LIFE SCIENCES

I : CHEMISTRY (COMPULSORY)

ONE MARKS QUESTIONS (1-10)

1. In ice, each oxygen atom of water molecule is
   a. bonded only covalently to two hydrogen atoms
   b. bonded covalently to two hydrogen atoms and hydrogen-bonded to two other hydrogen atoms
   c. hydrogen-bonded to four hydrogen atoms
   d. bonded only covalently to four hydrogen atoms
2. I_2 exists in the solid form under normal temperature and pressure. The principal intermolecular forces holding together iodine molecules in solid is
   a. Covalent
   b. Metallic
   c. Ionic
   d. van der Waals
3. Burning of phosphorus in the presence of air produces a highly hygroscopic white compound, which reacts with water to yield
   a. H_3PO_4
   b. H_3PO_2
   c. $H_4P_2O_7$
   d. $H_4P_2O_5$
4. The minimum uncertainly in the speed of an electron in a one dimensional box of length 10^{-10} m is
   a. 580 m/s
   b. 580 km/s
   c. 1160 km/s
   d. 5800 km/s
5. Which one of the following explains the origin of colligative properties correctly?
   a. Increase of the chemical potential of the liquid solvent due to added solute
   b. Reduction of the chemical potential of the liquid solvent due to added solute
   c. Influence of the solute on the chemical potential of the solvent vapour
   d. Influence of the solute on the chemical potential of the solid solvent
6. For a zero order reaction, $A \rightarrow P$, if the initial concentration of species A is $[A]_0$, then $t_{1/2}$, can be expressed as
   a. $[A]_0/k$
   b. $1/k$
   c. $2[A]_0/k$
   d. $[A]_0/2k$
7. Which one of the following compounds is most acidic?
   a. Protonated methanol
   b. Protonated methylamine
   c. Acetic acid
   d. Methanol
8. For a compound to be aromatic, how many π electrons must be in the π cloud ?
   a. An even number of pairs
   b. An odd number
   c. An even number
   d. An odd number of pairs
9. Which one & the foliowng alkyl halides would be the most stable in water?
   a. Cyclopropenyl bromide
   b. Cyclopentadienyl bromide
   c. Cyclopropyl bromide
   d. Bromobenzene
10. What starting materials must be used in order to have a 1, 4-cyclohexadiene to be the product of a Dies Alder reaction?
    a. A conjugated diene and an alkene
    b. A conjugated dienc and an alkyne
    c. A 1,4-diene and an alkyne
    d. A 1, 2-diene and an alkyne

TWO MARKS QUESTIONS (11-30)

11. The single-bond length between carbon and the elements viz., carbon, nitrogen, oxygen and fluorine follow the order C–C > C–N > C–O > C–F. This trend is due to
    a. increase in electronegativity
    b. increase in bond polarity
    c. increase in atomic weight
    d. decrease in atomic size

12. By applying the VSEPR model on the XeF_4 molecule, which one of the following statements is true?
    a. Has four bonding pairs and a lone pair
    b. Has octahedral geometry and square planar shape
    c. Has square planar geometry and octahedral shape
    d. Has tetrahedral geometry and tetrahedral shape

13. Which one of the following statements is NOT true for borazine and benzene?
    a. They are isoelectronic
    b. Both are aromatic
    c. Both undergo addition reactions
    d. Both undergo substitution reactions

14. The action of NH_3 on S_2Cl_2 produces a thermochromic crystalline compound, whose chemical formula is
    a. S_3N_3Cl
    b. S_4N_3Cl
    c. S_2N_2
    d. S_4N_4

15. The oxidation state of Fe and S in $Na_2[Fe(CO)_4C1_2]$ and $K_2S_2O_8$, respectively are
    a. 0 and +5
    b. +2 and +7
    c. +4 and +5
    d. 0 and +4

16. The structure of $Ni(CO)_4$ is
    a. square planar
    b. trigonal pyramidal
    c. tetrahedral
    d. distorted octahedral

17. The reaction of $CuCO_3$ with acetic acid produces a blue crystalline compound with its magnetic moment (μ_{eff}) being ~1.4 B.M/Cu. The compound is
    a. $Cu(CH_3COO)_2.2H_2O$
    b. $Cu_2CO_3(CH_3COO)_2.2H_2O$
    c. $Cu(CH_3COO)_2$
    d. $Cu_2(CH_3COO)_2.2H_2O$

18. The limiting ionic conductivities of Mg^{2+} and Cl^- in H_2O at 298 K are 10.60 and 7.635 mS mol^{-1} mol respectively. The limiting molar conductivity (in mS m^2 mol^{-1}) of $MgCl_2$ in H_2O at 298 K is
    a. 18.235
    b. 25.870
    c. 28.835
    d. 60.893

19. The longest wavelength transition in the Rainier series of atomic hydrogen is
    a. 656.5 nm
    b. 6564.7 nm
    c. 15233 nm
    d. 65647 nm

20. In a liquid vapour phase boundary, a plot of ln vapour pressure against the reciprocal of temperature would yield as slope
    a. $\Delta_{vap}H/R$
    b. $-\Delta_{vap}H/R$
    c. $\Delta_{vap}H/\Delta vap\ V$
    d. $\Delta vap\ H/R^2$

21. For a first order reaction, $A \rightarrow P$, the time required to complete 80% of the reaction is
    a. ln 1.25/k
    b. ln 8/k
    c. ln 5/k
    d. ln 80/k

22. If the molar enthalpy and entropy of Fusion of water are 6.01 kJ/mol and 22.0 J/mol K, respectively, the ΔG for lie melting of ice at 10 °C is
    a. –6220 kJ/mol
    b. –214 kJ/mol
    c. –5.79 kJ/mol
    d. –0.22 kJ/mol

23. When steady state approximation is applied in enzyme kinetics, which one of the following statements is correct with regard to the concentration of the enzyme substrate complex, [ES]
    a. $d[ES]/dt = 0$

b. d[ES]/dt = constant
c. [ES] = 0
d. d[ES]/dt = infinity

24. The wavelength possessed by a cricket ball of mass 1 kg, travelling with a velocity of 40 m/s is
a. 1.66×10^{-38} m
b. 1.66×10^{-35} m
c. 2.65×10^{-32} m
d. 1.66×10^{33} m

25. Which one of the following reaction sequences will convert toluene to para-chlorobenzoic acid?
a. (i) Cl_2/light, (ii) hot $KMnO_4/H^+$
b. (i) Hot $KMnO_4/W^+$, (ii) $Cl_2/FeCl_3$
c. (i) $Cl_2/FeCl_3$, (ii) hot $KMnO_4/H^+$
d. (i) N-Chlorosuccinimide, (ii) hot $KMnO_4/H^+$

26. For 2, 3-dibronobutane, which one of the following statement is true?
a. (2S, 3S) and (2R, 3S) is a pair of diastereomers; (2R, 3R) and (2S, 3S) is a pair of enantiomers
b. (2S, 3S) and (2R, 3S) is a pair of diastereomers; (2R, 3S) and (2S, 3R) is a pair of enantiomers
c. (2R, 3R) and (2S, 3S) is pair of diastereomers; (2S, 3S) and (2R, 3S) is a pair of enantiomers
d. (2R, 3R) and (2S, 3S) is a pair of diastereomers; (2R, 3R) and (2S, 3S) is a pair of enantiomers

27. When trans-1-bromo-2-methylcyclo-hexane reacts with methoxide ion, what products are formed under S_N2 and S_N1 conditions?
a. S_N2 and S_N1 both form cis and trans-1-methoxy-2-methylcyclohexane
b. S_N2 forms cis-1-methoxy-2-methylcyclohexane, and S_N1 forms cis and trans-1-methoxy-2-methylcyclohexane
c. S_N2 forms cis-1-methoxy-2-methylcyclohexane, and S_N1 forms 1-methoxy- 1- methylcyclohexane
d. SN_2 forms cis-1-methoxy-2-methylcyclohexane, and S_N1 forms trans-1-methoxy-2-methylcyclohexane

28. What product(s) is (are) formed when HBr is eliminated from (2S, 3S)-2-bromo- 3-phenylbutane in an E2 reaction?
a. (Z)-2-phenyl-2-butene
b. (Z) and (E)-2-phenyi-2-butene
c. (E)-2-phenyl-2-butene
d. (E)-3-methyl-3-phenyl-1-butene

29. The major product that would be formed in a Diels Alder reaction between (E)-penta-1,3-diene (trans-1-methyl-1,3-butadiene) and methyl acrylate is
a. 1,2-product (art/to) with Me and CO_2Me cis to each other
b. 1,2-product (onho) with Me and CO_2Me trans to each other
c. 1,3-product (meta) with Me and CO_2Me cis to each other
d. 1,3-product (meta) with Me and CO_2Me trans to each other

30. Flow many resonance structure contributors can be written for the carbocation intermediate formed when phenol undergoes electrophilic substitution in the ortho, meta, and para positions?
a. ortho:3, meta:3 and para:4
b. ortho:3, meta:3 and para:3
c. ortho:4, meta:3 and para:4
d. ortho:3, meta:4 and para:3

J: BIOCHEMISTRY

ONE MARKS QUESTIONS (1-10)

1. Which amino acid residue is most likely to be found in the interior of a water soluble globular protein?
a. Ser
b. Arg
c. Val
d. Asp

2. Of the peptide sequences given below, which one is the digestive enzyme trypsin most likely to cleave?
a. - - - - Val-Lys-Pro-Met - - - -
b. - - - - Arg-Val-Phe-Tyr - - - -
c. - - - - Trp-Asp-Gln-Pro - - - -
d. - - - - Glu-Gly-Trp-Gly - - - -

3. Which pair of amino acids will have the highest absorbance at 280 nm? (Assume equimolar concentrations)
   a. Thr & His
   b. Phe & Pro
   c. Trp & Tyr
   d. Phe & His
4. Which one of the following statements about protein secondary structure is correct?
   a. An α-helix is primarily stabilized by ionic interactions between the side chains of the amino acids
   b. β-sheets exist only in antiparallel form
   c. β-turns often contain proline
   d. An α-helix can be composed of more than one polypeptide chain
5. The enzymes where catalysis involves transfer of elections are named as
   a. Isomerases
   b. Transferases
   c. Oxidoreductases
   d. Lyases
6. Vitamin D is derived from which of the following precursors by the action of UV light?
   a. 7-Dehydrocholesterol
   b. Lanosterol
   c. Glycocholate
   d. Squalene epoxide
7. The molecular defect in familial hypercholesterolemia is due to the lack of functional
   a. VLDL receptor
   b. IDL receptor
   c. LDL receptor
   d. HDL receptor
8. Alcaptonuria is an inborn error in metabolism, transmitted as a single recessive Mendelian trait where the enzyme that is absent is
   a. Phenylalanine hydroxylase
   b. Ornithine decarboxylase
   c. Adenosine deaminase
   d. Homogentisate oxidase
9. The prokaryotic RNA polymerase holoenzyme has the subunit structure
   a. $\alpha_2\beta\beta'\sigma$
   b. $\alpha_2\beta_2\sigma$
   c. $\alpha_2\beta_2$
   d. $\alpha_2\beta\beta'$
10. Given below are four enzymatic reactions involved in glycolysis. In which of the following steps is ATP generated?
    a. 2-Phosphoglyceraw to Phosphoenol pyruvate
    b. Glucose-6-phosphate to Fructose-6-phosphate
    c. Phosphoenol pyruvate to Pyruvate
    d. Glyceraldehyde-3-phosphate to 1,3-bisphosphoglycerate

TWO MARKS QUESTIONS (11-30)

11. The correct decreasing order of permeability through a lipid bilayer of the molecules/ions Isoleucine, Tyrosine, O_2 and Na^+ is
    a. $O_2 > Na^+ >$ Isoleucine > Tyrosine
    b. $O_2 >$ Isoleucine > Tyrosine > Na^+
    c. Isoleucine > Tyrosine > $O_2 > Na^+$
    d. Isoleucine > Tyrosine > $Na^+ > O_2$
12. For the reaction

    Fructose-6-phosphate + P_i □ Fructose 1, 6-bisphosphate + H_2O

    the equilibrium constant at pH 7 and 300 K is 10^{-3}. The standard free energy change (in kcal per mole) for the reactions approximately equal to: (R = 2 cal deg^{-1} mol–1)
    a. +4.1
    b. –4.1
    c. + 2.2
    d. –2.2
13. Of the four statements given below only one is correct. Pick the correct one
    a. Progesterone is synthesized in the corpus luteum and it prepares the uterine lining for egg implantation and maintenance of pregnancy
    b. Progesterone is synthesized in the ovary and is responsible for female secondary sex characters

c. Progesterone is synthesized in the adrenal cortex and promotes gluconeogenesis and glycogen formation

d. Progesterone is synthesized in testis and is responsible for male secondary sex characters

14. Which one of the following statements about lipoproteins is true?

a. Molecular mass of lipoproteins is directly proportional to their density

b. The percent protein content in lipoproteins increases with molecular mass

c. Density of a lipoprotein decreases with increase in protein content

d. Molecular mass of lipoproteins is inversely proportional to their density

15. Choose the correct common sequence motif of Zn finger proteins from the choices given below. X stands for any amino acid

a. X_3-Cys-X_{2-4}-Cys-X_{1-2}-His-X_{3-4}-His-X_4

b. X_3-Cys-Cys-X_{2-4}-His-His-X_4

c. X_3-Cys-Cys-His-His-X_4

d. X_3-Cys-X_{2-4}-His-X_{1-2}-His-X_{3-4}-Cys-X_4

16. Pick the correct statement

a. In O-linked glycosylation sugars are attached to the protein via O-glycosidic bonds to the carboxyl groups of Asp and Glu

b. In O-linked glycosylation, performed oligosaccharides are attached to the relevant protein

c. In O-linked glycosylation, N-acelylgalactosamine is added via O-glycosdic bonds to the OH groups of Ser and Thr after which other sugars are added sequentially

d. O-linked glycosylation is inhibited by the passage of the newly synthesized protein through the Golgi complex

17. Which of the following statements is NOT true with regard to photosynthesis?

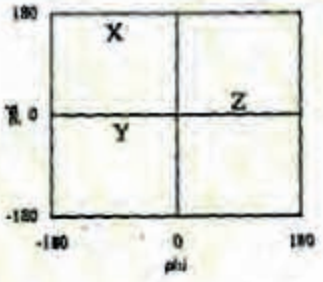
a. The dark reactions use NADPH and ATP to drive the synthesis of carbohydrate from CO_2 and H_2O

b. The principal photoreceptor, chlorophyll is derived biosynthetically from protoporphyrin IX

c. Photosystem II (PS II) generates a strong reductant capable of reducing $NADP^+$

d. The components involved in the electron transport from H_2O to NAUPH are largely organized into three thylakoid membrane-bound particles

18. In the adjoining Ramachandran diagram, which type of secondary structure does the regions marked X, Y and Z represent?



a. X : right handed α-helix
Y : left handed α-helix
Z : β-sheet

b. X : left handed α-helix
Y: right handed α-helix
Z : β-sheet

c. X : right handed α-helix
Y: left handed α-helix
Z : β-sheet

d. X : β-sheet
Y: left handed α-helix
Z : right handed α-helix

19. The RNase A catalyzed hydrolysis of tRNA follows a two-step process with the intermediate formation of a 2', 3'-cyclic nucleotide, In these steps

a. His 12 acts as a general base in the transphosphorylation step abstracting a proton from an RNA 2'-OH group

b. His 119 acts as a general base in the transphosphorylation step abstracting a proton from all RNA 2'-OH group

c. The 2', 3-cyclic intermediate is hydrolyzed when His 12 acts as a general base

d. His 12 acting as a general acid in the transphosphorylation step promotes bond scission by protonating the leaving group

20. Shown below is the autoradiogram of an electrophoresis gel obtained during the sequencing a single stranded DNA by Sanger's method.

The base sequence of the DNA is

a. 3'-AGTCGAGCT-5'
b. 5'-TCAGCTCGK-3'
c. 3'-TCAGCTCGA-5'
d. 5'-AGTCGAGCT-3'

21. In an antigen anti body interaction, in the zone of equivalence, the isolated antigen IgG complex was found to be in the molar ratio of antigen: IgG, 2 : 1. The number of epitope(s) present on the antigen is

a. 1
b. 2
c. 4
d. 10

22. Class switching occurs in a B cell to produce IgG from IgM. Which one of the following conclusions is correct ?

a. Specificity of the IgG and IgM are different from each other
b. Specificity of the IgG is the same as IgM
c. The molecular weight of the new antibody is the same as the old one
d. The valency of the new antibody is the same as the old one

23. Two types of IgMs are produced by the same B cell, one that is secreted and the other that can bind to the membrane. Which one of the following statements is correct'?

a. These two antibodies are coded by altogether two different genes
b. The membrane anchor residues are added to the protein by post-translational modification
c. The two different proteins associate, one of which provides the membrane anchor
d. The proteins are produced by alternate splicing of its primary transcript

24. During DNA replication, short RNA primers are synthesized which are then extended by DNA polymerase. These RNA primers in prokaryotes are removed by the enzyme

a. Primase
b. RNase H
c. DNA polymerase I
d. DNA polymerase III

25. A new antibiotic was discovered which strongly inhibited mRNA precursor transcripts and s_nRNA transcripts. This antibiotic was predicted to be an inhibitor of

a. RNA polymerase I
b. RNA polymerase II
c. RNA polymerase III
d. Helicase

26. Suppose [4-^{14}C] oxaloacetate is fed to mitochondria. After one turn of the Citric Acid Cycle, which carbon(s) of succinate would he labelled?

a. None
b. Equally distributed between C-1 and C-4
c. Equally distributed between C-2 and C-3
d. C-4

27. Two restriction enzymes A and B have eight and four base pairs as their recognition sites respectively. The ratio of the number of fragments that they will generate on restriction digestion of a genomic DNA of E. coli is approximately

a. 4:8
b. 8:4
c. 1:64
d. 1:256

28. A solution of tryptophan has an absorbance a 280 nm of 0.54 in a 0.5 cm path length cuvette. Given the absorbance coefficient (ε) for trypophan is 5.4×10^3 M^{-1} cm^{-1} , the concentration of the solution is

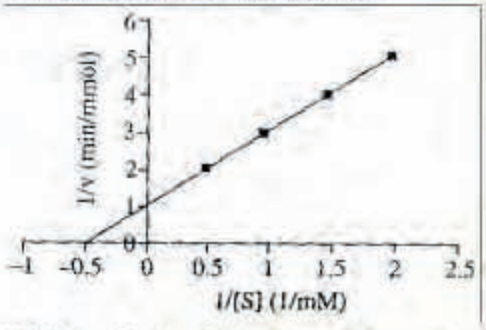
a. 0.2 mM
b. 20 µM
c. 1×10^{-3} M
d. 0.1 mM

29. From the data given below, idcnily the protein pair that would (a) give the least mobility band on a sodium dodecyl sulphate polyacrylamide gel electrophoresis (SOS-PAGE) experiment and (b) elute last on an anion exchange e.g., DEAE column respectively

Protein	pI	Subunit M.W.	Native M.W.
A	9	10,000	20,000
B	8	35,000	35,000
C	6	15,000	90,000
D	5	20,000	80,000
E	3	30,000	30,000

a. (a) Protein C (b) Protein A
b. (a) Protein A (b) Protein E
c. (a) Protein B (b) Protein E
d. (a) Protein B (b) Protein A

30. The graph shows a Lineweaver-Burke plot for an enzyme catalyzed reaction



Which of the following statements is correct?

a. The V_{max} is 5 mmol/min and with competitive inhibition V_{max} remains unchanged
b. K_m is 2 mmol/min and with competitive inhibition both K_m and V_{max} decrease
c. K_m is 0.5 mM and with competitive inhibition V_{max} increases but K_m remains unchanged
d. K_m is 2.0 mM and with competitive inhibition K_m increases but V_{max} remains unchanged

K : BIOTECHNOLOGY

ONE MARKS QUESTIONS (1-10)

1. Which of the following processes require energy?
   a. ligation
   b. transformation
   c. restriction digestion
   d. hybridization
2. To be a cloning vector, a plasmid does NOT require
   a. an origin of replication
   b. an antibiotic resistance marker
   c. a restriction site
   d. to have a high copy number
3. In animal cell cultures, the addition of serum to media is essential for providing
   a. amino acids for protein synthesis
   b. nucleotides for DNA synthesis
   c. growth factors
   d. all of the above
4. In the course of cell cycle, the level of the protein cyclin abruptly falls during
   a. G_1 phase
   b. S phase
   c. G_2 phase
   d. M phase
5. Enzyme papain is used with success to
   a. increase meat production
   b. leaven bread
   c. ripen papaya fruit
   d. tenderize meat
6. Microbes bring about biological transformation of xenobiotic compounds by
   a. degradation
   b. conjugation
   c. detoxification
   d. all of the above
7. Which one of the following reactions is used for the purpose of recycling enzymes in bioprocesses?
   a. Isomerization
   b. Immobilization
   c. Phosphorylation
   d. Polymerization

8. The separation principle of dialysis used in the recovery of fermentation products is
   a. diffusion
   b. charge
   c. turbulence
   d. solubility
9. Identify the statement that is NOT correct
   a. Penicillin fermentation is an aerobic process
   b. Penicillin biosynthesis is affected by phosphate concentration
   c. Lysine stimulates penicillin synthesis
   d. Penicillin production shows a distinct catabolite repression by glucose
10. For protoplast fusion to be successful in plant cells
   a. fusion agents other than polyethylene glycol should be used
   b. cell wall o the two strains of cells should not be damaged
   c. DNA between the two cells should be compatible
   d. osmolarity of the medium is not important

TWO MARKS QUESTIONS (11-30)

11. A batch culture fermentation was being conducted with Streptomyces rimosus. Analysis of samples collected indicated doubling of cell number per unit time. Your inference would be that the culture is in the
   a. lag phase
   b. log phase
   c. stationary phase
   d. death phase
12. An animal cell line was transected with DNA extracted from a tumorous tissue. Which one of the following will be diagnostic or its tumorous transformation?
   a. altered cell shape
   b. contact inhibition
   c. anchorage-independent cell division
   d. increased duration of cell cycle
13. In order to identify the person who committed a crime, forensic experts will need to extract DNA from the tissue sample collected at the crime scene, and conduct one of the following procedures for DNA finger-printing analysis
   a. cut the DNA and hybridize with specific micro-satellite probes
   b. cut the DNA and subclone the fragments
   c. determine the sequence of the subclones
   d. (b) followed by (c)

Common Data Questions

Common Data for Questions 14 to 15:

Dr. Singh isolated a new 5-kb gene and wants lo determine its sequence using a sequencer that can sequence upto 500 buses in a single reaction. Therefore, she decides to create subclones having suitable-size inserted for sequencing.

14. Which one of the following will be the most appropriate restriction enzyme for this subcloning?
   a. 8-bp cutter
   b. 6-bp cutter
   c. 3-bp cutter
   d. 5-bp cutter
15. To generate the minimum number of subclones needed for sequencing, what should be the size of the insert in these subclones?
   a. 1000 bp
   b. 500 bp
   c. 250 bp
   d. 2000 bp
16. All of the following are true about DNA microarray technology except
   a. an electron microscope is used to gather data from the arrays
   b. the technology is used to assess transcription from multiple genes simultaneously
   c. the technology works best for organisms whose genome is completely sequenced
   d. the technology is derived from computer chip manufacture

17. You have cut the genome of a double-stranded viral genome with a restriction endonuclease and electrophoresed the products on an agarose gel. You observe only one band on the gel, equivalent to the size of the genome. This is because
    a. there are no introns in the genome
    b. the introns contain the recognition sites and have already been spliced out
    c. all of restriction fragments are too small to detect
    d. restriction endonucleases do not cut RNA, and this virus has an RNA genome

18. The restriction endonuclease Eco52I recognizes the sequence C/GGCGG and cuts between the first C and the first G, indicated by the slash. DNA cut by which of the following enzymes (given with their recognition sequences and cut sites) could be cloned into a plasmid digested with Eco52I?
    a. EcoRI (G/AATTC)
    b. XmaIII (C/GGCGG)
    c. SmaI (CCC/GGG)
    d. SacII (CCGC/GG)

19. If bacterial cells are transformed with a mixture of linear and circular molecules resulting from a ligation reaction designed to produce a recombinant molecule
    a. no recombinant molecule will ever be detected
    b. both linear and circular molecules will replicate equally well
    c. none of the plasmids will express the antibiotic resistance gene located on the plasmid
    d. the circular molecules will be amplified by the cells

20. What is the primary purpose of neomycin in creating mice with knock-outs in gene X?
    a. neomycin selects for the survival of embryonic stem cells (ES) that have incorporated the mutant gene X anywhere in the genome
    b. neomycin selects for the survival of ES cell that have incorporated the mutant gene in the place of the wild-type gene
    c. neomycin prevents Candida infection during ES cell culture that does not have gene X
    d. neomycin makes the gene X knock-out mice resistant to Candida infection

21. Match the industrial application of the following enzymes

List I
A. Penicillinase
B. Pectinase
C. Trypsin
D. Rennin

List II
1. Pharmaceutical
2. Leather
3. Wine
4. Dairy

	A	B	C	D
a.	4	3	1	2
b.	1	3	2	4
c.	1	2	3	4
d.	4	2	3	1

22. To optimize the bioreactor system, which one of tie following conditions is east important for anaerobic fermentation?
    a. culture agitation to maintain oxygen supply
    b. restriction of the entry of contaminating organisms
    c. control of parameters like pH and temperature
    d. maintenance of constant culture volume

23. Match the activity spectrum of the Following antibiotics

List I
A. Actinomycin D
B. Daunorubicin
C. Rifamycin
D. Griseofulvin

List II
1. Antifungal
2. Antituberculosis
3. Antitumor
4. Antiprotosoal

	A	B	C	D

a. 3 4 2 1
b. 3 1 4 2
c. 3 1 2 4
d. 2 1 4 3

24. Autoclaves are routinely used in laboratories for sterilization. It acts by
a. disrupting cell membranes
b. denaturing proteins
c. changing physically membrane lipids
d. all of the above

25. All of the following are produced by animal cells in culture and help the cells adhere to the culture dish except
a. gycoproteins
b. collagen
c. phospholipase A
d. hyaluronic acid

26. The following are useful to introduce genes into crop plains except
a. Ti plasmid
b. particle gun
c. breeding
d. auxin

27. Power number, also called Newton's number, is defined as a dimensionless parameter relating to
a. turbulent flow
b. the relative velocity between the nutrient solution and individual cells
c. energy required by the stirred reactors
d. none of the above

28. The selection of the appropriate purification method in the product recovery after microbial fermentation depends on the
a. nature and the stability of the end products produced
b. type of the side products present
c. degree of purification required
d. all of the above

29. Which of the following techniques is NOT ideal for immobilizing cell-free enzymes?
a. physical entrapment by encapsulation
b. covalent chemical bonding to surface carriers
c. physical bonding by flocculation
d. covalent chemical bonding by cross-linking the precipitate

30. The full-length coding sequence of an eukaryotic gene was expressed in bacteria and the protein was purified. However, in the functional assay, no activity was detected for the purified protein. The reason could be
a. the host bacteria produced an enzyme that inhibited the activity of the expressed eukaryotic protein
b. the purified protein was contaminated with bacteria
c. the host bacteria did not produce the essential co-factors
d. no post-translational modification on the protein expressed in bacteria

L : BOTANY

ONE MARKS QUESTIONS (1-10)

1. The development of embryos horn the cells of nucellus or integument is known as
a. Apogamy
b. Apospory
c. Parthenogenesis
d. Adventive embryony

2. Synthesis of DNA polymerase occurs at
a. G1
b. S
c. G2
d. M

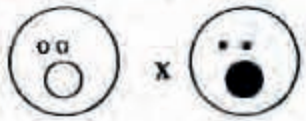
3. When the gynoecium is present in the top most position of thalamus the flower is known as
a. Epigynous
b. Hypogynous
c. Perigynous
d. Inferior

4. Synthetic seed is produced by encapsulating somatic embryo with
a. Sodium alginate
b. Sodium nitrate
c. Sodium acetate
d. Sodium sulphate

5. Which of the following acts as a precursor of IAA biosynthesis?
   a. Tryptophan
   b. Methionine
   c. Putrescine
   d. Geranyl geranyl pyrophosphate
6. Change from purine to pyrimidine or pyrimidine to purine is
   a. Transition
   b. Transversion
   c. Frame shift
   d. Reversion
7. Genetic engineering for male sterility utilizes the gene
   a. aroA
   b. Barnase
   c. Bt
   d. Crtl
8. Which plant part of Crocus sativus yields saffron, a food colorant?
   a. Root
   b. Leaf
   c. Stigma
   d. Seed
9. A form of disease reaction with complete resistance to some races and complete susceptibility to other races is termed as
   a. Vertical resistance
   b. Polygenic resistance
   c. Horizontal resistance
   d. Partial resistance
10. Which of the following is a logical sequence of carbon cycle?
    a. Producer → Decomposer → Consumer
    b. Consumer → Producer → Decomposer
    c. Producer → Consumer → Decomposer
    d. Decomposer → Consume → Producer

TWO MARKS QUESTIONS (11-30)

11. A transverse section of monocot stem can be distinguished from that of a dicot stem by observing the
    a. Scattered and collateral closed vascular bundle
    b. Cortex and collenchymatous hypodermis
    c. Collateral open vascular bundle with medullary rays
    d. Absence of bundle sheath and presence of pith
12. Choose the right combination for "Kranz anatomy" from the following features
    A. Radially arranged parenchymatous cells around each vascular bundle
    B. Vascular bundle is enclosed by loosely packed spongy mesophyll cells
    C. The leaf cells possess one type of chloroplast
    D. Mesophyll cells differentiated into palisade and spongy parenchyma
    a. A, C
    b. A, B
    c. B, C
    d. B, D
13. In the given diagram, fusions of two protoplasts along with the products are presented. Identify which one is the cybrid

Parental Protoplasts:  Products:

a. 

b. 

c. 

d.

14. The storage protein found in wheat and pea are
    a. Glutenin and Patatin
    b. Glutenin and Vicilin
    c. Zein and Vicilin
    d. Vicilin and Patatin

15. Two cells X and Y are adjacent with each other. The cell X has an osmotic potential of –20 bars and turgor pressure of 12 bars. Cell Y has an osmotic potential of – 16 bars and turgor pressure of 6 bars. In which direction water will move?
    a. From cell X to cell Y
    b. From cell Y to cell X
    c. There will be no movement of water
    d. Water call move either from cell X to cell Y or from Y to X

16. In photorespiration, glycolate and glyoxylate are produced sequentially in the following organelles. Choose the correct sequence
    a. Chloroplast and Mitochondria
    b. Chloroplast and Peroxisome
    c. Peroxisome and Mitochondria
    d. Peroxisome and Chloroplast

17. $NH_4^+ \xrightarrow{\text{Nitrosomonas}} I \xrightarrow{\text{Nitrobacter}} II$

    In the given reaction sequence, which of the following statement is correct?
    a. I is NO_2, II is N_2O
    b. I is NO_3, II is NO_2
    c. I is NO_2, II is NO_3
    d. I is N_2O, II is NO_2

18. $NADH \rightarrow QCytb \xrightarrow{\oplus} Cyt_1 \rightarrow Cytc \rightarrow Cyt(a+a_3) \xrightarrow{\oplus} O_2$

    Sequence of electron transfer in oxidative phosphorylation is given above. Which of the following pair of inhibitors block the electron transfer in the steps marked with
    a. Rotenone and CO
    b. Antimycin-A and CO
    c. Antimycin-A and DCMU
    d. DCMU and CO

19. Purple leaves (Pl) dominant to green leaves (pl) kind pigmy plant (pg) recessive to normal plant size (Pg) are two genes on chromosomes number 6 of maize. Hybrids from the cross Plpg / Plpg X plPg / plPg where test crossed and the following progenies were obtained in the F2

    419 : Normal size plants with green leaves

    381 : Pigmy plants with purple leaves

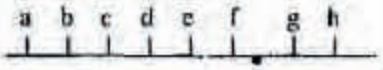
    79 : Normal size plants with purple leaves

    121 : Pigmy plants with green leaves

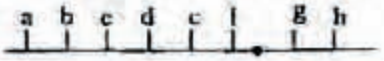
    What would be the map distance between Pl and pg?
    a. 10 cM
    b. 15 cM
    c. 20 cM
    d. 30 cM

20. Which of the following pairs of DNA sequences could qualify as terminal parts of a bacterial IS elements?
    a. 5'-GAATCGCA-3' and 5'-ACGCCTAAG-3'
    b. 5'-GAATCCGCA-3' and 5'-CTTAGGCGT-3'
    c. 5'-GAATCCGCA-3' and 5'-GAATCCGCA-3'
    d. 5'-GAATCCGCA-3' and 5-TGCGGATTC-3'

21. Assume a chromosome with the following gene sequence



    The following aberrations in this chromosome were observed



    What would be the kind of aberration ?
    a. Deletion
    b. Translocation
    c. Inversion
    d. Duplication

Q.22–25 are 'Matching" exercises. Choose the correct one from among the alternatives a, b, c and d

22. Group 1
    A. Meristem culture

B. Suspension culture
C. Protoplast culture
D. Anther culture

Group 2

1. Virus elimination
2. Homozygosity
3. Packed-cell volume
4. Embryo rescue
5. Macerozyme
6. Liposome

	A	B	C	D
a.	2	1	4	6
b.	1	3	5	2
c.	3	2	5	4
d.	5	6	2	1

23. Group 1

A. Biolistic
B. Agrobacterium
C. Electroporation
D. Microinjection

Group 2

1. Gene Pulser
2. PDS1000He
3. Micromanipulator
4. Silicon carbide
5. vir operons
6. rol C

	A	B	C	D
a.	2	5	1	3
b.	2	1	6	4
c.	5	6	2	4
d.	1	5	4	2

24. Group 1

A. Reserpine
B. Camphor
C. Pyrethrin
D. Catechin

Group 2

1. Thea sinensis
2. Taxus brevifolia
3. Rauwolfia serpentina
4. Ocimum americanum
5. Chrysanthemum cinerarifoliumn
6. Gloriosa superba

	A	B	C	D
a.	2	3	6	2
b.	4	2	6	3
c.	3	4	5	1
d.	1	6	3	5

25. Group 1

A. Early blight of potato
B. Panama disease of banana
C. Tikka disease of groundnut
D. Club root disease of cabbage

Group 2

1. Cercospora personata
2. Alternaria solani
3. Plasmodiophora brassicae
4. Fusarium oxysporum
5. Heminthosporium oryzae
6. Macrophomina phaseolina

	A	B	C	D
a.	1	3	2	4
b.	2	4	1	3
c.	4	2	5	6
d.	6	5	2	3

26. Acid rain is due to the emission of

A. Oxides of sulphur
B. Oxides of nitrogen
C. Chlorofluorocarbons
D. Carbon monoxide

Choose the right combination

a. A, B
b. B, C
c. A, C
d. B, D

27. The following statements outline the major features of a system of classification

- Monophyletic origin of angiosperm
- Dicotyledons are the primitive over monocotyledons
- Division of dicotyledonae into Lignosae and Herbaceae

Which of the following system of classifications represents above features?

a. Linnaeus
b. Bentham and Hooker
c. Engler and Prantl

d. Hutchinson

28. Following are the symptoms of a disease in wheat

- Spikelets transformed into a mass of black or olive green powdery spores
- Spores in young spikelets are covered by a delicate silvery membrane
- Alter liberation of spores, rachis of lie spikelet is left behind as a naked stalk

Identify the disease, which manifests these symptoms

a. Stem rust of wheat
b. Loose smut of wheat
c. Bunt of when
d. Ear rot of wheat

29. Which of the following pair of compounds involved in pathogenecity represents phytoalexin and toxin?

a. Ipomeamarone and Rishitin
b. Piricularin and Victorin
c. Lycomarasmine and Pisatin
d. Medicarpin and Abrin

30. There are three kinds of RNA polymerases (I, II, III) in eukaryotic cells, each specific for one class of RNA molecule

Which of the following is a correct match?

a. RNA poll I – rRNA, RNA pol II – tRNA
b. RNA pol II – mRNA, RNA pol III – rRNA
c. RNA poll I – rRNA, RNA pol II – mRNA
d. RNA pol I – tRNA, RNA pol III – rRNA

M : MICROBIOLOGY

ONE MARKS QUESTIONS (1-10)

1. Mycoplasmas are different horn other prokaryotes by

a. presence of chitin in cell walls
b. presence of murein in cell walls
c. presence of proteins in cell walls
d. absence of cell wall itself

2. Selective media facilitate growth of only one kind of organism. Saboraud's medium is used to selectively isolate

a. Coliform bacteria
b. Grain positive bacteria
c. Yeasts
d. Acid fast organisms

3. The cell walls of Gram positive bacteria contain two modified sugars, viz, N-acetylglucosamine (NAG) and N-acetylmuramic acid (NAM). They are covalently linked by

a. α-1,4-glycosidic bond
b. β-1,6-glycosidfc bond
c. α-1,6-glycosidk bond
d. β-1,4-glycosidic bond

4. The metal ion required for the enzymatic activities of nitrogenase and nitrate reductase is

a. Molybdenum
b. Iron
c. Copper
d. Zinc

5. DNA gyrase is inhibited by

a. Tetracyclin
b. Nalidixic acid
c. Aurintricarboxylic acid
d. Cephalosporin

6. Surface receptor (IgA) on the target cell is the site of binding of

a. Hepatitis B virus
b. HIV
c. Rabies
d. Influenza A, B viruses

7. In anoxygenic photosynthesis, the green and purple bacteria do not use the following one as electron source

a. H_2O
b. H_2
c. H_2S
d. S (elemental sulphur)

8. Marcophages are professional antigen-presenting cells. The protein molecule through which they present antigen in humans is:

a. Actin

b. Interleukin
c. HLA
d. CD8

9. The organism used for production of 'BT' bioinsecticide belongs to the genus
a. Borrelia
b. Bacillus
c. Bordetella
d. Blastobacter

10. The bacteriophage with a single stranded circular DNA, as genuine is
a. T4 phage
b. λ phage
c. MS2
d. ϕ x 174

TWO MARKS QUESTIONS (11-30)

11. A gram negative rod showed on EMB agar colonies with dark centre and greenish metallic sheen. The organism is
a. Salmonella
b. Shigella
c. E. coli
d. Pseudomonas

12. Two antibiotics have different sites of action in a bacterial cell. The frequency of occurrence of resistance to these antibiotics used singly are 10^{-5} and 10^{-6} respectively When the antibiotics are used in combination the frequency of occurrence of resistance to both antibiotic are
a. 10^{-5}
b. 10^{-6}
c. 10^{-30}
d. 10^{-11}

13. Species of penicillium, streptomyces and bacteria have been sources of the following group of important biomedical and industrial product(s)
a. Methane and other gases
b. Steroids
c. Antibiotics
d. Insulin, interferon

14. In the normal human being the concentration(s) of various antibodies in the serum is (are) in the order
a. IgM > IgA > IgG > IgE
b. IgG > IgA > IgM > IgE
c. IgE > IgG > IgM > IgA
d. IgA > IgM > IgE > IgG

15. The milk Streptococci produce acetoin that gets spontaneously oxidised yielding a Favoring agent (responsible for aroma of butter) is
a. Acetone
b. Acetyl CoA
c. Butyric acid
d. Diacetyl

16. Syntrophy is the phenomenon where
a. one microorganism degrades a substance and uses it
b. one microorganism degrades the substance and the other microorganism uses it
c. two or mole microorganisms cooperate to degrade a substance which neither can do alone
d. two or more organisms can independently degrade the substance but one inhibits the other from doing so

17. Association coefficient S_{AB} is given by the expression : $2N_{AB}/(N_A + N_B)$
Organism A UCACUUCUG-3' PO_4
Organism B UAUCUAAUG-3' PO_4
S_{AB} value for organisms 1 and 2 is
a. 0.25
b. 0.50
c. 0.75
d. 1.00

18. ATP synthetase is a multifunctional enzyme with subunit constitution of $\alpha_3\beta_3\gamma\delta\varepsilon$. The pair of constituent subunits taking part in nucleotide binding and catalysis are
a. $\alpha_1\beta_1$
b. $\alpha_2\beta_2$
c. $\alpha_3\beta_3$
d. $\gamma\delta$

19. The release of terminal D-ala from Park peptide during cross-linking, is catalyzed by
    a. carboxypeptidase
    b. protease
    c. aminopeptidase
    d. transpeptidase
20. Which one of the following sequences has helped in identifying Eukaryotes, Eubacteria and Archeabacterial cell types?
    a. signature sequence
    b. signal sequence
    c. Shine-Dalgarno sequence
    d. aminoacid sequence
21. In photoreactivation of UV-exposed cells the enzyme which synthesizes daughter DNA strand a 70 C and also proof-reads is
    a. Klenow fragment
    b. DNA poll I(E. coli)
    c. Pfu pol (Pyrococcus furiosus)
    d. Taq polymerase
22. Leuconostoc mesenteroides when streaked and grown on sucrose medium produces large mucoid colonies. It is due to the synthesis of dextran layer having a chemical structure of
    a. α-giu-β-fru 2 → 6 β-fru
    b. α-fru-β-glu 2 → 6 β-glu
    c. β-fru-α-glu 1 → 6 α-glu
    d. β-glu-α-fru 2 → 6 α-fru
23. Media containing spores and thermolabile constituents are sterilized by
    a. Pasteurization
    b. UV irradiation
    c. Dry heat
    d. Tyndallization
24. A highly aerobic and metabolically versatile organism used in oil-spill-clearing is
    a. Mycobacterium smegmatis
    b. Asotobacter vinelandii
    c. Pseudomonas cepacia
    d. Leuconostoc mesenteriodes
25. Penicillin and lysozyme prevent synthesis and cause lysis, respectively, of cell walls of
    a. Micrococcus lysodeikticus
    b. Escherichia coli
    c. Saccharomyces cerevisiae
    d. Methanobacterium barkeri
26. In Adansonian numerical taxonomy two organisms (a) and (h) tested positive and or negative to a battery of tests

    Number of tests positive in both (a) and (b) = 80

    Number of tests positive in (a) only = 6

    Number or tests positive in (b) only = 4

    Number of tests negative in both (a) and (b) 10

    Similarity coefficient S_J is
    a. 0.88
    b. 0.77
    c. 0.66
    d. 0.55
27. In Calvin cycle, RubisCO incorporates CO_2 into ribulose 1,5-bisphosphate (1^{st} 6 carbon compound), which rapidly splits into
    a. glyceraldehyde-3-P
    b. 2,3-phosphoglyceric acid
    c. 3-phosphoglycerate
    d. 1,3-diphospholycerate
28. A bacterial culture had an initial cell density of 10^4 cells/ml. In 6 hours the cell density reached 10^9 cells/ml. Given the formula for the number of generations,

    $n = (\log 10N_t - \log_{10}N_0) / 0.301$

    The number of generations (n) the cells have undergone is
    a. 3
    b. 10
    c. 15
    d. 20
29. Zymomonas mobilis metabolises glucose by Entner-Doudoroff pathway. In this pathway dehydratase converts 6-phosphogluconic acid into
    a. phosphogluconic acid
    b. 2-keto-6-phosphogluconic acid
    c. 2-keto-6-deoxygluconic acid
    d. 2-keto-3-deoxyphosphogluconic acid
30. When a 'pseudomonad' is wet-mounted and observed by microscopy, the motility stops after a few minutes. Motility is

restored by adding arginine solution because

a. Arginine replenishes amino acid pool
b. Arginine metabolism yields ATP
c. Arginine gets hydrolysed to citrulline and ammonia
d. Arginine metabolism leads to the formation of other amino acids

N: ZOOLOGY

ONE MARKS QUESTIONS (1-10)

1. Life appeared on earth
   a. ≅ 5000 million years ago
   b. ≅ 3500 million years ago
   c. ≅ 1000 million years ago
   d. ≅ 500 million years ago
2. Animals are classified into hierarchical groups. In which of the following, would you find the largest number of species?
   a. Genus
   b. Order
   c. Class
   d. Family
3. Human chromosome 1 to 22 are serially numbered
   a. In ascending order of their length
   b. In descending order of their length
   c. Relative position of the centromere from ends of the chromosome
   d. In order of their position in he cell
4. Microfilaments are fine protein filaments often abundant in eukaryotic cells. They are made up of the protein
   a. Actin
   b. Albumin
   c. Globin
   d. Fibrin
5. The subcellular organelle not bound by a single membrane is
   a. Golgi apparatus
   b. Lysosomes
   c. Endoplasmic reticulum
   d. Mitochondria
6. The storage carbohydrate in animal is
   a. Starch
   b. Cellulose
   c. Glycogen
   d. Glucose
7. The hormone testosterone is produced by
   a. Leydig cells
   b. Spermatocyte
   c. β cells of Pancreas
   d. Melanocytes
8. The predominant antibody in saliva is
   a. IgG
   b. IgA
   c. IgM
   d. IgD
9. Secondary consumers in ecological parlance are
   a. Organisms that are omnivores
   b. Organisms that eat only carnivores
   c. Organisms that eat only herbivores
   d. Organisms that are herbivores
10. In the fish species, where internal fertilization occurs, the parental care is provided by
    a. Both parents
    b. Neither parents
    c. Father
    d. Mother

TWO MARKS QUESTIONS (11-30)

11. Which pair of bases of nucleic acids differ horn each other having hydrogen or a methyl group in 5^{th} position?
    a. Adenine and Guanine
    b. Cytosine and Thymine
    c. Thymine and Uracil
    d. Uracil and Cytosine
12. Which is the correct statement of the following pertaining to the mass of bases present in a double stranded DNA with 50% GC content?
    a. A = T
    b. C > G

c. A > T

d. T > A

13. Nucleosomes contain a core and a linker region. The histones present in the core region and the histones present in the linker region are

a. Core (H1, H2A, H2K, H3)$_2$, Linker H4

b. Core (H2A, H2B, H3, H4)$_2$, Linker H1

c. Core (H2H, H3, H4, H1)$_2$, Linker H2A

d. Core (H4, H2A, H2B, H1)$_2$, Linker H3

14. Two species are considered phylogenetically closer because

a. there was very little difference between a protein they made

b. the base sequence in the messenger RNA they synthesized in a given time were similar

c. they made the same carbohydrate

d. the base sequence of their ribosomal KNA were very similar

15. The secretary IgA was electrophoresed on SDS-PAGE under educed and denaturing condition. The number of polypeptide bands detected on the gel is (are)

a. 2

b. 3

c. 4

d. 5

16. The Following are the primary lymphoid organs in mammals

a. Spleen and Thymus

b. Bone marrow and Thymus

c. Thymus and Lymph node

d. Spleen and Lymph node

17. Telomerase activity was monitored in the following cell types. The highest amount of telomerase activity was found in the combination of

a. Embryonic stem cells and Hematopoitic stem cells

b. Nerve cells and Muscle cells

c. Erythrocytes and Macrophages

d. Hepatocytes and Eosinophiles

18. Apicoplast is a unique organelle in malarial parasite which can be used as a specific drug target. The macromolecular transactions that take place in apicoplast are

a. DNA replication, transcription, fatly acid biosynthesis, nucleotide biosynthesis

b. DNA replication, transcription, translation, fatty acid biosynthesis

c. Translation, fatty acid biosynthesis, nucleotide biosynthesis, protein biosynthesis

d. Nucleotide biosynthesis, fatty acid biosynthesis, amino acid biosynthesis, carbohydrate biosynthesis

19. During oogenesis and spermeogenesis starting from single oocyte or single spermatocyte, the respective number or ovum anti sperm generated are

a. two ova and two sperms

b. one ovum and four sperms

c. four ova and four sperms

d. four ova and one sperm

20. A male rabbit was hyperimmunized with sheep red blood cells and produced high titer antibody (1:20,000). The plasma cells of this animal revealed hypermutation of the antibody genes. The animal was crossed with a normal female and a litter containing one male and one female offspring was obtained in F1 generation. The Fl rabbits, when four months old were bled and their serum titer for sheep red blood cells was monitored. The titers that were obtained in the F1 rabbits are

a. F1 male (1:20,000) and F1 female (0)

b. F1 male (1:10,000) and F1 female (1:10,000)

c. F1 male (0) and F1 female (1:20,000)

d. F1 male (0) and F1 female (0)

21. In order for the blood to flow from right ventricle to left atrium in mammalian heart, it must flow through

a. Right ventricle → Pulmonary arteries → Lungs → Pulmonary veins → Left atrium

b. Right ventricle → Pulmonary veins → Lungs → Pulmonary arteries → Left atrium

c. Right ventricle → Right atrium → Lungs → Pulmonary veins → Left atrium

d. Right ventricle → Systemic aorta → Lungs → Pulmonary veins → Left atrium

22. Long limbs are adapted for running. Choose the correct order for the relative length of the limbs in animals evolved for the gaits listed below
   a. Plantigrade > Digitigrade > Unguligrade
   b. Unguligrade > Digitigrade > Plantigrade
   c. Digitigrade > Unguligrade > Plantigrade
   d. Digitigrade > Plantigrade > Unguligrade

23. A man found to be suffering from a disorder linked to sex chromosome. All the sons and daughters did not suffer from the disease. This is because
   a. The man's father was a carrier of the disease trait
   b. The man's paternal grandmother was a carrier of the disease trait
   c. The man's paternal grandmother was a carrier or the disease trail
   d. The man's mother was a Carrier of the disease trait

24. The net order of primary productivity in terms of accumulation of drug organic matter per m^2 per year for various terrestrial communities is
   a. Tropical forest = Temperate forest > Boreal forest > Cultivated land
   b. Cultivated land > Boreal forest > Temperate forest > Tropical forest
   c. Temperate forest > Tropical forest > Cultivated land > Boreal forest
   d. Cultivated land > Tropical forest > Temperate forest > Boreal forest

25. When new male lions take over a pride, they often engage in infanticide. The reason attributed for the same is
   a. The females of the pride are thought to estrous by killing of suckling infants
   b. The infants interfere with hunting
   c. They hate the former males of the pride and therefore kill their infants
   d. To prove their dominance in the pride

26. The cross over frequency (Cross Over Value = COV) for a four gene loci (P Q R S) on a chromosome are

   P – Q = 30; Q – R = 25; Q – S = 15; R – S = 10 and P – R = 5

   The sequence in which they occur is
   a. PQRS or SRQP
   b. SQRP or PRQS
   c. RSPQ or QPSR
   d. PRSQ or QSRP

27. In a population the frequency of a recessive allele is 10%. The heterozygotes genotypes (Aa) frequency in he population in percent is
   a. 10 %
   b. 81 %
   c. 18 %
   d. 90 %

28. Experiments carried out have shown that Rohu and Catla, two common edible fresh water fish have the equal chance of being caught in the net. In a small lake, 100 tagged Rohu were released. Next day, a fisherman caught 10 tagged Rohu, 12 untagged Rohu and 8 Catla in his net. The fish population remaining in the lake is
   a. 120 Rohu and 80 Catla
   b. 220 Rohu and 80 Catla
   c. 198 Rohu and 72 Catla
   d. 108 Rohu and 72 Catla

29. Reverse transcriptase is
   a. RNA dependant DNA polymerase and DNA dependant DNA polymerase
   b. RNA dependant RNA polymerase and DNA dependant RNA polymerase
   c. DNA dependant DNA polymerase and DNA dependant RNA polymerase
   d. RNA dependant DNA polymerase and RNA dependant RNA polymerase

30. The two scientists who were awarded the Nobel Prize in physiology or medicine for their studies in the area of animal behaviour are
   a. B. Benaceraf and Karl von Frisch
   b. K. Lorenz and S. Tonegawa
   c. Karl von Frisch and K. Lorenz
   d. B. Benaceraf and S. Tonegawa