LIFE SCIENCES

M: CHEMISTRY (COMPULSORY)

ONE MARKS QUESTIONS (1-14)

For each question given below, four answers are provided, out of which only one is correct. Write the correct answer on the answer-book by writing a, b, c or d.

(14 × 1 = 14)

1. For a two component system of A and B at 1 atm. which forms a compound AR, the number of phases at the eutectic point and congruent point are respectively
   a. 1 and 3
   b. 3 and 1
   c. 3 and 2
   d. 2 and 3

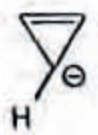
2. The precipitate of CaF_2 ($K_{sp} = 1.7 \times 10^{-10}$) is obtained when equal volumes of the following solutions are mixed
   a. 10^{-4} M Ca^{+2} + 10^{-4} M F^-
   b. 10^{-2} M Ca^{+2} + 10^{-3} M F^-
   c. 10^{-5} M Ca^{+2} + 10^{-5} M F^-
   d. 10^{-3} M Ca^{+2} + 10^{-6} M F^-

3. The correct order of second ionization potentials Cf Si, P, S and Cl is
   1. Si > P > S > Cl
   2. P > S > Cl > Si
   3. S > Cl > P > Si
   4. Cl > S > P > Si

4. Which of the following does not have the correct order of crystal field splitting parameters?
   a. $[CoF_6]^{4-} > [CoF_6]^{3-}$
   b. $[Mn(CN)_6]^{3-} > [MnF_6]^{3-}$
   c. $[CoCl_6]^{4-} > [CoCl_4]^{2-}$
   d. $[W(CO)_6] > [Cr(CO)_6]$

5. A transition element M forms the oxides MO, M_2O_3, MO_3 and M_2O_7. Which of the following statements about these oxides is true?
   a. MO is the most acidic.
   b. M_2O_3 is the one most likely to be a strong oxidising agent.
   c. MO_3 is the most basic.
   d. M_2O_7 is the one that cannot be a reducing agent.

6. Aluminium trichloride forms a dimer because
   a. it cannot be a trimer
   b. higher coordination number is achieved by aluminium
   c. aluminium belongs to third group
   d. aluminium has a higher ionization potential

7. Which of the following species will be aromatic?
   a. 
   b. 
   c. 
   d. 

8. When super cooled water suddenly freezes, the free energy of the system
   a. increases
   b. decreases

d. becomes zero

9. For a chemical reaction the proposed mechanism is $A \underset{k_2}{\overset{k_1}{\rightleftharpoons}} B, B + A \xrightarrow{k_3} C$. If B is present in only negligibly small amount at all times, the concentration of B in terms of major reagents A and C is

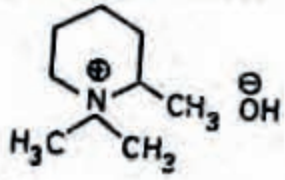
a. $\frac{k_1[A]}{k_2[A]+k_3}$

b. $\frac{k_1[A]}{k_2+k_3[A]}$

c. $k_1[A]-k_3[C]$

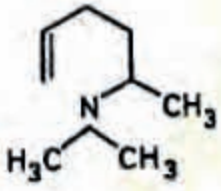
d. $k_1[A]-k_2-k_3[A]$

10. The major product formed in the elimination reaction of

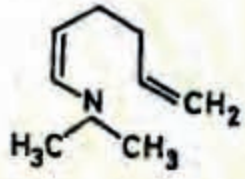


is

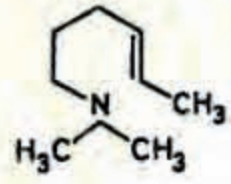
a.



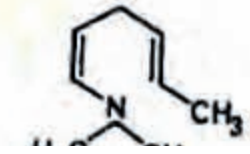
b.



c.



d.



11. The reaction of $C_6H_5C \equiv$ [illegible] ler in the presence of [illegible] H_2SO_4 leads to

a. $C_6H_5CH=CH_2$

b. $C_6H_5CHOHCH_3$

c. $C_6H_5CH_2CH_2OH$

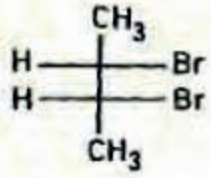
d. $C_6H_5COCH_3$

12. Which of the following compounds will exhibit optical activity?

a. 2-methyl-1-butanol

b. 2-chloro-2-methylpentane

c.



d. $CH_3CH_2CH(OH)CH_2CH_3$

13. The correct bond order of nitrogen - oxygen bond in NO, NO_2^-, NO_3^-, NO^+ is

a. $NO > NO^+ > NO_2^- > NO_3^-$

b. $NO_3^- > NO_2^- > NO > NO^+$

c. $NO^+ > NO > NO_2^- > NO_3^-$

d. $NO_2^- > NO > NO^+ > NO_3^-$

14. Out of BF_3, NF_3, SiF_4 and $SiCl_4$ the most resistant to hydrolysis is

a. BF_3

b. NF_3

c. SiF_4

d. $SiCl_4$

15. For each question given below, four answers are provided, out of which only one is correct. Write the correct answer on the answer script by writing a, b, c or d.

$(3 \times 2 = 6)$

1. In a hydrogen oxygen fuel cell the reactions at the cathode and anode are

(i) $O_2 + 4H^+ + 4e^- \rightarrow 2H_2O$ at $E^\circ = 1.229V$

(ii) $2H_2 \rightarrow 4H^+ + 4e^-$ at $E^\circ = 0.000V$

(F = 96500 coulombs). The free energy change for the cell reaction is

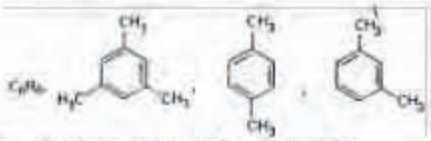
a. − 474.4 kJ

c. + 118.6 kJ
d. -118.6 kJ

2. Out of N_2O, SO_2, I_3^+ and I_3^-, the linear species are

a. N_2O and SO_2
b. I_3^+ and I_3^-
c. N_2O and I_3^-
d. SO_2 and I_3^-

16. The decreasing order of reactivity in the nitration will be followed in

a. 

b. C_6H_6, C_6H_5Br, $C_6H_5NO_2$, $C_6H_5CH_3$
c. $C_6H_5OCH_3$, $C_6H_5CH_3$, $C_6H_5NO_2$, C_6H_6
d. $C_6H_5NH_2$, $C_6H_5NHCOCH_3$, C_6H_6, $C_6H_5COCH_3$

17. Match each entry of column X choosing one each from columns Y and Z. (5 × 1 = 5)

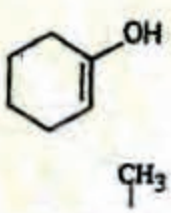
Column X

(1) Aldol condensation
(2) Cycloaddition
(3) Vinylbefizene
(4) 1-Phenyl-Propene
(5) Tautomerism

Column Y

(a) N-Bromo-succinimide
(b) HBr | peroxide
(c) Cyclohexanone
(d) Acetophenone
(e) Mixture of furan and malemide

Column Z

(i) 

(ii) $C_6H_5COCH = C\text{-}C_6H_5$
(iii) 2-phenylethyl bromide
(iv) (4+2)

18. (i) Calculate the la… of $MCl_{(s)}$ from the follo…

$M_{(s)} \rightarrow M_{(g)}$	
$M_{(g)} \rightarrow M^+_{(g)}$	95
$Cl_{2(g)} \rightarrow 2Cl_{(g)}$	54
$Cl_{(g)} \rightarrow Cl^-_{(g)}$	- 79
$M_{(s)} + 1/2\ Cl_{2(g)} \rightarrow MCl_{(s)}$	- 103

(3)

(ii) Titration of hydrazine in aqueous solution with potassium iodate gives a quantitative yield of nitrogen gas and potassium iodide. Write a balanced equation for this reaction.

(2)

19. (i) Estimate the magnitude of the CFSE of $CoCl_6^{4-}$ in cm^{-1} if the magnitude of CFSE of $CoCl_4^{2-}$ is 10800 cm^{-1}

(2)

(ii) The magnetic moments of $[Co(NH_3)_6]Cl_3$ and $K_3[FeF_6]$ are 0 and 5.92 B.M respectively. Predict the hybridization of Co and Fe in the above compounds

(2)

20. (i) An optically active halide A on dehydrobromination gave a major product of mol fonnula C_4H_8 which exists in the form of two geometrical isomers B and C. Write the structures of A, B and C

(2)

(ii) An organic compound D reacts with HCN to give E which on acid hydrolysis results in an optically active acid F of mol. formula $C_3H_6O_3$. Write the structures of P, B and F

(3)

21. (i) Sucrose when hydrolysed in an acid medium is a first order reaction. The half life period is 3.33 hrs at 27°C. What fraction of Sucrose remains unhydrolysed after 10 hrs?

(2)

(ii) One liter of a buffer solution contains 0.2 moles of acetic acid and 0.25 moles of sodium acetate. Calculate the change in pH of the solution if 0.5 ml of 1.0 M NO is added to it. The dissociation constant of acetic acid is 1.8×10^{-5}.

(3)

22. (i) An athlete consumes 180 g of glucose in a 400 meter race at 27°C. Calculate the entropy change of the athlete, only due to the consumption of glucose. Enthalpy of combustion of glucose is -673 kcal mol^{-1}, standard free energies of formation of $C_6H_{12}O_{6(s)}$, $CO_{2(g)}$ and $H_2O_{(l)}$ are -215, -94.5 and -56.7 kcal mol^{-1} respectively.

(3)

(ii) Calculate the molar conductivity of acetic acid, given the molar conductivities of

NaCl	126.46×10^{-4} S m^2 mol^{-1},
HCl	426.15×10^{-4} S m^2 mol^{-1} and
NaOAc	91.0×10^{-4} S m^2 mol^{-1}.

(2)

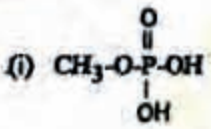
N: BIOCHEMISTRY

ONE MARKS QUESTIONS (1-6)

In each of the sub-questions, one answer among the alterative is correct. Choose the correct alternate's and write in your answer-book the letter A, B, C or D along with the corresponding sub-question number

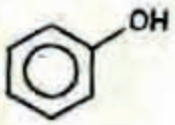
(6 × 1 = 6)

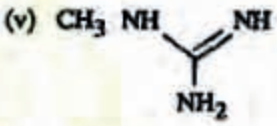
1. Which one of the following chromatographic techniques is most suitable for separating glucosamine from glucuronic acid?
   a. Affinity chromatography
   b. Molecular exclusion
   c. ion-exchange
   d. Hydrophobic chromatography
2. The dipeptide Lys-Glu on electrophoresis
   b. move towards cathode
   c. remain stationary
   d. get degraded
3. The following compounds were sep... dissolved in water to the concentration ... mol L^{-1}.

(i) 

(ii) CH_3-NH_2

(iii) CH_3-CO_2H

(iv) 

(v) 

The pHs of the solutions are in the order
   a. i < iii < iv < ii < v
   b. i < ii < iii < iv < v
   c. iii < iv < v < i < ii
4. Which one of the following is used for sequential amino terminal cleavage of peptides and proteins?
   a. Phenylglyoxal
   b. Phenylisothiocyanate
   c. 2,4 Dinitrofluorobenzene
   d. Phenyl methyl sulfonyl fluoride
5. The minimum molecular weight of a pure heme protein containing 0.426% by weight of iron (At. Wt. 56) is
   a. 13,100
   b. 60,000
   c. 26,300
   d. 100,000
6. The decapeptide Asp-Gly-Glu-Ala-Lys-Met-Leu-Arg-Phe-Val on trypsin treatment will give

c. our fragments
d. three fragments

7. Match the entries in Column A against those in Column B and write the matching pairs in your answer book. (4 × 1 = 4)

Column A

A. The amino acid with maximum number of codous (6)
B. The characteristic amino acid in papain active site
C. The amino acid precursor in heme biosynthesis
D. The amino acid contributing the most to protein absorbance at 280 nm

Column B

1. Cys
2. Trp
3. Ser
4. Gly
5. Pro

In each of the sub questions, one answer among the alternatives is correct. Choose the correct alternative and write in your answer book the letter a, b, c or d along with the corresponding question number.

(5 × 1 = 5)

8. On doubling the enzyme concentration, the kinetic parameters that change are
   a. K_m
   b. V_{max}
   c. k_{cat}
   d. both V_{max} and d_{cat}
9. An enzyme does the following in catalyzing a reaction
   a. stabilizes the substrate
   b. decreases the equilibrium constant
   c. increases the forward reaction rate
   d. hastens the approach to equilibrium
10. Two isozymes with identical turnover number have the K_m values 1 mM (for isozyme I) and 10 mM (for isozyme II). Which of the following statements is true with respect to the relative catalytic efficiencies of the isozymes?
    a. Isozyme II is superior to isozyme I
    b. isozyme us superior to isozyme II
11. Proline racemase and a[illegible]ase catalyze similar reaction[illegible] distinctly different chemical m[illegible] One uses pyridoxal phosphate [illegible] does not. The most likely reason is
    a. Proline is a helix breaker while alani[illegible] is not
    b. Proline is an imino acid while alanine is an amino acid
    c. Proline and alanine have different molecular weights
    d. Proline and alanine have different PI values
12. The coenzyme involved in the biosynthesis of thymidine from uridine is
    a. cyanocobalamine
    b. S-adenosylmethionine
    c. pantothenic acid
    d. folic acid

In each of the sub questions, one answer among the alternatives is correct. Choose the correct alternative and write in your answer book the letter a, b, c or d along with the corresponding question number.

(4 × 1 = 4)

13. The chemical bond energy mobilized during respiration is conserved in the form of
    a. glucose-6-phosphate
    b. UDP
    c. ATP
    d. pyrophosphate
14. The role of $NADP^+$ during photosynthesis is to
    a. dislodge electrons from chlorophyll
    b. accept electrons from water
    c. catalyze the combination of CO_2 and H_2O
    d. carry out photolysis
15. Death by cyanide poisoning is due to the inhibition of
    a. cytochrome P_{450}
    b. cytochrome c oxidase
    c. cytochrome b
    d. cytochrome c reductase
16. The toxin that impairs the function of G protein is
    a. [illegible]

c. saxitoxin
d. diphtheria toxin

In each of the sub questions, one answer among the alternatives is correct. Choose the correct alternative and write in your answer book the letter a, b, c or d along with the corresponding question number.

(6 × 1 = 6)

17. The length of a 3000 kb linear B DNA fragment will be approximately
    a. 10 millimeter
    b. 1 millimeter
    c. 100 millimeter
    d. 0.1 millimeter

18. The following double stranded DNA fragments have distinct Tm values

(i) G G C A T A T T A G G C
    C C G T A T A A T C C G

(ii) G C G G T A T T G G C G
     C G C C A T A A C C G C

(iii) T A T A G C G C A T T A
      A T A T C G C G T A A T

The T_m values are in the order
    a. i < ii < iii
    b. iii < ii < i
    c. ii < i < iii
    d. iii < i < ii

19. The mRNA transcribed from the DNA sequence 5'pACTTGATTC-OH 3' is
    a. 5' pTGAACTAAG-OH3'
    b. 5' pUGAACUAAG-OH3'
    c. 5' pGAATCAAGT-OH3'
    d. 5' pGAAUCAAGU-OH3'

20. During translation AUG codes for methionine at
    a. the end of a polypeptide chain
    b. the start of a polypeptide chain
    c. the start as well as the interior of a polypeptide chain
    d. none of the above

21. Following is the pictorial fragment representation of the transcription of strand A of a DNA

Which of the following assignment of the DNA strand polarities is correct?
    a. 5' _____ 3' A
       3' _____ 5' B
    b. 3' _____ 5' A
       3' _____ 5' B
    c. 3' _____ 5' A
       5' _____ 3' B
    d. 5' _____ 3' A
       5' _____ 3' B

22. In addition to oligonucleotide primers, the polymerase chain reaction (PCR) requires
    a. DNA ligase
    b. Taq polymerase
    c. Topoisomerase
    d. RNA polymerase

23. (i) List two most important factors that influence membrane fluidity (2)

    (ii) Define with one example each
    (a) facilitated transport, and
    (b) active transport. (2)

    (iii) In a globular protein most apolar amino acid side chains are buried inside while most ionizable and polar side chains are surface exposed. Why? (2)

    (iv) Reduced and urea denatured lysozyme, when dialyzed against water, regains almost full activity with all correct S-S bonds. What prevents the formation of incorrect S-S bonds? (1)

24. (i) 5×10^{-4} mole L^{-1} Tyrosine solution in a path length of 1 cm gave an absorbance of 0.7. What is the absorbance when tyrosine

(2)

(ii) Calculate the A for proton transport from cytoplasm into a lysosome, given that
cytoplasmic pH = 7.0; lysosomal pH = 5.0
$R=1.98\times10^{-3}$ Kcal/deg mol; T = 27°C

(2)

(iii) Arginase, a trimeric enzyme of MW 40,000, contains three active sites. Under optimal conditions, 5 µg of pure enzyme hydrolyzes 3.011 mol of arginine per min
(a) What is the specific activity of the enzyme?
(b) What is the turnover number per active site?

(2)

25. (i) Patients suffering from phenylketonurea are advised to avoid intake of food rich in phenylalanine. Explain the metabolic logic.

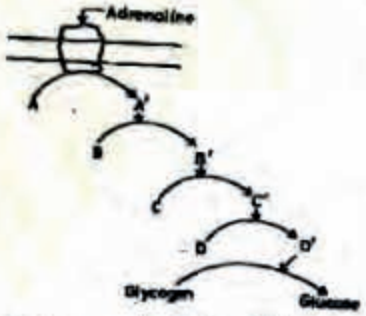
(2)

(ii) There is a decrease in ethanol production when yeast cells are transferred from anaerobic to aerobic environment. Explain the biochemical basis of the effect.

(2)

(iii) In the following scheme representing glycogen breakdown upon the stimulation of liver cells by adrenalin, identify the elements A, B, C and D, or A', B', C' and D'.

(2)



26. (i) Define each of the following: (a) Immunogen, (b) Hapten, (c)

(ii) Identify from the ... the antibody species whi...
(a) most efficient, an...
(b) least efficient ... complement fixation.

(2)

1. **Fab**
2. **(Fab)'**
3. **IgG**
4. **IgM**

(iii) Describe the logic in the use of anti-IgM antibodies to separate T and B cells.

(1)

P: LIFE SCIENCES

ONE MARKS QUESTIONS (1-7)

For each question given below four answers are provided, out of which only one is correct. Write the correct answer on the answer book by writing a, b, c or d.

(7 x 1 = 7)

1. An RNA molecule which can function as a catalyst is known as
   a. RNase
   b. RNA polymease
   c. Ribozyme
   d. Reverse transcriptase
2. Synthesis and degradation of glycogen are controlled by
   a. ATP
   b. cAMP
   c. Ca^{2+} ions
   d. G proteins
3. During meiosis centromeres divide at
   a. Anaphase II
   b. Metaphase II
   c. Anaphase I
   d. Both Anaphase I and II
4. Well-developed system of intercellular spaces which are present in the mesophyll, and which facilitate rapid gas exchange increases the efficiency of
   a. Photorespiration

d. Photosynthesis

5. The concentration of oxygen in expired air in man is
   a. 16.4%
   b. 4.1%
   c. 23.2%
   d. 79.5%

6. Hibernation in reptiles, nest-building in birds and swarming in insects follow:
   a. Diurnal rhythms
   b. Annual rhythms
   c. Circadian rhythms
   d. Semi-diurnal rhythms

7. Oxidation of succinia acid leads to the formation of
   a. Malic acid
   b. Oxalacetic acid
   c. Fumazic acid
   d. Oxalosuccinic acid

8. Match the items in Column I with those in Column II. (2)

   Column I
   A. CO_2
   B. CFC
   C. SO_2
   D. Hg

   Column II
   1. Acid rain
   2. Minamata disease
   3. Greenhouse effect
   4. Ozone layer depletion

9. Match the dinosaurs in Column I with their special features in Column II (2)

   Column I
   A. Ultrasaurus
   B. Tyrannosaurus
   C. Ornithomimus
   D. Compsognathus

   Column II
   1. The fiercest dinosaur, carnivorous, huge jaws with razor-sharp teeth, measuring 14 m from head to tail and 5.5 m in height
   2. The biggest dinosaur, plant eater, more
   3. Smallest dinosaur, a[illegible]ng and weighed hardly 3 kg
   4. Possibly the fastest dinosaur[illegible] at a speed of 80 km/hr

10. Match the items of Column I with tho[illegible] Column II. (2)

    Column I
    A. Cell cycle transition
    B. Differentiation of the eye lens in thick
    C. Dorsal lip of the blastopore
    D. Inductive interaction between ectoderm and underlying chordamesoderm

    Column II
    1. Organogenesis
    2. Cyclin-dependent kinase
    3. Secondary induction
    4. Organizer

11. Match the products from the aquatic living resources mentioned in Column I with their sources mentioned in Column II. (2)

    Column I
    A. Guanin
    B. Agar agar
    C. Chitosan
    D. Icinglass

    Column II
    1. Fish swim bladder
    2. Crustacean exoskeleton
    3. Fish scale
    4. Sea grass

12. Match the scientists mentioned in Column I with the names of their discoveries/techniques mentioned in Column II. (2)

    Column I
    A. Lederberg and Tatum
    B. Barbara Mcclintock
    C. Köhler
    D. Mullis

    Column II
    1. Polymerase chain reaction
    2. Conjugation

13. Match the items in Column I with those in Column II.

(2)

Column I

A. Genetic improvement of human race
B. Inbreeding
C. Carp induced breeding
D. Out breeding

Column II

1. Hybrid vigour
2. Hypophysation
3. Consanquineous
4. Eugenics

14. Match the aquatic animals in Column I with their osmoregulatory systems in Column II.

(2)

Column I

A. Amoeba
B. Fresh water Cray fish
C. Marine teleost
D. Elasmobranch

Column II

1. Retention of urea
2. Chloride secretary cells in gills
3. Antennal gland
4. Contractile vacuole

15. Match the items in Column I with those in Column II.

(2)

Column I

A. Tumour suppressor gene
B. Transposon
C. Oncogene
D. Cell cycle mutant

Column II

1. Tn3
2. p 53
3. cdc 28
4. src

16. Match the items in Column I with those in Column II.

(2)

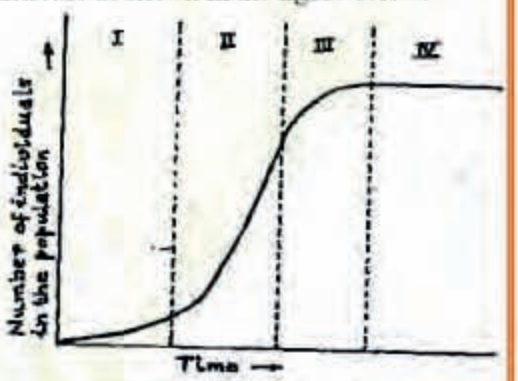
Column I

A. Multicolour FISH
D. Molecular marker

Column II

1. RAPD
2. Multiple drug resistance
3. Pulse field gel electrophoresis
4. Gene location

17. When a few individuals enter an unoccupied area, if there is no shortage of food and no predators, reproduction will occur and the number of individuals will increase as shown in the figure below:



I Population growing slowly
II Population growing exponentially
III Population growth decelerating
IV Population constant (Equilibrium condition)

Describe the factors which may limit the population growth of the particular species to maintain equilibrium.

(5)

18. Discuss the physical phenomena by which an organism may lose or gain heat from the environment it lives in.

(5)

19. Describe with schematic diagram the processes by which a hormone such as adrenaline and a steroid hormone such as progesterone affect their respective target cells

(5)

20. Show with schematic diagram the possible types of double crossovers (two-, three- (two types) and four-strand) between the two flanking markers (loci a and b, centromere located outside of the markers) and the results of each (in terms of recombination between flanking markers) to prove that the recombination fraction

(5)

21. Mention the basic events in a gene cloning experiment in Escherichia coli with suitable diagram. (5)

Q: MICROBIOLOGY

ONE MARKS QUESTIONS (1-20)

In sub-questions 1 to 20, one answer amongst the alternatives given is Correct. Choose the correct answer and write in your answer book the letter (a, b, c or d) along with the corresponding sub-question number.

(20 × 1 = 20)

1. Which of the following kingdoms is characterized by members that are eucaryotic and mostly all unicellular?
   a. Monera
   b. Protista
   c. Plantae
   d. Animalia
2. The resolution d of a microscope is given by the following equation, where λ is the wavelength of light used and n sin θ is the numerical aperture.
   a. $d = 0.5\lambda/n \sin\theta$
   b. $d = \lambda/2n \sin\theta$
   c. $d = 2\lambda/n \sin\theta$
   d. $d = n \sin\theta$
3. The endospore forming Gram-positive rods and cocci include the genera
   a. Bacillus and Clostridium
   b. Staphylococcus and Streptococcus
   c. Corynebacterium and Brevibacterium
   d. Pseudomonas and Brucella
4. The nucleic acid base sequence most widely used in phylogenetic studies of bacteria is
   a. messenger RNA
   b. transfer RNA
   c. 16 S ribosomal KNA
   d. 23 S ribosomal RNA
5. If the frequency of occurrence of against streptomycin is [illegible] against rifampicin is 10^{-5}, the [illegible] occurrence of resistance against antibiotics when used in combination be
   a. 10^{-5}
   b. 10^{-6}
   c. 10^{-11}
   d. 10^{-30}
6. The transfer of genes from one bacterium to another through bacteriophages is called
   a. Transformation
   b. Translocation
   c. Transfection
   d. Transduction
7. An Hfr strain
   a. transfers only a few genes at a time
   b. possesses the F' pilus
   c. transfers a large number of genes in a linear cycle
   d. mates the F' cells only
8. The causative organism for gas gangrene is
   a. Yersinia pestis
   b. Bordetella pertussis
   c. Treponema pallidum
   d. Clostridium perfringens
9. The DNA intercalating antibiotic is
   a. mitomycin C
   b. actinomycin D
   c. puromycin
   d. polymyxin B
10. The spore produced during sexual reproduction of some fungi is
    a. sporangiospore
    b. arthrospore
    c. blastospore
    d. ascospore
11. Class I MHC antigens are present on
    a. all cells of the body
    b. only on cells of the immune system
    c. only on leukocytes
    d. only on skin cells
12. The diversity encountered in mice with λ light chain containing antibody is far less that that of κ containing antibody because

b. V_λ has far less somatic mutations than V_κ
c. V_λ associates far less readily with heavy chain compared to V_κ
d. V_λ suppresses V_κ diversity

13. The primary function of interleukin-2 (IL-2) is
a. proliferation of B cells
b. proliferation of T cells
c. differentiation of B cells
d. activation of macrophages

14. Which of the following statements about Escherichla coil lex A protein is not correct?
a. It is cleaved by rec BCD complex.
b. It represses the synthesis of rec A protein.
c. It is involved in the SOS response to DNA damage
d. It represses the synthesis of more than IS different proteins

15. Which of the following statements about Ara C protein encoded by am C gene of arabinose operon is correct?
a. It regulates the synthesis of arabinose catabolizing enzymes
b. Ii binds specifically to DNA only when it is bound to arabinose
c. It binds to operator (O_1) and shuts off its own synthesis
d. In the presence of cAMP, the Ara C-arabinose complex binds to O_1 and to a region of DNA (ara I) adjacent to the promoter for the structural genes

16. A mutant is isolated from a wild type culture which loses its ability to grow on lactose, arabinose, galactose and several other sugars. The cAMP level in this mutant is found to be normal. What kind of mutation might give these results?
a. defect in catabolite activator protein
b. defect in lac operator
c. defect in structural genes of ara operon
d. defect in gal promoter

17. The water-soluble pigments phycoerythrin and phycocyanin, are found in
a. green algae
b. brown algae
d. red algae

18. The Ames test is employed t… chemical is
a. therapeutic
b. carcinogenic
c. antigenic
d. teratogenic

19. The association between flagellated protozoa living in the gut of termites is an example of
a. Commensalism
b. Parasitism
c. Mutualisin
d. Opportunistic association

20. Ergotism is caused by ergot alkaloids produced by the fungus
a. Aspergillus flavus
b. Amanita verna
c. Rhizoctonia spp
d. Claviceps purpurea

21. Match the scientists in Column A with their contribution listed in Column B. (5×1 = 5)

Column A

(i) Edelman
(ii) Kabat
(iii) Medawar
(iv) Chakrabarty
(v) Monod

Column B

(A) Gene synthesis
(B) Antibody structure
(C) Patenting of first bacterial life form
(D) Immunotolerance
(E) Hypervariable region of immunoglobulin
(F) Discovery of γ-globulin
(G) Concept of operon

22. (a) What are the distinguishing features of retrovirus and paramyxovirus? (3)
(b) Describe briefly the strategies they employ to replicate their genomes. (2)

23. (a) What are the major differences

(2)

(b) Define the terms plasmid, cosmid and transposon.

(3)

24. (a) Define growth rate, growth yield and synchronous growth as they apply to a growing microbial culture.

(3)

(b) Calculate the generation time in hours of a bacterial culture which increases from initial population of 10^2 cells to 10^7 cells in 20 hours.

(2)

25. (a) Differentiate between bactericidal and bacteriostatic agents.

(2)

(b) Define phenol coefficient and find its value for the disinfectant from the following observations made under standard conditions of testing (+ indicates growth, - indicates no growth)

(3)

		Growth of *Salmonella typhi* in subculture tubes after		
	Dilution	5 min	10 min	15 min
Disinfectant	1:100	-	-	-
	1:125	+	-	-
	1:150	+	-	-
	1:175	+	-	-
	1:200	+	+	+
Phenol	1:90	+	-	-
	1:100	+	+	+

26. Obligate anaerobes such as Clostridium pasteurinum ferment glucose to butyrate under reduced environments. They use EMP pathway for conversion of glucose to pyruvate. However, they do not use pyruvate dehydrogenase enzyme system for conversion of pyruvate to acetyl CoA; instead they employ pyruvate ferredoxin oxido-reductase enzyme system which results in formation of reduced ferredoxin. Reduced ferredoxin in turn transfers its electrons to H^+ in the presence of hydrogenase to evolve H_2 gas. Two moles of acetyl CoA subsequently produce one mole of butyrate with the input of 2 moles of NADH and the output of 1 mole of ATP.

ferredoxin oxido-reductas… …em over pyruvate dehydroge… system?

[Given:

E_o' (NAD$^+$ / NADH) = −0.32 volts

E_o' (fd / fd.H_2) = −0.41 volts

E_o' (2 H^+ / H_2) = −0.42 volts

fd and fd.H_2 represents the oxidized and reduced forms of ferredoxin respectively.]

R : PHARMACY

ONE MARKS QUESTIONS (1-13)

For each question given below four answers are provided, out of which only one is corrects Write the correct answer on the by writing A, B, C or ii against the corresponding sub-question number in the answer book

(13 × 1 = 13)

1. CLONIDINE HYDROCHLORIDE -IP is
   a. monoamine oxidase inhibitor which contains an imidazoline ring system
   b. arterial and Venous Vasodilator which contains imidazoline ring system
   c. monoamine oxidase inhibitor which contains Pyrimidine ring system
   d. monoamine oxidase inhibitor which contains Phthalazine ring system
2. Borntrager's test is performed for identification of
   a. Digitoxin
   b. Reserpine
   c. Digoxin
   d. Dianthrone of rhein
3. The electrode system employed in Potentiometric titrations of acids by non-aqueous method in basic solvents is
   a. Glass-Calomel electrodes
   b. Antimony-Glass electrodes
   c. Glass-Antimony electrodes
   d. Antimony-Calomel electrodes
4. The drug NALAXONE
   a. produces morphine like activity
   b. produces respiratory depression

d. precipitates withdrawal symptoms in morphine addicts

5. Phenyl alanine, ornithine and methionine are involved in the biogenesis of
   a. LYSERGIC ACID
   b. RESERPINE
   c. *l*-HYOSCYAMINE
   d. PAPAVERINE

6. The area under the serum concentration time-curve represents the
   a. biologic half life of the drug
   b. amount of drug that is cleared by the kidneys
   c. amount of drug absorbed
   d. amount of drug excreted in the urine

7. An interference filter consists of
   a. an iron plate coated with selenium
   b. a layer of silver deposited on glass coated with MgF_2
   c. a tungsten plate coated with silver oxide
   d. a solid sheet of glass coloured by pigment

8. Which of the following is the first process that must occur before a drug can become available for absorption from a tablet dosage form?
   a. dissolution of the drug in the G.I. fluids
   b. dissolution of the drug in the epithelium
   c. ionisation of the drug
   d. disintegration of the tablet

9. PROPRANOLOL
   a. reduces myocardial oxygen consumption
   b. Beta - 1 receptor selective blocker
   c. has intrinsic sympathomimetic activity
   d. is a hypotensive agent in patients with normal blood pressure

10. 2 - bis (2 chloroethyl) amino per hydro 1, 3, 2 oxazaphosphorinane is an
    a. anti-metabolite
    b. alkylating agent
    c. anti-tubercular agent
    d. anti-arrhythmic drug

11. A moiety of a molecule responsible for
    a. auxochrome
    b. catalyst
    c. chromophore
    d. elicitor

12. Chlorodiazepoxide is synthesised from
    a. p- Chloroaniline and Benzyl chloride
    b. p- Chloroaniline and Benzoyl chloride
    c. p- Chloroaniline and Benzidine
    d. p- nitroaniline and Benzyl chloride

13. Tablets are placed into a coating chamber and hot air is introduced through the bottom of the chamber. Coating solution is applied through an atomizing nozzle from the upper end of the chamber - This technique is called
    a. sealing before sugar coating
    b. coating by air suspension
    c. spray-pan coating
    d. chamber coating

14. In the following three questions match each of the items 1, 2, 3 and 4 on the left, with an appropriate item on the right and indicate the answer as for example, 6-H.

(3 × 4 = 12)

1. Match the following terms with the Phytoconstituents mentioned below.
   1 OPIUM
   2 ERGOMETRINE
   3 SCOPOLAMINE
   4 GINSENOSIDES
   A Tropane alkaloid
   B Cardiac glycosides
   C Latex of Poppy capsules
   D Oxytocic effect
   E Adaptogenic and tonic
   F Cyanogenetic aglycone

2. Formulation of hard gelatine capsules may necessitate the additives listed 1 to 4. Their functions are given in A to F. Match them.
   1 Diluents
   2 Protectives
   3 Glidants
   4 Antidusting
   A For preventing absorption of moisture by hygroscopic substances

C To prevent cross contamination
D For regulating the flow
E For avoiding weight variation
F For Bacterial resistance

3. For the drugs listed 1 to 4, mechanism of action is indicated front A to F Match them.

1 VINCRISTINE
2 STREPTOMYCEN
3 CHLORAMPHENICOL
4 RIFAMPICIN

A Macrocyclic antibiotic Which inhibits DNA dependent RNA Polymerase
B An antibiotic containing nitrogroup which binds to SOS ribosomal subunit
C A dimeric indole alkaloid which binds avidly to tubulin, a class of protein that form the mitotic spindle.
D An aminoglycosidic antibiotic, capable of binding to 30S ribosomal subunit.
E A Quinoline alkaloid which inhibits the growth Plasmodium ViVax
F A naphthacene antibiotic which inhibits cell wall synthesis.

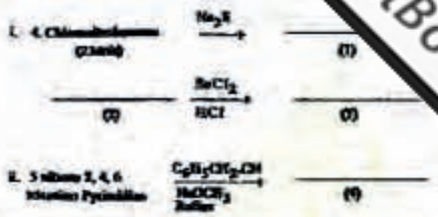
15. Name the crude drug associated with the following diagnostically impel-taut histological character. (5 × 1 = 5)

i. Stratified cork
ii. Non-lignified warty trichomes
iii. Pseudoparenchyma
iv. Ellipsoidal schizolysigenous oil glands
v. Clothing and glandular hairs

16. i. Excited triplet state is more stable than the excited singlet state-why? (2)

ii. There are three important reactions involved in the assay of Folic acid I.P. Write the equations. (3)

17. Complete the following reactions by giving the structural formulae of the



18. i. The coaceivation technique of microencapsulation consists of three steps. Mention them in one sentence each. (3)

ii. Give the full form of HEPA-filter (1)

iii. Define OCUSERT SYSTEM (1)

19. i. Compare the principal pharmacological effects of I_A, I_B and I_C anti-arrhythmic drugs. Answer in one or two sentences only. (3)

ii. Define
(a) First pass effect (1)
(b) Open one compartment model (1)

20. (a) What are embryonic stem cells? What property of embryonic stem cells makes it useful in introducing foreign genes into the germline of an animal' (2)

(b) S' children were born to a father with 'A' Blood group and mother with 'O' blood group. If the father is heterozygous for 'A' locus, what are the blood groups of the children and at what ratios do they occur? Illustrate with seggregation of alleles (3)

21. (a) What is convergent evolution? (2)

(b) Provide classification of man from Phylum to species. (3)