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12 - BIOLOGY – ZOOLOGY

LONG VERSION PORTION ALONE

(BOOK BACK)

ONE MARK

1. Painful menstruation is termed as **(Dysmenorrhoea)**

2. Malaria caused by plasmodium is transmitted through **(Mosquito bites)**

3. Which of the following disease is spread through droplet nuclei? **(Chicken pox)**

4. Poliomyelitis which causes infantile paralysis enters the body through **(Eyes)**

5. Marijuana is extracted from **(Dried leaves and flowers of hemp plant)**

6. Haemozoin is **(A toxin from plasmodium species)**

7. The drug synthesized from Datura is **(Hallucinogen)**

8. GEAC stands for **(Genetic Engineering Approval Committee)**

9. Colostrum provides **(Naturally acquired passive immunity)**

10. Paratope is an **(Antigen binding site on variable region)**

11. Allergy involves **(IgE)**

12. Anaphylactic shock is due to **(All the above)**

13. Spread of cancerous cells to distant sites is termed as **(Metastasis)**

14. AIDS virus has **(single stranded RNA)**

15. Match the pathogens with respective diseases caused by them and select the correct match using the codes given below.

I. *Leishmania donavani*	1. Malaria
II. *Wuchereria bancrofti*	2. Amoebiasis
III. *Trypanosoma*	3. Kala – azar
IV. *Entamoeba histolytica*	4. Sleeping sickness
	5. Filariasis

Codes

	I	II	III	IV
a)	1	4	2	3
b)	**3**	**5**	**4**	**2**
c)	3	5	2	4
d)	1	4	3	2

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16. All are peripheral lymphoid organs except **(Thymus)**
17. Which is not a macrophage? **(Microglia)**
18. True about interferon is that **(It inhibits viral replication in cells)**
19. Cell mediated immunity is carried out by _____ While humoral immunity is mainly carried out by. **(T cells/B cells)**
20. B cells are activated by **(Antigen)**
21. In agglutination and precipitation reactions, the antigen is a _____ and _____ respectively **(Whole cell / Soluble molecule)**
22. B cells that produce and release large amounts of antibody are called **(Plasma cells)**
23. Raja is injured and got swelling. The swelling is due to the infection of tissue is an example of **(Inflammation)**

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TWO / THREE MARKS

1. List the various menstrual disorders.

- ✓ Amenorrhea - Absence of menstruation is called.
- ✓ Polymenorrhoea - menstrual cycle that is shorter than 21 days.
- ✓ dysmenorrhea - Pain associated with menstruation
- ✓ menorrhagia - Heavy and prolonged menstrual period
- ✓ Oligomenorrhoea – infrequent menstrual periods

2. Explain the three level of impact of extinction of species.

Species extinction

- ✓ Eliminates an entire species, by an environmental event (flood etc.,) or by biological event (disease or non-availability of food resource half or more).

Mass extinction

- ✓ Eliminates half or more species in a region or ecosystem, as might occur following a volcanic eruption.

Global extinction

- ✓ Eliminates most of the species on a large scale or larger taxonomic groups in the continent or the Earth.
- ✓ Snow ball Earth and extinction following elevation in CO^2 levels are example.

3. Complete the following table

Diseases	Causative agent	Site of infection	Incubation period
Mumps	*Mumps virus (RNA virus) Paramyxo virus*	Salivary glands	16 – 18 days
Chicken pox	*Varicella -Zoster virus (DNA Virus)*	Respiratory tract, skin and nervous system	14 – 16 days
Dengue fever	*Dengue virus or Flavi virus (DENV 1-4 virus)*	Skin and blood	4 – 10 days

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4. Complete the given table.

Diseases	Causative agent	Symptoms
Ascariasis	*Ascariasis*	abdominal pain, vomiting, headache, anaemia, irritability and diarrhoea.
Ringworm	*Trichophyton*	Appearance of dry, scaly lesions on various parts of the body
Typhoid	*Salmonella typhi*	High fever, weakness, headache, stomach pain and constipation.
Pneumonia	*Streptococcus pneumoniae*	Fever, cough, painful breathing and brown sputum

5. What is Kala-azar?

Disease: Kala – azar or visceral leishmaniasis

Causative agent: Leishmania donovani

Transmission: Phlebotomus (sand fly).

Site of infection: Endothelial cells, bone marrow, liver, lymph glands and blood vessels of the spleen

Symptoms: Weight loss, anaemia, fever, enlargement of spleen and liver.

6. Given below are some human organs. Identify one primary and one secondary lymphoid organ. Explain its role. Liver, thymus, stomach, thyroid, tonsils

- ✓ Primary lymphoid organ: Thymus
- ✓ It stimulates the T cell to become mature and **immunocompetent**.
- ✓ Secondary lymphoid organ: Tonsils
- ✓ Help to fight infections
- ✓ Stop invading germs including bacteria and viruses.

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7. How does saliva act in body defence?

- ✓ Saliva contains Lysozyme acts as antibacterial agent and cleaves the bacterial cell wall.

8. Name and explain the type of barriers which involve macrophages.

- ✓ Phagocytic barriers
- ✓ Specialized cells like Monocytes, neutrophils, tissue macrophages, phagocytose and digest whole microorganisms.

9. What are interferons? Mention their role.

- ✓ Interferon is an antiviral protein produced from virally infected fibroblasts and leucocytes.
- ✓ Induces antiviral state in uninfected cells.

10. List out chemical alarm signals produced during inflammation.

- ✓ Serotonin
- ✓ Histamine
- ✓ Prostaglandins

24. Where is B-cells and T-cells produced in the human body? How do they differ from each other? Mention any two differences.

- ✓ Both these are produced in the bone marrow.

B-cells	T-cells
B lymphocytes mature in bone marrow	T lymphocytes mature in the thymus gland.
B lymphocytes produce antibodies.	T lymphocytes do not produce antibodies.

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25. What are the cells involved innate immune system?

- ✓ Monocytes
- ✓ Neutrophils
- ✓ Tissue macrophages

26. Why is opsonisation efficient in phagocytosis?

- ✓ Opsonisation or enhanced attachment is the process by which a pathogen is marked of ingestion and destruction by a phagocyte.
- ✓ Opsonisation involves the binding of an opsonin i.e., antibody, to a receptor on the pathogen's cell membrane.
- ✓ After opsonin binds to the membrane, phagocytes are attracted to the pathogen.
- ✓ So, opsonisation is a process in which pathogens are coated with a substance called an opsonin, marking the pathogen out for destruction by the immune system.
- ✓ This results in a much more efficient phagocytosis.

27. A person is infected by HIV. How will you diagnose for AIDS?

ELISA test (Enzyme Linked Immuno Sorbent Assay)

- ✓ detects the presence of HIV antibodies.
- ✓ It is a preliminary test.

Western blot test

- ✓ It detects the viral core proteins.
- ✓ more reliable and a confirmatory test.
- ✓ If both tests detect the presence of the antibodies, the person is considered to be
- ✓ HIV positive

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28. Autoimmunity is a misdirected immune response. Justify.

- ✓ Autoimmunity is due to an abnormal immune response
- ✓ The immune system fails to properly distinguish between self and non-self and attacks its own body.
- ✓ Our body produces antibodies and cytotoxic T cells that destroy our own tissues.
- ✓ If a disease-state results, it is referred to as auto-immune disease.
- ✓ Thus, autoimmunity is a misdirected immune response.

29. What are the possible risks of GMOs?

- ✓ Harming non-target species such as soil organisms, non-pest insects, birds and other animals.
- ✓ Disrupting biotic communities including agro ecosystems.
- ✓ Irreparable loss or changes in species diversity or genetic diversity within species.
- ✓ Creating risks for human health.

30. Differentiate between predator and prey.

Predator	Prey
Involves the killing and feeding of an organism by another organism.	Any animal that is being preyed upon by the predator.
Carnivorous as well as omnivorous	Herbivorous.
Completely depends on the prey	Not depend on predators
Stronger	Weaker

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FIVE MARKS

1. What is extra chromosomal inheritance? Explain with an example.

- ✓ The cytoplasmic extranuclear genes have a characteristic pattern of inheritance which do not resemble the genes of nuclear chromosomes and is known as extra chromosomal or extra nuclear or cytoplasmic inheritance.
- ✓ Example : 1.Shell coiling in *Limnaea, 2. Kappa particles in Paramecium*

Kappa particles in *Paramecium*

- ✓ The strains possessing the kappa particles are known as “killer Paramecia”.
- ✓ The kappa liberates a toxin, paramecin which is lethal to other individuals called “sensitives”.
- ✓ A killer *Paramecium* may contain hundreds of kappa particles which have their own DNA and which in turn are dependent on a dominant gene ‘K’ for its presence in the killer *Paramecia*.
- ✓ *Paramecia* with nuclear genotype “kk” are unable to produce kappa particles. The inheritance of killer trait does not follow the Mendelian pattern of inheritance.
- ✓ When a killer *Paramecium* KK conjugates with sensitive ”kk”, the exconjugants are all heterozygous for Kk genes.
- ✓ The Kk genotype suggest that both exconjugants should be killers. But this is not seen.
- ✓ If conjugation lasts only for a short period of time, there is no exchange of cytoplasm between the two *Paramecia* resulting in both killers (Kk) and sensitives.
- ✓ However prolonged conjugation permits mixing of cytoplasm of both the conjugants resulting in killers only.
- ✓ This confirms that the killer trait is determine cytoplasmically.
- ✓ Dominant chromosomal genes (KK) are required to maintain the cytoplasmic kappa particles.
- ✓ Without a dominant gene this particle would disappear from the cytoplasm of the host.

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- ✓ The kappa appears to be a bacterium, C*aedobacter taeniospiralis* that has its own DNA and replicates autonomously.
- ✓ Kappa particle occurs in atleast two forms; N and B forms.
- ✓ The N form is the infective form that passes from one *Paremicium* to another and confers the killer specificity to the host cell.
- ✓ The "N" form is attacked by a bacteriophage that induces the formation of inculsions called "R" bodies, inside the kappa particles and convert it to the "B" form.
- ✓ These "R" bodies are visible under the light microscope as refractile bodies.
- ✓ In the "B" form, kappa can no longer replicate, it is offen lysed within the cell, however, it confers killer specificity on the host cell.
- ✓ Whether viral DNA or kappa DNA codes the toxin paramecin is not known at present.

2. Comment on the methods of eugenics.

Two methods of Eugenics

- ✓ Constructive method or Positive eugenics
- ✓ Restrictive method or Negative eugenics

Positive eugenics

- ✓ Positive eugenics attempts to increase consistently better or desirable germplasm and to preserve the best germplasm of the society.
- ✓ The desirable traits can be increased by adopting the following measures:
  - Early marriage of those having desirable traits
  - Subsiding the fit and establishing sperm and egg banks of precious germplasm
  - Educating the basic principles of genetics and eugenics
  - Improvement of environmental conditions.
  - Promotion of genetic research
  - Negative eugenics

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Negative Eugenics

- ✓ Negative Eugenics attempts to eliminate the defective germplasm of the society by adopting the following measures:
  - Sexual separation of the defectives
  - Sterilization of the defectives
  - Control of immigration and
  - Regulation of marriages

3. Define isolating mechanism and explain its types with suitable examples.

- ✓ Isolation is the separation of the members of a single population into sub populations.

Prezygotic isolation	
Ecological isolation or habitat isolation	Separated from one another by a differences in their habitat. E.g., *Rana areolata* breeds in grassy shallow ponds whereas *Rana grylio* breeds in deep waters.
Seasonal isolation	Difference in the breeding seasons. E.g.Toad, *Bufo americanus* breeds much early in the spring; whereas *Bufo fowleri* breeds very late in the season.
Sexual or ethological isolation / Behavioural isolation	Difference in their sexual behavior. E.g., *Hyla versicolor* (grey tree frog) and *Hyla femoralis* (pine wood tree frog).
Morphological isolation or mechanical isolation	Differences in their external genitalia that is seen in two different species. E.g., *Bufo quercicus* and *Bufovalliceps*.
Physiological isolation	Though mating may occur, the gametes are prevented from fertilization due to mechanical or physiological factors.

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	E.g. The sperms of *Drosophila virilis*survive only for about a day when introduced into the sperm receptacle of *Drosophila americana* while the sperms of *Drosophila americana* live for a longer time.
Cytological isolation	Fertilization does not take place due to the differences in the chromosome numbers between the two species E.g., Bull frog *Rana catesbiana* and gopher frog *Ranaareolata*.
Post zygotic isolation	
Hybrid inviability	The sperm enters the egg, fertilization occurs and the embryo develops into the adult but it dies before reaching maturity. E.g., fishes, frogs, beetles, even fertilization takes place between two species, due to genetic incompatibility they do not leave any surviving offspring.
Hybrid sterility	Hybrids are formed due to inter specific crosses but they are sterile due to the failure of the chromosomes to segregate normally during meiosis, E.g., Mule (inter specific cross between a horse and a donkey).
Hybrid breakdown	F1 Hybrids are viable and fertile, but F2 hybrids may be inviable or sterile.

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4. Define speciation according to A.E. Emerson and Explain its types giving suitable examples.

- ✓ A.E. Emerson defines species as a 'genetically distinctive, reproductively isolated natural population'.

Sympatric speciation/Reproductive isolation

- ✓ It is a mode of speciation through which new species form from a single ancestral species while both species continue to inhabit the same geographical region.
- ✓ Two or more species are involved.

Allopatric speciation/ Geographical speciation

- ✓ It is a mode of speciation that occurs when biological populations of similar species become isolated from each other that prevents gene flow.
- ✓ One species becomes two species due to geographical barriers hence new species is evolved e.g. Darwin's finches.

5. Give an account on the major causes for the extinction of a particular species on earth.

Habitat loss

- ✓ Agriculture, forestry, mining, and urbanization have disturbed or destroyed more than half of Earth's land area.

Exotic species

- ✓ Introduced by humans into new habitats may carry disease, prey on native species, and disrupt food webs.

Over-harvesting

- ✓ Fish, trees, and other organisms. This threatens their survival and the survival of species that depend on them.

Global climate change

- ✓ Due to the burning of fossil fuels raising earth's temperatures.
- ✓ Raising sea levels.

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Pollution

✓ Chemicals, heat, and noise to the environment causes harm to organisms.

Human overpopulation

✓ Crowding out other species

6. Compare and contrast bacillary dysentery and amoebic dysentery.

	bacillary dysentery	amoebic dysentery
Diseases	Shigellosis (Bacillary dysentery)	Amoebiasis (amoebic dysentery)
Causative agent	*Shigella sp.*	*Entamoeba histolytica*
Site of infection	Intestine	Large intestine
Mode of transmission	Food and water contaminated by faeces / faecal oral route	House flies (*Musca domestica*) acts as a carrier for transmitting the parasite from contaminated faeces and water.
Symptoms	Abdominal pain, dehydration, blood and mucus in the stools	Abdominal pain and stools with excess mucus. Symptoms of amoebiasis can range from diarrhoea to dysentery with blood and mucus in the stool.

7. How does immune system work?

Primary immune response

✓ The primary immune response occurs when a pathogen comes in contact with the immune system for the first time.

✓ During this, the immune system has to learn to recognize the antigen, produce antibody against it and eventually produce memory lymphocytes.

✓ The primary immune response is slow and short-lived.

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Secondary immune response

- ✓ The secondary immune response occurs when a person is exposed to the same antigen again.
- ✓ During this time, immunological memory has been established and the immune system can start producing antibodies immediately.
- ✓ Within hours after recognition of the antigen, a new army of plasma cells are generated. Within 2 to 3 days, the antibody concentration in the blood rises steeply to reach much higher level than primary response.
- ✓ This is also called as “booster response”.

8. Differentiate between

(A) Innate immunity and acquired immunity

Innate immunity	Acquired immunity
Possess right from birth	Acquired during Life time
Non specific	Specific
Barriers – Anatomical, Physiological, phagocytosis, inflammatory	Unique features – Specificity, Diversity, Recognition of self and non self and memory

(B) Primary and secondary immune responses

Primary Immune Response	Secondary Immune Response
It occurs as a result of primary contact with an antigen.	It occurs as a result of second and subsequent contacts with the same antigen.
Antibody level reaches peak in 7 to 10 days.	Antibody level reaches peak in 3 to 5 days.
Prolonged period is required to establish immunity.	It establishes immunity in a short time.

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There is rapid decline in antibody level.	Antibody level remains high for longer period.
It appears mainly in the lymph nodes and spleen.	It appears mainly in the bone marrow, followed by the spleen and lymph nodes

(C) Active and passive immunity

Active Immunity	Passive Immunity
Active immunity is produced actively by host's immune system.	Passive immunity is received passively and there is no active host participation.
It is produced due to contact with pathogen or by its antigen.	It is produced due to antibodies obtained from outside.
It is durable and effective in protection.	It is transient and less effective.
Immunological memory is present.	No memory.
Booster effect on subsequent dose is possible.	Subsequent dose is less effective.
Immunity is effective only after a short period.	Immunity develops immediately.

(D) Humoral and CMI immunity

Humoral immunity	**CMI immunity**
B cell, antigen presenting cells and T helper cells	T cells, Macrophages and NK cells
Pathogens are destroyed by the production of antibodies	Pathogens are destroyed by cells without producing antibodies

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(E) Autoimmune disease and Immunodeficiency disease

Abnormal immune response in which the immune system fails to properly distinguish between self and non-self and attacks its own body. Our body produces antibodies (auto antibodies) and cytotoxic T cells that destroy our own tissues.	failure of one or more components of the immune system due to genetic developmental defects, radiation, use of cytolytic and immunosuppressive drugs and infections.
E.g., Rheumatoid arthritis and multiple sclerosis	E.g., AIDS

31. Explain the process of replication of retrovirus after it gains entry into the human body.

- ✓ After getting into the body of the person, the virus enters into macrophages where RNA genome of the virus replicates to form viral DNA with the help of the enzyme reverse transcriptase.
- ✓ This viral DNA gets incorporated into the DNA of host cells and directs the infected cells to produce viral particles.
- ✓ The macrophages continue to produce virus and in this way acts like a HIV factory.
- ✓ Simultaneously, HIV enters into helper T-lymphocytes, replicates and produces progeny viruses.
- ✓ The progeny viruses released in the blood attack other helper T-lymphocytes.
- ✓ This is repeated, leading to a progressive decrease in the number of helper T lymphocytes in the body of the infected person.
- ✓ During this period, the person suffers from bouts of fever, diarrhoea and weight loss.

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- ✓ Due to decrease in the number of helper T lymphocytes, the person starts suffering from infections and becomes immune deficient and unable to protect against any infection.

32. Why is an antibody molecule represented as H2 L2?

- ✓ An antibody molecule is Y shaped structure
- ✓ Comprises of four polypeptide chains
- ✓ Two identical light chains (L) of molecular weight 25,000 Da (approximately 214 amino acids)
- ✓ Two identical heavy chains (H) of molecular weight 50,000 Da (approximately 450 amino acids).
- ✓ The polypeptide chains are linked together by di-sulphide (S-S) bonds.
- ✓ One light chain is attached to each heavy chain and two heavy chains are attached to each other to form a Y shaped structure.
- ✓ Hence, an antibody is represented by H2 L2.

33. Explain the structure of immunoglobulin with suitable diagram.

- ✓ An antibody molecule is Y shaped structure
- ✓ Comprises of four polypeptide chains
- ✓ Two identical light chains (L) of molecular weight 25,000 Da (approximately 214 amino acids)
- ✓ Two identical heavy chains (H) of molecular weight 50,000 Da (approximately 450 amino acids).
- ✓ The polypeptide chains are linked together by di-sulphide (S-S) bonds.
- ✓ One light chain is attached to each heavy chain and two heavy chains are attached to each other to form a Y shaped structure.
- ✓ Each chain (L and H) has two terminals, are C - terminal (Carboxyl) and amino or N-terminal.
- ✓ Each chain (L and H) has two regions, have variable (V) region at one end and a much larger constant (C) region at the other end.

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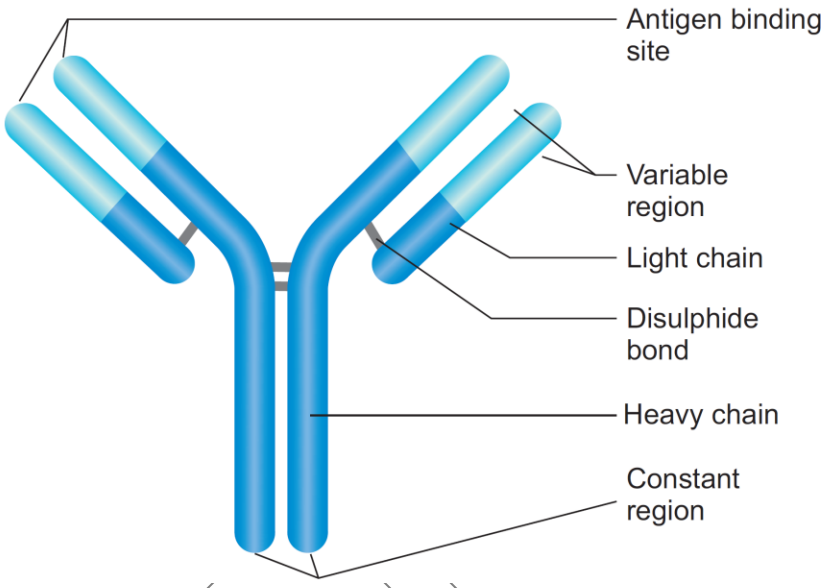

34. What is vaccine? What are its types?

- ✓ A vaccine is a biological preparation that provides active acquired immunity to a particular disease and resembles a disease-causing microorganism and is often made from weakened or attenuated or killed forms of the microbes, their toxins, or one of its surface proteins.

First generation vaccine

- ✓ Subdivided into live attenuated vaccine, killed vaccine and toxoids.

Live attenuated vaccines

- ✓ the weakened (attenuated), aged, less virulent form of the virus.
- ✓ E.g. Measles, mumps and rubella (MMR) vaccine and the Varicella (chickenpox) vaccine,

Killed (inactivated) vaccines

- ✓ killed or inactivated by heat and other methods.
- ✓ E.g. Salk's polio vaccine.

Toxoid vaccines

- ✓ Contain a toxin or chemical secreted by the bacteria or virus.
- ✓ E.g. DPT vaccine (Diphtheria, Pertussis and Tetanus).

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Second generation vaccine

- ✓ Contains the pure surface antigen of the pathogen.
- ✓ E.g. Hepatitis-B vaccine.

Third generation vaccine

- ✓ Contain the purest and the highest potency vaccines which are synthetic in generation.
- ✓ E.g., DNA vaccine or recombinant vaccine

35. Tabulate and analysis of two species population interaction.

SN. NO.	TYPES OF INTERATION	SPECIES 1	SPECIES 2	GENERAL NATUE OF INTERACTION	EXAMPLES
1	Amensalism	--	0	The most powerful animal or large organisms inhibits the growth of other lower organisms	Cat and Rat
2	Mutualism	+	+	Interaction favorable to both and obligatory	Between crocodile and bird
3	Commensalism	+	0	Population 1, the commensal benefits, while 2 the host is not affected	Sucker fish on shark
4	Competition	--	--	Direct inhibition of each species by the other	Birds compete with squirrels for nuts and seeds.
5	Parasitism	+	--	Population 1, the parasite, generally smaller than 2, the host	*Ascaris* and tapeworm in human digestive tract.
6	Predation	+	--	Population 1, the predator, generally larger than 2, the prey	Lion predatory on deer

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36. Explain parasitism with an example.

- ✓ Parasitism (+, --) is a kind of harmful interaction between two species, wherein one species is the 'parasite' and the other its 'host'.
- ✓ The parasite benefits at the expense of the host.
- ✓ A parasite derives shelter, food and protection from the host.
- ✓ Parasites exhibit adaptations to exploit their hosts.

The parasites may be

- ✓ Viral parasites E.g., Plant / Animal viruses
- ✓ Microbial parasites E.g., bacteria / protozoa / fungi
- ✓ Phyto parasites Eg., Plant parasites
- ✓ Zooparasites E.g., Platyhelminthes, nematodes, arthropods). Ectoparasites - attach to the surface of the host Eg., lice, Leech
- ✓ Endoparasites - live within the body of the host Eg., ascaris, tapeworm
- ✓ Temporary parasites - spend only a part of their life cycle as parasites. E.g., Glochidium larva of Anadonia (fresh water mussel)
- ✓ Permanent parasites - spend their life completely dependent on their host organism. E.g., Entamoeba, Round worms, Pin worms, Tape worms

SOME MORE POINTS TO REMEMBER

- ✓ *The cytoplasmic extranuclear genes have a characteristic pattern of inheritance which do not resemble the genes of nuclear chromosomes and is known as extra chromosomal or extra nuclear or cytoplasmic inheritance.*
- ✓ *The term eugenics means "well born" and was coined by Francis Galton*
- ✓ *Eugenics - Application of the laws of genetics for the improvement of human race is called eugenics.*
- ✓ *Euphenics - The symptomatic treatment of genetic disease of man is called Euphenics or Medical engineering. Eg. Phenylketonuria (PKU)*
- ✓ *Euthenics - The science of improvement of existing human race by improving the environmental conditions is called euthenics.*

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- ✓ The process by which one species evolves into one or more different species is called speciation.
- ✓ Speciation is a fundamental process in evolution.
- ✓ Evolution of a new species in a single lineage is called an agenesis / phyletic speciation.
- ✓ If one species diverges to become two or more species it is cladogenesis or divergent evolution.
- ✓ *Kala – azar or visceral leishmaniasis is caused by Leishmania donovani,*
- ✓ *Kala – azar is transmitted by the vector Phlebotomus (sand fly).*
- ✓ *When the cells act as antigens in the same body, they are called autoantigens.*

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