Previous Year Paper

31st May 2023 (Shift 3)

Q1. Arrange the following steps of Polymerase Chain Reaction in correct sequence
A. Denaturation of ds DNA
B. Extension of Primers
C. Amplification of desired DNA
D. Primer Annealing

Choose the correct answer from the options given below:
(a) A, B, C, D
(b) D, C, A, B
(c) A, D, B, C
(d) C, B, D, A

Q2. Identify the correct sequence of steps in breeding crop plants for disease resistance.
A. Testing and release of New varieties
B. Hybridization of the selected parents
C. Screening germplasm for resistance source
D. Selection and evaluation of hybrids

Choose the **correct** answer from the options given below:
(a) C ⟶ B ⟶ A ⟶ D
(b) C ⟶ A ⟶ B ⟶ D
(c) C ⟶ B ⟶ D ⟶ A
(d) A ⟶ C ⟶ B ⟶ D

Q3. Match **List-I** with **List-II**:

List-I		List-II	
(A)	Structural genes in eukaryotes	(I)	Polycistronic
(B)	The coding sequence that appear in mature RNA	(II)	Monocistronic
(C)	Structural genes in Prokaryotes	(III)	Intron
(D)	Sequences not present in processed RNA	(IV)	Exons

Choose the **correct** answer from the options given below:
(a) (A)-(III), (B)-(IV), (C)-(I), (D)-(II)
(b) (A)-(IV), (B)-(III), (C)-(II), (D)-(I)
(c) (A)-(II), (B)-(IV), (C)-(I), (D)-(III)
(d) (A)-(I), (B)-(II), (C)-(III), (D)-(IV)

Q4. Identify the practices followed to avoid sexually transmitted infection
A. Avoiding sex with unknown partners/multiple panners
B. Using condom during coitus
C. Periodic Abstinence
D. Insertion of copper-T in the uterus

Choose the **correct** answer from the option given below:
(a) A and D only
(b) A and B only
(c) C and D only
(d) B and D only

Q5. Match **List-I** with **List-II**:

List-I (Use of transgenic animal)		List-II (Work done)	
(A)	Emphysema	(I)	Polio vaccine
(B)	Human alpha-lactalbumin	(II)	Rosie
(C)	Transgenic mice	(III)	Toxin sensitive transgenic animal
(D)	Chemical safety testing	(IV)	α-1-antitrypsin

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)-(IV), (B)-(II), (C)-(I), (D)-(III)

Q6. Sediment left after secondary treatment of sewage/waste is known as:
(a) Primary Effluent
(b) Primary Sludge
(c) Activated Sludge
(d) Secondary Effluent

Q7. Select the gases which combined with oxygen to form water, carbon dioxide and others organic compounds earlier on earth.
(a) Ammonia and Methane
(b) Ammonia and Hydrogen
(c) Methane and Hydrogen
(d) Methane and Ozone

Q8. Match **List-I** with **List-II**:

List-I		List-II	
(A)	*Anabaena*	(I)	Preparation of Ethanol
(B)	*Monascus purpureus*	(II)	Statins
(C)	*Saccharomyces cerevisiae*	(III)	Cyanobacteria
(D)	Trichoderma polysporum	(IV)	Cyclosporin A

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

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

Q9. Which is correct about amensalism?
(a) One species is harmed and other is unaffected
(b) One species is benefitted and other is unaffected.
(c) One species is harmed and other is benefitted.
(d) Both the species are benefitted.

Q10. Transcription is the process of copying genetic information from one strand of -
(a) RNA into DNA
(b) RNA into RNA
(c) DNA into RNA
(d) DNA into DNA

Q11. Arrange the following steps of retrovirus replication sequentially.
A. Production of viral DNA by reverse transcriptase
B. Introduction of viral RNA in host cell
C. Production of new viral RNA by host cell
D. Incorporation of viral DNA into host genome

Choose the **correct** answer from the options given below:
(a) A, B, D, C
(b) B, A, D, C
(c) C, D, A, B
(d) D, A, B, C

Q12. Match **List-I** with **List-II**:

List-I (Process of Event)		**List-II (Term or called as)**	
(A)	Event of fusion of male and female gametes	(I)	Syngamy
(B)	Gamete develops into new organism without fertilisation	(II)	*Cladophora*
(C)	Isogametes	(III)	*Fucus*
(D)	Heterogametes	(IV)	Parthenogenesis

Choose the **correct** answer from the options given below:
(a) (A)-(I), (B)-(II), (C)-(III), (D)-(IV)
(b) (A)-(II), (B)-(I), (C)-(III), (D)-(IV)
(c) (A)-(I), (B)-(IV), (C)-(II), (D)-(III)
(d) (A)-(III), (B)-(IV), (C)-(I), (D)-(II)

Q13. Match **List-I** with **List-II**:

List-I		**List-II**	
(A)	Law of independent assortment	(I)	9:3:3:1
(B)	Incomplete dominance	(II)	3:1
(C)	Law of dominance	(III)	AB blood group
(D)	Co-dominance	(IV)	Flower colour in Snapdragon

Choose the **correct** answer from the options given below:
(a) (A)-(I), (B)-(IV), (C)-(II), (D)-(III)
(b) (A)-(III), (B)-(I), (C)-(II), (D)-(IV)
(c) (A)-(IV), (B)-(II), (C)-(I), (D)-(III)
(d) (A)-(I), (B)-(III), (C)-(IV), (D)-(II)

Q14. In some plants, the ovary develops into fruit without fertilization. This phenomenon is called:
(a) Apomixis
(b) Asexual reproduction
(c) Sexual reproduction
(d) Parthenocarpy

Q15. Which of the following is not an alien species in India?
(a) Water hyacinth
(b) Elephant Grass
(c) Carrot Grass
(d) *Lantana*

Q16. Match **List-I** with **List-II**:

List-I (Disease)		**List-II (Causal organism)**	
(A)	Ascariasis	(I)	*Salmonella typhi*
(B)	Amoebiasis	(II)	*Plasmodium vivax*
(C)	Typhoid	(III)	*Entamoeba histolytica*
(D)	Malaria	(IV)	*Ascaris*

Choose the **correct** answer from the options given below:
(a) (A)-(I), (B)-(II), (C)-(III), (D)-(IV)
(b) (A)-(II), (B)-(I), (C)-(III), (D)-(IV)
(c) (A)-(I), (B)-(II), (C)-(IV), (D)-(III)
(d) (A)-(IV), (B)-(III), (C)-(I), (D)-(II)

Q17. The construction of first rDNA was done using plasmid of:
(a) *Haemophilus influenzae*
(b) *Escherichia coli*
(c) *Salmonella typhimurium*
(d) *Bacillus amyloliquifaciens*

Q18. The polypeptide chains A and B in Insulin are linked together by:
(a) Covalent bands
(b) Peptide bonds
(c) Disulphide bonds
(d) Vanderwal forces

Q19. Identify the correct statements with respect to *Homo habilis*

A. *Homo habilis* had a brain size of 650-800cc
B. They probably did not eat meat
C. They lived near east and central Asia
D. These were the first human-like creature

Choose the correct answer from the options given below:
(a) A, B and D only
(b) A, B and C only
(c) A, B, C and D
(d) B, C and D only

Q20. Match **List-I** with **List-II**:

List-I		List-II	
(A)	Wheat, resistant to hill bunt	(I)	Pusa Sawani
(B)	Okra, resistant to shoot and fruit borer	(II)	Pusa Swarnim
(C)	Wheat, having high protein content	(III)	Atlas 66
(D)	*Brassica*, resistant to white rust	(IV)	Himgiri

Choose the **correct** answer from the options given below:
(a) (A)-(IV), (B)-(I), (C)-(III), (D)-(II)
(b) (A)-(II), (B)-(III), (C)-(IV), (D)-(I)
(c) (A)-(I), (B)-(II), (C)-(IV), (D)-(III)
(d) (A)-(II), (B)-(I), (C)-(IV), (D)-(III)

Q21. The rate of formation of new organic matter by consumers in termed as:
(a) Tertiary Productivity
(b) Gross Primary Productivity
(c) Net Primary Productivity
(d) Secondary Productivity

Q22. Which sugarcane species was originally grown in North India?
(a) *Saccharum officinarum*
(b) *Saccharum barberi*
(c) *Aegilops speltoides*
(d) *Aegilops squarrosa*

Q23. Which of the following are colloidal material in domestic waste?
(a) Suspended clay and silt
(b) Fecal matter and bacteria
(c) Dissolved ammonia and calcium
(d) Fecal matter and clay

Q24. Which of the following does not have direct role in genetic engineering?
(a) Restriction enzymes
(b) Polymerase
(c) Lipase
(d) Vectors

Q25. Amniocentesis is used in the prenatal diagnosis of:
(a) Chromosomal abnormalities
(b) HIV
(c) STD
(d) Communicable diseases

Q26. Which of the following antibody is present in mother's milk?
(a) IgA
(b) IgE
(c) IgM
(d) IgG

Q27. Chromosome number in a gamete of rat is _____.
(a) 36
(b) 21
(c) 32
(d) 23

Q28. RNA interference involves silencing of a specific mRNA due to complementarity of
(a) tRNA
(b) DNA
(c) dsRNA
(d) mRNA

Q29. The karyotype of a person with Turner's syndrome is:
(a) 44 + XY
(b) 44 + XO
(c) 44 + XXY
(d) 44 + YO

Q30. Identify the correct statement with respect to Mycorrhiza.

A. Fungal symbiont absorbs phosphorus from the soil and passes it on to the roots of the plant
B. Many members of the genus Glomus form mycorrhiza.
C. In paddy fields, mycorrhiza serve as an important biofertilizer.
D. Plants with mycorrhiza show tolerance to salinity and drought.

Choose the ***correct*** answer from the options given below:
(a) A, B and C
(b) A and C
(c) C and D
(d) A, B and D

Q31. Which of the following is a fine powder of recycled modified plastic?
(a) Polybond
(b) Polyfibre
(c) Polypowder
(d) Polyblend

Q32. In the course of evolution, life forms on earth tend to move from _____
(a) Land to water
(b) Water to land
(c) Dry land to wet land
(d) Fresh water to marine water

Q33. Which one of the following areas does not cover India's biodiversity hotspots?
(a) Indo-Burma plains
(b) Indo-Gangetic plains
(c) Western Ghats
(d) Himalayas

Q34. Number of births during a given period in a population is called as
(a) Natality
(b) Morality
(c) Immigration
(d) Emigration

Q35. The bond between two successive nucleotides in RNA is
(a) Peptide bond
(b) Hydrogen bond
(c) N-glycosidic bond
(d) Phosphodiester band

Q36. Foetal ejection reflex triggers the release of:
(a) Cortisol
(b) Oxytocin
(c) Colostrum
(d) Vasopressin

Q37. The detritus food chain (DFC) has _____ at the first tropic level.
(a) Autotrophs
(b) Dead organic matter
(c) Herbivores
(d) Carnivores

Q38. Identify the statements which are true with respect to colour blindness
A. Sex-linked recessive disorder
B. Sufferers are unable to differentiate between red or green colour
C. It occurs in 8% males and 0.4% females.
D. The defect is due to the mutation in genes present on 'Y' chromosome

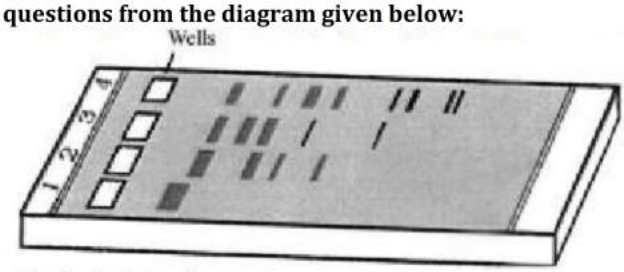
Choose the ***correct*** answer from the options given below:
(a) A, B and D only
(b) A and D only
(c) A, B and C only
(d) B, C and D only

Q39. Identify the statements which are correct with respect to lactation.
A. It helps the mother in feeding new born
B. It is triggered by foetal ejection reflex
C. Mammary glands start producing milk towards the end of pregnancy
D. Colostrum milk is rich in antigens.

Choose the **correct** answer from the options given below:
(a) A, B, C only
(b) B, C only
(c) B. C, D only
(d) A, C only

Q40. Transfer of pollen grains from anther to the stigma of another flower of the same plant is:
(a) Chasmogamy
(b) Geitonogamy
(c) Xenogamy
(d) Hybridisation

Direction for the question 41 to 45: **Answer the following questions from the diagram given below:**



Gel electrophoresis

Q41. The figure is showing the technique Of gel electrophoresis. The matrix used in this technique is made out of:
(a) DNA
(b) RNA
(c) Acryl amide
(d) Agarose

Q42. The technique shown in the picture is used to:
(a) Visualise nucleic acids
(b) Separate the nucleic acid fragments according to their size.
(c) Separate the nucleic acid fragments according to their charge.
(d) Visualise RNA and proteins only

Q43. The samples in different lanes are from different sources but treated with a common restriction endonuclease. The maximum number of restriction sites are present in
(a) Sample 4
(b) Sample 3
(c) Sample 2
(d) Sample 1

Q44. The most number of nucleotides will be present in (from left to right)
(a) Lane 4, band 6
(b) Lane 2, band 2
(c) Lane 3, band 4
(d) lane 1, band 1

Q45. The process of extracting the separated bond from the gel matrix is called
(a) Extraction
(b) Elution
(c) Segregation
(d) Retraction

Direction for the question 46 to 50: **Read the passage and answer the question:**

Secondary treatment or biological treatment: The primary effluent is passed into large tanks where air is pumped into it. This allows vigorous growth of aerobic microbes. While growing, these microbes consume the major part of the organic matter in the effluent. This significantly change the BOD (biochemical oxygen demand) of the effluent.

The effluent in then passed into a tank a small part of the sludge is pumped back into the aeration tank to serve as the inoculum. The remaining major part of the sludge is pumped into large tanks called sludge digesters. Here, other kinds of bacteria grow anaerobically in the sludge. The biogas produced can be used source of energy as it is inflammable. The effluent from the secondary treatment plant is generally released into natural water bodies like rivers and streams.

Q46. The greater the BOD of water
(a) Less is its pollution level
(b) Less is its oxygen consumption
(c) More is its pollution level
(d) No relation between oxygen consumption and BOD

Q47. Steps in primary treatment does not include:
(a) Filtration and Sedimentation
(b) Sedimentation only
(c) Grit filtration only
(d) Anaerobic digestion

Q48. Which of the following gas is not produced in anaerobic digestion?
(a) Carbon dioxide
(b) Sulphur dioxide
(c) Hydrogen sulphide
(d) Methane

Q49. The anaerobic sludge digester _____
(a) Supports microbial growth
(b) Digests the aerobic bacteria and fungi
(c) Sends the waste to secondary settlement tank
(d) Contains grit and stones for churning organic waste in water

Q50. The biogas is a mixture of the following gases
(a) Methane, Carbon dioxide and Oxygen
(b) Methane: Carbon dioxide and Hydrogen sulphide
(c) Carbon dioxide, Nitrogen and Hydrogen sulphide
(d) Methane, Hydrogen sulphide and Oxygen

SOLUTIONS

S1. Ans. (c)

Sol. The steps are as follows:

- Denaturation - When heated to 92°C, the two DNA strands of template DNA separate from each other because H-bonds between nucleotide base pairs are broken to separate the double helical structure.
- Annealing - The two primers anneal each of the single strands of DNA at the end of 3'OH.
- Extension - By adding nucleotides to form full strands of DNA, the primers are extended by DNA polymerase.

S2. Ans. (c)

Sol. The main steps in breeding a new genetic variety of a crop are:

Collection of germplasm→ Evaluation of germplasm and selection of parents→ Cross hybridisation among the selected parents→ Selection and testing of superior recombinants→ Testing, release and commercialisation of new cultivars.

S3. Ans. (c)

Sol. a cistron is a segment of DNA coding for a polypeptide, the structural gene in a transcription unit could be said as monocistronic (mostly in eukaryotes) or polycistronic (mostly in bacteria or prokaryotes). In eukaryotes, the monocistronic structural genes have interrupted coding sequences – the genes in eukaryotes are split. The coding sequences or expressed sequences are defined as exons. Exons are said to be those sequence that appear in mature or processed RNA. The exons are interrupted by introns. Introns or intervening sequences do not appear in mature or processed RNA.

S4. Ans. (b)

Sol. To avoid STDs one should:

Avoid sex with unknown partners/multiple partners, always try to use condoms during coitus, in case of doubt, one should go to a qualified doctor for early detection and get complete treatment if diagnosed with infection.

S5. Ans. (d)

Sol. Transgenic animals that produce useful biological products can be created by the introduction of the portion of DNA (or genes) which codes for a particular product such as human protein (α-1-antitrypsin) used to treat emphysema. Similar attempts are being made for treatment of phenylketonuria (PKU) and cystic fibrosis. In 1997, the first transgenic cow, Rosie, produced human protein-enriched milk (2.4 grams per litre). The milk contained the human alpha-lactalbumin and was nutritionally a more balanced product for human babies than natural cow-milk. Transgenic mice are being developed for use in testing the safety of vaccines before they are used on humans. Transgenic mice are being used to test the safety of the polio vaccine. Chemical safety testing is known as toxicity/safety testing. The procedure is the same as that used for testing toxicity of drugs. Transgenic animals are made that carry genes which make them more sensitive to toxic substances than non-transgenic animals. They are then exposed to the toxic substances and the effects studied. Toxicity testing in such animals will allow us to obtain results in less time.

S6. Ans. (c)

Sol. Activated sludge is formed during the secondary treatment of sewage.

S7. Ans. (a)

Sol. Oparin of Russia and Haldane of England proposed that the first form of life could have come from pre-existing non-living organic molecules (e.g. RNA, protein, etc.) and that formation of life was preceded by chemical evolution, i.e., formation of diverse organic molecules from inorganic constituents. The conditions on earth were – high temperature, volcanic storms, reducing atmosphere containing CH_4 , NH_3 , etc. In 1953, S.L. Miller, an American scientist created similar conditions in a laboratory scale. He created electric discharge in a closed flask containing CH_4, H_2, NH_3 and water vapour at 8000C. He observed formation of amino acids.

S8. Ans. (b)

Sol. Yeast (Saccharomyces cerevisiae) is used for commercial production of ethanol. Another bioactive molecule, 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. Cyanobacteria are autotrophic microbes widely distributed in aquatic and terrestrial environments many of which can fix atmospheric nitrogen, e.g. Anabaena, Nostoc, Oscillatoria, etc.

S9. Ans. (a)

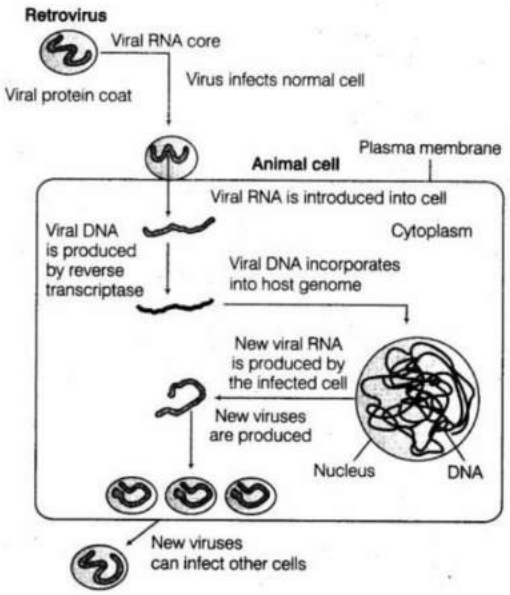
Sol. In amensalism one species is harmed whereas the other is unaffected.

S10. Ans. (c)

Sol. The process of copying genetic information from one strand of DNA into RNA is termed transcription.

S11. Ans. (b)

Sol. Replication of retrovirus is as follows:



S12. Ans. (c)

Sol. The most vital event of sexual reproduction is perhaps the fusion of gametes. This process called syngamy results in the formation of a diploid zygote. When the female gamete undergoes development to form new organisms without fertilisation. This phenomenon is called parthenogenesis. Isogametes are found in Cladophora and heterogametes in Fucus.

S13. Ans. (a)

Sol. According to the law of independent assortment, the alleles of two more genes get sorted into gametes independent of each other, the law of dominance is used to explain the expression of only one of the parental characters in a monohybrid cross in the F1 and the expression of both in the F2 . It also explains the proportion of 3:1 obtained at the F2 . The inheritance of flower colour in the dog flower (snapdragon or Antirrhinum sp.) is a good example to understand incomplete dominance. A good example of codominance is different types of red blood cells that determine ABO blood grouping in human beings.

S14. Ans. (d)

Sol. in some plants fruits develop without fertilisation. Such fruits are called parthenocarpic fruits. Banana is one such example. Production of seeds without fertilization is called apomixis. e.g species of Asteraceae and grasses.

S15. Ans. (b)

Sol. invasive weed species are carrot grass (Parthenium), Lantana and water hyacinth (Eicchornia). Elephant grass is a very important forage in the tropics due to its high productivity. It is particularly suited to feed cattle and buffaloes.

S16. Ans. (d)

Sol. Salmonella typhi is a pathogenic bacterium which causes typhoid fever in human beings. Different species of Plasmodium (P. vivax, P. malaria and P. falciparum) are responsible for different types of malaria. Ascaris, an intestinal parasite causes ascariasis. Entamoeba histolytica is a protozoan parasite in the large intestine of human which causes amoebiasis (amoebic dysentery).

S17. Ans. (c)

Sol. The construction of the first recombinant DNA emerged from the possibility of linking a gene encoding antibiotic resistance with a native plasmid of Salmonella typhimurium.

S18. Ans. (c)

Sol. Insulin consists of two short polypeptide chains: chain A and chain B, that are linked together by disulphide bridges.

S19. Ans. (a)

Sol. The first human-like being was the hominid and was called Homo habilis. The brain capacities were between 650-800cc. They probably did not eat meat. The Neanderthal man with a brain size of 1400cc lived in near east and central Asia between 1,00,000-40,000 years back.

S20. Ans. (a)

Sol.

Crop	Variety	Resistance to diseases
Wheat	*Himgiri*	*Leaf and stripe rust, hill bunt*
Brassica	*Pusa suvarnim (Karan rai)*	*White rust*
Cauliflower	*Pusa Shubhra, Pusa Snowball K-1*	*Black rot and Curl blight black rot*
Cowpea	*Pusa Komal*	*Bacterial blight*
Chilli	*Pusa Sadabahar*	*Chilly mosaic virus, Tobacco mosaic virus and Leaf curl*

Crop	Variety	Insect pests
Brassica (rapeseed mustard)	Pusa Gaurav	Aphids
Flat been	Pusa Sem 2 Pusa Sem 3	Jassids, aphids and fruit borer
Okra (Bhindi)	Pusa Sawani Pusa A-4	Shoot and Fruit borer

S21. Ans. (d)

Sol. Secondary productivity is defined as the rate of formation of new organic matter by consumers.

S22. Ans. (b)

Sol. Saccharum barberi was originally grown in north India, but had poor sugar content and yield.

S23. Ans. (b)
Sol. The colloidal material of domestic sewage includes faecal matter, bacteria, and cloth and paper fibres.

S24. Ans. (c)
Sol. Lipases are used in detergent formulations and are helpful in removing oily stains from the laundry

S25. Ans. (a)
Sol. In aminocentesis some of the amniotic fluid of the developing foetus is taken to analyse the fetal cells and dissolved substances. This procedure is used to test for the presence of certain genetic disorders such as, down syndrome, haemoplilia, sickle-cell anemia, etc., determine the survivability of the foetus.

S26. Ans. (a)
Sol. Type of immunoglobulin present in mother's milk is IgA. IgA is an antibody that plays important role in the immune function of mucous membranes.

S27. Ans. (b)
Sol. Chromosome number in gametes of rat is 21.

S28. Ans. (c)
Sol. RNAi takes place in all eukaryotic organisms as a method of cellular defense. This method involves silencing of a specific mRNA due to a complementary dsRNA molecule that binds to and prevents translation of the mRNA.

S29. Ans. (b)
Sol. Turner's Syndrome is a disorder caused due to the absence of one of the X chromosomes, i.e., such females are sterile as ovaries are rudimentary besides other features including lack of other secondary sexual characters.

S30. Ans. (d)
Sol. Fungi are also known to form symbiotic associations with plants (mycorrhiza). Many members of the genus Glomus form mycorrhiza. The fungal symbiont in these associations absorbs phosphorus from soil and passes it to the plant. Plants having such associations show other benefits also, such as resistance to root-borne pathogens, tolerance to salinity and drought, and an overall increase in plant growth and development. In paddy fields, cyanobacteria serve as an important biofertilizer.

S31. Ans. (d)
Sol. A plastic sack manufacturer in Bangalore has managed to find the ideal solution to the ever-increasing problem of accumulating plastic waste. Ahmed Khan, aged 57 years old, has been producing plastic sacks for 20 years. About 8 years ago, he realised that plastic waste was a real problem. Polyblend, a fine powder of recycled modified plastic, was developed then by his company. This mixture is mixed with the bitumen that is used to lay roads. In collaboration with R.V.College of Engineering and the Bangalore City Corporation, Ahmed Khan proved that blends of Polyblend and bitumen, when used to lay roads, enhanced the bitumen's water repellant properties, and helped to increase road life by a factor of three.

S32. Ans. (b)
Sol. Evolution of life shows that life forms tend to move from water to land. The fishes were early vertebrates that lived in water only. Some of them changed into amphibians that could live both on land and water. Some amphibians then transformed into the reptiles that could live on land while some of them evolved into birds and then later to mammals. All this suggest that life forms had moved from water to land.

S33. Ans. (b)
Sol. Initially 25 biodiversity hotspots were identified but subsequently nine more have been added to the list, bringing the total number of biodiversity hotspots in the world to 34. These hotspots are also regions of accelerated habitat loss. Three of these hotspots – Western Ghats and Sri Lanka, Indo-Burma and Himalaya – cover our country's exceptionally high biodiversity regions.

S34. Ans. (a)
Sol. Natality refers to the number of births during a given period in the population that are added to the initial density.

S35. Ans. (d)
Sol. The successive nucleotides of RNA and DNA are linked through Phosphodiester bonds.

S36. Ans. (b)
Sol. The signals for parturition originate from the fully developed foetus and the placenta which induce mild uterine contractions called foetal ejection reflex. This triggers release of oxytocin from the maternal pituitary.

S37. Ans. (b)
Sol. In detritus food chain, decomposers are found at the first trophic level. They feed on detritus (dead decaying organic matter).

S38. Ans. (c)
Sol. Colour Blidness is a sex-linked recessive disorder due to defect in either red or green cone of eye resulting in failure to discriminate between red and green colour. This defect is due to mutation in certain genes present in the X chromosome. It occurs in about 8 per cent of males and only about 0.4 per cent of females. This is because the genes that lead to red-green colour blindness are on the X chromosome.

S39. Ans. (d)
Sol. The mammary glands of the female undergo differentiation during pregnancy and starts producing milk towards the end of pregnancy by the process called lactation. This helps the mother in feeding the newborn. The milk produced during the initial few days of lactation is called colostrum which contains several antibodies absolutely essential to develop resistance for the new-born babies.

S40. Ans. (b)

Sol. Geitonogamy is the transfer of pollen grains from the anther to the stigma of another flower of the same plant. Although geitonogamy is functionally cross-pollination involving a pollinating agent, genetically it is similar to autogamy since the pollen grains come from the same plant.

S41. Ans. (d)

Sol. the most commonly used matrix in gel electrophoresis is agarose which is a natural polymer extracted from sea weeds.

S42. Ans. (b)

Sol. The cutting of DNA by restriction endonucleases results in the fragments of DNA. These fragments can be separated by a technique known as gel electrophoresis. The DNA fragments separate (resolve) according to their size through sieving effect provided by the agarose gel.

S43. Ans. (a)

Sol. In order to link the alien DNA, the vector needs to have very few, preferably single, recognition sites for the commonly used restriction enzymes. Presence of more than one recognition sites within the vector generates several fragments, that complicates gene cloning

S44. Ans. (d)

Sol. DNA is a long polymer of deoxyribonucleotides. The length of DNA is usually defined as number of nucleotides (or a pair of nucleotide referred to as base pairs) present in it. As the gel runs, shorter pieces of DNA will travel through the pores of the gel matrix faster than longer ones. After the gel has run for awhile, the shortest pieces of DNA will be close to the positive end of the gel, while the longest pieces of DNA will remain near the wells.

S45. Ans. (b)

Sol. The separated bands of DNA are cut out from the agarose gel and extracted from the gel piece. This step is known as elution.

S46. Ans. (c)

Sol. The greater the BOD of waste water, more is its polluting potential.

S47. Ans. (d)

Sol. Anaerobic digestion occurs in Biological treatment.

S48. Ans. (b)

Sol. During this digestion, bacteria produce a mixture of gases such as methane, hydrogen sulphide and carbon dioxide. These gases form biogas and can be used as source of energy as it is inflammable.

S49. Ans. (b)

Sol. Once the BOD of sewage or waste water is reduced significantly, the effluent is then passed into a settling tank where the bacterial 'flocs' are allowed to sediment. This sediment is called activated sludge. A small part of the activated sludge is pumped back into the aeration tank to serve as the inoculum. The remaining major part of the sludge is pumped into large tanks called anaerobic sludge digesters. Here, other kinds of bacteria, which grow anaerobically, digest the bacteria and the fungi in the sludge.

S50. Ans. (b)

Sol. biogas and can be used as source of energy as it is inflammable, it is a mixture of methane, hydrogen sulphide and carbon dioxide.