

Previous Year Paper

1st June 2023 (Shift 3)

Q1. Match List-I with List-II:

List-I (Pathogen)		List-II (Disease)	
(A)	Wuchereria	(I)	Typhoid
(B)	Plasmodium	(II)	Pneumonia
(C)	Streptococcus	(III)	Malaria
(D)	Salmonella	(IV)	Elephantiasis

Choose the **correct** answer from the options given below:

- (a) (A)-(IV), (B)-(III), (C)-(II), (D)-(I)
- (b) (A)-(II), (B)-(I), (C)-(III), (D)-(IV)
- (c) (A)-(I), (B)-(II), (C)-(IV), (D)-(III)
- (d) (A)-(III), (B)-(IV), (C)-(I), (D)-(II)

Q2. The process of cutting out of DNA fragments from agarose gel and their extraction from gel piece is known as:

- (a) Purification
- (b) Elution
- (c) DNA fingerprinting
- (d) Transformation

Q3. Arrange the following step of PCR in correct sequence.

- (A) Extension of Primer
- (B) Annealing
- (C) Denaturation of ds DNA
- (D) Amplification
- (E) Use of DNA polymerase and deoxynucleotides

Choose the **correct** answer from the options given below:

- (a) (A), (C), (E), (D), (B)
- (b) (B), (E), (A), (C), (D)
- (c) (C), (B), (E), (A), (D)
- (d) (C), (A), (E), (B), (D)

Q4. The fruit which develops without fertilisation is called:

- (a) True fruit
- (b) Parthenocarpic fruit
- (c) False fruit
- (d) Polyembryonic fruit

Q5. Ozone depletion in the stratosphere is particularly marked over _____.

- (a) Antarctic region
- (b) Arctic region
- (c) Europe
- (d) Asia

Q6. 'Terror of Bengal' is another name of:

- (a) *Solanum tuberosum*
- (b) *Eichhornia crassipes*
- (c) Algal bloom
- (d) *Oryza sativa*

Q7. The adaptive radiation is represented by which of the following?

- (A) Darwin's finches
- (B) Koala and Wombat
- (C) Tiger cat and Sugar glider
- (D) Spotted cuscus and lemur
- (E) Anteater and Numbat

Choose the **correct** answer from the options given below:

- (a) (A), (B) and (D) only
- (b) (B), (C) and (E) only
- (c) (A), (B) and (C) only
- (d) (B), (D) and (E) only

Q8. Identify the antibody present in colostrum.

- (a) IgA
- (b) IgE
- (c) IgM
- (d) IgD

Q9. Forest, grassland and desert are examples of:

- (a) Aquatic ecosystem
- (b) Terrestrial ecosystem
- (c) Ecological pyramid
- (d) Energy flow

Q10. Identify the correct statements with respect to Baculoviruses:

- (A) They attack insects and other arthropods
- (B) They have broad spectrum insecticidal applications
- (C) They are species specific
- (D) They show no negative impact on plants, mammals, birds, fishes and non-target insects

Choose the **correct** answer from the options given below:

- (a) (A), (B), and (D)
- (b) (A), and (D)
- (c) (A), (B), and (C)
- (d) (B), (C) and (D)

Q11. Arrange the following events chronologically as they occur during embryonic development.

- (A) Appearance Of heart sounds
- (B) Development Of limbs and digits
- (C) Formation of three primary germ layers
- (D) Separation Of eyelids

Choose the correct answer from the options given below:

- (a) (A), (B), (D), (C)
- (b) (C), (A), (B), (D)
- (c) (C), (A), (D), (B)
- (d) (A), (C), (B), (D)

Q12. The first restriction endonuclease to be isolated was:

- (a) *Eco RI*
- (b) *Hind II*
- (c) *Pru I*
- (d) *Bam HI*

Q13. "Species richness contributes to the well being of an ecosystem" was explained through an analogy "the rivet popper hypothesis". The hypothesis was given by:

- (a) Paul Ehrlich
- (b) David Tilman
- (c) Alexander Von Humboldt
- (d) Edward Wilson

Q14. Match **List-I** with **List-II**:

List-I (Crop)		List-II (Variety)	
(A)	Rice	(I)	<i>Pusa Sawani</i>
(B)	Wheat	(II)	<i>Ratna</i>
(C)	Cauliflower	(III)	<i>Kalyan Sona</i>
(D)	Okra	(IV)	<i>Pusa Shubhra</i>

Choose the **correct** answer from the options given below:

- (a) (A)-(I), (B)-(II), (C)-(III), (D)-(IV)
- (b) (A)-(II), (B)-(III), (C)-(IV), (D)-(I)
- (c) (A)-(I), (B)-(II), (C)-(IV), (D)-(III)
- (d) (A)-(III), (B)-(IV), (C)-(I), (D)-(II)

Q15. Match **List-I** with **List-II**:

List-I		List-II	
(A)	Produces crystals of toxic insecticidal proteins	(I)	<i>Meloidogyne incognita</i>
(B)	Nematode which infects the roots of tobacco plant	(II)	<i>Agrobacterium tumefaciens</i>
(C)	Vector used to transfer the nematode specific gene into the host plant was obtained from	(III)	<i>Bacillus thuringiensis</i>
(D)	Plasmids used to produce the insulin chains were obtained from	(IV)	<i>Propionibacterium shanmanii</i>
		(V)	<i>Escherichia coli</i>

Choose the **correct** answer from the options given below:

- (a) (A)-(I), (B)-(II), (C)-(IV), (D)-(III)
- (b) (A)-(III), (B)-(I), (C)-(II), (D)-(V)
- (c) (A)-(II), (B)-(I), (C)-(IV), (D)-(III)
- (d) (A)-(V), (B)-(I), (C)-(IV), (D)-(II)

Q16. Central dogma in molecular biology states that genetic information flows from:

- (a) DNA → DNA → Lipid
- (b) DNA → mRNA → Protein
- (c) Protein → mRNA → DNA
- (d) DNA → Protein → mRNA

Q17. Match **List-I** with **List-II**:

List-I		List-II	
(A)	Bacteriophage lambda	(I)	231 gene
(B)	Y-chromosome of human	(II)	48502 bp
(C)	<i>Escherichia coli</i> DNA	(III)	3.3×10^9 bp
(D)	Haploid content of human DNA	(IV)	4.6×10^6 bp

Choose the **correct** answer from the options given below:

- (a) (A)-(III), (B)-(IV), (C)-(II), (D)-(I)
- (b) (A)-(II), (B)-(I), (C)-(IV), (D)-(III)
- (c) (A)-(II), (B)-(III), (C)-(I), (D)-(IV)
- (d) (A)-(IV), (B)-(I), (C)-(III), (D)-(II)

Q18. Which of the following option is correct for amensalism?

- (a) One species is harmed and other is benefitted
- (b) One species is harmed and other remains unaffected
- (c) One species is benefitted and other remains unaffected
- (d) Both the species are harmed

Q19. Arrange the stages in the life cycle of Plasmodium after the bite of mosquito.

- (A) gametocytes in human RBCs
- (B) sporozoites in mosquito's salivary glands
- (C) sporozoites in human liver
- (D) Fertilization in gut of mosquito host

Choose the **correct** answer from the options given below:

- (a) (A), (C), (D), (B)
- (b) (B), (A), (D), (C)
- (c) (C), (A), (D), (B)
- (d) (A), (B), (D), (C)

Q20. Lichen can be used as industrial pollution indicator because:

- (a) They cannot grow in unpolluted area
- (b) They cannot grow in polluted areas
- (c) They can only grow hill - stations
- (d) They cannot grow in hill stations

Q21. Match **List-I** with **List-II**:

List-I (Organism)		List-II (Sex chromosomes)	
(A)	Male grasshopper	(I)	XY

(B)	Male <i>Drosophila</i>	(II)	ZX
(C)	Female bird	(III)	XX
(D)	Female grasshopper	(IV)	XO
		(V)	ZW

Choose the **correct** answer from the options given below:

- (a) (A)-(II), (B)-(III), (C)-(I), (D)-(IV)
 (b) (A)-(III), (B)-(II), (C)-(IV), (D)-(I)
 (c) (A)-(V), (B)-(I), (C)-(IV), (D)-(II)
 (d) (A)-(IV), (B)-(I), (C)-(V), (D)-(III)

Q22. What will be the chromosome number in the gamete of fruit fly if its meiocyte has 8 chromosomes?

- (a) 2 (b) 4
 (c) 8 (d) 16

Q23. Genetically modified rice i.e. Golden rice is enriched with:

- (a) Vitamin A
 (b) Vitamin B₆
 (c) Vitamin D
 (d) Vitamin E

Q24. The cotyledon in the seed of grass family is called:

- (a) Coleoptile
 (b) Coleorrhiza
 (c) Epiblast
 (d) Scutellum

Q25. There are 50 lotus plants in a pond. 20 new plants were added through reproduction. The birth rate of lotus in a year is:

- (a) 0.4 (b) 30
 (c) 20 (d) 2.5

Q26. The levels of biodiversity include:

- (a) Genetic diversity and species diversity
 (b) Species diversity and ecological diversity
 (c) Ecological diversity, species diversity and genetic diversity
 (d) Ecological diversity, genetic diversity

Q27. Arrange the steps of traditional plant breeding in sequentially.

- (A) Evaluation of hybrids
 (B) Emasculation of selected parents
 (C) Screening of germplasm
 (D) Hybridisation of selected parents
 (E) Release of hybrid variety

Choose the **correct** answer from the options given below:

- (a) (B), (A), (D), (C), (E)
 (b) (D), (B), (C), (E), (A)
 (c) (C), (B), (D), (A), (E)
 (d) (C), (D), (B), (E), (A)

Q28. Identify the statements which hold true for Phenylketonuria.

- (A) Phenylketonuria is a sex-linked disorder

(B) Phenylpyruvic acid is accumulated and converted to phenylalanine

(C) It is caused by mutation in a pleiotropic gene

(D) The affected individual lacks enzyme phenylalanine hydroxylase

Choose the **correct** answer from the options given below:

- (a) (A) and (B) only
 (b) (A) and (D) only
 (c) (C) and (D) only
 (d) (B) and (C) only

Q29. Down's syndrome is caused by:

- (a) trisomy of 14th chromosome
 (b) trisomy of 22nd chromosome
 (c) trisomy of 21st chromosome
 (d) short arm of 23rd chromosome

Q30. Microbe responsible for converting milk to curd is:

- (a) *Saccharomyces cerevisiae*
 (b) *Lactobacillus*
 (c) *E. Coli*
 (d) *Lens culinaris*

Q31. Adenosine deaminase deficiency is caused by _____ of the gene.

- (a) Duplication
 (b) Translocation
 (c) Deletion
 (d) Addition

Q32. Match List-I with List-II:

List-I (Structures for asexual reproduction)		List-II (Example)	
(A)	Conidia	(I)	Sponge
(B)	Gemmules	(II)	Hydra
(C)	Zoospores	(III)	Penicillium
(D)	Buds	(IV)	Algae

Choose the **correct** answer from the options given below:

- (a) (A)-(III), (B)-(IV), (C)-(II), (D)-(I)
 (b) (A)-(II), (B)-(IV), (C)-(I), (D)-(III)
 (c) (A)-(IV), (B)-(II), (C)-(III), (D)-(I)
 (d) (A)-(III), (B)-(I), (C)-(IV), (D)-(II)

Q33. Match List-I with List-II:

List-I		List-II	
(A)	Citric acid	(I)	<i>Saccharomyces cerevisiae</i>
(B)	Ethanol	(II)	<i>Trichoderma polysporum</i>
(C)	Cyclosporin A	(III)	<i>Monascus purpureus</i>
(D)	Statins	(IV)	<i>Clostridium butylicum</i>
		(V)	<i>Aspergillus niger</i>

Choose the **correct** answer from the options given below:

- (a) (A)-(V), (B)-(I), (C)-(IV), (D)-(II)
- (b) (A)-(II), (B)-(III), (C)-(IV), (D)-(I)
- (c) (A)-(V), (B)-(I), (C)-(II), (D)-(III)
- (d) (A)-(II), (B)-(I), (C)-(IV), (D)-(V)

Q34. Oral pills used by females for contraception consists of combination of:

- (a) Progesterone and Estrogen
- (b) Estrogen and Lactogen
- (c) Progesterone and Lactogen
- (d) Progesterone and Prolactin

Q35. Which of the following are not sexually transmitted diseases?

- (A) Gonorrhoea
- (B) AIDS
- (C) Diarrhoea
- (D) Syphilis
- (E) Ringworm

Choose the **correct** answer from the options given below:

- (a) (A) and (D) only
- (b) (C) and (D) only
- (c) (C) and (E) only
- (d) (A) and (E) only

Q36. Which of the following cannot be used as specimen for DNA finger printing?

- (a) Hair follicle
- (b) Saliva
- (c) Skin tissue
- (d) Food from stomach

Q37. The forelimbs of bat, whale, cheetah and human are the examples of:

- (a) Divergent evolution and analogous organs
- (b) Convergent evolution and analogous organs
- (c) Divergent evolution and homologous organs
- (d) Convergent evolution and homologous organs

Q38. Parturition is the:

- (a) End of pregnancy
- (b) Delivery of the foetus
- (c) Movements of the foetus during pregnancy
- (d) Distension of uterus

Q39. A sparrow is a primary consumer when it eat seeds, but becomes secondary consumer when it eats _____.

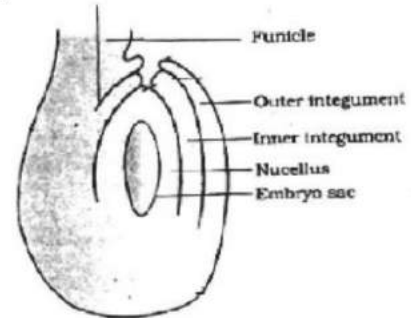
- (a) Fruits
- (b) Peas
- (c) Nuts
- (d) Insects

Q40. Which variety of Flat beans are resistant to Jassids and fruit borers?

- (a) Pusa Sawani
- (b) Pusa Komal
- (c) Pusa Sem 2

(d) Pusa Swarnim

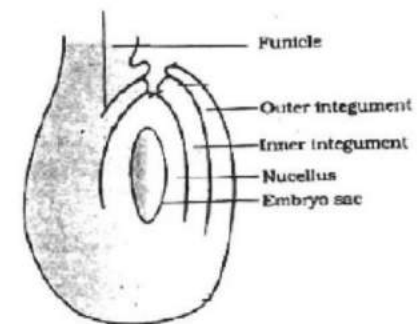
Q41. Answer the question from the diagram of typical anatropous ovule



The part of ovule which represents the junction between ovule and funicle:

- (a) Nucellus
- (b) Chalaza
- (c) Hilum
- (d) Micropyle

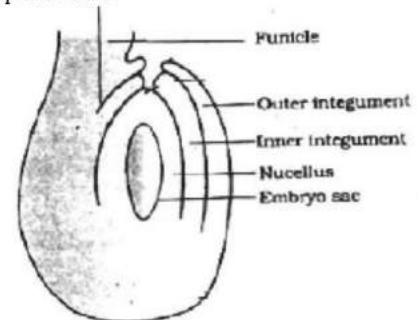
Q42. Answer the question from the diagram of typical anatropous ovule



The pollen tube enters the embryo sac through:

- (a) chalazal end
- (b) laterally
- (c) antipodals
- (d) micropylar end

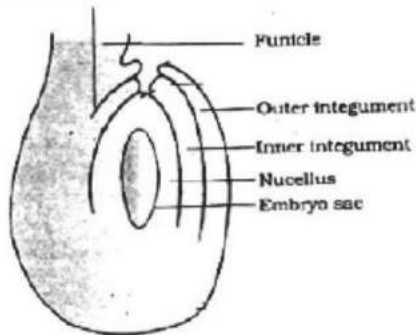
Q43. Answer the question from the diagram of typical anatropous ovule



The embryo sac is also known as:

- (a) megaspore
- (b) female gametophyte
- (c) megasporophyll
- (d) megagamete

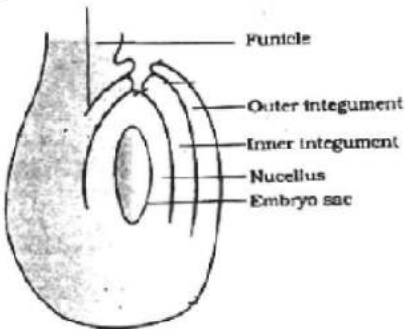
Q44. Answer the question from the diagram of typical anatropous ovule



Testa of a seed is produced from:

- (a) ovary wall
- (b) hilum
- (c) outer integument of ovule
- (d) funicle

Q45. Answer the question from the diagram of typical anatropous ovule



Identify the diploid cells present in the ovule:

- (A) Outer integument
- (B) Antipodal
- (C) Nucellus
- (D) Synergids

Choose the correct answer from the options given below:

- (a) (A), (B), only
- (b) (A), (C), only
- (c) (B), (C) only
- (d) (B), (D), only

Direction for the question 46 to 50: **Read the given paragraph and answer the given question.**

Nearly all plants cannot maintain a constant internal environment. Their body temperature changes with the ambient temperature. In aquatic animals, the osmotic concentration of the body fluids changes with that of the ambient air, water osmotic concentration. These animals and plants are simply conformers. Considering the benefits of a constant internal environment to the organism, we must ask why these

conformers had not evolved to become regulators. Recall the human analogy we used above; much as they like, how many people can really afford an air conditioner? Many simply 'sweat it out' and resign themselves to suboptimal performance in hot summer months. Very small animals are rarely found in polar regions. During the course of evolution, the costs and benefits of maintaining a constant internal environment are taken into consideration. Some species have evolved the ability to regulate, but only over a limited range of environmental conditions, beyond which they simply conform.

If the stressful external conditions are localised or remain only for a short duration, the organism has other alternatives for survival.

Q46. Conformers are the animals whose:

- (a) Body temperature remains constant.
- (b) Body temperature is higher than the ambient temperature.
- (c) Body temperature is lower than the ambient temperature.
- (d) Body temperature changes with the ambient temperature.

Q47. Identify the conformer from the following:

- (a) Elephant
- (b) Shrew
- (c) Human
- (d) Dog

Q48. Very small animals are rarely found in polar regions because they:

- (a) Cannot tolerate very low temperature.
- (b) Lose body heat very fast because of a larger surface area relative to their volume.
- (c) Lose body heat slowly because of a larger surface area relative to their volume.
- (d) Lose body heat very fast because of a smaller surface area relative to their volume.

Q49. Identify the animals for which thermoregulation is comparatively an energetically expensive process:

- (a) Humming birds and fishes
- (b) Shrews and frogs
- (c) Frogs and fishes
- (d) Humming birds and shrews

Q50. Why is it that most of the animals (99%) evolved are not able to maintain their body temperature?

- (a) Thermoregulation is a useless process
- (b) Thermoregulation is a useful process
- (c) Thermoregulation is energetically expensive process
- (d) Thermoregulation is energetically frugal process.

SOLUTIONS

S1. Ans. (a)

Sol. Wuchereria the filarial worms cause a slowly developing chronic inflammation of the organs in which they live for many years, usually the lymphatic vessels of the lower limbs and the disease is called elephantiasis or filariasis. Plasmodium, a tiny protozoan is responsible for malaria. Bacteria like *Streptococcus pneumoniae* are responsible for the disease pneumonia. *Salmonella typhi* is a pathogenic bacterium which causes typhoid fever in human beings.

S2. Ans. (b)

Sol. The separated bands of DNA are cut out from the agarose gel and extracted from the gel piece. This step is called elution. Elution is generally a process of extracting one material from another by washing with a solvent. It helps in the extraction of sample material into the solution so that it can be tested easily.

S3. Ans. (c)

Sol. Polymerase chain reaction or PCR consists of the following three steps:
Denaturation- The two DNA strands of template DNA separate from each other when heated to 92°C.
Annealing- The primers anneal to the 3' end of single strands of DNA.
Extension- The primers are extended by DNA polymerase by the addition of nucleotides to form complete strands of DNA. Hence the sequence of steps is denaturation, annealing, extension.

S4. Ans. (b)

Sol. The process of the formation of the fruits without the process of fertilization is known as parthenocarpy. The fruit is formed without the production of the seeds. This type of seedless fruit variety development is used in the banana and grapes.

S5. Ans. (a)

Sol. Ozone depletion is occurring widely in the stratosphere, particularly marked over the Antarctic region.

S6. Ans. (b)

Sol. Water hyacinth (*Eichhornia crassipes*) is called the 'Terror of Bengal'. It is an exotic species which is not native to Bengal. But once it got introduced into the water bodies of Bengal, it grew very fast and competed with the native species eliminating many of them. It depleted the dissolved oxygen in the water bodies leading to large scale loss of aquatic life, particularly fishes. This is why water hyacinth is referred to as the 'terror of Bengal'

S7. Ans. (c)

Sol. Adaptive radiation is the evolutionary diversification of many related species from a common ancestral species in a relatively short period. It is seen in mammals, marsupials and finches.

S8. Ans. (a)

Sol. Colostrum is a yellowish fluid secreted by mother during the initial days of lactation. Immunoglobulin A (IgA) is abundant in colostrum.

S9. Ans. (b)

Sol. Forest, grassland and desert are some examples of terrestrial ecosystems; pond, lake, wetland, river and estuary are some examples of aquatic ecosystems.

S10. Ans. (b)

Sol. Baculoviruses are pathogens that attack insects and other arthropods. The majority of baculoviruses used as biological control agents are in the genus *Nucleopolyhedrovirus*. These viruses are excellent candidates for species-specific, narrow spectrum insecticidal applications.

S11. Ans. (b)

Sol. Immediately after implantation, the inner cell mass (embryo) differentiates into an outer layer called ectoderm and an inner layer called endoderm. A mesoderm soon appears between the ectoderm and the endoderm. These three layers give rise to all tissues (organs) in adults. In human beings, after one month of pregnancy, the embryo's heart is formed. The first sign of growing foetus may be noticed by listening to the heart sound carefully through the stethoscope. By the end of the second month of pregnancy, the foetus develops limbs and digits. By the end of 12 weeks (first trimester), most of the major organ systems are formed, for example, the limbs and external genital organs are well developed. The first movements of the foetus and appearance of hair on the head are usually observed during the fifth month. By the end of about 24 weeks (end of second trimester), the body is covered with fine hair, eye-lids separate, and eyelashes are formed.

S12. Ans. (b)

Sol. Restriction enzymes cleave the DNA away from the recognition site. The first restriction endonuclease isolated was HindIII.

S13. Ans. (a)

Sol. The 'rivet popper hypothesis' was used by Stanford ecologist Paul Ehrlich.

S14. Ans. (b)

Sol. Okra is Pusa sawani, cauliflower is Pusa subhra, wheat is Kalyan sona and rice is Ratna.

S15. Ans. (b)

Sol. *Bacillus thuringiensis* produces crystals of toxic insecticidal proteins, *Meloidogyne incognita* is a nematode which infects the roots of tobacco plant, *Agrobacterium tumefaciens* is a vector used to transfer the nematode specific gene into the host plant and *Escherichia coli* are plasmids used to produce the insulin chains.

S16. Ans. (b)

Sol. Francis Crick proposed the central dogma of molecular biology in 1958, which tells about the flow of genetic information from DNA to RNA to Protein.

S17. Ans. (b)

Sol. Bacteriophage lambda has 48502 base pairs (bp), *Escherichia coli* has 4.6×10^6 bp, and haploid content of human DNA is 3.3×10^9 bp. Y gene has 231 genes.

S18. Ans. (b)

Sol. Amensalism is a type of biological interaction where one species causes harm to another organism without any cost or benefits to itself. It can be seen as a form of interaction or competitive behaviour among other organisms.

S19. Ans. (c)

Sol. The life cycle of plasmodium is : Immature sporozoites in the saliva of the mosquito are transmitted to the human when the mosquito bites the skin to feed on the blood of man. In the body of man, the parasites reach the liver, multiply and enter the blood where it attacks red blood cells for their haemoglobin. The red blood cells rupture to release the merozoites to attack more red blood cells. Haemozoin, a toxin is also released when the RBC ruptures. This causes chill and high fever. Some of the merozoites are transformed into gametocytes which are sexually mature and are transmitted back to another biting mosquito. In the mosquito, the gametocytes start the sexual cycle.

S20. Ans. (b)

Sol. Lichen can be used as industrial pollution indicators because lichens will not grow in polluted area. Lichens are organisms formed by mutually associated algae and fungi.

S21. Ans. (d)

Sol. The sex determining mechanism in grasshopper is XX-XO type. The males have only one X chromosome besides the autosomes whereas female has two X chromosomes. *Drosophila* has XY, the sex chromosomes in birds are designated Z and W, the male is homomorphic (ZZ) and the female heteromorphic (ZW).

S22. Ans. (b)

Sol. In diploid organisms, specialised cells called meiocytes (gamete mother cell) undergo meiosis. At the end of meiosis, only one set of chromosomes gets incorporated into each gamete. So chromosome number in the gametes will be 4.

S23. Ans. (a)

Sol. Golden rice is a good source of vitamin A and helps to prevent night blindness which is caused due to Vitamin A deficiency.

S24. Ans. (d)

Sol. In the grass family (monocot family), the cotyledon is shield-shaped and is situated towards one side of the embryonal axis. It is called scutellum.

S25. Ans. (a)

Sol. Birth rate will be $20 \div 50 = 0.4$ lotus in a year.

S26. Ans. (c)

Sol. Biodiversity is the term popularised by the sociobiologist Edward Wilson to describe the combined diversity at all the levels of biological organisation that include genetic, species and ecological diversity.

S27. Ans. (c)

Sol. The various sequential steps are : screening germplasm for resistance sources, hybridisation of selected parents, selection and evaluation of the hybrids and testing and release of new varieties.

S28. Ans. (c)

Sol. Phenylketonuria is an autosomal recessive metabolic disorder. The homozygous recessive individuals lack an enzyme called phenylalanine hydroxylase which converts phenylalanine to tyrosine in the liver. The absence of this enzyme leads to the accumulation of phenylalanine in the body causing skin pigmentation, mental retardation, and loss of hair.

S29. Ans. (c)

Sol. Down's Syndrome is caused due to the presence of an additional copy of the chromosome number 21 (trisomy of 21).

S30. Ans. (b)

Sol. Micro-organisms such as *Lactobacillus* and others commonly called lactic acid bacteria (LAB) grow in milk and convert it to curd.

S31. Ans. (c)

Sol. The first clinical gene therapy was given in 1990 to a 4-year old girl with adenosine deaminase (ADA) deficiency. This enzyme is crucial for the immune system to function. The disorder is caused due to the deletion of the gene for adenosine deaminase.

S32. Ans. (d)

Sol. Members of the Kingdom Fungi and simple plants such as algae reproduce through special asexual reproductive structures. The most common of these structures are zoospores that usually are microscopic motile structures. Other common asexual reproductive structures are conidia (*Penicillium*), buds (*Hydra*) and gemmules (*sponge*).

S33. Ans. (c)

Sol. Examples of acid producers are *Aspergillus niger* (a fungus) of citric acid, Yeast (*Saccharomyces cerevisiae*) is used for commercial production of ethanol, cyclosporin A, that is used as an immunosuppressive agent in organ-transplant patients, is produced by the fungus *Trichoderma polysporum*, Statins produced by the yeast *Monascus purpureus* have been commercialised as blood-cholesterol lowering agents.

S34. Ans. (a)

Sol. Oral administration of small doses of either progestogens or progestogen-estrogen combinations is a contraceptive method used by the females. They are used in the form of tablets and hence are popularly called the pills.

S35. Ans. (c)

Sol. Diarrhoea and ringworm are not STDs.

S36. Ans. (d)

Sol. DNA fingerprinting relies on the variation of repetitive sequences of DNA between different individuals to determine their uniqueness. Hence, the sample required to get the identity of the person is DNA, saliva contains cellular debris from buccal epithelial cells and WBCs, the hair follicle at the base of human hair contains cells rich in DNA. The hair pulled from the body retains remnants of roots which can be used for DNA analysis.

S37. Ans. (c)

Sol. Homologous structure of the organs or any other skeletal elements are the organs which have basic structural design and origin, but they have different in function, similarly the forelimbs of whales, bats and humans and cheetah are considered as homologous organs.

S38. Ans. (b)

Sol. Vigorous contraction of the uterus at the end of pregnancy causes expulsion/delivery of the foetus. This process of delivery of the foetus (childbirth) is called parturition.

S39. Ans. (d)

Sol. Since the sparrow eats seeds and fruits, it is primary consumer / herbivore. Since it eats worm, it is a primary carnivore / secondary consumer.

S40. Ans. (c)

Sol. Pusa Sem 2 variety of flat bean is resistant to jassids

S41. Ans. (c)

Sol. The body of the ovule fuses with funicle in the region called hilum. Thus hilum represents the junction between ovule and funicle.

S42. Ans. (d)

Sol. The pollen tube enters the embryo sac through micropylar end.

S43. Ans. (b)

Sol. Embryo sac is also known as the female gametophyte or megagametophyte.

S44. Ans. (c)

Sol. There are two layers in the seed coat - (i) outer layer (testa) that is usually hard and develops from the outer integument and (ii) the inner layer (tegmen) which forms from the inner integument when it becomes thin and papery.

S45. Ans. (b)

Sol. Nucellus forms a major part of the ovule and consists of a diploid layer of cells that surrounds the embryo sac. It provides nutrition to the embryo. The nucellus is part of the sporophyte and the ploidy is $2n$. The ploidy of outer integument is $2n$.

S46. Ans. (d)

Sol. Conformers are animals are also known as ectotherms, as they cannot regulate their own internal temperature. It adapts its behaviour to the surroundings or migrates to environments with optimal temperatures. Conformers are referred to as cold-blooded animals. Examples of this class are amphibians, reptiles, insects etc.

S47. Ans. (b)

Sol. Small animals like shrews and hummingbirds are conformers and are not able to maintain a constant internal environment. This is because they have a large surface area compared to their volume and loss or gain of heat is a function of the surface area of an organism.

S48. Ans. (b)

Sol. Since small animals have a larger surface area relative to their volume, they tend to lose body heat very fast when it is cold outside; then they have to expend much energy to generate body heat through metabolism. This is the main reason why very small animals are rarely found in polar regions.

S49. Ans. (d)

Sol. Thermoregulation is energetically expensive for many organisms particularly small animals like shrews and humming birds.

S50. Ans. (c)

Sol. Majority of animals cannot maintain a constant internal temperature. Their body temperature changes with ambient temperature. Thermoregulation is energetically expensive for many organisms.