Biotechnology Eligibility Test (BET)
for DBT-JRF Award (2013-14)

Government of India, Ministry of Science & Technology,
Department of Biotechnology, New Delhi
(Coordinated by National Centre for Cell Science)

May 5, 2013 **Total Marks – 300** **Duration 150 minutes.**

N.B. 1) All questions in Section A are **compulsory.**
2) Answer any 50 questions from Section B.
3) In case more than 50 are attempted, first 50 will be considered.
4) Each question carries 3 marks; for every wrong answer, one mark will be deducted.
5) Write your Registration no. strictly inside the space provided.

Section A

Q.1	**Mammalian cells in primary culture experience Heyflick limit after 50-60 cell generation time. However, in a rare situation or employing certain agents, cells can be induced to immortality. Which of the following genes/proteins have a major relationship with this?**	
	A	Cdc2
	B	Cyclin
	C	P53
	D	Proteasomes

Q.2	**SNARE proteins are found in the membranes of all of the following compartments EXCEPT**	
	A	Mitochondria
	B	Golgi complex
	C	Early endosome
	D	Endoplasmic reticulum

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Q.3	**In the preparation of Golden rice, a few exogenous genes have been used in order to achieve the production of Vitamin A through recombinant DNA technology. This is a true example of**	
	A	Metabolic repression
	B	Biochemical engineering
	C	Metabolic extension
	D	Combinatorial biosynthesis

Q.4	**All of the following enzymes are linked to reduction of NADH except**	
	A	Isocitrate dehydrogenase
	B	Lactate dehydrogenase
	C	Succinate dehydrogenase
	D	Pyruvate dehydrogenase

Q.5	**Which of the following are components of a phospholipid?**	
	A	cholesterol, glycerol, fatty acids
	B	fatty acids, phosphate group, glycerol
	C	glycerol, amino acids, phosphate group
	D	phosphate group, cholesterol, monosaccharides

Q.6	**Which one of the following is a signaling receptor?**	
	A	mannose receptor
	B	toll-like receptor
	C	scavenger receptor
	D	LPS receptor

Q.7	**Amino acid analysis of 1.0 mg of pure enzyme yielded 58.1 µg of leucine (MW = 131.2). What is the minimum MW of the enzyme based on leucine content?**	
	A	2000
	B	2300
	C	2350
	D	2258

Q.8	**The first metabolic intermediate that is common to the**

	aerobic metabolism of glucose and fatty acids is	
	A	acetyl CoA
	B	aceto-acetyl CoA
	C	Pyruvate
	D	Citrate

Q.9	**While sedimenting a microparticle by centrifugation, instead of increasing the rpm (to attain the desired "g" force), what else can be done to attain the complete sedimentation?**	
	A	Decrease the density of the medium
	B	Increasing the density of the medium
	C	By changing the Ph
	D	Increasing the sample volume

Q.10	**For passive vaccination, which antibody type will be most appropriate?**	
	A	Polyclonal antibody
	B	Monoclonal antibody
	C	Humanized antibody
	D	Single chain antibody

Q.11	**Which of the following is the best method to determine the phospholipid asymmetry in a plasma membrane?**	
	A	electron microscopy
	B	fluorescence spectroscopy
	C	lectin binding
	D	Thin layer chromatography

Q.12	**Prosthetic groups such as iron-sulfur clusters and heme function to**	
	A	Donate electrons to NADH
	B	Allow proteins to diffuse within the mitochondrial inner membrane
	C	Both accept and donate electrons during electron transport
	D	Transport protons across the mitochondrial inner membrane

Q.13	**APS (Ammonium persulphate) is used in SDS-PAGE for**	
	A	preventing oxidation
	B	cross-linking
	C	its role as a catalyst
	D	free radical formation
Q.14	**Which of the following statements about the trp operon is not correct?**	
	A	It is normally turned off if tryptophan is present.
	B	Tryptophan acts as the corepressor.
	C	The regulator gene product is inactive by itself.
	D	Tryptophan binds to the repressor protein and inactivates it.

Q.15	**Glucose labeled with ^{14}C at C-6 is added to a solution containing the enzymes and cofactors of the oxidative phase of the pentose phosphate pathway. The radioactive label will be observed at**	
	A	C5 of ribulose 5-phosphate
	B	C3 of ribulose 5-phosphate
	C	C1 of ribulose 5-phosphate
	D	C4 of ribulose 5-phosphate

Q.16	**The molarity of 15 % NaCl is**	
	A	2.56
	B	0.256
	C	25.6
	D	0.025

Q.17	**Which one of the following antibiotics is used to demonstrate the fresh protein synthesis in response to challenge by an inducer?**	
	A	Chloramphenicol
	B	Carbenicillin
	C	Rifampicin
	D	Tetracyclin

Q.18	**Identify the mismatch**	
	A	Alkaline phosphatase : remove phosphate group present at 5' end of DNA
	B	DNA Polymerase I : nick translation
	C	S1 endonucleases : cleaves only single strand DNA
	D	DNase I : cleaves only double stranded DNA

Q.19	**Sciophytes are plants that prefer to grow in**	
	A	Sun
	B	Shade
	C	Cold temperature
	D	Water

Q.20	**Which one of the following is a micronutrient of plants?**	
	A	Mn
	B	P
	C	Ca
	D	Mg

Q.21	**pHELLSGATE 12 is a/an**	
	A	BAC vector
	B	YAC vector
	C	RNAi Vector
	D	Phagemid

Q.22	**In protein 'A' glutamic acid is replaced by glutamine to make protein 'B'. Which technique can resolve these two proteins?**	
	A	Isoelectric focusing
	B	Pulse field electrophoresis
	C	SDS-PAGE
	D	Gel filtration

Q.23	**Genes related through descent from a common ancestral gene are called**	
	A	Orthologous

	B	Homologous
	C	Heterologous
	D	Paralogous

Q.24	**The Bohr effect in hemoglobin refers to**	
	A	the effect of pH on hemoglobin and myoglobin
	B	higher pH found in actively metabolizing tissues
	C	increased affinity for O2 at lower Ph
	D	reduced affinity for O2 at lower pH

Q.25	**In a biological system, amplification of signal is a fundamental regulatory principle. Which one of the following is NOT an amplification system?**	
	A	Blood clotting
	B	Complement activation
	C	Transmembrane receptor-mediated gene expression
	D	Ciliary movement in cochlea

Q.26	**The most pleiotropic colony-stimulating factor is**	
	A	M-CSF
	B	G-CSF
	C	IL-3
	D	GM-CSF

Q.27	**Which one of the following cells will migrate after injury in the central nervous system?**	
	A	Microglia
	B	Oligodendrocytes
	C	Astrocytes
	D	Ependymal cells

Q.28	**The pseudounipolar neurons are found in**	
	A	Scarpa's ganglion
	B	Dorsal root ganglion
	C	Nodose ganglion
	D	Geniculate ganglion

Q.29	**The genetic map for three genes A, B and C is as follows: A-B = 10 map units, B-C = 5 map units and A-C = 15 map units. In an individual of genotype AbC/aBc, the percentage of gametes expected to be of ABC is**	
	A	0.5
	B	5
	C	15
	D	50

Q.30	**Mendel's law of segregation, as applied to the behavior of chromosomes during cell division means that**	
	A	Alleles of a gene separate from each other when homologous chromosomes separate in meiosis
	B	Alleles of a gene separate from each other when chromatids separate in meiosis II
	C	Alleles of a gene separate from each other when homologs separate in meiosis I, or when chromatids separate in meiosis II if there is a cross over between the gene and the centromere.
	D	Alleles of a gene separate from each other when chromatids separate in meiosis I, or when homologs separate in meiosis II if there is a cross over between the gene and the centromere.

Q.31	**Which one of the following markers in brain is used for diagnosis of Rabies?**	
	A	Bollinger bodies
	B	Negri bodies
	C	Roswell bodies
	D	Ketone bodies

Q.32	**Which one of the following cell types is the most characteristic component of the early stages of acute inflammatory reaction?**	
	A	Eosinophils
	B	Neutrophils
	C	Basophils
	D	Monocytes

Q.33	**Competitive inhibition of an enzyme by a competitive inhibitor can be overcome by simply**	
	A	decreasing the concentration of substrate
	B	increasing the concentration of substrate
	C	decreasing the temperature of reaction
	D	increasing the temperature of reaction

Q.34	**Other than increase in capital cost, increasing the number of steps in downstream processing of proteins enhances the final cost of the product because**	
	A	loss in yield at each step is cumulative
	B	loss in activity/function at each step is cumulative
	C	difficulties in maintaining stringency at later stages of purification
	D	increase in contamination of the product at each step is cumulative

Q.35	**Even though many therapeutic proteins require only 95% purity, the final product is often tested for microscopic amounts of specific contaminants. Such contaminants such as endotoxins in a pharmaceutical protein product is an example of**	
	A	Adventitious agent
	B	Neglected impurity
	C	Critical impurity
	D	Non-critical impurity

Q.36	**Vortexing in a stirred tank reactor can be prevented by using**	
	A	axial flow impeller
	B	a turbine impeller
	C	baffles in the reactor
	D	multiple impellers

Q.37	**In which of the following reactions, is the unit of rate constant and rate of reaction the same?**	
	A	1st order reaction
	B	2nd order reaction
	C	3rd order reaction
	D	Zero order reaction

Q.38	**In an enzymatic reaction, if the enzyme concentration is increased from 1mg to 2 mg, which of the following statements is correct?**	
	A	Km and Vmax will remain constant
	B	Km will change while Vmax will remain constant
	C	Km will remain constant but Vmax will be more
	D	Km and Vmax will increase

Q.39	**Which one of the following receptors perceives blue light in plants?**	
	A	Cryptochrome
	B	Phytochrome
	C	Phototropin
	D	Photopsin

Q.40	**Paralytic shellfish poisoning (PSP) is caused by the consumption of molluscan shellfish contaminated with**	
	A	Brevetoxins
	B	Domoic Acid
	C	Saxitoxins
	D	Okadaic acid

Q.41	**The site of production of Gonad Inhibiting Hormone (GIH) in crustaceans is**	
	A	Thoracic ganglion
	B	Sinus gland
	C	X-organ
	D	Y-organ

Q.42	**The immunoglobulin isotype found both in cartilaginous and bony fishes is**

	A	IgD
	B	IgM
	C	IgE
	D	IgG

Q.43	**In Bhopal disaster by which hazardous substance the toxicity effect get increased?**	
	A	Methylisocyanate
	B	Methylmercury
	C	Methanol
	D	Plyaromatic hydrocarbons

Q.44	**Which one of the following microorganisms can be effectively used as a biocontrol agent?**	
	A	Bacillus thuringiensis
	B	Bacillus megaterium
	C	Aspergillus niger
	D	Pseudomonas putida

Q.45	**Which one of the following gases contributes most to the Greenhouse Effect?**	
	A	Acetylene
	B	Carbon dioxide (CO_2)
	C	Carbon monoxide
	D	Nitrous oxide (N_2O)

Q.46	**Which one of the following best represents the central dogma of Bioinformatics?**	
	A	Sequence-Structure-Function
	B	DNA-RNA-Proteins
	C	Motifs-domains-Superfamilies
	D	Data-Databanks-Data mining tools

Q.47	**Multiple sequence alignments are NOT used to derive**	
	A	Motifs
	B	Primers
	C	PSSMs
	D	HMMs

Q.48	**Which one of the following matrices can be used to identify distantly related homologs?**	
	A	BLOSUM90
	B	BLOSUM62
	C	BLOSUM45
	D	BLOSUM80

Q.49	**Among the different amino acid side chains in proteins, which of the following pairs might form side chain-side chain hydrogen bonding interaction with each other?**	
	A	Valine- Glutamic acid
	B	Alanine- Glycine
	C	Asparagine- Serine
	D	Proline- Lysine

Q.50	**If a protein is known to bind Ca2+ ions, which of the following side chains is likely to be involved in Ca2+ binding?**	
	A	Aspartic acid
	B	Lysine
	C	Proline
	D	Methionine

Section B

Q.51	**Which one of the following suggests the multimeric nature of p53?**	
	A	It causes pyrimidine-pyrimidine cross linking
	B	Dominant negative mutants are available
	C	p53 activates the genes
	D	Binds to single stranded DNA

Q.52	**Which of the following is also called the “suicide enzyme”?**	
	A	DNA glycosylase
	B	DNA photolyase
	C	Adenosine deaminase
	D	Exonuclease
Q.53	**IgG in patients with rheumatoid arthritis has abnormal**	
	A	Top of Form Light chain sequence
	B	Disufide bonds
	C	Glycosylation
	D	Hinge regions

Q.54	**Which one of the following pathogens does not use antigenic variation as a major means of evading host defences?**	
	A	Top of Form Streptococcus pneumonia
	B	Influenza A
	C	HIV
	D	Trypanosomes

Q.55	**Warburg effect is characterised by**	
	A	Increased glycolysis
	B	Decreased glycolysis
	C	Absence of glycolysis
	D	Malfunctional glycolysis

Q.56	**Amanita phalloides, which is responsible for the majority of fatal mushroom poisonings contains alpha-amanitin that specifically inhibits**	
	A	DNA Polymerase
	B	RNA Polymerase
	C	Telomerase
	D	Topoisomerase

Q.57	**Phenylmethylsulfonyl fluoride (PMSF) is a/an**	
	A	competive inhibitor of serine proteases
	B	non competive inhibitor of serine proteases

	C	reversible inhibitor of serine proteases
	D	irreversible inhibitor of serine proteases

Q.58	**Deficiency of HGPRT and Glucose-6-phosphatase leads to**	
	A	Gaucher's disease
	B	Phenylketoneuria
	C	Gout
	D	Alkaptonuria

Q.59	**Which is not an RNA virus?**	
	A	Paramyxovirus
	B	HIV
	C	HPV
	D	Picornavirus

Q.60	**Secondary metabolites are produced in which of the following stages?**	
	A	Lag phase
	B	Log phase
	C	Stationary phase
	D	Death phase

Q.61	**Which one of the following amino acids has pKa value near physiological pH?**	
	A	Histidine
	B	Arginine
	C	Lysine
	D	Serine

Q.62	**Somatic mutation of Immunoglobulin gene accounts for**	
	A	Allelic exclusion
	B	Class switching from IgM to IgG
	C	Affinity maturation
	D	V(D)J recombination

Q.63	**Many microorganisms can't use CO2 as their sole source of carbon as**	
	A	CO_2 is toxic for them
	B	Reduction of CO_2 is an energy expensive process
	C	Further reduction of CO_2 is not possible
	D	CO_2 is not a good source of carbon

Q.64	**There are three groups of photosynthetic bacteria: the cyanobacteria, green bacteria and**	
	A	Purple bacteria
	B	Red bacteria
	C	Blue green bacteria
	D	Violet bacteria

Q.65	**In human, the inherited autosomal recessive diseases Xeroderma pigmentosum is the result of a defect in the:**	
	A	SOS repair
	B	Mismatch repair
	C	Repair in alkylated DNA
	D	Repair of UV damaged DNA

Q.66	**Which one of the following methods requires multiple sets of primers to detect more than one organism targeting multiple loci from the genomic DNA?**	
	A	ARDRA
	B	AFLP
	C	Multiplex PCR
	D	AP-PCR

Q.67	**The advantage of the Edman's reagent (phenyl isothiocyanate-PTH) over Sanger's reagent (fluorodinotrobenzene-FDNB) in peptide analysis is**	
	A	complete oxidation of all disulfides
	B	complete denaturation
	C	that the process can be repeated on the remaining peptide
	D	complete hydrolysis

Q.68	The transition state of a catalyzed reaction (EX‡) is a highly-populated intermediate on the reaction pathway which is	
	A	higher in energy than that of an uncatalyzed reaction
	B	lower in energy than that of an uncatalyzed reaction
	C	lower in energy than the reaction substrate
	D	bound very weakly to the catalyst

Q.69	ETC has a potential to produce highly reactive free radicals that can damage the cells. Which one of the following is useful to prevent oxidative damage in cells?	
	A	superoxide molecule
	B	glutathione peroxidase
	C	Antimycin A
	D	Rotenone

Q.70	Gangliosides derived from glucosylceramide contain one or more molecules of	
	A	Sialic acid
	B	Glycerol
	C	Diacylglycerol
	D	Hyaluronic acid

Q.71	dUMP is converted to TMP by	
	A	Methylation
	B	Carboxylation
	C	Deamination
	D	Decarboxylation

Q.72	Esterification of cholesterol in plasma is catalyzed by	
	A	Lecithin: Cholesterol acyl transferase
	B	Acyl Co A: Cholesterol acyl transferase
	C	Succinyl CoA: Cholesterol acyl transferase
	D	Malonyl CoA : Cholesterol acyl transferase

Q.73	**What makes stem cells different from other cell types?**	
	A	Most of cell types can divide, but only stem cells can differentiate into a specific cell type
	B	Stem cells divide rapidly to develop a population of cells that will differentiate into a set of cell types
	C	Stem cell divide to give rise to a daughter stem cell an another cell that divides and differentiates into only one cell type.
	D	Stem cell divides asymmetrically to give rise to a daughter cell which remains as a stem cell and a second daughter cell that divides and differentiates into one or more cell types.

Q.74	**Which is the correct hierarchy of gene activity in early Drosophila development?**	
	A	Maternal, gap, pair-rule, segment polarity.
	B	Gap, maternal, segment polarity, pair-rule.
	C	Maternal, pair-rule, gap, segment polarity.
	D	Gap, segment polarity, pair-rule, homeotic gene.

Q.75	**The lineage of all adult somatic cells (cell lineage) has been documented in**	
	A	Drosophila melanogaster
	B	Arabidopsis thaliana
	C	Caenorhabditis elegans
	D	Xenopus laevis

Q.76	**The Noble Prize in Physiology or Medicine 'for the discovery that mature cells can be reprogrammed to become pluripotent' was awarded to**	
	A	Sir John B. Gurdon, Shinya Yamanaka
	B	Sydney Brenner, H. Robert Horvitz, John E. Sulston
	C	Edward B. Lewis, Christiane Nüsslein-Volhard, Eric F. Wieschaus
	D	Elizabeth H. Blackburn, Carol W. Greider, Jack W. Szostak

Q.77	**With reference to spontaneous mutations, one of the questions asked by geneticists was whether spontaneous mutations are induced in response to external stimuli or whether variants are present at a low frequency in most populations. In order to answer this, “fluctuation test” was carried out by**	
	A	Salvador Luria and Max Delbrück
	B	Francois Jacob and Jacques Monod
	C	Thomas Hunt Morgan
	D	Seymour Benzer

Q.78	**Which one of the following experimental designs is most suited to answer whether a newly discovered transposable element in yeast, transposes through an mRNA intermediate?**	
	A	Sequence the transcriptome of the yeast cell to see the presence of a corresponding mRNA.
	B	Introduce an intron which can be spliced out, in the transposable element and test the presence or absence of the intron at a newly transposed site.
	C	Block transcription and then test whether transposition occurs.
	D	Using a suitable bioinformatics tool predict whether an mRNA intermediate can be formed.

Q.79	**With reference to lac operon which one of the following merodiploids will show a constitutive expression of β-galactosidase?**	
	A	I-O+Z+Y-/ F' I+ O+Z-Y+
	B	I-OCZ+Y- / F' I+O+Z-Y+
	C	I-O+Z+Y- / F' I+OCZ-Y+
	D	I-OCZ-Y- / F' I+O+Z+Y+

Q.80	**In what way are the homeotic genes of flowering plants similar to those of Drosophila?**	
	A	They encode for transcription factors of the homeobox class
	B	They encode for transcription factors of the MADS-box type
	C	Mutations in the homeotic genes cause transformation of one organ to other
	D	The gene in flowering plants have evolved from the same lineage as those in Drosophila.

Q.81	**Integrin signaling promotes cell migration by inducing changes in the**	
	A	Lateral diffusion rate of integral membrane proteins
	B	Flip-Flop rate of phospholipids
	C	Cytoskeletal organization
	D	Membrane raft

Q.82	**Photon capturing prosthetic group moiety of chlorophyll molecule is known as**	
	A	Mn Porphyrin
	B	Mg Porphyrin
	C	Fe Porphyrin
	D	Mo Porphyrin

Q.83	**Opsonization process is involved with**	
	A	B cells
	B	T Cells
	C	Neutrophils
	D	Macrophages

Q.84	**Poly-L-leucine solution in dioxane is**	
	A	α-helical
	B	Random coil
	C	β-sheet
	D	α-helix

Q.85	**Which one of the following is best suited for hydrolyzing peptide bonds on the carboxyl side of aromatic residues?**	
	A	Chymotrypsin
	B	Trypsin
	C	CNBr
	D	Performic acid

Q.86	**Which one of the following molecules has the highest diffusion coefficient in plasma membrane?**	
	A	F0-F1 ATPase
	B	Glycophorin
	C	ABC transporters
	D	Insulin receptor

Q.87	**Cystic Fibrosis Transmembrane Regulator (CFTR) Protein is a**	
	A	Sodium transporter
	B	Calcium antiporter
	C	Chloride transporter
	D	Potassium transporter

Q.88	**Which one of the following modifications targets a protein for degradation?**	
	A	Fernesylation
	B	Ubiquitination
	C	Sumoylation
	D	Palmitoylation

Q.89	**Regulation of blood glucose level is by**	
	A	Opposing effects of insulin and glucagon
	B	Additive effect of insulin and glucagon
	C	Independent of glucagon
	D	Only by insulin

Q.90	**Which of the proteins or polysaccharides to which fibronectins are capable of binding is a normal plasma membrane component?**	
	A	Collagen
	B	Fibrin
	C	Heparan sulfate
	D	Integrin

Q.91	**The observation that plasma membrane proteins mix after cell fusion provides evidence for**	
	A	Rotational movement of plasma membrane proteins
	B	The bilayer structure of biomolecules
	C	The fluid mosaic model
	D	Interactions of plasma membrane proteins of two different cell types

Q.92	**The treatment of hepatocytes in in vitro culture with Ricin leads to**	
	A	Inhibition of endocytosis
	B	Inhibition of translation
	C	Inhibition of Transcription
	D	Inhibition of signal transduction

Q.93	**In a gel filtration chromatography**	
	A	The large protein will be eluted first
	B	The small protein will be eluted first
	C	Both large and small will elute at the same time
	D	The small protein with high charge will be eluted first

Q.94	**Two dimensional gel electrophoresis is a technique for separating proteins**	
	A	Based on charge
	B	Based on mass
	C	Based on both charge and mass
	D	Based on its pI value

Q.95	**Exact mass and sequence of proteins and peptides can be measured by**	
	A	MALDI-TOF
	B	Proton NMR
	C	X-Ray
	D	Mass spectroscopy

Q.96	**Fluorescence microscopy is based on the ability of certain molecules to**	
	A	Continuously emit light of a constant wavelength
	B	Absorb light of many different wavelengths
	C	Absorb light of a given wavelength and then emit light of a longer wavelength
	D	Absorb light of a given wavelength and then emit light of a shorter wavelength

Q.97	**An IgG and an IgM samples (against human red blood cell surface antigen) were treated with β-mercaptoethanol independently and tried for agglutinating human red blood cells with a view to checking the hemagglutination titer of the two samples. Which one of the following results is correct in this context?**	
	A	The titre of IgM was found to be drastically decreased in comparison with that of IgG remaining unaltered.
	B	The titre of IgG was found to be drastically decreased in comparison to that of IgM
	C	Both IgG and IgM exhibited the same titre
	D	β-mercaptoethanol was unable to craft any chemical change on IgG and IgM

Q.98	**A lectin can bind to plasma membrane vesicles if it is**	
	A	Right side out
	B	Inside out
	C	Both right side out and inside out
	D	Digested with protease

Q.99	**Membrane asymmetry can be regulated by**	
	A	ABC transporters
	B	Flippase
	C	Glycosylation of integral membrane proteins
	D	F1-ATPase

Q.100	**What is the activated reactant in the biosynthesis of phosphatidylinositol from inositol?**	
	A	CDP-ethanolamine
	B	CDP-diacylglycerol
	C	Geranyl-pyrophosphate
	D	UDP-inositol

Q.101	**Best method in tracking the synthesis and maturation of a protein in a living cell is**	
	A	Making a fusion protein with an appropriate epitope
	B	Making a specific and high affinity monoclonal antibody
	C	Making a specific and high affinity polyclonal antibody
	D	Making a fusion protein with GFP

Q.102	**a powerful technique for calculating**	
	A	The diffusion coefficient of membrane lipids and proteins
	B	The rate of synthesis of membrane proteins
	C	The distance between a lipid and a membrane protein
	D	The extent of signal transduction in membrane upon ligand-receptor interactions

Q.103	**Treatment of the inside- like DNP that allows protons to freely move across the vesicle membrane would be expected to**	
	A	Increase ATP synthesis
	B	Inhibit ATP synthesis
	C	Increase O_2 consumption
	D	Inhibit electron transport

Q.104	**The concept of “magic bullet” proposed long back for targeted anti-cancer drug delivery is not a reality till today because**	
	A	Of multi drug resistance of cancer cells
	B	Efficient drug has not being designed
	C	Of the lack of appropriate development of anti-
	D	Of the lack of avidin-biotin type high affinity of anti-cancer antibody

Q.105	**One of the major reasons of the failure of somatic gene therapy protocol can be assigned to**	
	A	Lack of appropriate gene delivery system
	B	Lack of technique in site specific integration of foreign gene into the chromosome of target cells
	C	Low level expression of foreign genes in target cells
	D	High level expression of foreign genes in target cells

Q.106	**SRP selectively recognizes ER signal sequences on newly synthesized proteins. This is an outcome of**	
	A	Hydrogen bonding
	B	Hydrophobic interactions
	C	Ionic interactions
	D	Formation of covalent intermediate

Q.107	**In the active site of Transaldolase, which amino acid forms the Schiff base?**	
	A	Arginine
	B	Methionine
	C	Lysine
	D	Glutamine

Q.108	**An enzyme has an activation energy of 10,700 cal/mole. How many times faster (approximately) will the reaction proceed at 37 oC compared to 15 oC?**	
	A	5 times
	B	10 times
	C	4 times
	D	8 times

Q.109	**Identify the small protein (167 amino acids) that is produced in adipocytes and acts on receptors in the hypothalamus to curtail appetite**	
	A	LDL
	B	Lutenizing hormone
	C	HDL
	D	Leptin

Q.110	**A TLC run of rat liver phospholipids is sprayed with ninhydrin, and the colour is allowed to develop. Which phospholipids can be detected in this way?**	
	A	DP PC
	B	DS PC
	C	PS
	D	Lecithin

Q.111	**N-ethylmaleimide (NEM) is known to selectively inhibit bacterial lactose transporters. Which amino acid of the transporter is responsible for this inhibition?**	
	A	Cysteine
	B	Cystine
	C	Methionine
	D	Arginine

Q.112	**Highest turnover number of an enzymatic reaction so far known is exhibited by**	
	A	Aspartate transcarbamylase
	B	ATPase
	C	Lysozyme
	D	Carbonic anhydrase

Q.113	**The chemical nature of covalent linkage in a disaccharide is known as**	
	A	Ester
	B	Ether
	C	Amide
	D	Diester

Q.114	**Cancer cells have an unique property to exhibit uncontrolled division. This is primarily due to**	
	A	Activation of glucose transporters
	B	Inhibition of protein synthesis
	C	Inhibition of DNA replication
	D	Loss of contact inhibition

Q.115	To evaluate cytotoxic potential of any anti-cancer drug, which is the molecule of choice?	
	A	^{3}H Thymidine
	B	^{3}H Uridine
	C	^{3}H Cytosine
	D	^{3}H Guanosine

Q.116	A monoclonal antibody binds to G-actin but NOT to F-actin. What does this tell you about the epitope recognized by the antibody?	
	A	F-actin does not has the epitope against the antibody
	B	In F-actin enough number of epitopes are not there
	C	In F-actin the epitope is glycosylated and not able to bind
	D	The epitope is likely to be a structure that is buried when G-actin polymerizes to F-actin

Q.117	Glutathione is	
	A	L-Glu-Cys-Gly
	B	L--Glu-Met-Gly
	C	D-Glu-Cys-Ala
	D	D-Glu-Cys-Ala

Q.118	Which one of the following amino acids is optically inactive?	
	A	Glycine
	B	Methionine
	C	Phenylalanine
	D	Glutamine

Q.119	Protein responsible for transport of O2 from alveoli to the tissue is	
	A	Leghaemoglobin
	B	Oxyhaemoglobin
	C	Haemoglobin
	D	Carbaminohaemoglobin

Q.120	**Process of formation of ATP from ADP during photosynthesis is referred to as**	
	A	Photophosphorylation
	B	Photorespiration
	C	Phosphorylation
	D	oxidative phosphorylation

Q.121	**Glycogen and cellulose are**	
	A	Helical and β-sheet structure, respectively.
	B	Helical structures but with different degree of helicity.
	C	β-sheet structures.
	D	Helical but glycogen is extensively branched molecule.

Q.122	**Topoisomerase I does not require ATP even though it does cleavage and ligation of DNA. This is because**	
	A	It uses GTP as energy
	B	It conserves the energy liberated during cleavage by binding with tryptophan of an enzyme and reused
	C	This reaction does not require energy
	D	It conserves the energy liberated during cleavage by binding with tyrosine of an enzyme and reused

Q.123	**A synthetic mRNA of repeating sequence 5'-CACACACACACACACAC... is used for a cell-free protein synthesizing system like the one used by Nirenberg. If we assume that protein synthesis can begin without the need for an initiator codon, what product or products would you expect to occur after protein synthesis?**	
	A	one protein, consisting of a single amino acid
	B	two proteins, each with an alternating sequence of two different amino acids
	C	one protein, with an alternating sequence of three different amino acids
	D	one protein, with an alternating sequence of two different amino acids

Q.124		
	A	Strand 1
	B	Strand 2
	C	Both strands 1 and 2
	D	Neither strand 1 nor 2

Q.125	**Which one of the following tools of recombinant DNA technology is INCORRECTLY paired with its applications?**	
	A	restriction endonuclease - production of DNA fragments for gene cloning.
	B	DNA ligase - enzyme that cuts DNA, creating sticky ends.
	C	DNA polymerase - copies DNA sequences in the polymerase chain reaction.
	D	reverse transcriptase - production of cDNA from mRNA.

Q.126	**Among the six types of plant cation channels identified, the shaker channels have been most thoroughly characterized. The shaker channels are highly selective to which one of the following cations?**	
	A	Na
	B	K
	C	Ca
	D	Mg

Q.127	**The process of oxidation of plastohydroquinone (PQH2) molecule during light reaction of photosynthesis takes place in which of the following major protein complexes of the thylakoid membrane?**	
	A	ATP Synthase
	B	Photosystem I
	C	Photosystem II
	D	Cytochrome b6f

Q.128	**In a metabolic engineering experiment the flux from primary carbon metabolism was diverted towards methylerythritol phosphate (MEP) pathway. Which one of the following secondary metabolites will be maximally synthesized?**	
	A	Alkaloids
	B	Phenolics
	C	Terpenes
	D	Glucosinolates

Q.129	**Which one of the following sequence of events is the first to take place during systemic production of protease inhibitors in young tomato leaves following insect feeding?**	
	A	Prosystemin is synthesized.
	B	Systemin is produced.
	C	Jasmonic acid is transported through phloem to other parts of plants.
	D	Systemin is released from damaged cells into apoplast.

Q.130	**Which of the following is NOT a typical feature of hypersensitive response observed in plants during the attack of invading microbes?**	
	A	Cells immediately surrounding the infection site die rapidly.
	B	Often preceded by rapid accumulation of reactive oxygen species.
	C	Results in increase in net photosynthesis rate.
	D	A rapid spike of nitric oxide production accompanies the oxidative burst in the infected leaves.

Q.131	**Plants carrying a transgene for glyphosate resistance will survive a field application of glyphosatethat kills weeds. Which of the following enzyme is inhibited by glyphosate?**	
	A	Phosphoglycerate
	B	Phosphoglycolatephosphatase
	C	Enolpyruvateshikimate -3 – phosphate synthase
	D	Glycolatedehydrogenase

Q.132	**A haploid sperm from one species and a haploid egg from another species may form a diploid interspecies hybrid. Meiosis in these plants generally fails but can lead to rare duplicated gametes called**	
	A	Aneuploid
	B	Autopolyploid
	C	Heteropolyploid
	D	Allopolyploid

Q.133	**Genes essential for embryo organization have been identified by mutant analysis. Which one of the following mutants shows reduction or inhibition of cotyledons and shoot apical meristem?**	
	A	FACKEL
	B	GNOM
	C	MONOPTEROS
	D	GURKE

Q.134	**Which one of the following is true for the polymer-trapping model of sugar diffusion in plant cells?**	
	A	should be less concentrated in the mesophyll than in intermediary cells.
	B	Sucrose should be more concentrated in the mesophyll than in the intermediary cells.
	C	Sucrose concentration should be equal in mesophyll and intermediary cells.
	D	Sucrose should be hydrolysed.

Q.135	**The T-DNA of Agrobacterium must be excised from its circular plasmid for its transfer into plant cells. Which one of the following complexes of Vir proteins is responsible for DNA nick at the left and right border sequences?**	
	A	VirA/VirC
	B	VirB6/VirB7
	C	VirD1/VirD2
	D	VirE2/VirG

Q.136	**What will happen to the growth of a vertically growing root if half of the root cap is removed?**	
	A	It will bend towards the side with remaining half of the root cap.
	B	It will bend opposite to the side with remaining half of the root cap.
	C	The root growth will be inhibited.
	D	The root will keep growing gravitropically.

Q.137	**GA2-oxidase cDNA from bean is overexpressed in wheat plant by genetic engineering. Which one of the following phenotypes correctly describes the resultant transgenic plant?**	
	A	The plant will be taller.
	B	The plant will be shorter.
	C	There will be no change in height.
	D	The plant will not survive.

Q.138	**Which one of the following statements is NOT correct regarding ethylene signaling in plants?**	
	A	Ethylene binding inactivates ethylene receptors.
	B	In the absence of ethylene the receptors are inactive and suppress the ethylene response.
	C	Disrupted ethylene receptors are inactive in the presence or absence of ethylene leading to constitutive ethylene response.
	D	Missense mutation at binding site makes receptor insensitive to ethylene and could shut off the ethylene response.

Q.139	**Leaf abscission is a phenomenon regulated by the amount of auxin and ethylene. Which one of the following statements is correct regarding the amount of auxin and ethylene during leaf abscission?**	
	A	Reduction in ethylene and increase in auxin.
	B	Increase in both ethylene and auxin.
	C	Reduction in auxin and increase in ethylene.
	D	Decrease in both ethylene and auxin.

Q.140	Transgenic plants were developed with a gene conferring kanamycin resistance. Four independent T_0 events were selfed and ~ 100 T_1 seeds were germinated on kanamycin. The number of kanamycin sensitive (Kan^S) and kanamycin resistant (Kan^R) progeny obtained in each case is listed below: Transgenic Line No. / Kan^R / Kan^S One / 95 / 7 Two / 72 / 25 Three / 51 / 47 Four / 11 / 87 Identify the line where the transgene has integrated at a single locus.	
	A	Line One
	B	Line Two
	C	Line Three
	D	Line Four

Q.141	**Using transgenic technology male sterile plants are developed by**	
	A	Expressing barnase gene in tapetum.
	B	Targeting barnase protein to tapetum.
	C	Expressing barnase gene in tapetum and barstar gene in the rest of the plant.
	D	Expressing barnase gene in tapetum and targeting barstar protein in the rest of the plant.

Q.142	**One of the concerns in commercial usage of transgenic plants is the spread of transgene through pollen flow. Which one of the following methods can be used to circumvent this problem?**	
	A	Use of terminator technology
	B	Chloroplast transformation
	C	Developing male sterile lines
	D	Planting of refugia

Q.143	**Which one of the following can be used as a selection marker for developing transgenic plants?**	
	A	green fluorescent protein
	B	β-glucuronidase
	C	β-galactosidase
	D	hygromycin phosphotransferase

Q.144	**Ac transposon is a /an**	
	A	Non-autonomous element
	B	Autonomous element
	C	Retrotransposon
	D	Intron

Q.145	**SSR is said to be a ----------type of marker**	
	A	Dominant
	B	Co-dominant
	C	Recessive
	D	Epistatic

Q.146	**Direct DNA uptake by protoplasts can be stimulated by**	
	A	Polyethylene glycol
	B	Sucrose
	C	$CaCl_2$
	D	LiCl

Q.147	**Aroma in rice is due to**	
	A	Acetyl choline
	B	4-benzyl pyrroline
	C	2-ethyl pyrroline
	D	2-acetyl-1-pyrroline

Q.148	**The male sterile cytoplasm in pearl millet is**	
	A	Milo
	B	CK 60A
	C	Tift 23A
	D	W.A

Q.149	**The pathogen against which the crop rotation can be adopted**	
	A	Soil invader
	B	Soil inhabitant
	C	Soil-borne
	D	Biotrophic

Q.150	**Iodine test is used in the detection of**	
	A	Bacterial leaf blight of rice
	B	Tungro virus
	C	Rice Blast
	D	Bacterial leaf streak
Q.151	**When urea-denatured inclusion bodies are renatured, protein aggregates can sometimes be found due to misfolding. For small proteins with no disulphide linkages and a single domain, the probability of misfolding is the highest when**	
	A	urea is diluted stepwise
	B	urea is diluted in a single step
	C	glutathione(s) addition is not done.
	D	pH of urea solution is adjusted to 7.0-7.5

Q.152	**The net charge of a protein may not be sufficient to determine whether a protein will bind to an ion exchanger. This is due to**	
	A	The presence of hydrophobic patches on the protein surface
	B	Heterogeneous spatial distribution of charged amino acids
	C	The presence of repeating motifs in some proteins
	D	The strong hydration potential of protein

Q.153	**In a large scale high cell density fed batch reactor, which one of the following statements is true?**	
	A	Dissolved oxygen starvation occurs at the top and glucose starvation at bottom of the fermenter
	B	Dissolved oxygen starvation occurs at the bottom and glucose starvation at top of the fermenter
	C	Both dissolved oxygen and glucose starvation occurs at the top of the fermenter
	D	Both dissolved oxygen and glucose starvation occurs at the bottom of the fermenter

Q.154	**Optimum bead loading for cell disruption in a bead mill is**	
	A	40-50%
	B	80-90%
	C	60-70%
	D	50-60%

Q.155	**In which one of the following membrane separation processes, concentration difference is the driving force?**	
	A	Reverse osmosis
	B	Ultra filtration
	C	Cross flow filtration
	D	Dialysis

Q.156	**Expanded bed chromatography runs on the principle of**	
	A	Fick's law of diffusion
	B	Stroke's law of sedimentation
	C	Darcy's equation
	D	Karman and Kozney Equation

Q.157	**Which one of the following statements pertaining to ultrafiltration is INCORRECT?**	
	A	In symmetric membranes entire membrane thickness acts as selective barrier
	B	In asymmetric membrane only a thin top layer determines the selective barrier
	C	All molecules below the Molecular Weight Cut Off (MWCO) – value will be retained on the membrane while all the other molecules will be permeated
	D	Membrane processes can be distinguished according to the type of driving force

Q.158	**Which one of the following factors affects the morphology of fungal biomass the least?**	
	A	Inoculum size
	B	Media composition
	C	Incubation pH
	D	Agitation rate

Q.159	**In order to fractionate particles based on size; which of the following centrifuges is best suited?**	
	A	Tubular centrifuge
	B	Multichamber centrifuge
	C	Disk stack centrifuge
	D	Decanter centrifuge
Q.160	**Which one of the following purification steps always requires a high initial ionic strength in the sample?**	
	A	Ion exchange chromatography
	B	Hydrophobic interaction chromatography
	C	Chromatofocusing
	D	Gel filtration chromatography

Q.161	**In Sephadex G series (gel filtration) as the G number increases from 10, 15, 25….200, the pore size of the beads**	
	A	Decreases
	B	Increases
	C	remains constant
	D	varies from manufacturer to manufacturer

Q.162	**In a large scale bioreactor with fungal fermentation, the dissolved oxygen concentration gradient is primarily due to the**	
	A	large volume of the reactor
	B	small size of agitator
	C	Low air flow rate per unit reactor volume
	D	Pseudoplastic nature of the broth

Q.163	**When in a plug flow reactor with low levels of axial mixing, is the maximum product concentration obtained?**	
	A	At the exit of reactor
	B	At the inlet of reactor
	C	It's the same throughout the reactor
	D	It depends upon the product formation kinetics

Q.164	**The reasons for existence of lag phase in a batch cultivation process in a bioreactor could be due to the following reasons. Identify the best combination from the following.P: low inoculum size Q:low preinoculum size R:stationary phase inoculum S:inoculum not having the same medium as in batch reactor**	
	A	P, Q, R and S
	B	P, R and S
	C	P, Q and S
	D	Q only

Q.165	**Increasing aeration at a particular rpm does not always lead to increase in oxygen mass transfer in a bioreactor. This is because**	
	A	As aeration increases, the bubble size increases.
	B	As aeration increases, the bubble size decreases
	C	Agitator can get flooded leading to inconsistencies in bubble size
	D	Residence time of the bubble does not change

Q.166	**If in a fed batch cultivation of recombinant E. coli, feeding of the substrate is based on the following equation $F(t)= [\mu VX(t)]/S_F.Y_{XS}$. Where μ is specific growth rate and is maintained constant, F(t) is feed rate, X(t) biomass cell concentration, Y_{XS} is biomass yield coefficient and S_F is the substrate feed concentration. The feed pattern indicates that with increasing time, every cell is receiving the**	
	A	same amount of substrate/time
	B	increasing amounts of substrate /time
	C	decreasing amounts of substrate /time
	D	initially increases and then decreases/time

Q.167		

			on again
Q.	static gassing out technique	2.	yields greater OTR and K_La than other methods
R.	dynamic gassing method	3.	It can be done precisely only at steady state
S.	sodium sulphite oxidation method	4.	Non respiring biological system is required

A	P-1, Q-2, R-3 and S-4
B	P-3, Q-4, R-1 and S-2
C	P-2, Q-4, R-1 and S-3
D	P-4, Q-2, R-1 and S-3

Q.168	**Under unaerated condition in a fermentor, the power consumed by a single impeller was 10,000 W. The diameter of the impeller D is 1m and the density of the medium is 1000 kg/m3 and the stirrer speed is 1s-1. If one more impeller is added to the fermentor, power consumption would be approximately**	
	A	10,000 W
	B	12,000 W
	C	20,000 W
	D	25,000 W

Q.169	**For mixing solid contents in a media mixing tank, inclined blade turbine is used because it**	
	A	acts like an axial flow impeller with downward movement of liquid
	B	is more powerful as compared to flat blade turbine and hence better mixing
	C	prevents vortex formation
	D	is a radial flow impeller with sideward movement of liquid

Q.170	**In microbial cultivation experiment with cells having significant maintenance requirements, the measured growth yield Y' XS (G) and the true growth yield Y XS**	
	A	are equal
	B	Y' XS (G) is greater than Y XS
	C	Y' XS (G) is lesser than Y XS
	D	Y' XS (G) is not related to Y XS

Q.171	The logistic equation for growth of a bacterial culture is given by $X = \frac{X_0 e^{k\beta}}{\quad}$ Where X and X_0 are biomass concentration, k and β are constants. The model depicts that initially when x is small, the growth pattern of the culture would be	
	A	Linear
	B	Cubical
	C	Exponential
	D	Inhibited by the theoretical maximum biomass value

Q.172	**In an anaerobic fermentor, broth is agitated intensely at 100rpm in a 3.0 m3 baffled tank using a Rushton turbine with diameter of 0.5m. If the diameter of the impeller is decreased to 0.25m the mixing time in (seconds) would approximately increase ……fold**	
	A	2
	B	4
	C	8
	D	32

Q.173	**Culture comprising a B. subtlis strain by inoculating 1g of cells into 1 liter bioreactor. Fermentor containing 10g/l of glucose. The maximum specific growth rate of the culture is 1.0 /h. The biomass yield from glucose is 0.5 g/g. If the residual glucose concentration left out is 1g/l, the final cell concentration in g/l achieved would be around**	
	A	4.5
	B	5
	C	5.5
	D	6

Q.174	**Continuous stirred tank fermenter is characterized by (biomass concentration X kg/m3, residual substrate is S kg/m3, Sf=substrate concentration in feed kg/m3, Dilution rate = D and $\mu m >> D$ and Km<Sf, XD= the biomass productivity kg/m3h. If the dilution rate is doubled to 2D then the new steady state values in comparison with earlier steady state is characterized by**	
	A	decreased X,increased S,increased XD
	B	X doubles, S unchanged, XD unchanged
	C	X unchanged,S=doubles,XD unchanged
	D	X unchanged, S=doubles, decreased XD

Q.175	Fourier's law of heat conduction $\frac{q}{A} = -\frac{k}{\rho C_p}\frac{d(\rho C_p T)}{dz}$ This equation is very similar to	
	A	Fick's law for mass diffusion
	B	Henderson Hasselbach equation
	C	Stefan Boltzman Law
	D	Monod kinetics

Q.176	**A fluidized bed is formed when**	
	A	friction is zero
	B	Gravity force is less than fluid friction
	C	Pressure force is equal but acts in opposite direction to the gravity force
	D	Sum of fluid friction and pressure force is equal but opposite to gravity force

Q.177	**Batch filtration often characterized by continuous increase of the inlet pressure of slurry, is called the ……filtration**	
	A	constant rate
	B	varying pressure
	C	varying rate
	D	constant pressure

Q.178	**The most precise method of estimating the metabolic heat produced in an aerobic fermentation process is by**	
	A	Measuring oxygen uptake
	B	Measuring CO2 production
	C	Measuring biomass production
	D	Measuring both biomass and product

Q.179	**The ethanol yield per unit mass of substrate consumed (YP/S) in an anaerobic fermentation process can be improved by**	
	A	Increasing specific growth rate and increasing maintenance coefficient
	B	Decreasing specific growth rate and increasing maintenance coefficient
	C	Decreasing specific growth rate and decreasing maintenance coefficient
	D	Increasing specific growth rate and decreasing maintenance coefficient

Q.180	**Exponentially growing cells increase 10 fold in 10 hours, the time required to increase 5 fold will be ……hours**	
	A	5 log 10
	B	5
	C	Log10/log5
	D	10 log5

Q.181	**There are five classes of immunoglobulins [Ig]: IgM, IgG, IgD, IgA and IgE. Upon stimulation of B cells through B cell receptor and a switch factor, which one of the following Ig classes does NOT switch?**	
	A	IgM
	B	IgG
	C	IgD
	D	IgE

Q.182	**For quantitation of an antigen, researchers A, B, C and D used the following set-up. Which one of the following set up is the most sensitive?**	
	A	Antigen-coated plates were directly probed with HRP-antigen-specific antibody
	B	Antigen-s antigen, followed by direct probing with HRP-labelled antigen-specific antibody
	C	Antigen-specific antibody captured antigen was probed with biotin-labelled antibody that is specific to the antigen, followed by streptavidin-HRP
	D	Antigen- antigen, sequentially followed by antigen-specific antibody, a secondary antibody specific to this antibody, an HRP-labelled tertiary antibody specific to the secondary antibody

Q.183	**A mouse deficient in ROR-gammaT will be deficient in**	
	A	T-reg cells
	B	Th1 cells
	C	Th2 cells
	D	Th17 cells

Q.184	**The specificity in IFN-α/β induced response comes from**	
	A	Phosphorylated homodimer of STAT-1/STAT-1
	B	A complex of IRF9, STAT-1 and STAT2 binding to ISRE sequence
	C	Phosphorylated homodimer of STAT-1/STAT-2
	D	A complex of IRF9, STAT-1 and STAT2 binding to GAS sequence

Q.185	**CD152-deficient mice have lymphoproliferative disorder. The disorder is characterized by**	
	A	Exaggerated B cell proliferation
	B	Very high T cell proliferation
	C	Very high NK T cell proliferation
	D	No proliferation of B cells and T cells in response to antigenic stimulation

Q.186	**MHC class-II molecule can signal because it**	
	A	has a long cytoplasmic domain where signaling molecules can bind
	B	has a transmembrane domain that interacts with membrane signaling molecules
	C	interacts with membrane receptors to make a supramolecular complex that signals
	D	is internalized immediately after ligand binding and results in signaling

Q.187	**The T cells in CD28-deficient mice do not proliferate in response to re-exposure to the same antigen. This is because**	
	A	the T cells cannot memorize the antigenic specificity
	B	the T cells do not secrete interleukin-2 at all
	C	the T cells are rendered Anergic
	D	the T cells die immediately after antigen re-exposure

Q.188	**CD1 molecules are unique antigen-presenting molecules because they**	
	A	are non-MHC Class-I molecules
	B	structurally mimic MHC Class-II molecules
	C	are MHC Class-I-like molecules presenting lipid and glycolipid antigens
	D	are non-MHC Class-II molecules

Q.189	**Mutations in common gamma chain of receptors for IL-2 cytokine family cause**	
	A	Leukocyte adhesion deficiency
	B	Hyper-IgM syndrome
	C	Goodpasture syndrome
	D	X-L SCID syndrome

Q.190	**Which one of the following conditions generally favours tumour development?**	
	A	Hyper gammaglobulinemia
	B	Impaired innate immunity
	C	Impaired cell mediated immunity
	D	Impaired humoral immunity

Q.191	**Which one of the following is NOT a single gene disease?**	
	A	Duchenne Muscular Dystrophy
	B	Hemophilia A
	C	Spinal muscular atrophy
	D	Turner syndrome

Q.192	**Dental plaque is an example of the formation of**	
	A	Calcium deposition
	B	Endotoxin
	C	Biofilm
	D	Exotoxin

Q.193	**Rheumatic fever is a complication of**	
	A	Streptococcal pharyngitis
	B	Tuberculous meningitis
	C	Pneumonia
	D	Whooping cough

Q.194	**Undulant fever is a characteristic of**	
	A	Tuberculosis
	B	Brucellosis
	C	Botulism
	D	Listeriosis

Q.195	**Bubonic plague is the infection of**	
	A	Spleen
	B	Liver
	C	Lungs
	D	Lymph nodes

Q.196	**Leptospirosis is transmitted by exposure to animal**	
	A	Urine and meat products
	B	Fecal matter and milk products
	C	Vectors and water
	D	Urine and milk products

Q.197	**Which one of the following is correct when Na ion concentration in the bathing fluid of a squid giant axon is less than that present in sea water, but the osmotic pressure is maintained by substituting it with choline chloride?**	
	A	Hyperpolarization in membrane potential
	B	The amplitude of the action generated in the nerve fibre will be higher than normal action potential in sea water
	C	Depolarization in membrane potential
	D	The amplitude of the action potential generated in the nerve fibre will be lower than normal action potential in sea water

Q.198	**When Tetrodotoxin is administered in bathing medium of a nerve fibre during voltage clamp experiments the membrane current may show which one of the following changes?**	
	A	(A) Absence of outward membrane current
	B	Absence of inward membrane current
	C	Higher amplitude of outward membrane current
	D	Higher amplitude of inward membrane current

Q.199	**The arrival of the action potential in a presynaptic knob initiates quantal release of neurotransmitter by influx of Ca ions, which may act by**	
	A	Changing the viscosity of cytoplasm and thereby increasing the Brownian movements of synaptic vesicles
	B	Activating calcium-calmodulin protein kinase
	C	Dephosphorylating clathrin
	D	Phosphorylation of dynamin

Q.200	**Which one of the following changes will occur when the external K+ ion concentration in the neuromuscular junction of skeletal muscles is increased?**	
	A	The rate of occurrence of MEPP is increased
	B	The amplitude of MEPP is increased
	C	The rate of occurrence of MEPP is decreased
	D	The amplitude of MEPP is decreased

Q.201	**The black widow spider venom, alpha-latrotoxin produces its neurotoxicity by**	
	A	Blocking calcium ion channels in the active zone
	B	Binding with neurexin resulting in a massive discharge of synaptic vesicles
	C	Binding with SNAP-25 causes blocking of exocytosis
	D	Destructing syntaxin causes inhibition of the docking of vesicles

Q.202	**The generalized seizure is due to the activity of**	
	A	Voltage dependent K ion channels
	B	GABAA channels
	C	T-type Ca ion channels
	D	AMPA receptor channels

Q.203	**Which one of the following genes is related with the late-onset of Alzheimer's disease?**	
	A	Amyloid precursor protein (APP)
	B	Presenilin 1
	C	Apolipoprotein E4
	D	Presenilin 2

Q.204	**The first genetic maps that were developed used genes as markers because**	
	A	the phenotype governed by the gene could be visually identified and its inheritance pattern followed.
	B	the location of the gene on the chromosome could be easily observed by the banding patterns like in the polytene chromosomes.
	C	the genes specifying a given phenotype could be easily cloned.
	D	genes spanned larger regions than the current day DNA markers like SNPs.

Q.205	In *E. coli* four Hfr strains donate the following genetic markers, shown in the order donated Strain 1: A D C E Q Strain 2: A K M T Y Strain 3: C E Q W X Strain 4: M T Y X W All these HFr strains are derived from the same F^+ strain. What is the order of these markers on the circular chromosome of the original F^+?	
	A	A D C E Q W X Y T M K A
	B	Y T M K A D C E Q W X Y
	C	D C E Q A K M T Y X W D
	D	C E Q W X Y T M A K D C

Q.206	**Which of the following statements is true?**	
	A	There is a lesser probability for a crossover to occur between 2 genes farther apart from the genes nearer to each other.
	B	There is a greater probability for a crossover to occur between 2 genes farther apart from the genes nearer to each other.
	C	Probability of crossover between 2 genes is not related to the distance between them.
	D	Maximum frequency of recombination that can result from crossing over between linked genes is 100%.

Q.207	**In which one of the following evolutionary processes, random changes in allele frequency can lead to a loss of genetic diversity?**	
	A	Recombinational event
	B	Frequency –dependent selection
	C	Genetic drift
	D	Spontaneous selection

Q.208	**In human pointed eyebrows are dominant to smooth eyebrows and widow's peak (downward pointed frontal hairline) is dominant to continuous hairline. What phenotypic ratio would you expect in the offspring from a cross between an individual heterozygous for both genes and an individual homozygous recessive for both genes?**	
	A	9:3:3:1
	B	1:01
	C	1:1:1:1
	D	9:03:04

Q.209	**The character regulated by a holandric gene**	
	A	passes from the father through the son to the grandson.
	B	
	C	passes from the mother through the daughter to the granddaughter.
	D	

Q.210	**Necrosis that develops in tissues subsequent to denaturation of structural and enzymatic proteins soon after death is appropriately referred to as**	
	A	Fat necrosis
	B	Liquefactive necrosis
	C	Coagulative necrosis
	D	Caseous necrosis

Q.211	**matter produced by the canine distemper virus is an example of**	
	A	Fat necrosis
	B	Coagulation necrosis
	C	Zenker's necrosis
	D	Liquefactive necrosis

Q.212	**Catarrhal exudate is observed in**	
	A	Stomach of a dog
	B	Brain of a cow
	C	Small intestine of a cat
	D	Trachea of a horse

Q.213	**Sudden onset of heavy mortality in chicken with cyanotic comb and wattles, closed eyes and a semicomatose state are characteristic features of**	
	A	Fowl plague
	B	Newcastle disease
	C	Blue comb
	D	Infectious bronchitis.

Q.214	**Most prominent initial symptom of Vitamin A deficiency in cows and horses is**	
	A	Copius lacrymation
	B	Copius salivation
	C	Xeropthalmia
	D	Night blindness

Q.215	**Hydropericardium syndrome is otherwise known as**	
	A	Leechi heart disease
	B	Chicken flu
	C	EDS 76
	D	Chicken heart attack

Q.216	**Scombroid Fish Poisoning is due to the high levels of free ---------- in fish tissue**	
	A	Histidine
	B	Proline
	C	Glutamate
	D	Aspartate

Q.217	**The synthetic equivalent of neuropharmacologically active peptides obtained from the marine snail Conus magus is**	
	A	Zinconotide
	B	Discodermin
	C	Didemnins
	D	Dolastatins

Q.218	**Prophenol Oxidase-mediated immune system is found in**	
	A	Crustaceans
	B	Coelenterates
	C	Tunicates
	D	Protozoans

Q.219	**Bryostatin is a marine derived anticancer agent obtained from**	
	A	Tethya crypta
	B	Salinospora tropica
	C	Bugula neritina
	D	Tridemnum solidum

Q.220	**Viral encephalopathy and retinopathy in fishes are caused by**	
	A	Betanodavirus
	B	Rhabdovirus
	C	Baculovirus
	D	Rotavirus

Q.221	**Environmental gene tags are**	
	A	16S rRNA gene signatures from the environment
	B	Habitat-specific functional genes from microbial communities
	C	Non-essential genes from microbial communities
	D	Fluorescently tagged metagenome

Q.222	**Which one of the following is NOT true of biophotolysis?**	
	A	It is a photoheterotrophic process
	B	It is a photoautotrophic process
	C	H2O is the electron donor in the process
	D	[FeFe]-hydorgenase catalyses the reaction

Q.223	**Which is NOT a characteristic of a plasmid used for production of DNA vaccines in fish?**	
	A	Promoter- and enhancer sequences
	B	Poly-adenylation sequence
	C	Transcriptional termination sequence
	D	Poly-T- tail

Q.224	**White spot syndrome virus has**	
	A	vertical transmission
	B	horizontal transmission
	C	both vertical and horizontal transmission
	D	an intermediate host

Q.225	**Haemorrhagic septicemia in carp is caused by**	
	A	Vibrio parahemolyticus
	B	Staphylococcus aureus
	C	Aeromonas hydrophila
	D	Streptococcus sp

Q.226	**Primary aetiology of Epizootic Ulcerative Syndrome is**	
	A	IHHNV
	B	Gregarines
	C	Aphanomyces invadans
	D	Baculovirus

Q.227	**Net Primary production (NPP) =**	
	A	GPP – respiration
	B	GPP - (Rp + Rh + Rd)
	C	Respiration- GPP
	D	GPP – Rp

Q.228	The lower, dense region of the atmosphere is known as	
	A	Hydrosphere
	B	Ionosphere
	C	Stratosphere
	D	Troposphere

Q.229	The two most important climatic factors affecting the distribution of world biomes are	
	A	Temperature and precipitation
	B	Latitude and temperature
	C	Altitude and temperature
	D	Humidity and precipitation

Q.230	A high BOD valu of	
	A	A pollution free system
	B	A highly polluted system due to excess of nutrients
	C	A highly polluted system due to abundant heterotrophs
	D	A highly pure water with abundance of autotrophs

Q.231	Benthic organisms of lakes or sea are usually	
	A	Producer
	B	Herbivores
	C	Carnivores
	D	Decomposers

Q.232	Which of these biomes would you expect to find a coyote living in?	
	A	Desert
	B	Taiga
	C	tropical rain forest
	D	Tundra

Q.233	The Ozone layer saves from lethal UV. It mainly absorbs	
	A	UV-A
	B	UV-B
	C	UV-A & B
	D	UV-B & C

Q.234	The maximum biodiversity in India occurs at	
	A	Western Himalayas
	B	North East Himalayas
	C	Western Ghats
	D	Eastern Ghats

Q.235	Extinction rate is high at	
	A	Main lands
	B	Large islands
	C	Small islands near mainlands
	D	Small island far from mainlands

Q.236	Bootstrapping technique in molecular phylogeny analysis is used to derive additional datasets by	
	A	Swapping the columns in Multiple sequence alignment
	B	Randomising individual sequences
	C	Inserting deletions and insertions
	D	Shuffling the order of sequences

Q.237	Which of the following statements regarding scoring matrices of proteins is incorrect?	
	A	Most scoring matrices are symmetrical.
	B	The scores are log odd ratios of observed vs expected probabilities.
	C	Gap is considered as 21st amino acid in deriving some of the scoring matrices.
	D	Most of the matrices assign highest score to substitution of an amino acid with itself.

Q.238	**Trade off between sensitivity and specificity can be represented by**	
	A	Receiving Operating Character curve
	B	Positive Predictive value
	C	Principle Component analysis
	D	Regression analysis

Q.239	**Which of the following interactions are NOT characteristics of epitope-paratope interactions?**	
	A	Hydrogen bond
	B	Disulfide bond
	C	Salt bridges
	D	Van der Waal's

Q.240	**While building a model of a protein using homology modeling approach, special care needs to be exercised while assigning conformation of**	
	A	Gly from non-Gly residue
	B	Non-Gly from Gly
	C	Arg from Lys
	D	Non-Pro from Pro

Q.241	**Which of the following complementarity determining regions (CDRs) of antibodies is sequentially and conformationally the most variable?**	
	A	CDR1 of Light chain
	B	CDR3 of Light chain
	C	CDR1 of Heavy chain
	D	CDR3 of Heavy chain

Q.242	**The LIS technique is used in the MUMmer algorithm for**	
	A	Identification of MUMs
	B	Sorting of MUMs
	C	Alignment of MUMs
	D	Tabulating MUMs

Q.243	The numbers at the internal nodes of a phylogenetic tree indicate	
	A	Number of times the OTUs were clustered together
	B	Number of parsimony sites shared by OTUs
	C	Number of mismatches shared by OTUs
	D	Similarity score of OTUs that cluster together

Q.244	Which one of the following statements is FALSE?	
	A	Needleman & Wunsch algorithm is used for global alignment of pair of sequences.
	B	There could be several possible local alignments as part of a global alignment.
	C	In Needleman & Wunsch algorithm sequences are randomised by keeping length and composition same.
	D	The terms identity, similarity and homology are expressed as %.

Q.245	Structure determination of myoglobin in 1958 revealed that the protein consists mostly of	
	A	Right-handed α-helices
	B	Left-handed α-helices
	C	β-sheets
	D	Random coils

Q.246	One side of a 30-residue α-helix faces the hydrophobic interior of a protein. If the helical wheel of this helix were to be drawn, which of the following residues are likely to be hydrophobic?	
	A	10th, 20th and 30^{th}
	B	1st, 6th, 11th, 16th, 21st and 26^{th}
	C	1st, 4th, 7th, 10th, 13th, 16th, 19th, 22nd, 25th and 28^{th}
	D	1st, 5th, 8th, 12th, 15th, 19th, 22nd, 26th and 30^{th}

Q.247	The dielectric constant of protein interiors is likely to be	
	A	Similar to that of water's, i.e. close to 80
	B	Much smaller than that of water
	C	Much more than that of water
	D	At some places in the interior more and at some other places less than that of water

Q.248	**In a helix-turn-helix motif in proteins, which one of the following is true for binding to nucleic acids?**	
	A	Both the helices bind
	B	Neither of the two helices bind
	C	Only the 1st helix is important in binding
	D	The 2nd helix is important in binding

Q.249	**In the prokaryotic ribosome structure, the peptidyl transferase activity of the ribosomes is found**	
	A	Entirely in the ribosomal RNA
	B	Entirely in the ribosomal proteins
	C	Partially embedded in the RNA and partially in the proteins
	D	Ribosomal RNA binds the m-RNA but proteins catalyze peptidyl transferase activity

Q.250	**Maximum parsimony analysis in the context of molecular phylogeny implies**	
	A	Complex hypotheses are preferred over simpler hypotheses
	B	Complex and simple hypothesis need not be considered
	C	Simpler hypotheses are preferred over complex hypotheses
	D	Both complex and simple hypotheses are considered, and the one, which is more suitable to observations is applied

ANSWER KEY TO BET-2013 EXAMINATION

Held on 5th May 2013

Question No.	Answer
1	C
2	A
3	C
4	C
5	B
6	B
7	D
8	A
9	A
10	A
11	D
12	C
13	D
14	D
15	A
16	A
17	A
18	D
19	B
20	A
21	C
22	A
23	D
24	D
25	D
26	C
27	A
28	B
29	A
30	C
31	B
32	B
33	B
34	A
35	C
36	C
37	D

38	C
39	A
40	C
41	C
42	B
43	A
44	A
45	B
46	A
47	D
48	C
49	C
50	A
51	B
52	C
53	C
54	A
55	A
56	B
57	D
58	C
59	C
60	C
61	A
62	C
63	B
64	A
65	D
66	C
67	C
68	C
69	B
70	A
71	A
72	A
73	D
74	A
75	C
76	A
77	A
78	B
79	B
80	C
81	C

82	B
83	D
84	A
85	A
86	B
87	C
88	B
89	A
90	D
91	C
92	B
93	A
94	C
95	A
96	C
97	A
98	A
99	B
100	B
101	D
102	A
103	D
104	D
105	B
106	D
107	C
108	C
109	D
110	C
111	A
112	D
113	B
114	D
115	A
116	D
117	A
118	A
119	B
120	A
121	A
122	D
123	D
124	A
125	B

126	B
127	D
128	C
129	A
130	C
131	C
132	D
133	D
134	B
135	C
136	A
137	B
138	B
139	C
140	B
141	A
142	B
143	D
144	B
145	B
146	A
147	D
148	C
149	A
150	B
151	A
152	B
153	A
154	B
155	D
156	B
157	C
158	C
159	B
160	B
161	B
162	D
163	A
164	B
165	C
166	A
167	B
168	C
169	A

170	C
171	C
172	C
173	C
174	A
175	A
176	D
177	A
178	A
179	B
180	D
181	C
182	C
183	D
184	B
185	B
186	C
187	C
188	C
189	D
190	C
191	D
192	C
193	A
194	B
195	D
196	A
197	D
198	B
199	B
200	A
201	B
202	C
203	C
204	A
205	B
206	B
207	C
208	C
209	A
210	C
211	D
212	B
213	A

214	A
215	A
216	A
217	A
218	A
219	C
220	A
221	B
222	A
223	D
224	C
225	C
226	C
227	B
228	D
229	A
230	B
231	D
232	D
233	D
234	C
235	D
236	A
237	C
238	A
239	B
240	B
241	D
242	B
243	A
244	D
245	A
246	D
247	B
248	D
249	A
250	C