Application No.: _____.

Gujarat Biotechnology Research Centre

Industrial/Environmental Biotechnology Mains Exam

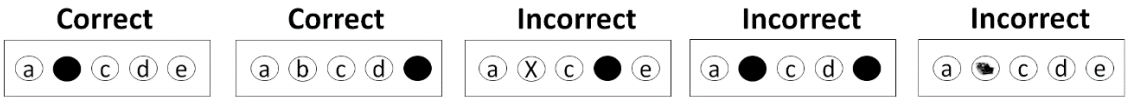
Scientist-B (Group-I)

Total MCQ: 200 Total Duration: 2 Hours

Do not open unless asked to do so

Instructions for Candidate:

1. This question booklet contains 200 questions, and each correct answer carries 1 mark.
2. Every attempted question with an incorrect answer shall carry a negative mark of 0.25.
3. Choose 'E' Option if you don't want to attempt a question, if no option is marked, 0.25 marks will be deducted.
4. Use only Blue/Black Ball Point Pen to darken the appropriate circle in OMR.
5. Please darken the complete circle.
6. Darken **ONLY ONE CIRCLE** for each question as shown below:



7. The answer once marked, cannot be changed.
8. Please do not make any stray marks on the Question Booklet.
9. Do not fold the OMR sheet.
10. Rough work must be done on the blank page of the Question Booklet.
11. Mark your answer in the appropriate space in the Answer Sheet against the Number corresponding to thequestion.
12. The Candidate has to submit a Question booklet and OMR response sheet to the invigilator at the conclusion of the examination.

I have read all the instructions above.

Candidate Signature: _____ **Invigilator Signature:** _____

1	Which of the following option is incorrect about Mycoplasma?			
	a	They lack a cell wall	b	They are resistant to β-lactam drugs
	c	They are the smallest prokaryote that can grow in cell free culture media	d	They are sensitive to osmotic shock
2	Which of the following is a small naked circular fragment of RNA that infect plant cells			
	a	Prion	b	Nucleon
	c	Macrophage	d	Viroid
3	The membrane lipids of Archaea have which of the following linkages			
	a	Ester	b	Carboxyl
	c	Ether	d	Glycosidic
4	Which of the following is an organelle that is found in some extant protists which produce ATP by fermentation			
	a	Heterocyst	b	Hydrogenosome
	c	Vacuole	d	Trichome
5	The phenomenon of small, random genetic changes that occur over generations to slowly drive either speciation or extinction in a relatively short span of time, is known as?			
	a	Microevolution	b	Macroevolution
	c	Punctuated Equilibria	d	Genetic Switching
6	The variant of strains (of similar species) characterized by distinctive antigenic properties are known as?			
	a	Morphovar	b	Biovar
	c	Serovar	d	Chemovar
7	A two-step process of conversion of ammonium ion (NH_4^+) to nitrate (NO_3^-) is termed as?			
	a	Nitrification	b	Ammonification
	c	Denitrification	d	Nitrogen fixation
8	The formation of long DNA molecules composed of several genome units linked together in the same direction in a series is known as			
	a	Octamer	b	Telomere
	c	Concatemer	d	Anomer
9	What is the symbiotic relationship between fungi and roots of higher plants known as			
	a	Lichen	b	Mycorrhizae
	c	Symbiont	d	Azolla
10	Which among the following use reduced inorganic molecules as their energy and electron source but derive their carbon from reduced organic sources, also otherwise known as “Mixotrophs”			
	a	Chemolithoheterotrophs	b	Photolithotrophs
	c	Organotrophs	d	Chemoorganotrophic heterotrophs
11	The total biomass of an organism is determined by the nutrient present in the lowest concentration relative to the organism’s requirements is a statement of			

	which law?			
	a	Heisenberg's uncertainty principle	b	Shelford's law of tolerance
	c	Liebig's law of the minimum	d	Bergmann's Law
12	Which of the following staining technique is used to differentiate Mycobacterium from other bacteria			
	a	Capsule staining	b	Endospore staining
	c	Gram staining	d	Acid Fast staining
13	If division of cell takes place in three planes it will produce a cube of 8 cocci which is named as			
	a	Helical	b	Sarcina
	c	Tetrad	d	Spirilla
14	Which of the following enzyme attacks peptidoglycan by hydrolyzing the bond that connects *N*-acetylmuramic (NAM) acid with *N*-acetylglucosamine (NAG)			
	a	Lysozyme	b	Amylase
	c	Peroxidase	d	Laccase
15	Syntrophy is an association between two organisms in which			
	a	One benefits while the other is harmed	b	One organism gives off antagonistic substances to prevent the growth of the other
	c	They cooperate to break down a nutrient	d	One species living off the products of another species
16	Transfer of piece of naked DNA fragment between organism/outside environment and organism is called as			
	a	Conjugation	b	Recombination
	c	Transformation	d	Transduction
17	Repair of thymine dimers by splitting them with the help of visible light is known as			
	a	Proofreading	b	Photoreactivation
	c	Excision repair	d	Mismatch repair
18	Purine is replaced by pyrimidine, and pyrimidine is replaced by purine in which of the following?			
	a	Transition	b	Transversion
	c	Silent mutation	d	Point mutation
19	Which mutation takes place by the insertion and deletion of one or two base pairs within the coding region of genes?			
	a	Silent mutation	b	Missense mutation
	c	Point mutation	d	Frameshift mutation
20	Chemist Erwin Chargaff used which of the following to analyze the base composition of nucleic acid?			
	a	Paper Chromatography	b	Sanger Sequencing
	c	Column Chromatography	d	Next Gen. Sequencing
21	Which of the following virulent combination killed the rat in genetic testing of Fred Griffith?			
	a	Smooth (S) and heat killed S	b	Smooth (S) and Rough (R)

	c	Smooth (S) and heat killed S and Live R	d	Smooth (S) and heat killed S and No R
22	Which amongst the following is the function of the DNA Pol. I?			
	a	Synthesis of RNA primer	b	Primosome assembly
	c	RNA primer removal & Gap filling	d	Stable binding to single DNA strand
23	Which of the following is not required for DNA polymerases to catalyze the synthesis of a complementary strand of DNA?			
	a	Template strand	b	RNA strand
	c	dNTPs	d	Glutathione
24	When replication of a circular chromosome is complete, the two circular daughter chromosomes may remain intertwined and are called?			
	a	Catenanes	b	Pro-Chromosome
	c	Twins	d	Chromids
25	The Redfield ratio is an index of concentration of which of the following			
	a	C, H, O	b	C, N, P
	c	C, H, N	d	C, N, S
26	As per the drinking water quality standard, the permission level of *Escherichia coli* cells in drinking water samples is?			
	a	10 per 100 mL	b	0 per 100 mL
	c	1000 per 100 mL	d	100 per 100 mL
27	A relationship in which the symbiont is benefited while the host is neither harmed nor helped			
	a	Commensalism	b	Predation
	c	Mutualism	d	Parasitism
28	Which of the following property of E.coli makes it as promising and distinguishing marker for considering it as fecal coliform indicator?			
	a	Absence of urease & Presence of β-galactosidase	b	Presence of urease & absence of β-glucuronidase
	c	Absence of urease & Presence of β-glucuronidase	d	Presence of urease & Presence of β-galactosidase
29	Which of the following human excretory substance is one of the major chemical indicator of fecal contamination?			
	a	Bile acid	b	RBC
	c	Fatty acid	d	Pus cell
30	To detect the level of endotoxins in the wastewater samples for pathogenic contamination, Limulus amoebocyte lysate (LAL) assay is used. It is based on which of the following mechanism?			
	a	Reaction of antiserum of the chicken blood with endotoxins	b	Reaction of white blood cells of the horseshoe crab with endotoxins
	c	Reaction of antiserum of the horseshoe crab with endotoxins	d	Reaction of antibody raised against lysate with the endotoxins
31	A bacterium having one of the smallest genome and was the first to be sequenced by Fred Sanger?			
	a	*Haemophilus influenza*	b	*Escherichia coli*

	c	*Streptococcus pneumonia*	d	*Bacillus subtilis*
32	A method which is used to study the microbial communities sampled directly from their natural environment, without prior culturing is known as			
	a	Proteogenomics	b	Epigenomics
	c	Metagenomics	d	Transcriptomics
33	The expression of a set of genes depending on a parent-of-origin-specific manner is observed in which of the following?			
	a	Maternal effect	b	Genetic Imprinting
	c	Mosaicism	d	Footprinting
34	Which of the following option is correct?			
	a	In genetic imprinting: both alleles of a gene inherited from mother and father are expressed	b	In X-inactivation/Lyonization, one of the copies of X-chromosome present in female mammals get inactivated
	c	Expression of genes is solely governed by genetic factors	d	In mosaicism: cells of an individual have same genetic makeup
35	Proteins are separated on the basis of _____ during first dimension separation of 2D gel electrophoresis			
	a	Molecular weight	b	Charge
	c	Isoelectric Point	d	Shape
36	Gel retardation assay gives information related to which of the following interaction?			
	a	Protein-DNA	b	DNA-DNA
	c	Protein-Protein	d	Protein-RNA
37	Large DNA fragments (size) can be resolved by which of the following technique?			
	a	Pulse-field electrophoresis	b	Fingerprinting
	c	Southern blotting	d	Northern blotting
38	Reverse two hybrid system is used to determine which of the following interaction?			
	a	Protein-Protein	b	Amino acid-Protein-Protein
	c	Protein-DNA	d	Amino acid-Protein-DNA
39	Quaternary structure of protein is contributed by which of the following covalent interaction?			
	a	Van der Waals	b	Disulfide
	c	Peptide	d	Hydrogen
40	Proteins of same molecular mass but having different pI values can be separated by which of the following chromatography?			
	a	Ion Exchange	b	Affinity
	c	Gel permeation	d	Hydrophobic
41	C-value Paradox is related to which of the following?			
	a	DNA content of haploid genome	b	Total RNA content of cell
	c	Cellular protein content	d	Membrane lipid content
42	Conventionally, unusual base pairing occurs in which of followings?			
	a	mRNA	b	rRNA

	c	tRNA	d	siRNA
43	Spliceosomes are small ribonucleoproteins involved in which of following processes?			
	a	5′ capping	b	RNA interference
	c	Polyadenylation	d	Alternate splicing
44	The formation of hydrogen bonds between two extended polypeptide chains will lead to formation of which of the followings structure?			
	a	Primary structure	b	Alpha helix secondary structure
	c	Beta sheets secondary structure	d	Quaternary structure
45	Amongst the following, which is not a post transcriptional modification process?			
	a	Alternate splicing	b	Polyadenylation
	c	Glycosylation	d	Capping
46	Which of the following describes "Karyotype"			
	a	Haploid set of total chromosome	b	Diploid set of chromosome
	c	Nuclear surface structure	d	Arrangement of nucleosomes
47	The peptide bond exists in "*trans*" form for all amino acids, except?			
	a	Proline	b	Serine
	c	Glycine	d	Tryptophan
48	Riboswitches are elements commonly found in the 5′-untranslated region (UTR) that exert their regulatory control over the transcript in a *cis*-fashion by directly binding a small molecule ligand			
	a	mRNA	b	siRNA
	c	tRNA	d	rRNA
49	Usually, di-sulphide bond of proteins are formed in either E.R. or periplasmic space of eukaryotes and prokaryotes, respectively. It does not take place in cytoplasm because of which of the following reason?			
	a	Oxidative nature of cytoplasm	b	Acidic pH of cytoplasm
	c	Reducing nature of cytoplasm	d	Alkaline pH of cytoplasm
50	Which of the following wavelength of UV gets absorbed by peptide bond of proteins			
	a	170-180 nm	b	260-270 nm
	c	280-290 nm	d	210-220 nm
51	The indicator(s) is/are used to study the growth of anaerobic bacteria in the culture media is/are:			
	a	Resazurin	b	Phenol red and tryphane blue
	c	Iodine and crystal violet	d	Propidium iodide and Acridine orange
52	Which of the following dye stains Gram negative bacteria?			
	a	Nigrosin	b	Safranin
	c	India ink	d	None of the above
53	Which of the following disinfectant act by causing precipitation of proteins and is known to be bacteriostatic?			
	a	Mercuric chloride	b	copper sulfate
	c	silver nitrate	d	All of the above
54	Which of the following DNA-Based Typing Methods is not used for reference			

	identification and classification of microorganisms?			
	a	RFLP	b	PFGE
	c	ARDRA	d	Native PAGE
55	Measuring the metabolic activity of a bacterial sample provides:			
	a	Direct count of the bacteria	b	Indirect count of the bacteria
	c	Both (a) and (b)	d	None of the above
56	Which important factors are taken into account to identify serotypes of public health importance?			
	a	Cell wall (O) antigen	b	Flagellar (H) antigen
	c	Capsular (K) antigen	d	All of the above
57	The phenotypic classification of Gram's staining is based upon			
	a	Peptidoglycan cell wall	b	Flagella and pili
	c	Cellular organelles	d	All of the above
58	What is the strict requirement of Pseudomonas aeruginosa species for its growth?			
	a	Aerobic condition	b	Acidic environment
	c	High temperature environment	d	All of the above
59	The universal phylogenetic tree in bacteria is based upon:			
	a	16S rRNA sequence	b	Plasmid DNA sequence
	c	Protein sequence	d	All of the above
60	Auxotropic mutant variety can be isolated by _____			
	a	Gradient plate technique	b	Replica plate technique
	c	rDNA technique	d	All of the above
61	Heterocysts are			
	a	Biological fertilizers	b	Biofertilizers
	c	Specialized cells for nitrogen fixation	d	Enzymes required
62	Which of the following is required by Rhizobium to fix atmospheric nitrogen is called			
	a	Lectins	b	Alkaloids
	c	Leghaemoglobin	d	Glycoside
63	Sulphide spoilage in the canned food is due to_____.			
	a	*Clostridium nigrificans*	b	*Clostridium thermosaccharolyticum*
	c	*Bacillus coagulans*	d	*Bacillus sterothermophilus*
64	Which of the following is an enzyme used for cell disruption			
	a	Lysozyme	b	Hexokinase
	c	TriptonX100	d	Phosphokinase
65	Proteins are precipitated from media by			
	a	Salting out	b	Salting in
	c	Addition of organic solvent	d	Both a & c
66	Antibiotics are			
	a	Primary metabolite	b	Secondary metabolite
	c	Precursor	d	Product
67	Methods used to get immobilized enzyme,			
	a	Adsorption	b	Encapsulation

	c	Covalent bonding	d	All of the above
68	Cloning vector commonly used in gene cloning			
	a	Ti plasmd	b	EMBL3
	c	pPR 322	d	EMBL4
69	Antifoam agent is/are_____.			
	a	Silicon compounds	b	Corn oil
	c	Soyabean oil	d	All of the above
70	Which of the following will use energy obtained from the oxidation of H2S to transform carbon dioxide to organic biomass			
	a	Chemolithotrophic autotroph	b	Chemoorganotrophic heterotroph
	c	Photolithotrophic autotroph	d	Photoorganotrophic heterotroph
71	Antioxidant present lycopene is present in			
	a	Tomato	b	Banana
	c	Potato	d	Oranges
72	What is chronic infection?			
	a	Infection that occurs occasionally	b	Indicative infection
	c	Persists over a long time	d	No symptoms
73	The most prevalent bacterium in the oil glands is			
	a	*Escherichia coli*	b	*Helicobacter pyroli*
	c	*Staphylococcus epidermidis*	d	*Propionibacterium acnes*
74	Bacterially produced heat-stable antimicrobial peptides			
	a	Gnotobiotic	b	Prebiotics
	c	Synbiotics	d	Bacteriocins
75	Which cell plays an important role in destroying cancer cells?			
	a	T-lymphocyte	b	Natural killer cell
	c	B-lymphocyte	d	Macrophage
76	Most abundant immunoglobulin in serum, nasal mucus, saliva, breast milk, and intestinal fluid is			
	a	IgG	b	IgA
	c	IgE	d	IgD
77	Formation of the antigen antibody complexes has which of the following interaction			
	a	Affinity	b	Avidity
	c	Firm	d	Irreversible
78	Septic meningitis is caused by _____.			
	a	Fungus	b	Virus
	c	Bacteria	d	Protozoa
79	Influenza is caused by_____.			
	a	A DNA virus	b	A RNA virus
	c	A negative strand RNA virus	d	Single stranded DNA virus
80	"Nosocomial" are _____.			
	a	Hospital- acquired infection	b	Antibiotic resistant pathogen
	c	Pandemic in many parts of the world	d	None
81	*Clostridium tetani*'s spores-tetanospasmin is a			

	a	Hemolysin	b	Neurotoxin
	c	Enzyme	d	All of the above
82	ESKAPE group pathogens are assessed in the water quality parameters. However, which organism is not assessed under this category?			
	a	*Pseudomonas*	b	*Escherichia*
	c	*Candida*	d	*Klebsiella*
83	Which pathogen is often used as an indicator for faecal contamination in water quality assessments?			
	a	*Salmonella*	b	*Giardia lamblia*
	c	*Clostridium difficile*	d	*Enterococcus*
84	Among the following energy rich compounds which possess highest $\Delta G^{o`}$ (kJ/mol),			
	a	ATP	b	Phosphocreatine
	c	AcetylCoA	d	Phosphoenolpyruvate
85	Bio-luminescence is an example of,			
	a	Chemical energy into Light energy	b	Light energy into chemical energy
	c	Chemical energy into kinetic energy	d	Kinetic energy into Light energy
86	During anaerobic growth of microbes there is a specific critical demand of,			
	a	NADH regeneration	b	NAD+ regeneration
	c	ATP generation	d	GTP generation
87	For the Ping-Pong mechanism of nucleoside diphosphate kinase reaction,			
	a	$\Delta G'^{\circ} = -1$	b	$\Delta G'^{\circ} = -100$
	c	$\Delta G'^{\circ} \approx 0$	d	$\Delta G'^{\circ} = 1$
88	What is the preferred energy source for E. coli during aerobic respiration?			
	a	Glucose	b	Lactose
	c	Acetate	d	Pyruvate
89	During anaerobic respiration in *E. coli*, what molecule can serve as an alternative final electron acceptor?			
	a	Oxygen	b	Nitrate
	c	Sulfate	d	Carbon dioxide
90	Which of the following diseases is associated with *Clostridium difficile*?			
	a	Botulism	b	Gas gangrene
	c	Tetanus	d	Antibiotic-associated diarrhea
91	What is the critical pigment responsible for capturing light energy during cyanobacterial photosynthesis?			
	a	Chlorophyll a	b	Phycocyanin
	c	Carotenoids	d	Phycoerythrin
92	What is the major metabolic pathway used by cyanobacteria for carbon fixation during photosynthesis?			
	a	Calvin cycle	b	Glycolysis
	c	Krebs cycle	d	Pentose phosphate pathway
93	In *Pseudomonas*, what is the primary function of the pyoverdine pigment?			
	a	Protection against UV radiation	b	Iron uptake

	c	Photosynthesis	d	Pathogenicity
94	Cellular compartment which is responsible for protein secretion and post-translational modifications in yeast?			
	a	Nucleus	b	Polyphosphates
	c	Golgi apparatus	d	Cytoplasm
95	What is the primary role of the T7 promoter in bacterial protein expression systems?			
	a	Improve translation efficiency	b	Induce DNA/protein folding
	c	Initiate transcription	d	Initiate protein degradation
96	What is the major advantage of using yeast as a protein expression system over bacteria?			
	a	Higher transformation efficiency	b	Lower cost of media
	c	Lack of endogenous proteases	d	Capacity for glycosylation
97	Yeast is a simple but efficient eukaryotic model system. Because,			
	a	its genome is sequenced.	b	23% of human genes' homologs are found in yeast.
	c	Mutant and over-expression libraries are not available	d	Option (a) and (b)
98	_____ is a fission yeast.			
	a	*Saccharomyces cerevisiae*	b	*Candida spp.*
	c	*Schizosaccharomyces pombe*	d	*Rhodotorula rubra*
99	Metabolic engineering is used to improve the production of desired product in the microbial system which involves,			
	a	Pathway optimization towards desired product formation	b	Metabolic flux analysis
	c	Media optimization	d	Option (a) and (b)
100	Citrate utilization needs,			
	a	A specific membrane transporter (T)	b	Citrate lyase activity (CL)
	c	An oxaloacetate decarboxylase activity (OAD)	d	All of the above
101	Lysosomes are known as "suicidal bags" because of			
	a	Hydrolytic activity	b	Catalytic activity
	c	Presence of food vacuole	d	Parasitic activity
102	Chloroplast is found in			
	a	Plant cells	b	Animal cells
	c	*E. coli*	d	All of the above
103	Division of the Cytoplasm is known as the			
	a	Mitosis	b	Cytokinesis
	c	Meiosis	d	Interphase
104	Which of the following is not ionizing radiations			
	a	X-Rays	b	UV-Rays
	c	Both A & B	d	None of the above
105	Fermentation process takes place in the			
	a	Presence of oxygen	b	Absence of oxygen

	c	Presence of hydrogen	d	Absence of hydrogen
106	Photosynthesis occurs in			
	a	Endoplasmic reticulum	b	Lysosome
	c	Chloroplast	d	Mitochondria
107	Class of carbohydrate which cannot be hydrolyzed further, is known as?			
	a	Polysaccharides	b	Monosaccharide
	c	Oligosaccharides	d	Both A & B
108	Genes that show tendency to be inherited together is known as _____			
	a	Homologous group	b	Linkage group
	c	Conjugation	d	None of these
109	Viruses that infect bacteria known as?			
	a	Virus	b	Jumbo phage
	c	Bacteriophage	d	Virophage
110	DNA replication is _____			
	a	semi-conservative	b	conservative
	c	non-conservative	d	disruptive
111	Which among the following is a nitrogen fixing microorganism?			
	a	Nostoc	b	E. coli
	c	Paramecium	d	Penicillium
112	Citric acid is produced by which microorganisms?			
	a	Pseudomonas	b	Saccharomyces
	c	Bacillus	d	Aspergillus
113	Which of the following organisms is used in alcoholic fermentation?			
	a	Pseudomonas	b	Saccharomyces
	c	Bacillus	d	Aspergillus
114	World environment day is celebrated on			
	a	5 July	b	5 January
	c	5 June	d	15 August
115	Meselson and Stahl model of replication was called			
	a	conservative replication	b	semi-conservative replication
	c	dispersive replication	d	All of the above
116	The process of formation of RNA from DNA is known as			
	a	Replication	b	Transcription
	c	Translation	d	All of the above
117	In a eukaryotic cell, DNA can be found in?			
	a	Nucleus	b	Chloroplast
	c	Endoplasmic reticulum	d	Both (a) and (b)
118	The organism which grows best at high temperature are called			
	a	psychrophilic	b	mesosphilic
	c	thermophilic	d	All of the above
119	The study of interaction between living organism and environment is called			
	a	Life science	b	ecology
	c	Physiology	d	Biochemistry
120	After the fermentation is over, ethanol is recovered by			
	a	centrifugation	b	distillation

	c	filtration	d	cell disintegration
121	Kreb's cycle in eukaryotes occur in			
	a	cytoplasm	b	mitochondrial matrix
	c	mitochondrial cristae	d	outside the cell
122	In ion-exchange chromatography			
	a	proteins are separated on the basis of their net charge	b	proteins are separated on the basis of their size
	c	proteins are separated on the basis of their shape	d	Both B & C
123	Gram staining was discovered by			
	a	Christian gram	b	Alfred Gram
	c	Robertcook	d	Louis Pasteur
124	The five-kingdom system of classification was proposed by			
	a	Louis Pasteur	b	Robert Whittaker
	c	Robert Koch	d	Masaki Ogata
125	Which of these is not a product of fermentation?			
	a	Lactate	b	Oxygen
	c	Carbon dioxide	d	Ethanol
126	Mycology is			
	a	Study of viruses	b	Study of Plants
	c	Study of marine organisms	d	Study of fungi
127	Who discovered jumping genes?			
	a	Abelson	b	Harvey
	c	McClintock	d	Griffith
128	Oxidation of a molecule involves			
	a	gain of electron	b	gain of proton
	c	loss of electron	d	Both A & B
129	Which metal is found in chlorophylls?			
	a	Copper (Cu)	b	Iron (Fe)
	c	Magnesium (Mg)	d	Manganese (Mn)
130	Protein synthesis begins with which of the following amino acid			
	a	Glycine	b	Proline
	c	Thymine	d	Methionine
131	Which among the following enzyme is involved in hydrolysis of starch			
	a	Amylase	b	Cellulase
	c	Pectinase	d	all of these
132	During glycolysis, the glucose molecule is converted into			
	a	One pyruvic acid	b	Two pyruvic acid
	c	One glycogen	d	Two glycogen
133	Which among the following is gaseous phytohormone			
	a	Auxin	b	Abscisic acid
	c	Salicylic acid	d	Ethylene
134	The bioreactor is not capable of _____			
	a	Maintaining aseptic conditions	b	Large scale production
	c	Controlling pH	d	Downstream Purification

135	The natural residence of every organism is known as:			
	a	Biome	b	Microbiome
	c	Habit	d	Habitat
136	Animal adopts a similar state like sleep to reduce their metabolic rate, it is called:			
	a	Migration	b	Transpiration
	c	Hibernation	d	All of the above
137	In a natural ecosystem, which pyramid can never be inverted?			
	a	pyramid of numbers	b	pyramid of energy
	c	pyramid of biomass	d	all can be inverted
138	Interrelationship between two organisms, in which both benefit is called			
	a	Mutualism	b	Symbiosis
	c	Parasitism	d	Food chain
139	Oil immersion objective lens has an NA value of_____			
	a	0.65	b	0.85
	c	1.33	d	1.0
140	The molecule which acts directly on an enzyme to lower its catalytic rate is _____			
	a	Enzyme	b	Inhibitor
	c	Modulator	d	Regulator
141	What is the general mechanism of an enzyme?			
	a	It acts by reducing the activation energy	b	It acts by increasing the activation energy
	c	It acts by decreasing the pH	d	It acts by decreasing the temperature
142	Which of these is referred to as Kcat?			
	a	Miachelis Menten constant	b	Enzyme concentration
	c	Substrate concentration	d	Turn over number
143	Which of the following types of microorganisms is photosynthetic?			
	a	Yeast	b	Virus
	c	Seaweed	d	E. Coli
144	Who is known as the father of Microbiology?			
	a	Edwin John Butler	b	Ferdinand Cohn
	c	Robert Koch	d	Antoni van Leeuwenhoek
145	Vaccination was invented by _____			
	a	Watson	b	Jenner
	c	Antoni van Leeuwenhoek	d	Robert Koch
146	Acridine orange is which type of mutagen?			
	a	Physical mutagen	b	transposons
	c	base analog	d	intercalating agents
147	Lipopolysaccharide is the outer layer of?			
	a	Algae	b	Fungi
	c	Gram-negative bacteria	d	Gram-positive bacteria
148	Which of the following biomolecules are not synthesized by the endoplasmic reticulum?			

	a	Proteins	b	Lipids
	c	Nucleic acids	d	Cholesterol
149	Which enzyme is used to join nicks in the DNA strand?			
	a	Primase	b	DNA polymerase
	c	DNA ligase	d	Endonuclease
150	How many RNA polymerases are present in a bacterial system?			
	a	4	b	2
	c	3	d	1
151	An organism that can grow under extreme low water conditions is referred to as:			
	a	Hydrophile	b	Xerophile
	c	Acidophile	d	None of the above
152	Which of the following is correct with respect to *Aspergillus niger*			
	a	Aerobe	b	Anaerobe
	c	No spore formation	d	Non-filamentous
153	Snow algae represent which type of an extremophile?			
	a	Barophile	b	Cryophile
	c	Thermophile	d	None of the above
154	_____ was the first commercially produced plant secondary metabolites using bioreactor technology.			
	a	Shikonin	b	Colchicine
	c	Cercosporin	d	Cytokinin
155	Protein conformational dynamics cannot be determined by which of the following techniques?			
	a	NMR spectroscopy	b	Fluorescence spectroscopy
	c	Mass spectroscopy	d	Differential scanning calorimetry
156	The following technique is not suitable to identify the molecular mass of the protein			
	a	Chromatofocusing	b	MALDI-TOF
	c	SDS-PAGE	d	Gel filtration Chromatography
157	Which enzyme is commonly used in the production of bioethanol from biomass?			
	a	Lipase	b	Cellulase
	c	Protease	d	Amylase
158	Which organism is commonly used in the production of recombinant proteins?			
	a	*Saccharomyces cerevisiae*	b	*Streptomyces coelicolor*
	c	*Escherichia coli*	d	*Bacillus subtilis*
159	Which of the following is an example of a biopolymer produced through industrial biotechnology?			
	a	Polypropylene	b	Polyethylene
	c	Polystyrene	d	Polyhydroxyalkanoates (PHA)
160	Which organization in India approves and gives regulatory clearance of manufacturing and import of biological products?			
	a	National Institute of Biologicals	b	Central Drugs Standard Control

		(NIB)		Organization (CDSCO)
	c	Indian Pharmacopoeia Commission (IPC)	d	Department of Biotechnology (DBT)
161	_____ fungus is used in industrial production of citric acid?			
	a	*Fusarium moniliformae*	b	*Rhizopus nigricans*
	c	*Aspergillus niger*	d	*Rhizopus Oryzac*
162	If the sequence of bases in DNA is ATCCGGAAGA, then the sequence of codons on the transcript will be _____			
	a	UAGGCCUUCU	b	ATGGCTGGTA
	c	AUGGACUAAT	d	TAGGCCTTCT
163	The net yield of ATP produced by the complete oxidation of one mole of glycerol is_____			
	a	29	b	21
	c	22	d	27
164	Which one is the best example of secondary metabolite?			
	a	Monoclonal Ab	b	Penicillin
	c	Covaxin	d	Streptokinase
165	Which of the following is not included in enzyme immobilization process?			
	a	Entrapment	b	Affinity
	c	Adsorption	d	Absorption
166	What is/are the cell wall structural component(s) of fungi?			
	a	peptidoglycan	b	chitin
	c	chitin, cellulose, or hemicellulose	d	cellulose
167	Which of these is not an anion exchanger?			
	a	Diethylaminoethyl (DEAE)	b	Quaternary aminoethyl (QAE)
	c	Sulphopropyl (SP)	d	Quaternary ammonium (Q)
168	What cutting-edge AI system, developed by DeepMind, has revolutionized the field of protein structure prediction by accurately predicting the 3D structure of proteins?			
	a	Colabfold	b	Alphafold
	c	DeepFold	d	AIfold
169	*Deionococcus radiodurans* is an:			
	a	Acid resistant microorganism	b	Radiation resistance microorganism
	c	Higher salt tolerant microorganism	d	None of the above
170	What are the basic elements for the building blocks of life?			
	a	Carbon, Hydrogen	b	Oxygen, Nitrogen
	c	Both a & b	d	None of the above
171	Which of the following, according to Darwin, might have been a source for first production of a living organism			
	a	Hot lakes	b	Warm little pond
	c	Snow covered ponds.	d	None of the above
172	COD is generally ..... then BOD			
	a	Lower	b	Higher
	c	Equal	d	3 folds

173	Higher biomass can be achieved during _____			
	a	Continuous mode of operation in a bioreactor	b	Fed-batch mode of operation in a bioreactor
	c	Batch mode of operation in a bioreactor	d	None of the above
174	Which of the following is correct for Quality Assurance in Industrial Production			
	a	Only fixing problems related to the product	b	A preventive measure
	c	Has nothing to do with the process flow	d	None of the above
175	An alternative to "Rennet" for conversion of Milk Protein to Curd and Whey is _____			
	a	Sodium Chloride	b	Rennin
	c	Semi-skimmed milk	d	All of the above
176	The process of Cheddaring refers to_____			
	a	Removal of extra liquid or whey from curd in cheese making	b	Formation of acidified milk through conversion of milk sugar into acid
	c	Pasteurization of milk	d	None of the above
177	In cheese production, which of the following microbe is used for conversion of milk sugar from pasteurized milk into acid (acidified milk)			
	a	*Pseudomonas sps.*	b	*Lactobacillus bulgaricus*
	c	*Aspergillus niger*	d	All of the above
178	Which of the following pH range supports the growth of an acidophilic microorganism			
	a	6.5 – 9.0	b	> 9.0
	c	1.0 – 3.0	d	None of the above
179	Which of the following is not correct with regards to Quality Control in Industry			
	a	A relative measure	b	Involves steps related to testing for detect reliability
	c	Fixing problems of the product after manufacturing	d	None of the above
180	Which of the following could possibly be used as the tubing material?			
	a	Polypropylene	b	Polytetrafluoroethylene
	c	Polyether ether ketone	d	All the above
181	Investments for developing research infrastructure in the industry falls into which of the following category?			
	a	Capital expenditures	b	Operational expenditures
	c	Revenue expenditures	d	All of the above
182	For single use vessels, in general the material used is_____			
	a	Special plastic, autoclavable and disposable	b	Metal alloy, non-autoclavable and disposable
	c	Special plastic, non-autoclavable and disposable	d	Glass, autoclavable and disposable

183	For bubble column reactor which of the following is correct			
	a	Gas superficial velocity is greater than liquid superficial velocity	b	Gas superficial velocity is lower than liquid superficial velocity
	c	Gas superficial velocity is equal to liquid superficial velocity	d	None of the above
184	Based on a particular concept, preliminary research was done at a university level and the idea was established. It will come under which of the TRLs:			
	a	TRL 1 – 3	b	TRL 4 – 6
	c	TRL 7 – 9	d	None of the above
185	Which of the following represents the correct order for the stages of development of a drug?			
	a	Pre-clinical – Drug Discovery – Clinical Trails – Regulatory review – Approval	b	Pre-clinical – Clinical Trails – Regulatory review - Drug Discovery – Approval
	c	Drug Discovery - Pre-clinical – Clinical Trails - Regulatory review – Approval	d	Drug Discovery - Regulatory review - Pre-clinical – Clinical Trails – Approval
186	Which of the following is false_____			
	a	Two di-sulfide bonds link A and B chains of Insulin	b	Insulin is the mature form and Pro-Insulin is the immature form.
	c	Islets of Langerhans produced insulin.	d	One hydrogen bond helps fold A chain into the correct shape.
187	Which of the following is correct about R-Insulin (recombinant Insulin)			
	a	Can be produced at a large scale.	b	Purity and quality of the produced Insulin is higher than animal and/or semi-synthetic sources.
	c	Infection transfers are prevented through the r-DNA technology	d	All the above
188	The number of amino acids in Insulin is _____			
	a	110	b	86
	c	51	d	32
189	Immobilized enzymes are generally seen to exhibit_____			
	a	Higher thermal stability than free enzymes	b	Lower thermal stability than free enzymes
	c	No thermal stability than free enzymes	d	None of the above
190	Micro-capsule type of the entrapment for enzyme immobilization requires which type of membranes?			
	a	Non-permeable	b	Semi-permeable
	c	Both a & b	d	None of the above
191	Which of the following best describes the characteristics of a Continuous Stirred Tank Reactor (CSTR)?			
	a	Steady state operation with semi-continuous flow of reactants and products	b	Steady state operation with continuous flow of reactants and semi-continuous flow of products

	c	Steady state operation with continuous flow of reactants and products	d	Unsteady state operation with continuous flow of reactants and products
192	In an air-lift reactor, which of the following ensures mixing in the system_____			
	a	Impellers stirring at a high speed.	b	Turbulence caused due to the flow of air
	c	Excessive foaming in the reactor	d	Bubble coalescence
193	Wine production process is called as_____			
	a	Vinification	b	Vineyard
	c	Viticulture	d	Winery
194	What should be the temperature range for producing red wine using the conventional yeast fermentation?			
	a	70 - 90° F	b	40 - 60° F
	c	30 - 40° F	d	10 - 20° F
195	The steps after a bio-synthesis stage that involves product extraction, purification and recovery is called as_____.			
	a	Upstream Processing	b	Downstream Processing
	c	Both A & B	d	None of the above
196	Fermentation process at a large scale (or large volume) from a small scale (or small volume) represents _____			
	a	Scale-Up process	b	Scale-Down Process
	c	Nutrient Recycling	d	None of the above
197	"RSM" is used in the statistical analysis of collected data. What is the full form?			
	a	Regression Statistical Methodology	b	Regression Surface Methodology
	c	Response Surface Methodology	d	Response Statistical Methodology
198	What does CRISPR stands for?			
	a	Clustered regulatory interdisciplinary short palindromic repeats	b	Clustered regularly interspaced short palindromic repeats
	c	Clustered regulatory interspaced short palindromic reoccurrence	d	None of the above
199	Mixing of reactants in a bioreactor is ensured by_____			
	a	Gas supply	b	Impeller
	c	Condenser	d	Vessel
200	The volumetric mass transfer coefficient of oxygen is represented as___			
	a	OUR	b	OTR
	c	k_La	d	mV

------- Space for Rough Work -------

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