Chemotherapy
- Administration of biological response mediators such as α-interferons that activate the immune system thus helping in destroying the tumour. **[2+3]**

OR

Lymphoid organs are organs where origin or maturation & proliferation of lymphocytes occurs.



These lymphoid organs are of two types:-

1. **PRIMARY LYMPHOID ORGAN :** where immature lymphocytes differentiate into antigen-sensitive lymphocytes. It includes :

(a) **BONEMARROW :** It is the main lymphoid organ present in the thigh region where all types of blood cells including lymphocytes are formed. It provides micro-environment for the development & maturation of B-cells.

(b) **THYMUS :** It is located beneath the chest bone near heart. It provides micro environment for the development & maturation of T-lymphocytes.

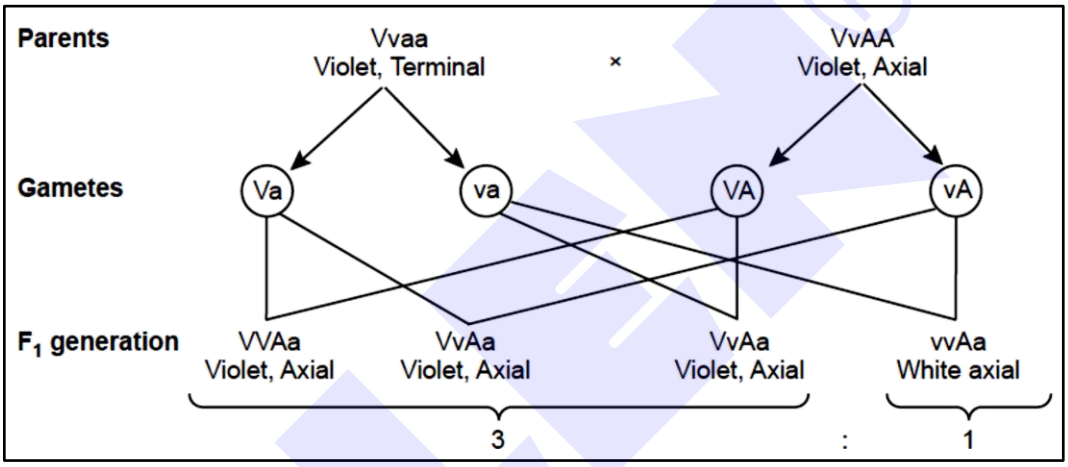
2. **SECONDARY LYMPHOID ORGAN:** They provide the site for interaction of lymphocytes with antigen which then proliferate to become effector cells. It includes.

(a) **SPLEEN:** It is large bean shaped organ & contains mainly lymphocytes & phagocytes. It acts as a filter of blood by trapping blood-bound micro-organism.

(b) **LYMPH NODE :** They are small-solid structure located at different points along lymphatic system. It serves to trap antigen which happens to get into lymph & tissue fluid. Antigen trapped in lymph nodes are responsible for activation of lymphocytes.

[2½ + 2½]

33. (a) **[3+2]**



(b) Law of Independent Assortment.
The law states that when two pairs of traits are combined in a hybrid, segregation of one pair of characters is independent of the other pair of character.

OR

(a) Post-transcriptional modifications **[3+2]**

- The primary transcripts are non-functional, containing both the coding region, exon, and non-coding region, intron, in RNA and are called heterogenous RNA or hnRNA.
- The hnRNA undergoes two additional processes called capping and tailing.
- In capping, an unusual nucleotide, methyl guanosine triphosphate, is added to the 5′-end of hnRNA.
- In tailing, adenylate residues (about 200–300) are added at 3′-end in a template independent manner.
- Now the hnRNA undergoes a process where the introns are removed and exons are joined to form mRNA by the process called splicing.

(b) In prokaryotes, there is a single DNA-dependent RNA polymerase that catalyses transcription of all types of RNA in bacteria. In bacteria, mRNA does not require any processing as it does not have any introns.