

Medical Biotechnology

Answer Key

27/06/2021



Gujarat Biotechnology Research Centre

Medical Biotechnology (Scientist B)

This question booklet contains 28 pages

Application No: _____

Time: 2 Hours

Total Marks: 200

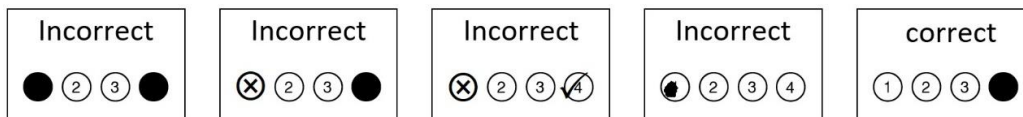
Total Questions: 200

Candidate Signature :

Invigilator Signature :

Instructions for Candidate

1. This question booklet contains 200 questions.
2. Each correct answer carries 1 mark.
3. Use only Black Ball Point Pen to darken the appropriate circle in OMR.
4. Please darken the complete circle.
5. Darken ONLY ONE CIRCLE for each Question as shown below:



6. Answer once marked cannot be changed.
7. Please do not make any stray marks on the Question Booklet.
8. Rough works must be done on the blank page of Question Booklet.
9. Mark your answer in the appropriate space in the Answer Sheet against the Number corresponding to the question.
10. The Candidate is NOT allowed to carry Question booklet and OMR response sheet with him/her on conclusion of examination.

- 1 What inheritance pattern does Fragile X syndrome follows?
 - (A) Autosomal recessive
 - (B) Autosomal dominant
 - (C) X-linked
 - (D) Y-linked

- 2 What genetic defect leads to Myotonic dystrophy?
 - (A) Single nucleotide variation
 - (B) Copy number variation
 - (C) Triplet repeat expansion
 - (D) Somatic variant

- 3 What is the application of ARMS-PCR?
 - (A) Detect single nucleotide variants
 - (B) Detect copy number variants
 - (C) Detect triplet repeat expansions
 - (D) Detect translocations

- 4 Suppose that you have identified a new strain of bacteria. If the DNA content of this organism's cell is 13% adenine, approximately what percentage of this organism's genome consists of thymine?
 - (A) 13
 - (B) 37
 - (C) 87
 - (D) 50

- 5 What kind of cell division occurs in germ cells?
 - (A) Meiosis
 - (B) Mitosis
 - (C) No cell division
 - (D) Cell arrest

- 6 How many mature sperm cells will be produced by 100 primary oocytes?
 - (A) 100
 - (B) 200
 - (C) 300
 - (D) 400

- 7 A man who has achondroplasia marries a phenotypically normal woman. If they have four children, what is the probability that none of their children will be affected with this disorder?
 - (A) $1/2$
 - (B) $1/4$
 - (C) $1/8$
 - (D) $1/16$

- 8 In what cell cycle stage are chromosomes arrested to conduct karyotyping?
 - (A) Prophase
 - (B) Metaphase
 - (C) Anaphase
 - (D) Telophase

- 9 In G banded karyotype, which regions of the genome are stained by Giemsa stain?
- (A) GC rich regions
 - (B) AT rich regions
 - (C) Centromere region
 - (D) Telomere region
- 10 Which banding technique is used to visualise centromeric regions on the chromosomes?
- (A) G banding
 - (B) C banding
 - (C) NOR banding
 - (D) Q banding
- 11 Which concentration metric value changes based on room temperature?
- (A) Molarity
 - (B) Molality
 - (C) Normality
 - (D) Weight
- 12 What probability distribution is observed for dichotomous variables?
- (A) Binomial
 - (B) Polynomial
 - (C) Logarithmic
 - (D) Normal
- 13 Which technique is ideal to detect known microdeletion/ microduplication syndrome?
- (A) Karyotype
 - (B) Microarray
 - (C) FISH
 - (D) PCR
- 14 In Q-PCR, what number of DNA copies for a given loci does an RQ value of 1.5 indicate?
- (A) 1
 - (B) 2
 - (C) 3
 - (D) 4
- 15 In ARMS-PCR, how many primers are used?
- (A) 1
 - (B) 2
 - (C) 3
 - (D) 4
- 16 Which sites in the genome does a restriction endonuclease cleaves the DNA?
- (A) Restriction site
 - (B) Microsatellite site
 - (C) AT rich sites
 - (D) GC rich sites

- 17 In microarray, what genetic abberation can be observed?
- (A) Deletion
 - (B) Translocation
 - (C) Inversion
 - (D) Single nucleotide variant
- 18 What sequencing generation does Sanger sequencing belongs to?
- (A) First generation
 - (B) Second generation
 - (C) Third generation
 - (D) Fourth generation
- 19 On which instrument fragment length analysis can be carried out?
- (A) ABI 3130
 - (B) Ion Torrent Sequencer
 - (C) Illumina MiSeq sequencer
 - (D) Illumina HiSeq
- 20 What technology is used for base calling in Nanopore sequencing technology?
- (A) Ion Semiconductor
 - (B) Fluorescently labelled reversible terminator
 - (C) Biological pore
 - (D) Dideoxy chain termination
- 21 Which genetic abberation can't be observed by Illumina sequencing technology?
- (A) Missense variant
 - (B) Frameshift variant
 - (C) Tandem duplication
 - (D) Small indels
- 22 Which genetic abberation can be detected by PacBio sequencing but not by Illumina sequencing technology?
- (A) Missense variant
 - (B) Frameshift variant
 - (C) Trinucleotide repeat expansion
 - (D) Small indels
- 23 What is the name of the file that contains raw read data from Nanopore sequencing machine?
- (A) Fastq
 - (B) BAM
 - (C) SAM
 - (D) VCF
- 24 What file is generated after aligning raw sequence read data with reference genome?
- (A) Fastq
 - (B) BAM
 - (C) SAM
 - (D) VCF

- 25 Which tool is used to assess quality metrics of BAM files?
(A) BAMQC
(B) FastQC
(C) VCFQC
(D) BQSR
- 26 Which tool is used for variant calling in next generation sequencing data?
(A) BWA
(B) GATK HaplotypeCaller
(C) Galaxy
(D) BAMQC
- 27 Which tool is used to annotate variants in VCF file?
(A) GATK HaplotypeCaller
(B) VarScan
(C) VEP
(D) Galaxy
- 28 Which tool is used for in silico pathogenicity scoring of a particular variant?
(A) GATK HaplotypeCaller
(B) Galaxy
(C) VarScan
(D) DANN
- 29 For small sample size, which statistical test is used to compare proportions of a categorical outcome in different independent groups?
(A) Chi squared test
(B) Fisher exact test
(C) Student T-test
(D) ANNOVA
- 30 Which test statistic measures association between exposure and outcome?
(A) Odds Ratio
(B) Hazard Ratio
(C) P-value
(D) Chi square
- 31 Which test statistic compares probability of outcome in treatment group versus control group?
(A) Relative risk
(B) Hazard Ratio
(C) P-value
(D) Chi square
- 32 At what wavelength does DNA absorb light?
(A) 230nm
(B) 260nm
(C) 280nm
(D) 300nm

- 33 In nanodrop, what A260/230 ratio is accepted as "pure" nucleic acid?
- (A) 1
 - (B) 1.5
 - (C) 1.8
 - (D) 2
- 34 Which homozygous variant in HBB gene leads to sickle cell anemia?
- (A) DeltaF508
 - (B) p.L444P
 - (C) p.E6V
 - (D) rs1799853
- 35 Considering both parents being carriers of DeltaF508 variant in CFTR gene, what is the probability of child being homozygous wildtype for cystic fibrosis in next pregnancy?
- (A) 0
 - (B) 0.5
 - (C) 0.25
 - (D) 1
- 36 RNA vaccines are based on what TLR biology?
- (A) TLR-2
 - (B) TLR-3
 - (C) TLR-5
 - (D) TLR-9
- 37 Mutation in which gene often leads to male infertility?
- (A) CFTR
 - (B) GBA
 - (C) SRY
 - (D) HTT
- 38 Mutation in which gene increases risk of male breast cancer?
- (A) MLH1
 - (B) BRCA1
 - (C) BRCA2
 - (D) HTT
- 39 What is the chromosome makeup of a patient with Down syndrome?
- (A) 46, XX
 - (B) 47, XY +21
 - (C) 47, XY +18
 - (D) 47, XY +13
- 40 Risk of which genetic disease in a given pregnancy increases with maternal age?
- (A) Edward syndrome
 - (B) Cystic fibrosis
 - (C) Myotonic dystrophy
 - (D) SMA

- 41 What type of variants in DMD gene leads to Duchenne muscular dystrophy?
(A) Missense variant
(B) Frameshift variant
(C) In-frame deletion
(D) In-frame duplications
- 42 In which disease does one observe sticky mucus lining in the lungs?
(A) Becker muscular dystrophy
(B) Cystic fibrosis
(C) Beta thalassemia
(D) Gaucher disease
- 43 Hinge region in the structure of immunoglobulins is due to which of the following residue?
(A) Methionine
(B) Proline
(C) Serine
(D) Glycine
- 44 Vasodilation leads to _____.
(A) increase in blood pressure
(B) decrease in blood pressure
(C) thickening of blood
(D) thinning of blood
- 45 Erythrocyte Sedimentation Rate' is used for the identification of which type of infection?
(A) Bacteria
(B) Virus
(C) Parasitic
(D) Fungi
- 46 CD32 receptor is specific for which cells?
(A) Neutrophils
(B) Basophils
(C) Monocytes
(D) Eosinophils
- 47 Which of the following listed cells do not function as the 'Antigen Presenting Cells' (APCs)
(A) Plasma Cells
(B) B Cells
(C) Dendritic Cells
(D) Macrophages
- 48 Which Toll Like Receptor (TLR) is involved in identifying CPG moieties
(A) TLR2
(B) TLR4
(C) TLR5
(D) TLR9

- 49 Which residue is phosphorylated in the JAKSTAT pathway?
(A) Tyrosine
(B) Tryptophan
(C) Threonine
(D) Serine
- 50 Identify the probable amino acid sequence of transmembrane antigen protein.
(A) RHKDE
(B) QDHET
(C) AVMLW
(D) KSNRH
- 51 Which of the following is not a part of Cytotoxic T-Cells (CTLs)?
(A) Granzyme
(B) Ficolin
(C) Serglycin
(D) Perforin
- 52 What suffix is used for chimeric antibodies?
(A) umab
(B) zumab
(C) ximab
(D) omab
- 53 Which protein is involved in the cleavage of antigenic protein into smaller peptides in MHC-I Pathway?
(A) TAP
(B) ERAP
(C) Ubiquitin
(D) Chaperone
- 54 What is the universal marker of T-Cells?
(A) CD3
(B) CD4
(C) CD28
(D) CD56
- 55 Coding hairpin DNA is removed by the action of which enzyme in VDJ recombination?
(A) VDJ recombinase
(B) Artemis
(C) RAG
(D) Terminal Deoxynucleotidyl Transferase (TDT)
- 56 Which of these disease follows an X-linked recessive inheritance?
(A) Cystic fibrosis
(B) Fragile X
(C) Gaucher disease
(D) red-green colour blindness

- 57 Identify the anaphylotoxin in the classical complement pathway.
- (A) C2a
 - (B) C3b
 - (C) C4a
 - (D) C5b
- 58 Which of the following is a positive sense diploid ssRNA virus?
- (A) Coronavirus
 - (B) Polio Virus
 - (C) Hepatitis B Virus
 - (D) Human Immunodeficiency Virus
- 59 Rheumatoid Arthritis is an example of _____ hypersensitivity.
- (A) Type I
 - (B) Type II
 - (C) Type III
 - (D) Type IV
- 60 A patient undergoes treatment wherein his healthy skin is transplanted on his burned area of skin. This is an example of _____.
- (A) Autologous grafting
 - (B) Allogenic grafting
 - (C) Isologous grafting
 - (D) Xenografting
- 61 Cyclosporin is commonly used drug in
- (A) Bacterial Infection
 - (B) Preventing Graft Rejection
 - (C) Viral Infection
 - (D) Inflammation
- 62 Which receptor is found only in activated T-cells?
- (A) CD40L
 - (B) CD28
 - (C) CTLA4
 - (D) B7
- 63 The first in the cascade of steps in inflammation is _____.
- (A) Vasodilation
 - (B) Vasoconstriction
 - (C) Diapedesis
 - (D) Venular dilation
- 64 The pro-apoptotic proteins among the following is _____.
- (A) Bcl-2
 - (B) Bcl-10
 - (C) Bcl-x
 - (D) Bcl-w

- 65 Which enzyme is known to be involved in forming the sticky nets in NETosis?
(A) PMN granule
(B) Cathelicidin
(C) Calcineurin
(D) Calnexin
- 66 Etosis is mainly due to which cells?
(A) Neutrophils
(B) Eosinophils
(C) T-Cells
(D) B-Cells
- 67 David Baltimore is a molecular biologist. What did he discover?
(A) Structure of DNA
(B) X-ray crystallographic techniques
(C) Reverse transcriptase
(D) The anti HIV drug zidovudine
- 68 Viruses of different families have varied geometric structures. Which of the following is true?
(A) All viruses have a lipid bilayer
(B) Virus nucleocapsids are either icosahedral or helical
(C) The nucleic acid is commonly linear
(D) All viruses have the same basic geometry
- 69 A type of cell culture that can reproduce for an extended number of generations and is used to support viral replication is a _____.
(A) Continuous cell line
(B) Primary cell culture
(C) Diploid fibroblast cell
(D) Connective tissue
- 70 A chemical component that is found in all viruses is _____.
(A) Protein
(B) Lipid
(C) DNA
(D) RNA
- 71 Which viruses appear to be hypermutable?
(A) DNA
(B) Emerging
(C) Influenza and HIV
(D) RNA
- 72 Bacteriophage are readily counted by the process of _____.
(A) Immunoassay
(B) ELISA
(C) Plaque assay
(D) Electron Microscopy

- 73 Assembly is a vital late replication stage for a virus and is often accomplished by which of the following?
- (A) Use of cellular scaffolding in the nucleus and cytoplasm
 - (B) Snatching cellular lipids and membranes
 - (C) Master plan embedded in the viral genome
 - (D) Random interactions between cellular and virus proteins
- 74 A quasi species virus such as influenza and HIV has which of the following characteristics?
- (A) A fragmented or segmented genome
 - (B) Co-existence of innumerable genetic variants
 - (C) A very large genome
 - (D) Possesses RNA and DNA
- 75 Reverse transcriptase enzyme is present in _____.
- (A) Human papilloma virus
 - (B) Hepatitis B virus
 - (C) Hepatitis C virus
 - (D) Epstein-Barr virus
- 76 Which of the following virus is used for the biocontrol of insect pest in plants?
- (A) Cauliflower mosaic virus
 - (B) Rice tungro virus
 - (C) Cucumber mosaic virus
 - (D) Nuclear polyhedrosis virus
- 77 What types of viruses contain the enzyme lysozyme to aid in their infection?
- (A) Human Viruses
 - (B) Animal Viruses
 - (C) Plant Viruses
 - (D) Bacteriophage
- 78 Influenza virus enter the host by _____.
- (A) Cell fusion
 - (B) Endocytosis
 - (C) Exocytosis
 - (D) Transcytosis
- 79 A structural component that is found in all viruses is _____.
- (A) Envelope
 - (B) DNA
 - (C) Capsid
 - (D) Spike protein
- 80 Viruses that can remain latent (usually in neurons) for many years are most likely _____.
- (A) Togaviruses
 - (B) Herpesviruses
 - (C) Enteroviruses
 - (D) Retroviruses

- 81 The vector responsible for Japanese Encephalitis is _____.
- (A) *Culex tritaeniorhynchus*
 - (B) *Culex jenseni*
 - (C) *Culex pipiens*
 - (D) *Culex pusillus*
- 82 The virus inserted in genome is recognized by _____.
- (A) FISH
 - (B) Microarray
 - (C) Northern blot
 - (D) Southern blot
- 83 Different strains of viruses can be identified by _____.
- (A) Electron microscope
 - (B) Polymerase Chain Reaction (PCR)
 - (C) Fluorescence microscopy
 - (D) Disease symptoms observation
- 84 Which of the following cells is not infected by HIV?
- (A) CD4+ Helper T cells
 - (B) Macrophages
 - (C) Dendritic cells
 - (D) B lymphocytes
- 85 Which of the following is a dsDNA-RT virus?
- (A) HIV
 - (B) HBV
 - (C) HCV
 - (D) HPV
- 86 Tobacco mosaic virus is a _____.
- (A) Positive-sense ss-RNA virus
 - (B) Negative-sense ss-RNA virus
 - (C) Positive-sense ss-DNA virus
 - (D) Negative-sense ss-DNA virus
- 87 Epstein-Barr Virus (EBV) is not associated with _____.
- (A) Infectious Mononucleosis
 - (B) Hepatitis
 - (C) Burkitt's lymphoma
 - (D) Multiple myeloma
- 88 Which of the following viruses can be transmitted by blood?
- (A) Hepatitis A
 - (B) Coxsackie B
 - (C) Rubella
 - (D) Varicella-Zoster

- 89 Human T-lymphotropic virus 1 (HTLV-1) is associated with _____.
- (A) Burkitt's lymphoma
 - (B) Multiple Sclerosis
 - (C) Hodgkin's lymphoma
 - (D) Adult T-cell lymphoma
- 90 Which of the following viruses are transmitted from animals to humans?
- (A) Influenza A
 - (B) Polio
 - (C) Lassa Fever
 - (D) Herpes
- 91 Which of the following antiviral agents is active against the following virus?
- (A) Lamivudine and RSV
 - (B) Acyclovir and HSV
 - (C) Ribavirin and HIV
 - (D) Amantidine and influenza B
- 92 What happens during the 'incubation period' in the viral replication cycle?
- (A) The virus is cleared from the body by the immune system
 - (B) Virus replication happens at an intracellular level
 - (C) This period commonly lasts for a few days
 - (D) This period commonly lasts for a few hours
- 93 Papillomaviruses cause warts and cancer but how do they most often infect humans?
- (A) Waterborne transmission
 - (B) Airborne transmission
 - (C) Scratches and breaks in the skin
 - (D) Nosocomial transmission
- 94 Many virus infections result in immune pathology, this is caused predominantly by which of the following?
- (A) Antibody mediated reactions
 - (B) A cytokine storm
 - (C) A response of killer T cells (CD-8)
 - (D) A decline in function of the immune system
- 95 Poliovirus can most easily become more virulent by which of the following processes?
- (A) Recombining with another enterovirus
 - (B) Mutation of the RNA genome at only a few positions
 - (C) Altering its protein coat
 - (D) Multiple nucleotide deletions and substitutions
- 96 Cytotoxic T cells can be activated by which of the following events?
- (A) By reacting with budding viruses
 - (B) By identifying virus peptides presented by antibodies
 - (C) By identifying virus peptides presented by MHC-I
 - (D) By releasing complement

- 97 Identify the most commonly used diagnostic technique in a virus laboratory?
(A) Virus isolation in cell culture
(B) Sequencing
(C) RT-PCR
(D) Immuno-serology
- 98 Next Generation Sequencing (NGS) most often used _____.
(A) To identify a newly discovered virus
(B) To search for drug resistant mutants
(C) To identify quasi species viruses
(D) To isolate virus from sample
- 99 Viruses are limited in their host range because _____.
(A) They can only replicate in certain types of cells
(B) Only certain cells are susceptible to viral infections
(C) They can only absorb to cells with proper receptors
(D) They can only bind to cells that have the opposite charge
- 100 MERS has the following functional features except _____.
(A) it can be spread by faecal oral route
(B) it can be spread by aerosol droplets
(C) reservoir of this virus can be found in bats
(D) it is conduit to humans via camels
- 101 Interferons are very special defence mechanisms which operate by _____.
(A) Binding to viruses
(B) Binding to neighbouring cells
(C) Producing a long lasting state of resistance
(D) Inhibiting virus induced enzymes
- 102 How rapid is 'rapid viral diagnosis' by molecular methods?
(A) Within a working day for most laboratories
(B) 5 minutes at the bedside
(C) 3 day laboratory turnarounds
(D) 1 hour laboratory turnarounds in special emergencies
- 103 Which of the following statements explains why viruses are only able to multiply in living cells?
(A) Their binary fission is controlled by host cell genes
(B) Virus do not possess the necessary components for self-replication
(C) DNA is only able to replicate inside living cells
(D) They have only enough genetic information for DNA replication
- 104 Which of the following statements correctly describes how the host cell membrane is changed by viral replication?
(A) Pores develop
(B) A glycocalyx layer is formed
(C) The membrane is resynthesized
(D) Viral proteins are acquired

- 105 Measles and mumps are examples of _____.
(A) Orthomyxovirus
(B) Paramyxoviruses
(C) Picornaviruses
(D) Togavirus
- 106 What is the most common cause of acute adult viral gastroenteritis?
(A) Rotavirus
(B) Norovirus
(C) Sapovirus
(D) Astrovirus
- 107 Reactivation of what latent virus can cause shingles?
(A) VZV
(B) HCMV
(C) EBV
(D) RSV
- 108 Which of the following viruses replicate in the nucleus?
(A) Orthomyxoviruses
(B) Poxviruses
(C) Picornaviruses
(D) Paramyxoviruses
- 109 Which of the following statement is true for prions?
(A) Readily inactivated by autoclave at 121°C
(B) Highly immunogenic
(C) Have long incubation periods
(D) May be readily cultured
- 110 During the incubation period of HIV infection, _____.
(A) The viral load has a direct bearing on the prognosis
(B) there is low HIV replication
(C) HIV is mainly integrated into the genome of long-lived cell populations
(D) generation of little antibody against the HIV envelope
- 111 HHV-8 is associated with _____.
(A) Fifth disease
(B) Roseala Infantum
(C) Kaposi's Sarcoma
(D) Nasopharyngeal Carcinoma
- 112 Which of the following is a special feature of the rabies vaccine?
(A) The vaccine has not changed since the time of L. Pasteur
(B) The original air dried spinal cord of infected rabbits was a killed vaccine
(C) The vaccine still needs 16 doses given into the peritoneal cavity
(D) The modern rabies vaccine is grown in human diploid cells from an aborted embryo

- 113 Which of the following methods may be used for serological diagnosis?
(A) Polymerase chain reaction (PCR)
(B) CMV DEAFF test
(C) Complement-fixation tests (CFT)
(D) Northern blot
- 114 Modification of a standard PCR include _____.
(A) branched DNA (bDNA)
(B) Nested PCR
(C) Isothermal amplification
(D) Ultraviolet irradiation
- 115 Which of the following statement is correct regarding viral infection of the central nervous system?
(A) The detection of antibody in the CSF is a useful diagnostic marker
(B) PCR has no role in the diagnosis of CNS infections
(C) Electron microscopy of the cerebrospinal fluid (CSF) is a useful diagnostic test
(D) Meningitis may not occur together with encephalitis
- 116 Which of the following was a major discovery of molecular biology when the adenovirus replication strategy was uncovered?
(A) The function of RT
(B) Mechanism of replication of DNA
(C) The importance and frequency of mRNA splicing
(D) The speed of action of viral DNA dependent DNA polymerase
- 117 Which unique form does the rabies virus take?
(A) The virion has a dumbbell appearance
(B) It is shaped like a bullet
(C) The virus is star shaped
(D) The virion is very pleomorphic
- 118 Proteins can act as excellent buffers because of:
(A) The wide range of pKa values of side chains found within the proteins
(B) The ability of the terminal regions of the protein to accept or donate H⁺ ions
(C) Their hydrogen-bonding capabilities in forming secondary and tertiary structures.
(D) The ease with which H⁺ and OH⁻ ions can be absorbed once the protein is hydrolyzed
- 119 The amino acid that can act both as an acid and a base in an enzyme catalyzed reaction is:
(A) Tryptophan
(B) Histidine
(C) Lysine
(D) Aspartic acid
- 120 Amino acid with asymmetric C β atoms are _____.
(A) Proline, Methionine
(B) Lysine, Isoleucine and Valine
(C) Cystine, Serine and Methionine
(D) Threonine and Isoleucine

- 121 The most abundant amino acid found in collagen protein?
(A) Lysine
(B) Alanine
(C) Leucine
(D) Glycine
- 122 The peptide bond displayed the absorbance in the range of _____.
(A) 190-230 nm
(B) 240-270 nm
(C) 160-180 nm
(D) 250-280 nm
- 123 Which of the following amino acid is abundantly available in histones?
(A) Aspartic Acid
(B) Tryptophan
(C) Arginine
(D) Glycine
- 124 The tertiary structure of a protein is governed mainly by _____.
(A) Intramolecular interactions of the side groups of polypeptide chains
(B) Intermolecular interactions of the polypeptide chains
(C) Hydrogen bonding
(D) Vander walls interaction
- 125 The amino acids with phi and psi values (-60, -40),(-59,-47), and (-80,120) will be adapting which of the following conformations?
(A) Helix-Coil-Extended
(B) Helix-Helix-Extended
(C) Extended-Extended-Loop
(D) Loop-Loop-Coil
- 126 Which of the following amino acid residue interrupts α -helices and also disrupts β -sheets?
(A) Phenylalanine
(B) Cysteine
(C) Histidine
(D) Proline
- 127 The Ramachandra Plot of a protein allows you to identify _____.
(A) the most stable structure
(B) the allowed tertiary structure conformation
(C) sterically disallowed conformations
(D) secondary structure elements
- 128 Among the different amino acid side chains in proteins which of the following pairs might form side chain-side chain hydrogen interactions with each other?
(A) Valine-glutamic acid
(B) Alanine-Glycine
(C) Asparagine-serine
(D) Proline-Lysine

- 129 If a protein is known to bind Ca^{2+} ions, which of the following side chains is likely to be involved in Ca^{2+} binding
- (A) Aspartic Acid
 - (B) Lysine
 - (C) Proline
 - (D) Methionine
- 130 The linear and circular form of the same DNA molecular can be distinguished using _____.
- (A) Absorbance at 260 nm
 - (B) Endonuclease digestion
 - (C) Viscosity of the solution
 - (D) Exonuclease digestion
- 131 Which one of the following bases has the largest hydrogen bonding possibility?
- (A) Adenine
 - (B) Guanine
 - (C) Cytosine
 - (D) Uracil
- 132 The nucleotide analogue used in DNA sequencing by chain termination method is _____.
- (A) 1',3'-dideoxy nucleoside triphosphate
 - (B) 2',3'-dideoxy nucleoside triphosphate
 - (C) 2',4'-dideoxy nucleoside triphosphate
 - (D) 2',5'-dideoxy nucleoside triphosphate
- 133 The 4-amino or 4-keto group of pyrimidine bases is located in the _____.
- (A) major groove of the double stranded DNA
 - (B) minor groove of the double stranded DNA
 - (C) minor groove of the B form DNA but not the A form DNA
 - (D) major groove of the B form DNA but not the A form DNA
- 134 The compound that consists of ribose linked by an N-glycosidic bond to N-9 of adenine is _____.
- (A) a deoxyribonucleoside
 - (B) a purine nucleotide
 - (C) a pyrimidine nucleotide
 - (D) adenosine.
- 135 In nucleotides and nucleic acids, syn and anti conformations relate to _____.
- (A) base stereoisomers
 - (B) rotation around the phosphodiester bond
 - (C) rotation around the sugar-base bond
 - (D) sugar pucker
- 136 Name the type of culture which is prepared by inoculating directly from the tissue of an organism to culture media.
- (A) Primary cell culture
 - (B) Secondary cell culture
 - (C) Cell lines
 - (D) Transformed cell culture

- 137 Range of osmolarity tolerated/accepted in mOsm/Kg of H₂O by mammalian cells is
- (A) 150-300
 - (B) 280-360
 - (C) 300-325
 - (D) 360-400
- 138 Freshly prepared complete media will last years when stored at -20°C.
- (A) this is true since many biologicals last a long time when stored at -20°C
 - (B) this is false since -80°C is known to work better
 - (C) this is false since basal media should not be frozen because components will precipitate out of solution
 - (D) this is true since my serum comes from the vendor frozen
- 139 The cultivating animal cells under in-vitro conditions using appropriate media is called _____
- (A) Gene expression
 - (B) Transgenetic animals
 - (C) Hybrid culture
 - (D) Animal cell culture
- 140 Which is the recommended way of freezing animal cells?
- (A) freeze as rapidly as possible
 - (B) freeze slowly, at about 1 degree per minute
 - (C) freeze sequentially with some time interval
 - (D) keep at -20°C for long time
- 141 Identify the vitamin deficiency responsible for the pernicious anemia?
- (A) Vitamin C
 - (B) Vitamin K
 - (C) Vitamin A
 - (D) Vitamin B12
- 142 Which of the following diseases is a suitable example of pleiotropic gene?
- (A) Colour blindness
 - (B) Phenylketonuria
 - (C) Haemophilia
 - (D) Thalassemia
- 143 Which of the following is an autosomal dominant gene type disorder?
- (A) Gaucher's disease
 - (B) Fragile X syndrome
 - (C) Marfan syndrome
 - (D) Duchenne muscular dystrophy
- 144 Identify the suitable genetic disorder having impaired chloride ion channel which causes obstruction in lung and follow an autosomal recessive pattern?
- (A) Hypercholesterolemia
 - (B) Huntington disease
 - (C) Polycystic kidney disease
 - (D) Cystic fibrosis

- 145 GLP is a formal regulation that was created by _____
(A) The United States Food and Drug Administration in 1978
(B) Medical Council of India in 2000
(C) Health Department of United Kingdom in 1991
(D) International Organization of Standards in 1991
- 146 Which one of the followings is not the principle of good laboratory practices?
(A) Quality Assurance Program (QAP).
(B) Standard Operating Procedures (SOP).
(C) Storage and retention of records and materials
(D) Procurement of raw materials
- 147 Who said: "All substances are poisons: there is none which is not a poison. The right dose differentiates a poison from a remedy."
(A) Swiss physician Paracelsus
(B) Sumol Pavittranon
(C) Michael Aschner
(D) Ronald N. Hines
- 148 The concentration that kills 50% of the population exposed to the test substance is called _____
(A) ED-50
(B) TD-50
(C) LD-50
(D) KD-50
- 149 Kala azar is caused by the following parasite _____.
(A) Trypanosoma brucei
(B) Leishmania donovani
(C) Entamoeba histolytica
(D) Plasmodium vivax
- 150 What is placebo treatment?
(A) Subject know what is the treatment
(B) Subject is unaware that treatment doesnot contain active drug
(C) Subject is given inactivated or expired drug
(D) Subject is given distilled water only
- 151 The ventricular repolarization of an ECG is represented by _____
(A) P-wave
(B) T-wave
(C) Q-wave
(D) QRS complex
- 152 The bipolar neurons are located in which part of human eye?
(A) Cornea
(B) Sclera
(C) Retina
(D) Choroid

- 153 Which of the following would require carrier protein?
(A) Passive diffusion
(B) Facilitated diffusion
(C) Active transport
(D) Group translocation
- 154 Superbugs are?
(A) Microbes with multiple plasmids
(B) Microbes having ability to utilize numerous carbon sources
(C) Microbes resistant to multiple antibiotics
(D) Microbes able to produce multiple enzymes of commercial importance
- 155 Which of the ribosomal RNA is considered to have catalytic activity?
(A) 5S rRNA
(B) 5.8S rRNA
(C) 23S rRNA
(D) 16S rRNA
- 156 _____ method of immobilizing enzymes is most promising delivery system into the blood stream.
(A) Adsorption on RBCs
(B) Cross linking
(C) Entrapment in cellulose matrix
(D) Liposome encapsulation
- 157 To make artificial plasmid which of the following enzymes can be used?
(A) polymerase, ligase
(B) lyase, endonuclease
(C) ligase, endonuclease
(D) polymerase, endonuclease
- 158 Which of the following is found common in plants and cyanobacteria?
(A) Plasmodesmata and chloroplast
(B) Circular DNA and photosynthesis
(C) Photosynthesis and chlorophyll
(D) Chlorophyll and chloroplast
- 159 Where is cardiolipin found in Mitochondria?
(A) In F₀-F₁ complex
(B) Inner membrane
(C) Outer membrane
(D) Matrix
- 160 Svedberg units is used for the representation of Ribosome size, it is measured based on which of the following property?
(A) Gravity
(B) Diameter
(C) Weight
(D) Density

- 161 _____ is the minimal length of time for all bacteria in a particular liquid culture to be killed at a given temperature.
- (A) D-Value
 - (B) DRT
 - (C) TDT
 - (D) TDP
- 162 UV radiations are of _____ wavelength and acts as _____ that kill microbes
- (A) 200 to 400 nm; DNA mutating radiations
 - (B) 200 to 400 nm; DNA nicking radiation
 - (C) 800 to 1200 nm; DNA denaturing radiation
 - (D) 800 to 1200 nm; DNA nicking radiations
- 163 Mode of action of Tetracyclines
- (A) inhibits the formation of peptide bonds in the growing polypeptide chain by reacting with the 50S portion of the 70S prokaryotic ribosome
 - (B) interfere with the attachment of the tRNA carrying the amino acids to the ribosome at the 30S portion of the 70S ribosome, preventing the addition of amino acids to the growing polypeptide chain
 - (C) binds to the small 16S rRNA of the 30S subunit of the bacterial ribosome, interfering with the binding of formyl-methionyl-tRNA to the 30S subunit
 - (D) block the TRANSPEPTIDASE REACTION, namely the cross-linking of the two linear polymers. The penicillin is bactericidal to growing cells
- 164 Selective media for Haemophilus influenzae is
- (A) EMB agar
 - (B) Bismuth sulphite agar
 - (C) MacConkey agar
 - (D) Blood/Chocolate agar
- 165 Stanley Miller and Harold Urey stated formation of amino acids by the reaction of formaldehyde, ammonia and HCN by the reaction called
- (A) Butlerov's reaction
 - (B) Strecker synthesis
 - (C) BMA process
 - (D) Degussa process
- 166 Endosymbiont theory suggests
- (A) Mitochondria (Aerobic) like prokaryote was engulfed first then evolved ER and then organism similar to chloroplast (cyanobacteria) was engulfed
 - (B) Cell evolved as eukaryote by invasions forming ER and Golgi bodies then aerobic prokaryote was engulfed which evolved as Mitochondria
 - (C) Chloroplast in eukaryotic plant cell evolved prior to mitochondria
 - (D) Mitochondria and Chloroplast concurrently evolved during same era of time
- 167 Ribosomes reads mRNA from
- (A) 3' to 5' only
 - (B) 5' to 3' only
 - (C) 3' to 5' as well as 5' to 3' at a same time
 - (D) Any one of 3' to 5' or 5' to 3' any one at a point of particular polypeptide synthesis

- 168 Glycosylation of protein where fucose and sialic acid is incorporated, takes place at
(A) Lumen of RER
(B) Golgi apparatus
(C) Lumen of SER
(D) On the outer membrane towards Cytosolic face of RER
- 169 Gluconeogenesis is a process that converts non-carbohydrate compounds (pyruvate / lactate) to glucose takes place at
(A) Lumen of RER
(B) Matrix of mitochondria
(C) Lumen of SER
(D) Cis-cisternae of Golgi body
- 170 Antibiotics such as Ciprofloxacin and Fluoroquinolones work by inhibiting a specific enzyme. This enzyme is normally necessary to relieve torsional strain that is caused by the unwinding of the helix. What is the name of this enzyme?
(A) DNA ligase
(B) Topoisomerase
(C) Single strand binding protein
(D) Primase
- 171 Which out of the following is an example of post translational modification?
(A) Splicing
(B) Class switching
(C) Subunit aggregation
(D) Base modification
- 172 Which of the following is the site where tRNA donates its amino acid to growing polypeptide chain
(A) mRNA Binding site
(B) A site
(C) P site
(D) E site
- 173 Injection of anti-venom to a patient for snake bite is an example of
(A) Naturally acquired active immunity
(B) Artificially acquired active immunity
(C) Naturally acquired passive immunity
(D) Artificially acquired passive immunity
- 174 Type IV hypersensitivity is also called as
(A) immediate hypersensitivity
(B) delayed hypersensitivity
(C) cytotoxic hypersensitivity
(D) immune complex hypersensitivity
- 175 To neutralize 150 ml of 0.05 N HCl, how much volume of 0.075 N NaOH will be required?
(A) 75 ml
(B) 100 ml
(C) 110 ml
(D) 125 ml

- 176 An intermediate that connects TCA cycle with Urea cycle is
(A) Fumarate
(B) Aspartate
(C) Bicarbonate
(D) Oxaloacetate
- 177 Which of the following amino acids is responsible for intrinsic fluorescence of proteins
(A) Proline
(B) Methionine
(C) Histidine
(D) Tryptophan
- 178 An individual's HLA haplotype is
(A) One allele at each MHC Class I locus
(B) The individual's Class I antigen type
(C) One allele at each MHC Class II locus
(D) The individual's complete set of MHC alleles
- 179 Which of the following is not part of the core RNA polymerase enzyme in prokaryotes?
(A) α (alpha)
(B) β (beta)
(C) ω (omega)
(D) σ (sigma)
- 180 FcRII (CD32) found on the B cell can identify which of the following
(A) MHC II
(B) MHC I
(C) IgG
(D) IgM
- 181 Activity of Glucokinase is catalysed by
(A) ATP
(B) Mg^{++}
(C) ATP & Mg^{++}
(D) NADP
- 182 End product of beta oxidation of fatty acid is
(A) Fatty acyl Co-A
(B) pyrophosphate
(C) b-keto fatty acyl-Co
(D) Acetyl CoA
- 183 Warburg effect is a suitable example of
(A) Anerobic glycolysis
(B) Aerobic glycolysis
(C) Gluconeogenesis
(D) Fermentation

- 184 Pheromones are
(A) hormone produced for the mimicry
(B) artificial chemical used to attract insects
(C) chemical produced by social insects for communication
(D) chemicals regulate electrolyte balance in insects
- 185 Under the aerobic condition presence of oxygen, the inhibition of sugar breakdown is known
(A) Hill's effect
(B) Pasteur's effect
(C) Koch's effect
(D) Dixon's effect
- 186 Which of the following metallic co-factor is present in urease enzyme?
(A) Fe
(B) Cu
(C) Ni
(D) Mn
- 187 The monosaccharides most rapidly absorbed from the small intestine is
(A) Glucose
(B) Fructose
(C) Mannose
(D) Galactose
- 188 A steroid hormone typically alters the activity of target cells by
(A) entering the cell and altering gene expression
(B) digesting holes in the cells Golgi body
(C) digesting holes in the cell membrane
(D) passing the message to an intracellular messenger
- 189 _____ isoenzyme is elevated during myocardial infarction
(A) CK-MB
(B) SOD
(C) Amylase
(D) G6-PD
- 190 Which of the following is an example of agglutination test?
(A) GTT
(B) Differential count
(C) ELISA
(D) Blood Grouping
- 191 Which of the following part of the human body is producing 20 -25 % daily cholesterol?
(A) Pancreas
(B) Liver
(C) Spleen
(D) Pineal gland

- 192 Which of the following enzyme is required for helix unbound during DNA replication process?
(A) Helicase
(B) DNA ligase
(C) DNA polymerase
(D) Topoisomerase
- 193 Which of the following agent block a cytochrome oxidase during ETC?
(A) Carbon dioxide
(B) Helium
(C) Carbon monoxide
(D) Oxygen
- 194 Which of the following physical agent mainly causes pyrimidine dimer?
(A) Microwave
(B) Radio wave
(C) Visible light
(D) Ultraviolet light
- 195 The Chargaff's rule applies to
(A) Double strand DNA
(B) Single strand DNA
(C) Single strand RNA
(D) Single strand RNA and DNA
- 196 "Pap smear" test is useful to investigate _____.
(A) gastric carcinoma
(B) osteosarcoma
(C) cervical carcinoma
(D) colon carcinoma
- 197 Egg of Eutherian mammal is
(A) Centrolecithal
(B) Telolecithal
(C) Macrolecithal
(D) Microlecithal
- 198 Leutenizing hormone (LH) LH stimulates testosterone production from _____
(A) Germ cell
(B) Sertoli cell
(C) Leydig cell
(D) Primordial cell
- 199 This subset of T cells is very few in number, and identifies super antigens expressed by CD1
(A) alpha-beta T double negative cell subsets
(B) gama-delta T double negative cell subsets
(C) alpha-beta T single positive cell subsets
(D) alpha-beta T double positive cell subsets

- 200 How does Insulin induce its effect in effector cells?
- (A) By activating tyrosine kinase pathway
 - (B) By activating adenylate cyclase through G –Protein coupled receptor
 - (C) By gene activation
 - (D) By inhibiting several protein kinases

Q.No	Option	Q.No	Option	Q.No	Option	Q.No	Option
1	C	51	B	101	B	151	B
2	C	52	C	102	A	152	C
3	A	53	B	103	B	153	B
4	A	54	A	104	D	154	C
5	A	55	B	105	B	155	C
6	A	56	D	106	B	156	D
7	D	57	C	107	A	157	C
8	B	58	D	108	A	158	C
9	B	59	C	109	C	159	B
10	B	60	A	110	A	160	D
11	A	61	B	111	C	161	C
12	A	62	C	112	D	162	A
13	C	63	B	113	C	163	B
14	C	64	B	114	B	164	D
15	C	65	A	115	A	165	B
16	A	66	A	116	C	166	A
17	A	67	C	117	B	167	B
18	A	68	B	118	A	168	B
19	A	69	A	119	B	169	C
20	C	70	A	120	D	170	B
21	C	71	D	121	D	171	C
22	C	72	C	122	A	172	C
23	A	73	A	123	C	173	D
24	C	74	B	124	A	174	B
25	A	75	B	125	B	175	B
26	B	76	D	126	C	176	A
27	C	77	D	127	C	177	D
28	D	78	B	128	C	178	D
29	B	79	C	129	A	179	D
30	A	80	B	130	D	180	C
31	B	81	A	131	B	181	C
32	B	82	A	132	B	182	D
33	D	83	B	133	A	183	B
34	C	84	D	134	D	184	C
35	C	85	B	135	C	185	B
36	B	86	A	136	A	186	C
37	C	87	D	137	B	187	D
38	C	88	A	138	C	188	A
39	B	89	D	139	D	189	A
40	A	90	C	140	B	190	D
41	B	91	B	141	D	191	B
42	B	92	B	142	B	192	A
43	B	93	C	143	C	193	C
44	B	94	B	144	D	194	D
45	C	95	B	145	A	195	A
46	A	96	C	146	D	196	C
47	A	97	C	147	A	197	D
48	D	98	A	148	C	198	C
49	A	99	C	149	B	199	B
50	C	100	A	150	B	200	A