KCET-2015 (Biology)

1. Which vector can clone a small fragment of DNA ?
   a. Bacterial artificial chromosome
   b. Yeast artificial chromosome
   c. Plasmid
   d. Cosmid

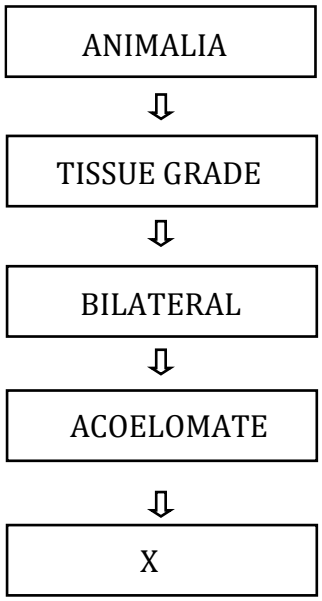
2. Continuous self pollination results in
   a. Inbreeding depression
   b. Self incompatibility
   c. Formation of unisexual flowers
   d. Gametes loose vigour

3. Identify the wrong statement.
   a. Alleles I^A and I^B produce sugars.
   b. Both I^A and I^B are present together and they express because of co- dominance.
   c. Alleles b and c also produce sugar.
   d. When I^B and b or i are present only I^B is expressed.

4. The codon AUG had dual function. It is an initiation codon and also codes for
   a. Formaldehyde
   b. Methionine
   c. Phenylalanine
   d. Serine

5. Natural killer lymphocytes are an example for
   a. Cytokine barrier
   b. Physiological barrier
   c. Physical barrier
   d. Cellular barrier

6. Identify the phylum X :



a. Aschelminthes
b. Ctenophora
c. Hemichordata.
d. Platyhelminthes

7. With respect to Eichhornia:
Statement X : It drains off Oxygen from water and is seen growing in standing water.
Statement Y: It is indigenous species of our country.
a. Both statement X and Y are correct
b. Both statement X and Y are wrong.
c. Only statement X is correct and Y is wrong.
d. Only statement Y is correct and X is wrong.

8. Seeds without fertilization is obtained from
a. Parthenocarpy
b. Apomixis
c. Polyembryony
d. Dormancy

9. The hormone which acts on Sertoli cells and stimulates the process of spermiogenesis is
a. Androgen
b. LH
c. GnRH
d. FSH

10. The nitrogen base only in DNA is also called
a. 5- methyl uracil
b. NH_4Cl
c. Uracil
d. Guanine

11. Hisardale is obtained by crossing
a. Merino ewes with Bikaneri Rams
b. Bikaneri ewes with Merino Rams
c. Horse with Donkey
d. Superior Bull with Superior Cow

12. The ancestors of modern day Frogs and Salamanders are
a. Jawless fish
b. Coelacanth
c. Ichthyopis
d. Amphioxus

13. During sewage treatment biogas produced includes
a. Methane, Oxygen, Hydrogen sulphide
b. Hydrogen sulphide, Methane, Sulphur oxide
c. Hydrogen sulphide, Nitrogen Methane
d. Methane, Hydrogen sulphide, Carbon dioxide

14. If 30j of energy is trapped at producer level, then how much energy will be available to Peacock as food in the following chain ? Plant → Mice → Snake → Peacock
    a. 0.03j
    b. 0.003j
    c. 0.3j
    d. 0.0003j

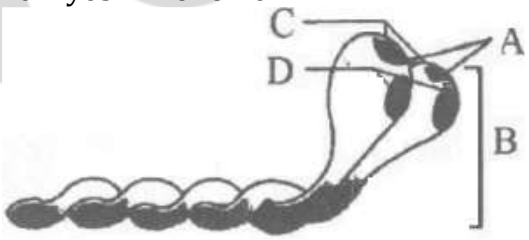
15. Which of the following is not an ex-situ conservation ?
    a. Seed bank
    b. Botanical garden
    c. Cryopreservation
    d. Biosphere reserves

16. One hormone hastens maturity period in juvenile conifers, a second hormone controls xylem differentiation, while the third increases the tolerance of plants to various stresses. They are respectively
    a. Auxin, Gibberellins, Cytokinin
    b. Auxin, Gibberellins ABA
    c. Gibberellin, Auxin, Cytokinin
    d. Gibberellin, Auxin, ABA

17. The element responsible for the ring structure of chlorophyll and maintenance of ribosome structure is
    a. Mg^{+}
    b. K^{+}
    c. Ca^{++}
    d. S

18. Which of the following sentences is correct?
    a. Cells of all living organisms have a nucleus.
    b. Both animal and plant cells have a well-defined cell wall.
    c. In prokaryotes there are no membrane bound cell organelles.
    d. Cells are formed de novo from abiotic materials.

19. Label the correct parts of the Myosin monomer:



    a. A. Cross arm
       B. Actin binding site
       C. Head
       D. ATP binding site
    b. A. Head
       B. Cross arm
       C. Actin binding site
       D. ATP binding site
    c. A. Actin binding site
       B. Head
       C. ATP binding site
       D. Cross arm
    d. A. ATP binding site
       B. Actin binding site
       C. Head
       D. Cross arm

20. The 2000-year-old seed excavated from Herod's place at dead sea belongs to
    a. Lupine arcticus
    b. Strobilanthes kunthiana
    c. Dendrocalamus strictus
    d. Phoenix dactylifera

21. In a human foetus the limbs and digits develop after
    a. First trimester
    b. 8 weeks
    c. 12 weeks
    d. 5^{th} month

22. With respect to phenylketonuria identify which statement is not correct.
    a. It is an example of pleiotropy.
    b. It is an error in metabolism.
    c. It is a case of aneuploidy.
    d. Caused due to autosomal recessive trait.

23. Match the following:

A. VNTR	p. Largest gene
B. Introns and Exons	q. DNA fingerprinting
C. Dystrophin	r. Bulk DNA
D. Satellite DNA	s. Splicing

    a. A – q, B – s, C– p, D, – r
    b. A – s, B – p, C– q, D, – r
    c. A – r, B – s, C– p, D, – q
    d. A – q, B – p, C– s, D, – r

24. RNA polymerase-I transcribes eukaryotic ribosome which does not consist of
    a. 28 SrRNA
    b. 5 SrRNA
    c. 5.8 SrRNA
    d. 18 SrRNA

25. The organism which completely lack a cell and can live without oxygen are
    a. Archaebacteria
    b. Thermoacidophiles
    c. Mycoplasma
    d. Methanogens

26. Green house crops such as tomatoes and bell pepper produce higher yields. This is due to
    a. CO_2 is a limiting factor to photosynthesis.
    b. Tomatoes and bell pepper are not C_3 plants.
    c. CO_2 enriched atmosphere leads to higher yields.
    d. Diffused light in green house.

27. A fall in glomerular filtration rate actives
    a. juxta glomerular cells to release rennin
    b. adrenal cortex to release adrenaline
    c. adrenal medulla to release adrenaline
    d. posterior pituitary to release vasopressin

28. The chromosome number in meiocyte is 34. The organism could be.
    a. Dog
    b. Apple
    c. Ophioglossum
    d. Onion

29. Progestasert is an IUD which makes the uterus unsuitable for implantation and cervix hostile to the sperms as they are
    a. Copper releasing IUDs
    b. Non-medicated IUDs
    c. Hormone releasing IUDs
    d. Ideal contraceptive

30. Double lines in pedigree analysis show
    a. Sex unspecified
    b. Consanguineous marriage
    c. Unaffected offspring
    d. Normal mating

31. Smack and Crack are produced from
    a. Cannabis sativa and Atropa belladonna
    b. Papaver somniferum and Erythroxylum coca
    c. Cannabis sativa and Papaver somniferum
    d. Erythroxylum coca and Atropa belladonna

32. Sonalika and Kalyan Sona are high yielding varieties of
    a. Rice
    b. Maize
    c. Sugarcane
    d. Wheat

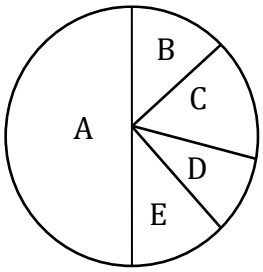
33. BOD refers to
    a. The amount of oxygen consumed if all the organic matter in 1000 ml of water were oxidized by bacteria
    b. The amount of oxygen released when all the organic matter was consumed by bacteria in 1 litre of water.
    c. The oxygen required for bacteria to grow in 1 litre of effluent.
    d. The amount of oxygen released if all the organic matter in 1000 ml of water were oxidized by bacteria.

34. During menstrual cycle the cyclical changes takes place in
    a. Endometrium
    b. Myometrium
    c. Perimetrium
    d. Corpus luteum

35. Assisted Reproductive Technology does not include?
    a. In vitro fertilization and embryo transfer
    b. Gamete intra fallopian transfer
    c. Zygote extra fallopian transfer
    d. Artificial insemination

36. In a 3.2 Kbp long piece of DNA, 820 adenine bases were found. What would be the number of cytosine bases?
    a. 1560
    b. 1480
    c. 780
    d. 740

37. Given below is the representation of the extent of global diversity of vertebrates. What group does the portions represents.



	A	B	C	D	E
a.	Mammals	Birds	Fishes	Amphibians	Reptiles
b.	Fishes	Mammals	Birds	Reptiles	Amphibians
c.	Birds	Reptiles	Fishes	Mammals	Amphibians
d.	Fishes	Amphibians	Mammals	Birds	Reptiles

38. Choose the correct statement :
    a. Pyruvate is formed in the mitochondrial matrix.
    b. During the conversion of Succinyl CoA to Succinic acid a molecule of ATP is Synthesized.
    c. Oxygen is vital in respiration for removal of Hydrogen.
    d. There is complete breakdown of glucose in fermentation.

39. According to Robert Constanza, 50% of the total cost for ecosystem services goes to
    a. Recreation
    b. Climate regulation
    c. Nutrient cycling
    d. Soil formation

40. The function of a selectable marker is
    a. Identify ori site.
    b. To destroy recognition sites.
    c. Eliminating transformants and permitting non-transformants.
    d. Elimination of non-transformants and permitting transformants.

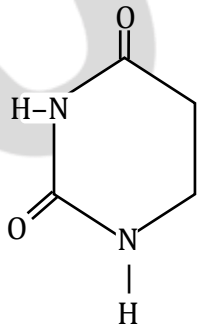
41. Find the wrongly matched pair :
    a. Endemism – Species confined to one region and also found in other regions
    b. Alien species – Clarias gariepinus.
    c. Lungs of the planet – Amazon rain forest
    d. Hot spots – Regions with species richness

42. If an inheritable mutation is observed in a population at high frequency, it is referred to as
    a. DNA polymorphism
    b. Expressed sequence Tag
    c. Sequence annotation
    b. Linkage

43. Which of the following would most likely help to slow down the greenhouse effect?
    a. Ensuring that all excess paper packaging is burned to ashes.
    b. Promoting the use of private rather than public transport.
    c. Converting tropical forests into grazing land for cattle
    d. Redesigning and fill dumps to allow methane to be collected.

44. Select the mismatch pair from the following:
    a. Insulin – Gluconeogenesis
    b. Glucagon – Glycogenolysis
    c. Oxytocin – Contraction of uterine muscles
    b. Prolactin – Milk production in mammary glands

45. Identify this structure:



    a. Uracil
    b. Adenosine
    c. Adynylic Acid
    d. Cholesterol

46. Which of the following is not correct in mass flow hypothesis ?
    a. The sugar is moved bidirectionally.
    b. Loading of the phloem sets up a water potential gradient that facilitates the mass movement in the phloem.
    c. As hydrostatic pressure in the phloem sieve tube increases pressure flow stops and sap is accumulated in phloem.
    d. The sugar which is transported is sucrose.

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47. In prokaryotes the Glycocalyx when it is thick is called?
    a. Slime layer
    b. Mesosome
    c. Capsule
    a. Cell wall

48. The T-wave in an ECG represents
    a. Electrical excitation of atria
    b. Return of the ventricles from excited state
    c. Depolarisation of ventricles
    d. Beginning of systole

49. Ernest chain and Howard Florey's contribution was
    a. Discovery of Streptokinase
    b. Discovery of DNA sequence
    b. Establishing the potential of penicillin as an effective antibiotic
    c. Production of genetically engineered insulin

50. Which of the following is not correct with respect to malaria?
    a. Sporozoites multiply in blood.
    b. Malignant malaria is caused by Plasmodium falciparun.
    c. RBCs rupture and release haemozoin which causes chills.
    d. Female anopheles mosquito is the vector.

51. Three copies of chromosome –21 in a child with Down's syndrome have been analysed using molecular biology technology to detect any possible DNA polymorphism with reference to different alleles located on chromosome–21. Results showed that out of 3 copies 2 of the chromosomes of the child contain the same alleles as one of the mother's alleles. Based on this when did the non-disjuction event most likely occur?
    a. Maternal meiosis – I
    b. Maternal meiosis – II
    c. Paternal meiosis – III
    d. Paternal meiosis –II

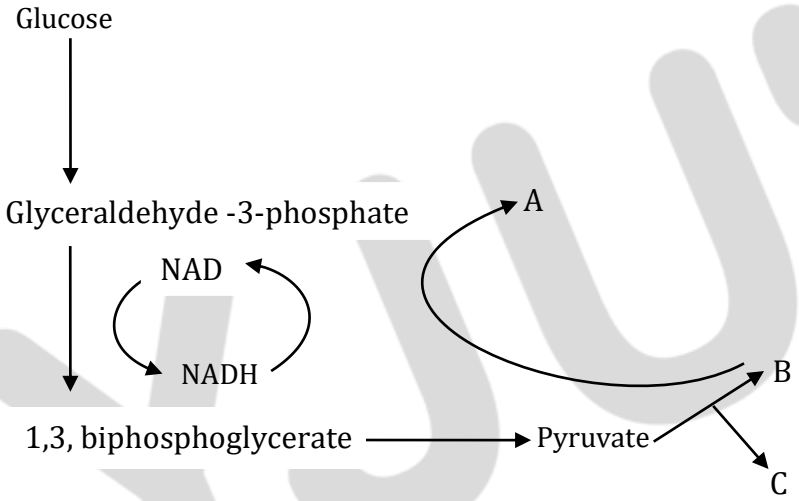
52. In 125 amino acid sequence if the codon for 25th amino acid is mutated to UAA, then
    a. a polypeptide of 124 amino acids is formed
    b. a polypeptide of 25 amino acids is formed.
    c. A polypeptide of 24 amino acids is formed.
    d. No polypeptides are formed.

53. A scrubber in the exhaust of a chemical industrial plant removes
    a. Gases like Sulphur dioxide
    b. Particulate matter of the size 5 micrometres or above
    c. Gases like ozone or methane
    d. Gases like Nitrous oxide

54. The formation of two species from one ancestral species is known as
    a. Phyletic evolution
    b. Divergent evolution
    c. Convergent evolution
    d. allopatry

55. The breakdown of detritus into small particles by detrivores is called
    a. Humification
    b. Catabolism
    c. Leaching
    b. Fragmentation

56. Choose the correct combination of labelling the molecules involved in the pathway of anaerobic respiration in Yeast.



    a. A– Ethanol, B–CO_2, C– Acetaldehyde.
    b. A–CO_2, B–Ethanol, C– Acetaldehyde.
    c. A– Acetaldehyde, B–CO_2, C– Ethanol.
    d. A– Ethanol, B– Acetaldehyde, C– CO_2.

57. Which of the following conditions correctly describes the manner of determining the sex in the given example?

    a. XO type of sex determines male sex in grasshopper.
    b. XO condition in humans as found in Klinefelter's syndrome determines female sex.
    c. Homozygous sex chromosome XX produce male in Drosophila.
    d. Homozygous sex chromosome ZZ determines female sex in birds.

58. Hibernating animals have tissue containing mitochondria with a membrane protein that accelerates electron transport while blocking the synthesis of ATP. What is the consequence of this ?

a. Energy is saved because glycolysis and the citric acid cycle shuts down.
b. The energy of respiration is converted into heat.
c. Hibernating animals can synthesize fat instead of wasting energy of respiration.
d. Pyruvate is converted to lactic acid by anaerobic fermentation.

59. The pioneer species in Xerarch and Hydrarch succession are respectively

a. Lichens and sedges
b. Lichens and rooted hydrophytes
c. Lichens and phytoplanktons
d. Phytoplanktons and lichens

60. With respect to DNA fragmentation

Statement A: Gel electrophoresis and elution are two important processes.

Statement B: After staining with ethidium bromide it has to be exposed to U.V. light.

a. Both A and B are correct statements.
b. Only A is correct and B is not correct.
c. Only A is correct.
d. Only B is correct.

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ANSWER KEYS

* G – Indicates one Grace mark awarded for the question number.

1. (c)	2. (a)	3. (c)	4. (b)	5. (d)	6. (G)	7. (c)	8. (b)	9. (d)	10. (a)
11. (b)	12. (b)	13. (d)	14. (a)	15. (d)	16. (d)	17. (a)	18. (c)	19. (b)	20. (d)
21. (b)	22. (c)	23. (a)	24. (b)	25. (c)	26. (c)	27. (G)	28. (b)	29. (c)	30. (b)
31. (b)	32. (d)	33. (a)	34. (a)	35. (c)	36. (c)	37. (b)	38. (c)	39. (d)	40. (d)
41. (a)	42. (a)	43. (d)	44. (a)	45. (G)	46. (c)	47. (c)	48. (b)	49. (c)	50. (a)
51. (a)	52. (c)	53. (a)	54. (b)	55. (d)	56. (d)	57. (a)	58. (b)	59. (c)	60. (a)

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Solution

1. (c)

   Plasmid (autonomously replicating circular extra – Chromosomal DNA.) which carries antibiotic resistant gene and origin of replication i.e. , the ability of autonomous replication and its Size is smaller than Chromosomal DNA. One of the earliest Commonly used cloning vectors is the PBR 322 plasmid.

2. (a)

   Continuous self–pollination results in inbreeding depression. So, Flowering plants have developed following devices to discourage self pollination and to encourage cross pollination:-

   (i) In some Species, pollen release and Stigma receptivity are not synchronised.

   (ii) In Some other Species, the anther and Stigma are placed at different position, So that the pollen Cannot Come in contact with the stigma of the same flower.

   (iii) The third devices to prevent inbreeding is self-incompatibility It prevents self- pollen from fertilizing the ovules by inhibiting pollen germination or pollen tube growth in the pistil.

   (iv) Dicliny (unisexuality) i.e. flowers are unisexual, So that self pollination is not possible

3. (c)

   ABO blood grouping is a type of blood grouping system in which blood is of 4 types A,B, AB and O blood group. These blood groups are Controlled by the gene l. Surface of the RBC Contains Sugar polymer. The gene l has 3 types of alleles A, B and i. Different forms of Sugars are present on RBC Surface of alleles I^A and I^B . However, C does not produce Sugar.

4. (b)

   Initiation Codon is the 1st codon on mRNA. In Eukaryotes, AUG is the Start Codon of mRNA which Codes for amino acid methionine and modified into formylmethionine in prokaryotes. It is the first Codon at which the translation of proteins begins, it is paired during the translation with the t RNA with anticodon UAG , i.e, it acts as an initiator of protein synthesis as well as a codon for methionine and modified into formylmethionine in prokaryotes.

5. (d)

Innate immune System is non-Specific type of defense i.e., present at the time of birth. They are providing different types of barriers to the entry of the foreign agents into our body. It Consists of 4 types of barriers:-

(A) Cytokine to cellular barrier: Virus infected Cells Secrete proteins called interferons which protect non- infected cells from further viral infection.

(B) Physiological barriers: Acid in the stomach , Saliva in the mouth tears from eyes all prevent microbial growth.

(C) Physical barriers: Skin is the main barrier which prevents entry of the micro-organism.

(D) Cellular barriers: Leukocytes (WBC) acts like polymorpho nuclear leukocytes (PMNL-neutrophils), Single –Celled organism i.e. Cellular barriers. It also include monocytes, natural killer Cells in the blood as well as Macrophages in tissue can phagocytose and destroy microbes.

6. (G)
Bonus

7. (c)

Eichhornia is an alien or exotic Species, These plant are introduced in india because of its beautiful flowers and shape of leaves Since it can propagate vegetatively at a phenomenal rate and Spread all over the water body in a Short Period of time. It is the most invasive weeds found growing wherever there is Standing water. It drains oxygen from the water, which leads to death of fishes. It adversely effects the aquatic life and increases the biological oxygen demand.

A Species is defined as indigenous to a given region or ecosystem, if its presence in that region is the result of the only natural process, with no human intervention. Indigenous Species include those that are endemic i.e., naturally occurring in an area and restricted entirely to that area. So, eichhornia is not an indigenious Species of our Country.

8. (b)

(i) A Special mechanism to produce seeds without fertilization called apomixis. There are several ways of development of apomictic Seeds. In some species, the diploid egg cell is formed without reduction division and develops into the embryo without fertilization.

(ii) Polyembryony is the formation of more than one embryo from a single fertilized ovum.

(iii) Parthenocarpy is the process of development of fruits without fertilization of ovules. It can be induced through the application of growth hormones and Such fruits are Seedless. For example, Banana.

(iv) Seed dormancy means embryo may enter a state of inactivity Seeds are prevented from germinating even under favourable conditions. These Conditions are a Complex Combination of water, light, temperature, hormone etc.

9. (d)
Each Seminiferous tubules is lined on its inside by two types of cell called male germ cells (Spermatogonia) and Sertoli cells. The male germ cells undergo meiotic division finally leading to sperm formation while Sertoli cells acts as neutrition to the germ cells, Leydig cells synthesise and secrete testicular hormones called androgens.

Spermiogenesis is the final stage of Spermatogenesis where the spermatids need to mature into motile sperm cells. The main hormones which regulate spermatogenesis are testosterone and FSH and the Sertoli Cells possess receptions for both these hormones. Thus, the FSH hormones acts on sertoli cells and stimulates the process of spermatogenesis, when the FSH screated by the anterior pituitary binds to its receptors.

10. (a)
Nitrogenous base is a molecule that contains nitrogen and has the chemical properties of a base. The nitrogenous bases in DNA are adenine (A), guanine (G), thymine (T) and Cytosine (C). The nitrogenous bases in RNA are the Same, with one exception are uracil (U) is present in place of thymine (T) .

Thymine is also known as 5-methylated uracil. It is found in DNA. Uracil is found in RNA and guanine is found in DNA as well as in RNA. Ammonium Chloride is not Considered as a nitrogenous base

11. (b)
Cross-breeding is the process where Superior males of one breed are mated with Superior females of another breed. It allows the desirable qualities of two different breeds to be Combined.
Hisardale is a new breed of Sheep developed by crossing Bikaneri ewes and Merino rams of Punjab.

12. (b)
(i) In 1938, fish caught in South Africa happened to be a Coelacanth which was thought to be extinct. These animals evolved into first amphibians that lived on land and water. These were ancestors of modern- day frogs and Salamanders
(ii) Jawless fishes were ancestor of Cephalochordates and notochord extends from head to tail region and is persistent throughout their life.
(iii) Ichthyophis is a genus of Caecilians. They are limbless amphibians called asian caecilians
(iv) Amphioxus were ancestors of Chordates.

13. (d)

During Sewage treatment, 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 called activated Sludge. A Small part of the activated Sludge is pumped back into the aeration tank or 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. 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.

14. (a)

According to 10% law of energy flow by Raynold lindeman The total amount of energy that can be transferred to the next trophic level is the 10%. At producer level 30J will received by plants . Energy received by other organisms are:

Plant $\longrightarrow$ mice $\longrightarrow$ snakes $\longrightarrow$ Peacock

30J $\quad \frac{30}{100}\times 100 = 3J \quad \frac{30}{100}\times 10 = .3J \quad \frac{.3\times 10}{100} = .03J$

So, peacock will receive 0.03 J of energy as top Consumer

15. (d)

(i) In Situ Conservation is the production and management of important Components of biological diversity through a network of protected areas. Invariably, the number of Species waiting to be saved from extinction exceeds the Conservation resources available. In India, ecologically unique and biodiversity- rich regions are legally protected as biosphere reserves, national parks and Sanctuaries. Sacred groves are found in khasi and jaintia. In Meghalaya, sacred groves are the last refuges for a large number of rare and threatened plants.

(ii) Ex Situ conservation is the Conservation of threatened animals and plants are taken out from their natural habitat and placed in Special setting where they can be protected and given Special care. Zoological parks, botanical gardens and wildlife Safari parks serve this purpose. The gametes of threatened species can be preserved in viable and fertile Condition for long periods using Cryopreservation techniques. Seeds of different genetic Strains of Commercially important plants can be Kept for long periods in seed banks.

16. (d)

(i) Gibberellin is a plant hormone i.e. involved in wide range of physiological responses in the plants. Their ability to cause an increase in length axis is used to increase the length of gropes stalks. It is involved in stem elongation, germination, flowering and leaf Senescence. It hastens the maturity period in Juvenile Conifers.

(ii) Auxin are generally produced by the growing apices of the stems and roots, from where they migrate to the regions of their action. They help to initiate rooting in stem cuttings, widely used for plant propagation and it also control xylem differentiation and helps in cell division.

(iii) ABAs Stimulates the closure of stomata in the epidermis and increases the tolerance of plants to various kind of stresses. Therefore, it is also called the stress hormone. ABAs acts as an antagonist to Gibberelins. It also helps in seed development, maturation and dormancy.

17. (a)

Magnesium is an essential mineral element. It is one of the macronutrients. It is absorbed by plants in the form of divalent Mg^{+2}. It activates the enzymes of respiration, photo-synthesis and are involved in the Synthesis of DNA and RNA. It is a Constituent of the ring structure of chlorophyll and helps to maintain the ribosome structure. It forms the centre of the porphyrin ring of the green plant pigment chlorophyll . It helps the plants to be able to Convert light into the usable form of energy.

18. (c)

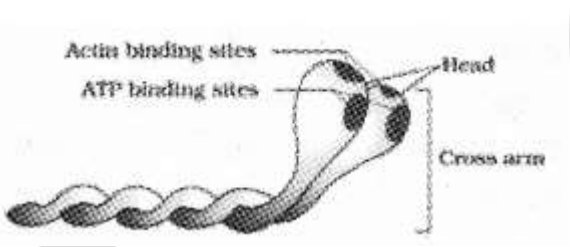
(i) In Eukaryotic cell, the membrane bound organelles are organelles Surrounded by a double or a Single membrane like nucleus, mitochondria, Chloroplast etc. are example of such organelles. In prokaryotic cells, the membrane bound organelles are absent.

(ii) Only in eukaryotic cells, membrane bound nuclei are present and they are absent in prokaryotes.

(iii) The main difference between animal cells and plant cells is the presence cell wall, it is present in plant cells via absent in all animal cells.

(iv) All living organisms are composed of cells and products of cells and all cells arise from pre-existing cells.

19. (b)



Each myosin filament is also a polymerized protein. Many monomeric proteins called meromyosins Constitute of thick filament. It has two important parts a globular head (A) with a short arm and a tail, the former being called the heavy meromyosin (HMM) and the latter, the light meromyosin (LMM). The HMM Component i.e., the head and short arm projects out wards at regular distance and angle from each other from the surface of a polymerized myosin filament and is known as the cross arm [B]. The globular head has an active ATPase enzyme [D] and has binding sites for ATP and active [C].

20. (d)

Phoenix dactylifera commonly known as date or date pallam. It is a flowering plant species in the plant family Arecaceae, Cultivated for its edible sweet fruit. During excavations at the site of the Great Herod's palace in the early 1960's, archeologist unearthed a small stockpile of seeds Stowed in a clay jar dating back 2,000 years. In 2005, one day botanical researcher decided to plant and today the tree Continues to grow & thrive.

21. (b)

In human beings, after one month of pregnancy, the embryo's heart is formed. The first Sign of growing foetus is noticed the heart sound carefully. At the end of the Second month i.e. at weeks, the foetus develops limbs and digits. By the end of 12 weeks i.e. first trimester, most of the Major organ Systems are formed, For example, limbs and external genital organs are well developed. During the Fifth month, the first movements of the foetus and appearance of hair on the head. By the end of 24 weeks i.e. second trimester, the body is covered with fine hair, eyelids Separate and eyelashes are formed, At the end of 9 Month pregnancy, the foetus is fully developed and is ready for delivery.

22. (c)
Phenylketonuria is caused by a defect in the gene that helps create the enzyme needed to breakdown phenylalanine, It Causes the amino acid to increase in the amount of the body. It is an autosomal recessive disorder, caused by mutations in both alleles of the gene for phenylalanine hydroxylase found on chromosome 12. Aneuploidy is the state where humans have an abnormal number of Chromosomes that cannot be related to this disease.

23. (a)
(i) The technique of DNA fingerprinting was initially developed by Alec jeffreys. It is used a satellite DNA as probe that shows very high degree of polymorphism is known as Variable Number of Tandem Repeats (VNTR). To determine if a person has particular VNTR, a southern Blot is performed and then the southern Blot is probed through a hybridization reaction, DNA fingerprinting.
(ii) Splicing is the process in which newly made precursor messenger RNA transcript is transformed into a mature messenger RNA, During Splicing, introns are removed and exons are Joined together.
(iii) Dystrophin is a rod- shaped cytoplasmic protein and a vital part of a protein complex that connects the cytoskeleton of a muscle fibre to the Surrounding extracellular matrix through the cell membrane and it is the largest gene.
(iv) Satellite DNA Consists of a very large arrays of tandemly repeating, non-coding DNA and is basically the bulk DNA.

24. (b)
In eukaryotes, 80 S ribosomes are made up of 60 S as a large Sub unit and 45 S as a small subunit. The large subunit, the 60 S is made up of 28 SrRNA, 5.8 rRNA, 5 SrRNA. Whereas the small subunit, the 40 S is comprised of 18 SrRNA. During translation process, RNA polymerase gets attached to the smaller subunit of RNA.

25. (c)
Archaebacteria live in some of the most harsh habitat such as extreme salty areas (homophiles), hot springs (thermoacidophiles) and marshy areas (methanogens). It differ from other bacteria in having a different cell wall structure and it responsible for their survival in extreme conditions.

Mycoplasm are organism that completely lack a cell wall. They are the smallest living cells and can survive without oxygen

26. (c)
Green house crops such as tomatoes and bell pepper produce higher yields because CO_2 enriched atmosphere leads to higher yields, temperature control, reduced pest and disease exposure and humidity. Availability of concentrated CO_2 results in larger leaves, early flowering and fruiting.

27. (G)
Bonus

28. (b)
A meiocyte is a type of cell that differentiates into a gamete through the process of meiosis, It is reductional cell division which produces haploid gametes. The haploid gamete are produced by the meiocytes. In apple meiocyte has 34 chromosomes after meiosis the gamete has 17 chromosome

29. (c)
Intra uterine devices (IUDS) are effective and popular method. These devices are inserted by doctors or expert nurses in the uterus through vagina. These Intra uterine devices are non– medicated IUDs (e.g lippes loop), copper releasing IUDS (progestasert, LNG-20). The hormone releasing IUDS turns the cervix hostile to spermatozoa and bring changes in the uterus making it unsuitable for implantation..

30. (b)
Consanguineous marriage is a marriage between two blood related individuals.

A double line between parents indicates consanguineous marriages (mating between relatives). It increases the change of a birth defect.

31. (b)
Heroin commonly called smack is chemically diacetylmorphine which is a white odourless, bitter crystalline compound and these by obtained by acetylation of morphine, which is extracted from the latex of poppy plant papaver somniferum. Crack is obtained from the cocaine plant erythroxylum coca. It is commonly known as coke plant. Crack is the crystal form of cocaine, which normally comes in a power form.

32. (d)
In 1963, several varieties such as sonalika and kalyan sona which were high yielding and disease resistant, were introduced all in the wheat growing belt of India.

33. (a)

BOD means the amount of biodegradable organic matter in sewage water or It is the amount of dissolved oxygen needed by aerobic biological organism to break down organic material present in given water sample of 100 ml at certain temperature over a specific time period.:

34. (a)

During the menstrual cycle, the cyclical changes take place in the endometrial. The menstrual flow results due to breakdown of endometrial lining of the uterus and it's blood vessels which form liquid that comes out through vagina.

In 6–13th days i.e proliferative phase, the endometrial cells in the uterus proliferate in preparation for a possible pregnancy, It's growth is stimulated by estrogen from the primary follicles and simultaneously the endometrium of uterus regenerates through proliferation.

The ovulation is followed by the luteal phase during which the remaining parts of the graafian follicle transform as the corpus luteum. It secretes large amount of progesterone which Is essential for maintenance of the endometrium. Endometrium is necessary for implantation of the fertilized ovum and events of pregnancy

In the absence of fertilization, the corpus luteum degenerates. This causes disintegration of the endometrial leading to menstruation, marking a new cycle.

35. (c)

(1) Assisted reproductive technologies (ART) refers that the couples could be assisted to have children through certain special techniques.

(2) It include invitro fertilization and embryo-transfer, ZIFT, GIFT and artificial insemination.

(3) IVF is followed by embryo transfer. In this method, popularly known as test tube baby programme, i.e. ova from the wife/ donor (female) and sperm from the husband/donor (male) are collected and are inducted to form Zygote in laboratory.

(4) ZIFT refers to the transfer of embryos with more than 8 blastomeres into the uterus to complete 'It' further developments.

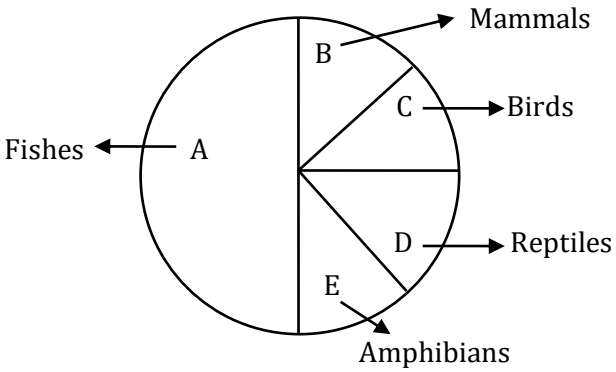
(5) Transfer of an ovum collected from donor into the following tube (GIFT) of another female who cannot produce one, but can provide suitable environment for fertilization.

(6) In artificial insemination (AI), the semen collected either from the husband or a healthy donor is artificially introduced either into the vagina or into the uterus of the female.

36. (c)

- One Kbp of DNA contains 1000 base pairs. So the total number of base pairs in 3.2 Kbp is = 3200bp
- According to chargaff's rule, number of adenine is equal to thymine. So 820 base pairs are adenine i.e. the number of thymine will also be 820 bp.
- The total number of cytosine + guanosine will be 3200 – 820 × 2 = 1560. The number of cytosine is equal to guanine. So cytosine bases in the DNA can be calculated as 1560/2 = 780

37. (b)



Vertebrates

• The change in the gene pool due to the process of mutation and recombination may lead to a change in the diverse range of vertebrates. The external factors like temperature, food availability may bring certain adaptation changes which may also contribute to global diversity.

• According to pie chart, fishes have maximum global diversity followed by mammals, birds, reptiles and amphibians.

38. (c)

• Pyruvate is formed in the cytoplasm, During fermentation glucose is partially broken down by glycolysis.

• During the conversion of succinic COA to succinic acid, a molecule of GTP is synthesized.

• oxygen sites at the end of the electron transport chain (ETC), where it accepts hydrogen electrons and picks up protons to form water. So, oxygen play a vital role in respiration for removal of hydrogen.

39. (d)

•Robert costanza and his colleagues have very recently tried to put price tags on nature's life support services.

• Out of the total cost of various ecosystem services, the soil formation accounts for about 50 percent and contributions of other services like recreation and nutrient cycling, are less than 10 percent each. The cost of climate regulation and habitat for wildlife are about 6 percent each.

• So according to him, soil formation accounts for 50% of the ecosystem service. It is the most important ecosystem service.

40. (d)

In selectable marker, the addition to 'ori', the vector requires a selectable marker which helps in selectively permitting the growth of the transformants. Transformation is a procedure through which a piece of DNA is introduced in a host bacterium.

A selectable marker gene is a gene used to determine if a nucleic acid sequence has been successfully inserted into an organism is DNA or not. Normally, the gene encoding resistance to antibiotics ampicillin, tetracycline etc. are considered useful selectable

marker for E. coil. The normal E. coil cells do not carry resistance against any of these antibiotics.

41. (a)

1. Endemism – Species confined to one region and not found elsewhere else.

2. Clarias gariepinus is an alien species to india.

3. Amazon rain forest is known as 'Lungs of the planet'

4. Regions with species richness are called hotspots'

42. (a)

The sudden change in the genome creates variations at a genetic level which may lead to DNA polymorphism. Polymorphic DNA contains a variable sequence which may lead to expression of a various random gene which brings a remarkable change in the gene pool. Mutation is a sudden change in the genome that can be inherited from one generation to next generation.

43. (d)

The greenhouse effect in a naturally occurring phenomenon i.e responsible for heating of earth's surface and atmosphere. The greenhouse effect can happen by redesigning the landfill dumps, so that the methane produced by the decomposition of biodegradable waste is collected effectively and it can be used for the production of biogas as methane is an integral component of it. Carbon dioxide and methane are responsible for the green house gases, because they are responsible for the green house effect. Increases in the level of green house gases has led to considerable heating of earth leading to global warming.

44. (a)

1. Insulin is secreted by beta cells of pancreas helps in regulating the glucose homeostasis. It stimulates conversion of glucose into glycogen i.e. glycogenesis.

2. Glucagon in secreted by alpha cells of pancreas helps blood. It stimulates conversion of stored glycogen into glucose i.e. glycogenolysis .

3. Oxytocin is secreted by pituitary gland helps in contracting uterine muscles during child birth.

4. Regions with species richness are called hotspots' gland helps in stimulating the production and secretion of milk.

45. (G)

Bonus

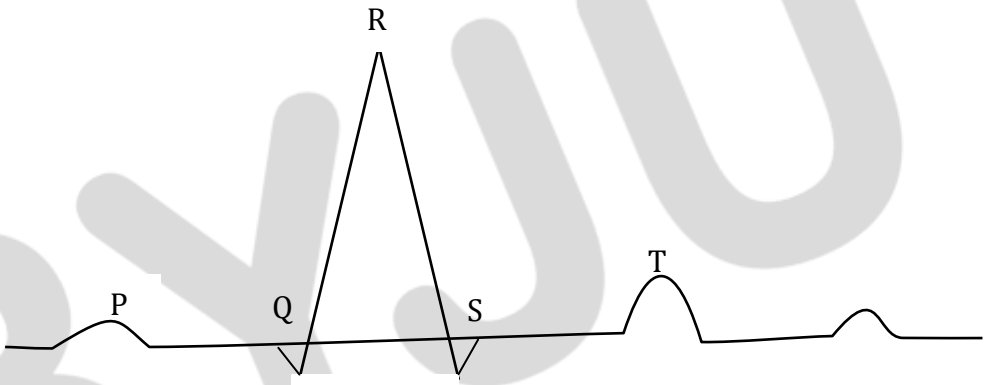
46. (c)

Phloem is a conducting tissue that conducts the prepared food from the source to sink. Increase in the solute in the phloem, increases the solute potential of the sieve tubes and creates a gradient that collects water into the cells from the adjacent xylem. This increases the hydrostatic pressure from source to sink, as hydrostatic pressure in the phloem sieve tube increase, pressure flow begins and the sap moves through the phloem.

47. (c)

Glycocalyx is a polysaccharide of the glycoprotein which mainly forms a layer on the bacterial cell wall. The regular gelatinous glycocalyx is known as capsule. It forms the structural framework of a prokaryotic cell.

48. (b)



- Each peak in the ECG is identified with a letter from P to T that corresponds to a specific electrical activity of the heart.
- The P- wave represents the electrical excitation (or depolarization) of the atria, which leads to the contraction of both the atria.
- The QRS complex represents the depolarization of the ventricles which initiates the ventricular contraction. The contraction starts shortly after Q and marks the beginning of the systole.

The T– wave represents the return of the ventricles from excited to normal state. (Repolarisation). The end of the T– wave marks the end of systole..

49. (c)

Ernst chain and howard Florey's were the scientists who followed the Alexander Fleming (discovery of penicillin) and establish the potential of penicillin as an effective antibiotic

50. (a)

Plasmodium enters the human body as sporozoites (infectious form) through the bite of infected female anopheles mosquito. The parasites initially multiply within the liver cells and then attack the red blood cells resulting in their rupture when female anopheles mosquito bites an infected person, these parasites enter the mosquito's body. The parasite multiply within them to form sporozoites that are stored in their salivary glands. and when mosquitoes bite, sporozoites are introduced into his/her body..

51. (a)

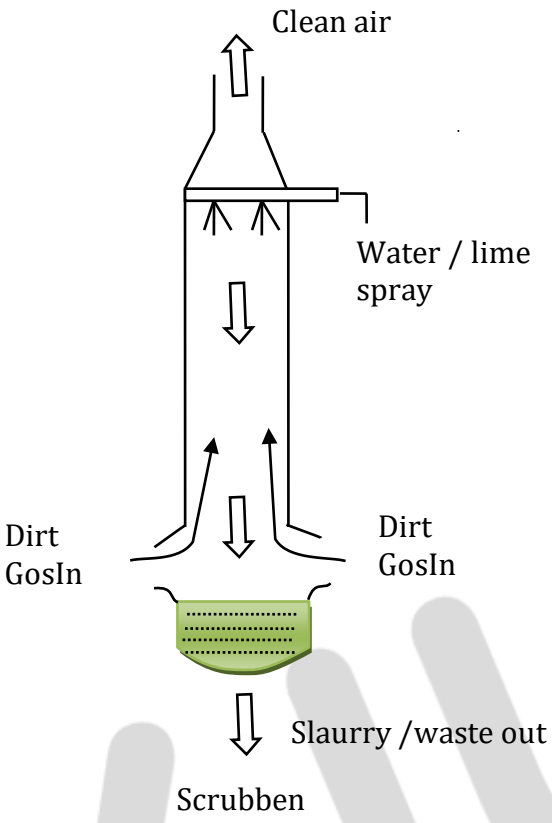
(i) Down syndrome is the cause of genetic disorder is the presence of an additional copy of the chromosome number 21 i.e. additional copy is formed due to non–disjunction of chromosomes during meiosis.

(ii)In this case, the 2 chromosomes of the child has the same allele as the mother, so it can be concluded that the non–disjunction has taken place during maternal meiosis with duplication of maternal allele

52 . (c)

UAA is a stop codon. It does not code for any amino acid called as non-sense. Codon. Hence the polypeptide synthesis is terminated and a polypeptide of 24 amino acids is formed. The polypeptide chain of 124 amino acid is formed only when the 125^{th} codon works as a stop codon, so the translation of 125 amino acid sequence so, the translation of 125 amino acids sequence will terminate at 24 amino acids.

53. (a)



The scrubber is an electrostatic precipitator in which the dirty air is cleaned by capturing the gas like SO_2 and other oxides in the lime spray ($CaCO_3$). The calcium in lime stone combines chemically with the sulphur to produce calcium sulphate $CaSO_4$, which is separately collected

54. (b)

Phyletic gradualism is a model of evolution which theorizes that most speciation is slow, uniform and gradual when evolution accurse, transformation of a whole species into a new one.

Divergent evolution is caused when the difference in the groups lead to the formation of new species. Due to the divergent evolution, the structures with the common origin develop differently according to the environment need.

Convergent evolution is the independent evolution of similar features is species of different periods

Allopathic speciation is speciation that results when a population is repeated by a physical barrier

55. (d)

- Decomposition is a process by which the decomposers in the soil breaks the complex organic matter into inorganic substances.

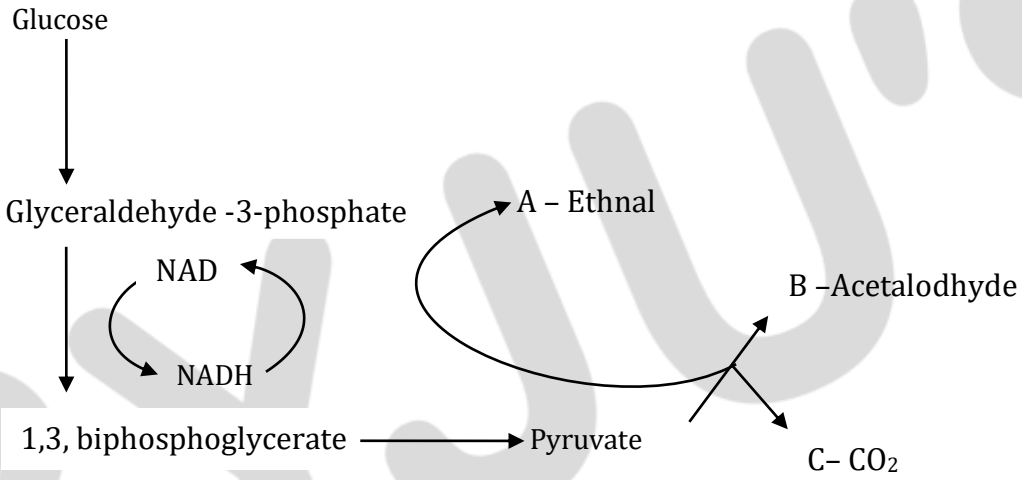
- Detritivores break down detritus into smaller particles is known as fragmentation, for example : -earthworm

- Humification and mineralisation occur during decomposition is the soil. Humification leads to accumulation of a dark colored amorphous substance called humus. The humus is further degraded by some microbes and release of inorganic nutrients occur by the process known as mineralisation.

- Bacterial and fungal enzymes Degrade detritus into simpler inorganic substance, these process is known as catabolism.

- In leeching , water soluble inorganic nutrients go down into the soil horizon and get precipitated as unavailable salts.

56. (d)



- Glucose is converted into pyruvate by the process of glycolysis with net production of ATP. TCA and ECS(electron transport chain) leads to the production of CO_2, water and PTP in aerobic oxidation.

In an anaerobic condition, the pyruvate undergoes fermentation where the pyruvate is broken down into acetaldehyde and carbon dioxide by the enzyme pyruvate decarboxylase, followed by the conversion of acetaldehyde into ethanol

57. (a)

In grasshopper, XX–XO mechanism of sex determination is present where females are homogametic (XX) but the male carries only one sex – chromosome (X,O). Hence, the male grasshopper carries XO sex chromosomes

The presence of part are full copy of one x–chromosome in the human female is "klinefilter's syndrome" but the ''XO" condition is not female sex determinant.

The ratio of number of x–chromosome to that of a complete set of auto some determines the sex of drosophila, The X/A value is 0.5 for a normal male

Sex-determination in birds is of ZW–ZZ types in which females are heteromorphic (ZW) and males have homomorphic sex chromosome (ZZ).

58. (b)

During hibernation, the animals metabolic rate drops significantly and thus require less for their survival. There are 2 types of adipose tissue i.e. white and brown. Brown fat cells contain a mitochondria & it produces considerable amount of heat because there lipids are respired with little or no ATP formation; most energy is released as heat

59. (c)

Xerarch is a plant succession starting on bare ground or rock and culminating in a mature climax forest. The pioneer species, such as lichens and mosses, results in the gradual accumulation of soil.

Hierarch is a plant succession which starts in relatively shallow water, such as ponds and lakes and culminating in a mature forest. Eg;- phytoplankton, Hydrilla etc.

60. (a)

The cutting of DNA by restriction end nuclease results in the fragments of DNA. These fragments can be separated by a technique known as gel electrophoresis.

The separated DNA fragments can be visualized only after staining the DNA with a compound known as ethidium bromide followed by exposure to UV radiation.

Bright orange colored bands of DNA in a ethidium bromide stained gel exposed to UV light. The separated bands of DNA are cut out from the agarose gel and extracted from the gel piece is known as elution.