

ZOO511 – PRINCIPLES OF SYSTEMATICS

FINAL TERM MOST IMPORTANT QUESTIONS

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1. What is an Herbivore?

Animals that mainly feed on plants and herbs are called Herbivorous animals. For example: Goat, Horse, sheep, rabbit e.t.c.

2. Explain Green lacewing?

Green lacewings are an often under-appreciated group of beneficial insects. As with lady beetles, these natural enemies are important predators of many types of soft bodied insects and insect eggs. The adult green lacewing is about 3/4 inches long, light green and has a delicate appearance with lacy wings. One unusual characteristic are its eyes, they look like two golden hemispheres. They are weak fliers and are commonly found near aphid colonies. The adults feed mostly on nectar, pollen, and honeydew but with some species the adults will feed on insects. The eggs are either laid singly or in small groups. Each is always found perched on the tip of a hair-like stalk that is about 1/2 inch long. This helps to reduce cannibalism of the eggs by sibling larvae. Females will usually deposit the egg close a food source for the larvae. The larvae are brown and white and may grow up to about 1/2 inch in length. Larvae are called aphid lions, because they feed on other soft-bodied insects as well as aphids. They are voracious feeders, attacking with large, curved, hollow mandibles.

3. Write classification of Species?

In the 18th century, naturalist Carl Linnaeus invented a system for classifying all living species and defining their relationship to one another. In this system, each species belongs to a “genus”, a “family”, an “order”, a “class” a “branch” and a “kingdom”.

4. What is ANOVA test?

Analysis of variance (ANOVA) is a technique used to compare means of more than two samples. This technique can be used only for numerical data as it is a parametric test.

5. Write ways of ANOVA test.

The Seven Steps are:

- Step 1: Calculate the Mean
- Step 2: Setup the null and alternate hypothesis
- Step 3: Calculate the Sum of Squares
- Step 4: Calculate the Degrees of Freedom
- Step 5: Calculate the Mean Squares
- Step 6: Calculate the F Statistic
- Step 7: Look up statistical Table and state your conclusion

6. What are Epigyne?

Epigyne or epigynum is the external genital structure of female spiders.

7. Define Parasitoid.

A parasitoid is an organism that has young that develop on or within another organism (the host), eventually killing it. Parasitoids have characteristics of both predators and parasites. Parasitoids are usually smaller than their selected host.

8. What causes Rice Leaf Fold? What are its controls?

- Bright yellow or straw in color
- Two wavy lines in forewing and one in hind wing
- Eggs are laid singly or in groups in rows beneath the leaf surface
- Eggs are scaly white in color
- Incubation period is 4-8 days

Control

- Reform tillage and cultivation system
- Light trap or lure can be used.
- Utilize natural enemies (beetles and *Trichogramma* spp.) as biological control
- Application of chlorpyrifos EC 1000ml/acre

9. What is Karyology?

Karyology is description of size, shape and number of chromosomes.

10. Define systematic sampling?

In this sampling method first sample from the population is taken randomly but after that samples are selected systematically at a regular interval. Examples:

- Shopping Centre
- Selection of plants
- Selection of soil sample

11. Define female Mealybug egg laying.

Female Mealybug eggs are very small and are laid under a white, loose woolly wax, which remains attached to the abdomen of the females. A female may lay between 50 to 600 eggs. Within 3-9 days crawlers come out and actively move and spread out and settle down for on plant parts and gradually develops waxy coating.

12. Name body parts of Scorpion.

The body of a scorpion is divided into two parts or tagmata: the cephalothorax or prosoma, and the abdomen or opisthosoma. The opisthosoma is subdivided into a broad anterior portion, the mesosoma or pre-abdomen, and a narrow tail-like posterior, the metasoma or post-abdomen.

13. What is non-genetic variation?

Types of Non-Genetic variations

- Individual variations in Time
- Social Variations
- Ecological Variations
- Traumatic variation
- Post-mortem variations

14. What is Monograph?

A Monograph is a complete global account of a taxon of any rank – family, genus or species at a given time.

15. Write applications of T test.

The T-test is used to compare the mean of two samples, dependent or independent. It can also be used to determine if the sample mean is different from the assumed mean. T-test has an application in determining the confidence interval for a sample mean.

16. How to control yellow stem borer?

Control

- Destruction of weeds harboring pests
- Pulling out infested rice plant
- Flooding the field after harvest
- Stubble (short cut stalks) left after harvest should be ploughed up and burn or submerged in water immediately after harvest
- Crop rotation
- Application of insecticides
- Collection and destruction of egg masses from nursery plants.
- Setting up of light traps to trap and destroy the moth.
- Destruction of seedlings with “dead hearts” while planting.

17. Write types of coelom with examples.

Coelom

- Body cavity between body wall and alimentary canal
- Schizocoel/enterocoel
- Acoelomates: Coelenterates, Platyhelminthes.
- Coelomates: Mollusk, Annelids, Arthropod, Echinoderms, Vertebrates etc.
- Pseudocoelomates: Nematodes

18. Write components of reference.

- Reference in text
- Full reference
- Reference
- Reference of Thesis
- Reference of Book

19. Write characters of Arthropods.

- Some are aquatic, others are terrestrial, some are free living, other are parasitic.
- All arthropods have a body supported by hard exoskeleton
- Legs, antennae and mouth are jointed
- Tube like heart
- Overall body bilateral Symmetrical
- Seven million species
- Arthropods are the most successful of all animal phyla based on diversity, distribution, and numbers.
- Nearly one million species identified so far, mostly insects.
- The exoskeleton, or cuticle, is composed of protein and chitin.
- Molting of the cuticle is called ecdysis

- Extensive cephalization
- Open circulatory systems in which a heart pumps hemolymph through short arteries and into open spaces (sinuses)
- Aquatic members have gill for gas exchange; terrestrial members- tracheal system of branched tubes leading from surface throughout body
- Appendages in arthropods are modified for a number of functions:
 - Walking legs
 - Mouth parts
 - Antennae
 - Claws
 - Organs for mating
 - Holding eggs
- Segmentation is an ancestral characteristic that carries over from the Annelids
- The exoskeleton provides rigid support and strong points for muscle attachment
- The exoskeleton also forms a protective shell.

20. Explain Cephalothorax region of Spiders.

The cephalothorax is the first of 2 body parts on a spider. It is a combination of the head and thorax, and on it is found the legs, eyes, pedipalps, chelicerae, and other mouthparts.

21. Explain Water Vascular System of Echinoderms.

Echinoderms are characterized by a unique coelomic water vascular system. This is a hydraulically controlled system consisting of a circumoral ring around the esophagus with connecting radial canals each leading to an ambulacrum. The radial canals in crinoids run along each arm into an ambulacral groove and tube feet.

22. Define Random Sampling.

- If every individual of target population has an equal chance of selection then it will be called random sampling. Simple random sampling is the easiest form of probability sampling.
- No biasness and expert opinion is required in this method.
- All the researcher needs to do is assure that all the members of the population are included in the list and then randomly select the desired number of subjects.

Examples:

- Selection of plants from rice fields
- Selection of students from class
- When carrying out a survey, it would be impractical to study a whole population.

23. What is Standard Deviation?

- It is positive square root of variance.
- Standard deviation provides of average of the differences of all scores from the mean.
- It is a measure of the dispersion of scores around the mean.
- Generally, a low standard deviation means that a set of scores is not very widely dispersed around the mean.
- While a high standard deviation indicates that the scores are more widely dispersed
- Its advantage over variance is that its physical unit are same as that of individual observations.

24. Explain Biological Specie concept.

Biological Species Concept

“A species is a group of interbreeding natural population that is reproductively isolated from other such species”.

A species has three properties:

- Reproductive community
- Ecological Unit
- Genetic Unit

25. Explain sericulture in Pakistan.

SERICULTURE IN PAKISTAN

- Despite the growing demand for natural silk, this industry could not flourish in Pakistan.
- This industry is facing numerous challenges such as lack of trained personnel, high mortality rate in local silk breed, and poor economic conditions of the farmers.
- Unfortunately, this industry has not been on the list of priorities of our Government.
- Provide livelihood for rural poor families but silk proteins also have wide range of applications in textile, food, cosmetics and pharmaceutical industry as well as in traditional medicines.
- Currently, Pakistan is importing about 70% raw silk to meet the demand of local market.

26. Define social variation in ants.

Social variation in ants

Ants live in complex social colonies.

Queen: founder and leader of the colony. Primary goal is to populate colony. Lay thousands of eggs. Queen Chambers are deep within the colony for protection. Long life in some species up to 30 years.

Drones: Only function is to fertilize female. They die after fertilization. They are rarely encountered outside the colony.

Workers: Their tasks are Foraging and protection. Sometime: queen lay eggs, winged male and females-Alates or reproductive. After maturation, they leave the colony in swarms and establish new colony.

27. Write types of publications.

- Short research paper
- Synopsis & Reviews
- Revisions
- Monographs
- Faunal/Floral Work
- Field guide/Manuals
- Catalogues & Check lists

28. What is three domain system?

The three-domain system is a biological classification introduced by Carl Woese, Otto Kandler and Mark Wheelis in 1990 that divides cellular life forms into three domains, namely Archaea, Bacteria, and Eukaryote or Eukarya.

29. Define Aphids.

- Soft bodied & weak
- Compound and simple eyes
- Walking legs
- Skinny
- Head pointed downwards for feeding
- Most aphids have conicles (excrete pheromones)
- Also have cauda (flick honeydew)

30. Explain climatic conditions in ecological variation.

- Animals with phenotypic plasticity
- Variations with temperature, draught, cold etc.

31. What is metasoma?

- Metasoma is also called as postabdomen.
- The postabdomen includes five metasomal segments, the last of which contains the anus and bears the telson.
- The telson consists of the vesicle, which holds a pair of venom glands, and the hypodermic aculeus, the venom-injecting sting.

32. What conditions should be met to apply T test.

- For two sample t - test, the two populations must be independent
- It is not necessary that sample size should be same for both samples.

33. What is swim bladder?

The swim bladder is a gas-filled organ in the dorsal coelomic cavity of fish. Its primary function is maintaining buoyancy, but it is also involved in respiration, sound production, and possibly perception of pressure fluctuations (including sound).

34. Write note on post mortem variations.

It is impossible to prevent postmortem changes in some animals.

- Deep yellow plumage of twelve wire bird of paradise----white
- Chinese jay plumage changes from green to blue in collection
- Wasps over-exposed to cyanide turn bright red

35. Define lac insect.

- Lac insect live as parasite on sap of certain trees and shrubs and shows sexual dimorphism
 - *Babul (Acacia arabica)*
 - *Khair (Acacia catchu)*
- Its life is completed in 6 months
- Two crops can be obtained
- The adult lac insect shows a marked phenomenon of sexual dimorphism. The male and female insect varies in:
 - Shape
 - Size and
 - Presence or absence of certain body parts

36. Define central tendency.

Central tendency

- It provides information about average value of a data set.
- Mean, Median and Mode are commonly used measures of central tendency.
- Data set has only one Mean.
- Value of mean is influenced by all observations in the data set.

37. What is Floral work?

The shape, size and finer details of different parts of a flower helps one to identify a species. Moreover the flower color and structure helps one to get a clue on its pollinator and pollination biology.

38. Write five characters of phylum Mollusca.

Phylum Mollusca:

- They are mostly marine.
- They have segmented body with distinct head, muscular foot and visceral hump.
- They show bilateral symmetry.
- The shell may be external, internal or absent. It is secreted by mantle and made up of CaCO_3 .
- Coelom is greatly reduced. It bound to pericardial cavity and to small spaces within kidneys and gonads.
- They have complete digestive tract.
- They have open blood vascular system.
- Blood is blue due to copper containing blue respiratory pigment called haemocyanin.
- Respirator organs are gills.
- Excretory organs are one or two pairs of sac-like kidneys.
- Osphradium is present in some mollusks for testing physical and chemical nature of water.
- The sexes are separated but some are hermaphrodite.
- Nervous system consists of cerebral, visceral, pleural and pedal ganglia.

39. Differentiate between sample standard deviation and population standard deviation.

- A sample standard deviation is a statistic. This means that it is calculated from only some of the individuals in a population.
- The population standard deviation is a parameter, which is a fixed value calculated from every individual in the population.

40. Define two-way ANOVA.

- In two - way ANOVA there are two independent variables and one dependent variable.
- In one - way ANOVA there was only one independent variable.

41. Write a note on history of taxonomy.

Taxonomy is as old as the language skill of mankind. Taxonomy is the science of naming, describing and classifying organisms including all plants, animals and microorganisms of the world. Taxonomy identifies and enumerates the components of biological diversity. Native tribes used to call the species on the basis of their morphological characters

- Simpson in 1961 gives a valuable survey of History of Taxonomy. Simpson was the most influential paleontologists of the twentieth century. He published extensively on the taxonomy of fossil and extinct mammals.

- Frederick Smith worked in the zoology department of British Museum from 1849. He published from 1851 to 1870 on ant taxonomy. During the 28 years of his activity he described 25 genera, 702 species and subspecies.
- Thomas E. Mittler was an Austrian entomologist. He worked on history of higher taxonomy and also on the classification of insects.
- Mayr in 1982 provided a details of various periods of History of Taxonomy. His work contributed to the conceptual revolution that led to modern evolutionary synthesis of taxonomy and systematics.
- Several early Greek scholars notably Hippocrates enumerated the types of animals but he did not classify. Aristotle known as father of biological classification, referred to the major groups of animals. Aristotle also made distinction in insects He first used the following terms: Coleoptera and Diptera. He established numerous collective categories, or genera using differentiating characters. Aristotle made further categories of animals. His thinking dominated for next two thousand years. After his death no system of classification were recognized.

42. Explain Genetic Drift and its impact on allele frequency.

- Change in allele frequency which occur by chance.
- Loss in alleles
- Loss in genetic diversity
- Lost genes for ever
- Bottle neck effect
- Unique genes

43. Write composition of silkworm.

Silk emitted by the silkworm consists of two main proteins, sericin and fibroin, fibroin being the structural center of the silk, and sericin being the sticky material surrounding it. Fibroin is made up of the amino acids Gly-Ser-Gly-Ala-Gly-Ala and forms beta pleated sheets.

44. Describe Jassids.

- Major sucking pests of cotton.
- Eggs yellowish white.
- Nymphs and adults are greenish yellow with a black spot on tip of each forewing.
- Jump on disturbing.
- Nymphs and adults both suck sap.
- Leaves first show yellow and then reddish spots.
- Attacked leaves turn downwards, dry and fall.
- Plants become weak and their fruit fall.

45. Differentiate between amniotes and anamniotes with examples.

- Amniotes are higher vertebrates including reptiles, birds, and mammals
- Anamniotes are lower vertebrates including fishes and amphibians.
- The anamniotes are an informal group comprising the fishes and the amphibians, the so-called "lower vertebrates", which lay their eggs in water.
- They are distinguished from the amniotes, the "higher vertebrates" (reptiles, birds and mammals), which lay their eggs on land or retain the fertilized egg within the mother.

46. Discuss types of glands in mamals

Class Mammalia

These animals are warm blooded, hairy and have mammary or milk producing glands, (mammary glands). They are homoiothermous. Oil glands (sebaceous glands) and sweat glands (sudoriferous

glands) are present in the skin. Teeth are of different types (heterodont) and are embedded in the sockets of jaws (the codont).

47. Differentiate between Phyletic Gradualism and Punctuated Equilibrium.

Phyletic gradualism

- Evolution is a continuous process
- Bring small variation to particular species
- Occurred over a long period of time
- Describe as slow process
- Not proven by fossil record
- It is natural theory of natural selection.
- Small changes are passed from one generation to other generation.
- Horses 50 million years (from small to model day horse)

Punctuated Equilibrium

- Evolution is not a continuous process/fast at one time and slow at other time
- Caused consistent and accumulative changes
- Occurred within short period of time.
- Better model to describe species
- Evolution of Trilobites

48. Define homology structure with example.

- A body part with a same structure between some groups due to inheritance from same ancestor.
- Not necessarily performing same function.

49. Write methods of using taxonomic keys.

Indented Key:

In indented key, we have sequence of choices between two or more statements.

Bracketed Key:

- Pair of contrasting characters are taken in brackets
- It is Simple to use
- It is most commonly used in the field of taxonomic study.

Pictorial Key:

- For non-scientists
- Simple to use
- Key with pictures
- Jungle or desert/easy for identification of plants and animals

Polyclave Key:

- Based on computer program
- Simple to use
- Plant identification
- Take photos/Google/identification

50. Define Nominallistic Species concept.

Nominallistic Species Concept

- According to this concept “Nature produces individuals and nothing more”
- It is also known as Linneaus species concept.
- Proponents of this concept (Buffon, Bessey, Lamarck etc.) believe that only individuals exists but they do not believe in existence of species.
- Species are man's own creations
- No actual existence in nature.
- Mental concept nothing more.
- Such mental concept of man has no value.
- This concept was popular in France in 18th Century.

51. Write chemical control of citrus psylla.

- Insecticides
- Injection of trees with tetracyclin and antibiotics

52. Write about of parapatric speciation.

Parapatric speciation

- It occurs when populations are separated not by a geographical barrier, such as a body of water, but by an extreme change in habitat.
- Populations in these areas may interbreed.
- Charles Darwin was the first to propose this mode of speciation.
- Although interbreed but reduced gene flow.
- They often develop distinct characteristics and lifestyles.
- Reproductive isolation is rather temporal or behavioral.
- It is extremely rare.

53. Define systematics.

Biological systematics is the study of the diversification of living forms, both past and present, and the relationships among living things through time. Relationships are visualized as evolutionary trees. Phylogenies have two components: branching order and branch length.

54. Write classification of stink bug upto family.

Phylum	Arthropoda
Class	Insecta
Order	Hemiptera
Family	Pentatomidae
Sub-Family	Asopinae

55. What are types of mimicry?

Types of Mimicry

- Batesian mimicry
- Mullerian mimicry
- Wasmannian mimicry
- Peckhamian mimicry
- Self-mimicry

56. What are causes of speciation?

- Geographical Isolation
- Behavioral isolation
- Reproductive isolation

57. Define sub species and sibling species.

Sub species:

‘An aggregate of phenotypic ally similar populations of a species inhabitation a geographic subdivision of the orange of that species and differing taxonomically from other populations of that species.’

Sibling Species:

‘Reproductively isolated species without morphological difference are called sibling species’. Sibling species are very similar in appearance, behavior and other characteristics but they are reproductively isolated.

58. Write phylums of invertebrates.

Phylum Porifera, Phylum Cnidaria, Phylum Platyhelminthes, Phylum Annelida, Phylum Mollusca, Phylum Nematoda, Phylum Arthropoda, Phylum Echinodermata.

59. Write characteristics of coelenterate/cnidarians.

Phylum Coelentrata

- Coelentrata also known as Cnidaria. This name of cnidaria is due to single cavity Coelenteron.
- Cnidarian has tissue but don't have organ or organ system. That's why they possess tissue level of organization.
- They are radially symmetry and Diploblastic.
- No separate body cavity. They have incomplete digestive system. It has a single aperture mouth but don't have anus.
- They respire through body surface by diffusion.
- They excrete through body surface by diffusion.
- Segmentations are absent in them.
- Tentacles are present in them which act as appendages.
- They are mostly marine, aquatic animals and free-living animals.
- They reproduce both sexually and asexually.
- Ex :- Sea-pan, Sea-fan, Brain coral etc.

60. Write characters of spiders.

Spiders have two main body parts, eight legs, two pincerlike venomous appendages, and three pairs of spinnerets. Species range in length from 0.02 to 3.5 inches (0.5 to about 90 mm). The venom of a few species (e.g., brown recluse) is harmful to humans.

61. Explain mullerian mimicry.

Mullerian mimicry is the form of protective mimicry in which two or more distasteful or harmful species especially insects, closely resemble each other and therefore avoided equally by all their natural predators (Muller (1821-1897)/German born Brazilian Zoologist.

62. Write characteristics of reptiles.

- Reptiles are the creeping and burrowing cold blooded vertebrates bearing epidermal scales.
- They are ectothermic (coldblooded) and are found mostly in the warmer parts of the world.
- Skin is dry, rough and without glands, bearing epidermal scales or scutes.
- Snakes and lizards shed their scales as skin cast.
- They do not respire by means of gills. Respiration always takes place through lungs.
- Skull is monocondylic, i.e., with single occipital condyle.
- Except in snakes, there are two pairs of pentadactyl limbs, each with 5 digits bearing claws—tetrapodus pentadactyl type.
- Heart consists of two auricles and a partially divided ventricle. In crocodilians, heart is four chambered (two auricles and two ventricles).
- Twelve pairs of cranial nerves are present.
- Each ear consists of three parts; external, middle and internal. Snakes do not possess ears.
- The lateral line system is altogether absent.
- Tortoises feed almost entirely on vegetation.
- Some turtles are flesh eaters.
- All other reptiles are carnivorous/insectivorous.
- A typical cloaca is present.
- They are mostly oviparous.

63. Differentiate between cold blooded and warm blooded animals.

Warm blooded animals

- They maintain their body temperature
- Examples: Birds, Mammals

Cold Blooded animals

- Do not maintain their body temperature
- Examples: Amphibians, Fishes

64. Define clade.

- A clade is a group of organisms that evolved from a common ancestor.
- Eutheria is one mammalian clade and the other is Metatheria, which includes marsupials.
- Another example of a clade could be birds: they all also descended from a common ancestor.

65. What is lateral line system?

The lateral line, also called the lateral line organ, is a system of sensory organs found in fish, used to detect movement, vibration, and pressure gradients in the surrounding water.

66. Write names of spider legs.

- Spiders typically have eight walking legs (insects have six)
- They do not have antennae.
- The pair of appendages in front of the legs are the pedipalps (or just palps).
- Spider's legs are made up of seven segments.
- The tip of the tarsus bears claws, which vary in number and size.
- Spiders that spin webs typically have three claws, the middle one being small
- Hunting spiders typically have only two claws.
- Starting from the body end, these are the: Coxa, Trochanter, Femur, Patella, Tibia, Metatarsus, and Tarsus.

- Since they do not have antennae, spiders use specialized and sensitive setae on their legs to pick up scent, sounds, vibrations and air currents.
- Some spiders, such as the Australia crab spiders, do not have claws.
- The pedipalps have only six segments: the metatarsus is missing.
- In adult males, the tarsus of each palp is modified for mating (variously called a palpal pulb, palpal organ or copulatory bulb)

67. What is poison distribution?

The data distribution in which total numbers are not predetermined and some time there number can reach to infinite. These events occur in nature rarely. Outcome of such events is complete discrete value not in decimal points. For example number of deaths in Lahore per hour. Number of deaths can be infinite if some unusual event occurs.

68. Explain symmetry and body parts of echinoderms.

- Symmetry usually radial, nearly always pentamerous.
- Body shape globular, star-like, spherical, discoidal, or elongated.
- Water -vascular system of coelomic origin, including podia or tube feet for locomotion and usually with a madreporite.

69. What is swarming?

The mass movement of larvae from female cell to the new offshoots of host plant, is termed as “swarming”.

70. Explain Typological Species concept.

- Species is the basic unit of classification according to the International Commission of Zoological Nomenclature.
- Survey of taxonomic literature shows that there are more than 20 species concepts.
- This concept was proposed by Aristotle and Plato. According to this concept “A certain pattern of features is found in each species of organisms and all members of species show maximum equality in this format”. Example: certain pattern in dogs.

71. What variations occur in animals when climate change?

- Animals with phenotypic plasticity
- Variations with temperature, draught, cold etc.

72. Explain Brood Lac.

- Prior to about two weeks of hatching, lac bearing sticks are cut to the size of six inches. They are called “Brood lac”.
- Brood lacs are then kept for about two weeks in some cool place.
- When the larvae start emerging from this brood lac, they are supposed to be ready for inoculation.

73. Write classification of spiders up to order.

Phylum:	Arthropoda
Subphylum:	Chelicerata
Class:	Euchelicerata
Subclass:	Arachnida
Order:	Araneae

74. Who is father of Biological classification?

Aristotle is considered father of biological classification. He established numerous collective categories or genera using differentiating characteristics:

- Blooded and bloodless
- Two-footed vs four footed
- Hairy vs feathered
- With or without an outer shell
- Note: He failed to provide orderly and fully consistent classification of animals.

75. Define Accumulation Curve.

The species discovery curve or species accumulation curve is a graph recording the cumulative number of species of living things recorded in a particular environment as a function of the cumulative effort expended searching for them.

76. Write examples of flatworms.

Flatworms, Flukes, Turbellaria.

77. Define pathogen.

Pathogen is an infectious agent that feed on host body and cause damage to its host.

- Bacteria
- Viruses
- Protozoan

78. How to identify jumping spider?

- Jumping spiders are generally recognized by their eye pattern.
- All jumping spiders have four pairs of eyes, with the anterior median pair being particularly large.
- Best vision among arthropods.
- The legs are not covered with any very prominent spines.
- Their front four legs generally are larger than the hind four.
- Not held in the outstretched-arms attitude characteristic of the Thomisidae.
- The body length from 1 to 25 mm (0.04– 0.98 in).
- Prior to jumping, the spider attaches a silk thread to the surface beneath it, so it can climb quickly back to its perch if needed.
- Jumping spiders hunt and feed on small insects.
- All are carnivorous, but a few species also eat pollen and nectar.

79. Explain feeding habits of lynx spider.

- 9 genera worldwide, 419 species (WSC).
- The common name refers to their quickness and agility; lynx like in nature.
- They are dwellers grasses, found shrubs, on and trees.
- Primarily tropical and subtropical in distribution, but also in temperate zones
- Primarily vegetation.
- Feed on Insects and spiders.
- Oxyopids are active hunters during both day and night.
- They use their vision to detect and legs to catch.
- Some lynx's also capture prey by jumping from a stationary location much like a Salticid.

80. Explain internal morphology.

- Internal anatomy provides taxonomic Characters for all groups of higher animals.
- They extend to use vary from group to group.
- The skull of routinely used in classification of higher mammals.
- Teeth and bones of fossils and other hard parts.

81.Explain Hardy Weinberg calculation for genic and allelic frequency.**Hardy-Weinberg Equilibrium Model**

- P = frequency of Allele A
- q = Frequency of Allele a
- P² = Frequency of AA genotype
- 2pq= Frequency of Aa genotype
- q² = Frequency of aa genotype

	AA	Aa	aa	
Individuals	70	80	50	(200)
Genotypic Array	$70/200 = 0.35$	$80/200 = .40$	$50/200 = 0.25$	= 1
"A' alleles	140	80	0	$220/400 = 0.55$
'a' alleles	0	80	100	$180/400 = 0.45$

82. Write different types of mammary glands.

Cross-section of the human mammary gland. Mammals are divided into 3 groups: prototherians, metatherians, and eutherians. In the case of prototherians, both males and females have functional mammary glands, but their mammary glands are without nipples. These mammary glands are modified sebaceous glands.

83. Write types of non-probability sampling.

- Quota sampling
- Purposive sampling
- Convenience sampling
- Snowball sampling
- Self-selection sampling

84. Differentiate between Polytypic and Monotypic.

Species that contain two or more subspecies are called polytypic species. Species that are not subdivided into subspecies are called monotypic species.

85. Write types of sponges.

The approximately 5,000 living sponge species are classified in the phylum Porifera, which is composed of three distinct groups, the Hexactinellida (glass sponges), the Demospongia, and the Calcariea (calcareous sponges).

86. Write about eyes of spiders.

Eyes in Spiders:

Most spiders have eight eyes. Some species have six or fewer eyes, but they always come in an even number. Some species of spiders, such as those that live in caves or under the soil, have no eyes at all. Even those species with eight eyes don't usually see very well.

- Important Taxonomic character
- Eye arrangement in different families is unique
- 99% of all spiders have 8 eyes
- 1% nearly all has 6, but there are a few exceptions.
- Varying number of eyes in the same spider family.
- For example, there are spiders in Cybaeidae that have eight eyes, six eyes, and two eyes.

87. What problems occur in typological species concept?

Problems with Typological species concept

- Polymorphism within populations.
- Sibling or cryptic species.
- Geographical variations among populations.

88. Explain Phenetic method.

Phenetics

Computer algorithms based on the phenetic model rely on distance method to build tree from sequence data. Phenetic approach lead to faster algorithms and have nice statistical properties for molecular data. Error rate is less. But final tree is not highly reliable. Phenetics methods construct threes (phenogram) by considering the current states of characters without considering the evolutionary history that brought the species to their current phenotype.

89. Write about Hottentota tamulus.

Hottentotta tamulus, the Indian red scorpion also known as the eastern Indian scorpion, is a species of scorpion of the family Buthidae. It occurs in most of India, eastern Pakistan and the eastern lowlands of Nepal, and recently from Sri Lanka.

90. Explain cephalization in spiders.

In zoology, cephalization is the evolutionary trend toward concentrating nervous tissue, the mouth, and sense organs toward the front end of an animal. Fully cephalized organisms have a head and brain, while less cephalized animals display one or more regions of nervous tissue.

91. Write characters of Aves.

- Birds are bipedal feathered and warm blooded (homoiothermous) animals.
- The hind-limbs are adapted for perching, walking or swimming, etc., and usually bear four, sometimes three and rarely two toes.
- Except uropygium gland (preen gland or oil gland), at the base of the tail, no skin gland is present.
- Ostrich and parrot lack oil gland.
- The upper and lower jaws are modified into beak, which lacks teeth.
- Legs are modified for walking, hopping, grasping, perching, wading and swimming. Legs bear horny epidermal scales.
- The alimentary canal has additional chambers, the crop and gizzard.
- The crop stores and softens the food; however, the gizzard helps in crushing and churning the food.

- Gall bladder is absent in some seed-eating birds (graminivorous) such as pigeons.
- Respiration is by lungs. The lungs are spongy and inelastic. Air sacs are connected to lungs for supplement respiration.
- Voice is produced by a special organ, the syrinx.
- The heart is four-chambered. Sinus venosus is absent.
- Renal portal system is very much reduced. Red blood corpuscles are nucleated, oval and biconvex.
- The kidneys are metanephric.
- Birds have 12 pairs of cranial nerves.
- Female has usually well-developed single left ovary and oviduct. If right ovary and oviduct are present, they are vestigial (nonfunctional).
- Many birds show sexual dimorphism.
- All birds are oviparous.
- They show courtship, nest building, parental care, migration and territorial behaviour.

92. Write feeding habits of jumping spiders.

Although jumping spiders are generally carnivorous, many species have been known to include nectars in their diets and one species, *Bagheera kiplingi* feeds primarily on plant matter.

93. What is catalogue of taxonomic work?

- The Catalogue of Life is an online database
- It provides the most comprehensive and authoritative index of known species of organisms.
- The Catalogue interface is available in twelve languages and is used by research scientists, citizen scientists, educators, and policy makers
- June 2001; 19 years ago
- Current status is active
- Registration not required
- Not commercial
- Available in English Catalogue of life
- The Catalogue listed 300,000 species by 2003,
- 500,000 species by 2005 and over 800,000 species by 2006. As of 2019, the Catalogue lists 1.9M extant and extinct species.
- There are an estimated 14M mainly unpublished species.

94. What are correlated characters?

- Characters which are functionally correlated have very low weight
- They have low phylogenetic content
- Do not deserve to be treated as separate character
- Analogues organs birds wings, bats and insects (analogus)/convergent evolution
- Redundant
- Phyletic correlation
- High weight
- Higher genetic contents

95. Define Allelic frequency.

Allele frequency refers to how common an allele is in a population. It is determined by counting how many times the allele appears in the population then dividing by the total number of copies of the gene.

96. What are predators?

- Predators kill and consume other organisms (prey)
- Usually prey is smaller in size
- Weak
- Lion is a predator
- Spiders are predators
- Lady beetles are predators

97. Explain developmental process between Carrolus Linnaeus and Darwin's period.

Darwin Period

1. Specialization became more pronounced. Many authors identified birds, beetles, or butterflies
2. Classification became more hierarchical and soon the categories family and phylum were added.
3. Philosophical guidelines were rejected.
4. Search for a natural system was intensified.
5. This thought was applied by a botanist in 1873 and later by nearly all zoologists.
6. This shift from downward classification to upward classification was a philosophical change.
7. Evolutionary thought was widespread in 18th century.
8. Darwin believed in fixity of species but after observing natural fauna in Galapagos Island, he begins to believe in the plasticity of species.
9. Empirical taxonomists were greatly influenced by Darwin's idea.
10. The phylogenetic tree of Ernest Haeckel also stimulated the empirical workers.
11. Large number of new species were discovered and described.

Carl Linnaeus Period

1. Linnaeus adopted the principle of downward classification in 15th edition of his book (Systema naturae).
2. He for the first time applied binomial nomenclature to animal kingdom.
3. Linnaeus's idea was largely acceptable for the classification of insects.
4. Not acceptable for the classification of birds, amphibians, and lower vertebrates (Vermes).