Q 1: Difference between purine and pyrimidine?
Purines and Pyrimidines are nitrogenous bases that make up the two different kinds of nucleotide bases in DNA and RNA. The two-carbon nitrogen ring bases (adenine and guanine) are purines, while the one carbon nitrogen ring bases (thymine and cytosine) are pyrimidines.

Q 2: Difference between Nucleoside vs Nucleotide?
A **nucleoside** consists of a pentose sugar and a nitrogenous base, but no phosphate groups.
A **nucleotide** consists of a pentose sugar and a nitrogenous base and one to three phosphate groups.

Q 3: Chargaff's Rule?
The rules of base pairing explain the amount of adenine equals the amount of thymine (A = T), and the amount of guanine equals the amount of cytosine (G = C). As a result, the total abundance of purines (A + G) equals the total abundance of pyrimidines (T + C). The structure of DNA could not have been worked out without this information, now known as Chargaff's rule.

Q 4: PCR Requirements?
PCR required five component,
1. DNA template: The DNA template is that particular DNA sequence which you want copied.
2. DNA polymerase: a type of enzyme that synthesizes new strands of DNA complementary to the target sequence.
3. Primer: using a DNA template and primers, and they are heat resistant - short pieces of single-stranded DNA that are complementary to the target sequence.
4. dNTP: new DNA from the end of the primer.- single units of the bases A, T, G, and C, which are essentially "building blocks" for new DNA.
5. Reaction Buffer: a reaction buffer is used to provide a stable pH. It may also contain magnesium chloride vital role in the PCR reaction, acting as a co-factor for *Taq* polymerase and thereby influencing enzyme activity.

Q 5: Helices vs Primase?
Helices:
This is very similar to the **role** that DNA **helicase** plays in DNA replication: DNA**helicase** is the zipper. It unzips our DNA strands to allow space for attachment and to expose the nucleotides that are used as a template during DNA replication and transcription.
Primase:
Primase is an **enzyme** that creates a primer on a DNA strand by adding RNA nucleotides to the strand according to the DNA template sequence. This process occurs during DNA replication.

Q 6: Function of DNA?
Deoxyribonucleic acid (DNA) is a nucleic acid that contains the genetic instructions for the development and function of living things. All known cellular life and some viruses contain DNA. The main role of DNA in the cell is the long-term storage of information. Genetic information is carried in the linear sequence of nucleotides in **DNA**. Each molecule of **DNA** is a double helix formed from two complementary strands of nucleotides held together by hydrogen bonds between G-C and A-T **base pairs**.

Q 7 : What type of bacterial colonies F. Griffith was used in his experiment?
Griffith used two strains of pneumococcus (Streptococcus pneumoniae) bacteria which infect mice - a type III-S (smooth) which was virulent, and a type II-R (rough) strain which was nonvirulent. The III-S strain synthesized. A polysaccharide capsule that protected itself from the host's immune system, resulting in the death of the host, while the II-R strain did not have that protective capsule and was defeated by the host's immune system.

Q 8: Write the main three dilemma of DNA replication?
The three steps in the process of DNA replication are initiation, elongation and termination. Replication Basics. Replication depends on the pairing of bases between the two strands of DNA. ... Initiation. ... Elongation. ... Termination.

Q 9: Enlist the requirements of Polymerase chain reaction?
For PCR there are five chemical components needed, including a DNA template, DNA polymerase enzyme, primers, nucleotides and reaction buffer. These are described here in detail. 1. The DNA template is that particular DNA sequence which you want copied.

Q 10: What is technique of genetic engineering?

1 Process 2History 3Choosing target genes 4Gene manipulation 4.1 Extraction from cells 4.2Gene isolation 4.3Modification 5Transformation 6Development 6.1 Selection 6.2 Regeneration 6.3Confirmation 7Gene targeting 8Gene trapping

Q 11: Cell cycle?
The cell cycle or cell-division cycle is the series of events that take place in a cell leading to its division and duplication of its DNA (DNA replication) to produce two daughter cells. In bacteria, which lack a cell nucleus, the cell cycle is divided into the B, C, and D periods.

Q 12: Mitochondrial features?
Mitochondria are known as the powerhouses of the cell. They are organelles that act like a digestive system which takes in nutrients, breaks them down, and creates energy rich molecules for the cell. The biochemical processes of the cell are known as cellular respiration.

Q 13: Restriction endo-nuclease?
Restriction enzymes are DNA-cutting enzymes found in bacteria (and harvested from them for use). Because they cut within the molecule, they are often called restriction endonuclease. In order to be able to sequence DNA, it is first necessary to cut it into smaller fragments.

Q 14: Macromolecules present in cell?
The four major types of macromolecules found in living cells—carbohydrates, lipids, proteins, and nucleic acids--are made of these smaller, repeating subunits called monomers. The monomers within one molecule are not always identical but they always have similar chemical structures.

Q 15: Define Electro negativity?
The tendency of an atom to attract electrons towards itself.

Q 16: Define Genetic engineering ?
genetic engineering the deliberate modification of the characteristics of an organism by manipulating its genetic material.

Q 17: Incomplete Dominance?
Incomplete dominance is a form of intermediate inheritance in which one allele for a specific trait is not completely expressed over its paired allele. This results in a third phenotype in which the expressed physical trait is a combination of the phenotypes of both alleles.

Q 18: Co dominance?
Codominance is a form of dominance wherein the alleles of a gene pair in a heterozygote are fully expressed. This results in offspring with a phenotype that is neither dominant nor recessive. A typical example showing codominance is the ABO blood group system

Q 19: Mutation?
The changing of the structure of a gene, resulting in a variant form which may be transmitted to subsequent generations, caused by the alteration of single base units in DNA, or the deletion, insertion, or rearrangement of larger sections of genes or chromosomes.

Q 20: Epitasis?
The interaction of genes that are not alleles, in particular the suppression of the effect of one such gene by another.

Q 21: differentiate between dispersive, conservative, semi-conservative model of DNA?
Semi-conservative replication. In this model, the two strands of DNA unwind from each other, and each acts as a template for synthesis of a new, complementary strand. This results in two DNA molecules with one original strand and one new strand.

Conservative replication. In this model, DNA replication results in one molecule that consists of both original DNA strands (identical to the original DNA molecule) and another molecule that consists of two new strands (with exactly the same sequences as the original molecule).

Dispersive replication. In the dispersive model, DNA replication results in two DNA molecules that are mixtures, or "hybrids," of parental and daughter DNA. In this model, each individual strand is a patchwork of original and new DNA.

Q 22: Difference between DNA and RNA? (5)

Structurally, **DNA and RNA** are nearly identical. however, there are three fundamental **differences** that account for the very different functions **of the** two molecules. **RNA** has a ribose sugar instead **of a** deoxyribose sugar like **DNA**.**RNA** nucleotides have a uracil base instead of thymine.

Q 23: Describe process of mitosis? (5)
mitosis / cell division. **Mitosis** is a **process** of nuclear division in eukaryotic cells that occurs when a parent cell divides to produce two identical daughter cells. During cell division, **mitosis** refers specifically to the separation of the duplicated genetic material carried in the nucleus.

Q 24: Describe the techniques used by Mendel in his experiment.?
Gregor Mendel conducted hybridization experimentson around 29,000 pea plants. Peas were an ideal choice for Mendel to use because they had easily observable traits there were 7 of which he could manipulate. He began his experiments on peas with two conditions.

Q 25: What is Role of lipids?
The main biological functions of lipids include storing energy, signaling, and acting as structural components of cell membranes. ... Although the term "lipid" is sometimes used as a synonym for fats, fats are a subgroup of lipids called triglycerides.

Q 26: Differenece b/w meiosis and mitosis?
The processes differ in two fundamental. Meiosis has two rounds of genetic separation and cellular division while mitosis only has one of each. In meiosishomologous chromosomes separate leading to daughter cells that are not genetically identical. ... two cells with no net change in the number of chromosomes.

Q 27: define aquaporins?
Water molecules move through membranes by Osmosis (diffusion). Number of solute particles not on the kinds of particles.

Q 28: What is law of inheritance?
Mendel, through his work on pea plants, discovered the fundamental laws of inheritance. He deduced that genes come in pairs and are inherited as distinct units, one from each parent. Mendel tracked the segregation of parental genes and their appearance in the offspring as dominant or recessive traits.

Q 29: What is role of protein?
Every cell in your body contains protein, so meeting your protein requirement is essential for your health. Building Tissues and Muscles.Protein is necessary in building and repairing body tissues. ... Hormone Production. ... Enzymes. ... Immune Function. ... Energy.

Q 30: What are stages of meiosis 1?
Therefore, meiosis includes the stages of meiosis I (prophase I, metaphase I, anaphase I, telophase I) and meiosis II (prophase II, metaphase II, anaphase II, telophase II). Meiosis generates gamete genetic diversity in two ways: (1) Law of Independent Assortment.

Q 31: What are PCR applications?
The polymerase chain reaction has been elaborated in many ways since its introduction and is now commonly used for a wide variety of applications including genotyping, cloning, mutation detection, sequencing, microarrays, forensics, and paternity testing. Typically, a PCR is a three-step reaction.

Q 32: enlist of cell organelles?
1. Cell membrane (plasma membrane)
2. Nucleus
3. Mitochondria
4. Golgi bodies
5. Endoplasmic reticulum
6. Lysosome
7. Peroxisome
8. Centrosome (Centrioles)
9. Microvilli
10. Cilium
11. Flagella.

Q 33: define threshold effect and write the rate of accurance first degree of relative and identical twins?

A threshold effect is a sudden and radical change in a phenomenon which often occurs after surpassing a quantitative limit, called the threshold. It may refer to: Renormalization_group#Threshold_effect, a particle physics calculation. Threshold effect (genetics), a trait in genetics. Twins are two offspring produced by the same pregnancy. Twins can be either monozygotic ("identical"), meaning that they develop from one zygote, which splits and forms two embryos, or dizygotic ("fraternal"), meaning that they develop from two different eggs.

Q 34: What is denature of protein struture?

Since denaturation reactions are not strong enough to break the peptide bonds, the primary structure(sequence of amino acids) remains the same after adenaturation process. Denaturation disrupts the normal alpha-helix and beta sheets in a protein and uncoils it into a random shape.

Q 35: Differenece between Klienefelter syndrom and tumer syndrom ?

Klinefelter syndrome (KS) also known as 47,XXY or XXY, is the set of symptoms that result from two or more X chromosomes in males. The primary features are sterility and small testicles. Often, symptoms may be subtle and many people do not realize they are affected. ... Klinefelter syndrome usually occurs randomly.

Turner syndrome is a chromosomal condition that affects development in females. The most common feature of Turner syndrome is short stature, which becomes evident by about age 5. An early loss of ovarian function (ovarian hypofunction or premature ovarian failure) is also very common.

Q 36: What is Abbrevation of VNTRs?

Variable Number of Tandem Repeats (genetics)

Q 37: What is Ionic bond?

Ionic bonding is a type of chemical bonding that involves the electrostatic attraction between oppositely charged ions, and is the primary interaction occurring in ionic compounds

Q 38: What are Co enzyme? Co factor and prosthetic group?

Metal ions are usually cofactors. Coenzymes are a specific type of helper or partner that are organic molecules required for enzyme function that bind loosely to an enzyme. They are often, though not always, derived from vitamins. Prosthetic groups are enzyme partner molecules that bind tightly to an enzyme.

Q 39: What is active site in an enzyme?

In biology, the active site is the region of an enzymewhere substrate molecules bind and undergo a chemical reaction. The active site consists of residues that form temporary bonds with the substrate (binding site) and residues that catalyse a reaction of that substrate (catalytic site)

Q 40: Define carbohydrates. Also write their classification?

On the basis of the number of forming units, three major classes of carbohydratescanbe defined: monosaccharides, oligosaccharides and polysaccharides. Monosaccharides or simply sugars are formed by only one polyhydroxyaldehydeidic or ketonic unit.

Q 41: Define polyploid and aenuploid with examples?

Cells (and their owners) are polyploid if they contain more than two haploid (n) sets of chromosomes; that is, their chromosome number is some multiple of n greater than the 2n content of diploid cells. For example, triploid (3n) and tetraploid cell (4n) cells are polyploid. Chromosomes in Down syndrome, the most common human condition due to aneuploidy. Notice the three copies of chromosome 21 in the last row. Aneuploidy is the presence of an abnormal number of chromosomes in a cell, for example a human cell having 45 or 47 chromosomes instead of the usual 46.

Q 42: Write down the functions of cellular membrane. Write down the requirements of PCR?

It consists of a lipid bilayer with embedded proteins. The basicfunction of the cell membrane is to protect the cell from its surroundings. The cell membrane controls the movement of substances in and out of cells and organelles. In this way, it is selectively permeable to ions and organic molecules.

Q 43: What is function of cell?

Cells are the basic building blocks of all living things. The human **body**is composed of trillions of cells. They provide **structure** for the **body**, take in nutrients from food, convert those nutrients into **energy**, and carry out specialized functions.

Q 44: What is function of cell membrane?
This is the outer covering of cell. In plant cells it is present just below the cell wall while in animal cell, it forms the outer most cover.

Q 45: What are types of cristae golgi apparatus?
Cristae membrane and cristae junction

Q 46:What are mitosis steps?
Mitosis occurs in four phases, called prophase,metaphase, anaphase, and telophase.

Q 47:What is gel electrophoresis?
The process in which molecules (such as proteins, DNA, or RNA fragments) can be separated according to size and electrical charge by applying an electric current to them while they are in a gel.

Q 48:What is down syndrome ?
Down syndrome (DS or DNS), also known as trisomy 21, is a genetic disorder caused by the presence of all or part of a third copy of chromosome 21. It is typically associated with physical growth delays, characteristic facial features, and mild to moderate intellectual disability.

Q 49: What are lysosome and heat shoack protein?
an organelle in the cytoplasm of eukaryotic cells containing degradative enzymes enclosed in a membrane. a protein induced in a living cell in response to a rise in temperature above the normal level

Q 50: What is disaccharide two examples?
A sugar consisting of two linked monosaccharide molecules, For example, sucrose comprises one glucose molecule and one fructose molecule bonded together by glycoside linkage. disaccharides are soluble in water. Example: sucrose lactose, and maltose.

Q 51: Quatnary structure of protein?
Two or more polypeptides assemble to form larger protein molecules. The hypothetical molecule here is a tetramer, made up of four polypeptide subunits.

Q 52 Tautomers define?
Each of two or more isomers of a compound which exist together in equilibrium, and are readily interchanged by migration of an atom or group within the molecule.

Q 53: Explain Transcription?
Transcription is the process by which the information in a strand of DNA is copied into a new molecule of messenger RNA (mRNA). DNA safely and stably stores genetic material in the nuclei of cells as a reference, or template.

Q 54: Briefly explain the sites of larger subunits of Ribosome?
Ribosomes consist of two major components: the smallribosomal subunit, which reads the RNA, and the large subunit, which joins amino acids to form a polypeptide chain. Each subunit is composed of one or more ribosomal RNA (rRNA) molecules and a variety of ribosomal proteins

Q 55: Different types of bacteria will produce
How bacteria grow. Bacteria need warmth and moisture to grow Clostridium Perfringens. Clostridium perfringens is found in low numbers in many foods, particularly meat and poultry and their products Salmonella. Listeria. E.Coli 0157. Campylobacter

Q 56: What are the role of protein in living organisms?
Proteins are large, complex molecules that play many critical **roles** in the body. They do most of the work in cells and are required for the structure, **function**, and regulation of the body's tissues and organs.

Q 57: Differences between PKU and PAH?

Phenylketonuria (also called **PKU**) is a condition in which your body can't break down an amino acid called phenylalanine. Amino acids help build protein in your body. Without treatment, phenylalanine builds up in the blood and causes health problems.

The **PAH gene** provides instructions for making an enzyme called phenylalanine hydroxylase. This enzyme is responsible for the first step in processing phenylalanine, which is a building block of proteins (an amino acid) obtained through the diet.

Q 58: Define 1-4 Glycosidic Bond.
1,4 glycosidic bond. ... There are are two types of**glycosidic bonds - 1,4** alpha and **1,4** beta **glycosidic bonds**. **1,4** alpha **glycosidic bonds** are formed when the OH on the carbon-1 is below the glucose ring; while**1,4** beta **glycosidic bonds** are formed when the OH is above the plane.

Q 59: Steps of Meiosis II?
Definition. The second of the **two** consecutive divisions of the nucleus of eukaryotic cell during **meiosis**, and composed of the following **stages**: **prophase II**,**metaphase II**, anaphase **II**, and telophase **II**.

Q 60: Write hydrolysis of disaccharides; maltose, lactose, sucrose?
Enzymes that hydrolyse glycosidic bonds are called "glycoside hydrolases" or "glycosidases". The best-known **disaccharide** is **sucrose** (table sugar). **Hydrolysis of sucrose** yields glucose and fructose. Invertase is a sucrase used industrially for the **hydrolysis of sucrose** to so-called invert sugar. **Maltose** can be broken down to **glucose** by the **maltase** enzyme, which catalyses the **hydrolysis** of the glycosidic bond. ... A 10% solution of **maltose** is 35% as sweet as sucrose.

Q 61: Define folding of the protein. 3 marks
Protein folding is the physical process by which a protein chain acquires its native 3-dimensional structure, a conformation that is usually biologically functional, in an expeditious and reproducible manner.

Q 62: The importance of glucose in the human body. 5 marks
Glucose Metabolism. Energy is required for the normal functioning of the organs in the **body**. Many tissues can also use fat or protein as an energy source but others, such as the brain and red blood cells, can only use **glucose**. **Glucose** is stored in the **body** as glycogen.

Q 63: Effects of allosteric haemoglobin 5 marks

Q 64: types of RNA and their functions(3)
There are 3 **types** of RNA, each encoded by its own type of gene:
mRNA - Messenger RNA: Encodes amino acid sequence of a polypeptide.
tRNA - **Transfer** RNA: Brings amino acids to ribosomes during translation.
rRNA - Ribosomal RNA: With ribosomal **proteins**, makes up the ribosomes, the organelles that translate the mRNA.

Q 65: note on endocytosis, pinocytosis & phagocytosis(5)
Unlike receptor-mediated **endocytosis**, **pinocytosis**is nonspecific in the substances that it transports. The cell takes in surrounding fluids, including all solutes present. **Pinocytosis** also works as **phagocytosis**; the only difference is that **phagocytosis** is specific in the substances it transports.

Q 66: How alpha helix stabilize?
The alpha helix (α-helix) is a common motif in the secondary structure of proteins and is a righthand-coiled or spiral conformation (helix) in which every backbone N−H group donates a hydrogen bond to the backbone C=O group of the amino acid located three or four residues earlier along the protein sequence.

Q 67: Diffrence b/w T cell and B cell?

An important **difference between T-cells** and **B-cells**is that **B-cells** can connect to antigens right on the surface of the invading virus or bacteria. This is different from **T-cells**, which can only connect to virus antigens on the outside of infected **cells**.

Q 68: Define Homozygous , Hetrozygous, phenotype, and genotype?

An organism can be **homozygous** dominant, if it carries two copies of the same dominant allele, or homozygous recessive, if it carries two copies of the same recessive allele.
Heterozygous means that an organism has two different alleles of a gene.
The **genotype** is the set of genes in our DNA which is responsible for a particular trait.
The **phenotype** is the physical expression, or characteristics, of that trait.

Q: Endo-plasmic reticulm
Both the **smooth** and **rough endoplasmic reticulum** help **in the** production and storage of proteins The main **difference** is that one contains ribosomes on it and the other does not. The **rough endoplasmic reticulum** (RER) has ribosomes on its surface. ... The **smooth endoplasmic reticulum** (SER) does not contain ribosomes.

Q: Sex linked?
a gene or heritable characteristic carried by a sex chromosome.

Q: phospholipid?
a lipid containing a phosphate group in its molecule, e.g. phosphatidylcholine.

Q: Leading, Lagging fargement
leading strand, and it is replicated continuously in the 3' to 5' direction. The other **strand** is the **lagging strand**, and it is replicated discontinuously in short sections. ... The fragments are bound together by the enzyme DNA ligase in order to complete replication in the **lagging strand** of DNA.

Q peptide bond
A **peptide bond**, also known as an amide **bond**, is a covalent chemical **bond** linking two consecutive amino acid monomers along a **peptide** or protein chain.

Q: Function of centrosome
Centrosomes are structures found inside of cells. They are made from two centrioles. Centrioles are microtubule rings. The main purpose of a centrosome is to organize microtubules and provide **structure** for the **cell**, as well as work to pull chromatids apart during **cell** division.

Q: Hypotonic Iso, Hyerptonic condition and envroment?
Isotonic, **Hypotonic**, and **Hypertonic** Solutions. Water moves readily across cell membranes through special protein-lined channels, and if the total concentration of all dissolved solutes is not equal on both sides, there will be net movement of water molecules into or out of the cell.

Q: Function of centromere
In eukaryotes, a **centromere** is a region of DNA that is responsible for the movement of the replicated chromosomes into the two daughter cells during mitosis and meiosis. There is one **centromere** on each chromosome, and **centromeres** are responsible for two major **functions**.

Q: Centrosome and Centromere?
Centrosome: a cell organelle. ... Cetriole is a cylindrical cell structure composed of a protein tubulin. An associated pair of **centriole** surrounded by amorphous mass of dense material, makes up a structure called **centrosome**. **Centromere** is the part of a chromosome, that links sister chromatids.

Q: Condensation and Hydrolysis?
Condensation: joint two monomer by removel H20.
Hydrolysis: Break polymer into monomer adding water molecule