000710

Sr. No. .....

ENTRANCE TEST-2020

SCHOOL OF ENGINEERING

B.TECH. LATERAL ENTRY

Total Questions : 60
Time Allowed : 70 Minutes

Roll No. : | | | | | | |

Instructions for Candidates

1. Write your Roll Number in the space provided at the top of this page of Question Booklet and fill up the necessary information in the spaces provided on the OMR Answer Sheet.
2. OMR Answer Sheet has an Original Copy and a Candidate's Copy glued beneath it at the top. While making entries in the Original Copy, candidate should ensure that the two copies are aligned properly so that the entries made in the Original Copy against each item are exactly copied in the Candidate's Copy.
3. All entries in the OMR Answer Sheet, including answers to questions, are to be recorded in the Original Copy only.
4. Choose the correct / most appropriate response for each question among the options A, B, C and D and darken the circle of the appropriate response completely. The incomplete darkened circle is not correctly read by the OMR Scanner and no complaint to this effect shall be entertained.
5. Use only blue/black ball point pen to darken the circle of correct/most appropriate response. In no case gel/ink pen or pencil should be used.
6. Do not darken more than one circle of options for any question. A question with more than one darkened response shall be considered wrong.
7. There will be 'Negative Marking' for wrong answers. Each wrong answer will lead to the deduction of 0.25 marks from the total score of the candidate.
8. Only those candidates who would obtain positive score in Entrance Test Examination shall be eligible for admission.
9. Do not make any stray mark on the OMR sheet.
10. Calculators and mobiles shall not be permitted inside the examination hall.
11. Rough work, if any, should be done on the blank sheet provided with the question booklet.
12. OMR Answer sheet must be handled carefully and it should not be folded or mutilated in which case it will not be evaluated.
13. Ensure that your OMR Answer Sheet has been signed by the Invigilator and the candidate himself/herself.
14. At the end of the examination, hand over the OMR Answer Sheet to the invigilator who will first tear off the original OMR sheet in presence of the Candidate and hand over the Candidate's Copy to the candidate.

[Turn over

Lateral Entry Paper (Year 2020)

Q1. The Energy operator $\hat{E}$ is given by

a. $-i\hbar\,\partial/\partial t$
b. $-i\hbar\,\partial/\partial x$
c. $\hbar\,\partial/\partial x$
d. $i\hbar\,\partial/\partial t$

Q2. Wien's Displacement Law is given by

a. $\lambda_{max}T = 1.898 \times 10^{-3} mK$
b. $\lambda_{max}T = 2.898 \times 10^{-3} mK$
c. $\lambda_{max}T = 3.898 \times 10^{-3} mK$
d. $\lambda_{max}T = 4.898 \times 10^{-3} mK$

Q3. Find the maximum wavelength associated with a black body at a temperature of 2.7 K ?

a. 1.1 mm
b. 2.2 mm
c. 3.3 mm
d. 3.1 mm

Q4. The ultra violet catastrophe occurs at

a. Short wavelengths
b. Long wavelengths
c. Lower frequencies
d. None of the above

Q5. The Compton effect is given by

a. $\Delta\lambda = \lambda_c(1 + cos\Phi)$
b. $\Delta\lambda = \lambda_c(1 - sin\Phi)$
c. $\Delta\lambda = \lambda_c(1 - cos\Phi)$
d. $\Delta\lambda = \lambda_c(1 + sin\Phi)$

Q6. The zero point energy of a harmonic oscillator is

a. 0
b. hv
c. 0.5hv
d. 1.5hv

Q7. The Hamiltonian operator is given by

a. $\frac{-\hbar^2}{m}\frac{\partial}{\partial x} + U_{(x)}$
b. $\frac{-\hbar^2}{2}\frac{\partial^2}{\partial x^2} + U_{(x)}$
c. $\frac{\hbar^2}{2m}\frac{\partial^2}{\partial x^2} + U_{(x)}$
d. $\frac{-\hbar^2}{2m}\frac{\partial^2}{\partial x^2} + U_{(x)}$

Q8. For an electron revolving in any orbit, the Bohr's quantization condition states that

a. $mvr = \frac{nh}{4\pi}$
b. $mvr = \frac{nh}{2\pi}$
c. $mvr = \frac{nh}{\pi}$
d. $mvr = \frac{nh}{3\pi}$

Q9. The molecule which possess Trigonal bipyramidal geometry with See Saw shape is

a. NH_3
b. SF_4
c. ICl_3
d. N.O.A

Q10. How many number of unpaired electrons are present in NO molecule?

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

Q11. Thermoplastic polymers are having properties like

a. Reversibility
b. Permanent hardness
c. a and b
d. N.O.A

Q12. If the functional groups in a polymer are arranged randomly around the main chain

a. Isotactic polymer
b. Atactic polymer
c. Syndiotactic polymer
d. All

Q13. In NMR spectroscopy the compound used as reference standard is

a. $Pb(C_2H_5)_4$
b. $Si\ (CH_3)_4$
c. Trimethyl toluene
d. All

Q14. ESR (electron paramagnetic resonance) spectroscopy is used to detect

a. Anions
b. Cations
c. Free radicals
d. N.O.A

Q15. The high value of aniline point indicates
a. High Aromaticity
b. Low Aromaticity
c. Intermediate Aromaticity
d. N.O.A

Q16. To avoid corrosion of machine parts, the acid value of a good lubricating oil must be
a. Very high
b. Very low
c. Moderate
d. N.O.A

Q17. If $x^2\frac{d^2y}{dx^2}+x\frac{dy}{dx}+(x^2-4)y=0,$ then $x=0$ is
a. a regular singular point of the equation
b. an irregular singular point of the equation
c. an ordinary point of the equation
d. None of these

Q18. What is the general solution of the partial differential equation $Pp+Qq=R$.
a. $\emptyset(u,v)=1$
b. $\emptyset(u,v)=-1$
c. $\emptyset(u,v)=0$
d. None of these

Q19. What is the general solution of the equation
$$2zy\frac{\partial z}{\partial x}+zx\frac{\partial z}{\partial y}=3xy.$$
a. $f(x^2-2y,\ y-z)=0$
b. $3y^2-z^2=f(x^2-2y^2)$
c. $x^2-2y=f(y^2-z^2)$
d. None of these

Q20. What is the singular solution of the partial differential equation $z=px+qy+pq$.
a. $z=ax+by+ab$
b. $z=2xy$
c. $z=-xy$
d. None of these

Q21. The sum of roots of the auxiliary equation of the differential equation $(D^4-5D^2+4)y=0$ is
a. *0*
b. *1*
c. *2*
d. *3*

Q22. What is the particular integral of the equation
$(D+2)(D-1)^3y = e^x$

a. xe^x
b. $\frac{1}{18}x^3e^x$
c. $\frac{1}{5}e^x$
d. None of these

Q23. The complimentary function of the equation $(D^3-D^2-6D)y = x^2+1$ is

a. $c_1e^x + c^2e^{3x} + c_3e^{2x}$
b. $c_1e^{-2x} + c_2e^{3x}$
c. $c_1 + c_2e^{-2x} + c_3e^{3x}$
d. None of these

Q24. The partial differential equation
$\frac{\partial u}{\partial t} = 4\frac{\partial^2 u}{\partial x^2}$ is

a. One dimensional heat equation
b. Two dimensional heat equation
c. Two dimensional wave equation
d. Two dimensional Laplace equation

Q25. What is current flowing through a 2Ω resistor connected to 1A current source?

a. 2 V
b. 1 A
c. 0.5 A
d. 1 V

Q 26. What is impedance at Resonance?

a. 0 Ω
b. 1 Ω
c. Resistance only
d. X_L

Q27. Ohms law is applicable to

a. Linear systems
b. Non linear systems
c. Both a & b
d. None of these

Q28. If the length of resistance R is uniformly stretched to 10 times its original value its new resistance is

a. 10R
b. R/10
c. 100R
d. R/100

Q29. Find the period of the sinusoidal ac voltage $v(t)= 12Cos(50t+10°)$

a. 0.115s
b. 0.007s
c. 0.1257s
d. 0.215s

Q30. Impedance of a capacitor for $\omega=0$ is equal to

a. Zero
b. Infinity
c. Finite value
d. None of the above

Q31. An electric iron draws 2A at 150V. Its conductance will be

a. 75 Siemen
b. 0.0133 Siemen
c. 75 ohm
d. 0.0133 ohms.

Q32. Determine the current flowing through an element if the charge flow is given by $q(t) = (8t^2+4t-2)$ C

a. $8t^3+2t^2-2$ A
b. $16t+4$ A
c. $8t+2$ A
d. $16t^2+4t$ A

Q33. Valence band and conduction band overlap in:

a. Metal
b. Semiconductor
c. Insulator
d. All of the above

Q34. Valence band and Conduction band are far apart in:

a. Metal
b. Semiconductor
c. Insulator
d. All of the above

Q35. A semiconductor which is not doped is:

a. Extrinsic
b. P-type
c. N-type
d. Intrinsic

Q36. A semiconductor which is doped by trivalent impurity is:

a. N-type
b. P-type
c. Intrinsic
d. None of the above

Q37. A capacitor is used after a rectifier for:

a. Boosting
b. Attenuating
c. Amplifying
d. Smoothing

Q38. CC configuration of transistor has:

a. High Current Gain
b. High Input Resistance
c. High Output Resistance
d. Both (a) and (b)

Q39. CB configuration of transistor has:

a. High Voltage Gain
b. High Output Resistance
c. Both (a) and (b)
d. None of the above

Q40. Which of the following medium is used between CPU & RAM to speed up the processing power of a CPU?

a. Cache Memory
b. Virtual Memory
c. D RAM
d. Flash Memory

Q41. Which of the following is the port number for Telnet?

a. 20
b. 21
c. 22
d. 23

Q42. Which of the following is default permission set for ordinary files?

a. rwxrwxrwx
b. rw-rw-rw-
c. r--r--r--
d. rw-rw-rwx

Q43. Static memory allocation is typically performed during:

a. Compilation
b. Execution
c. Loading
d. Linking

Q44. If c is initialized to 1, how many times following loop is executed

```
while((c>0)&&(c<60))
{
        c++;
}
```

a. 60
b. 59
c. 61
d. 1

Q45. What is the output of the following code?

```
main( )
{
        int n = 10;
        switch (n)
        {
                default:
                        printf("I am Default \t");
                Case 15:
                        printf("I am 15 \t");
                Case 20:
                        printf("I am 20 \t");
        }
}
```

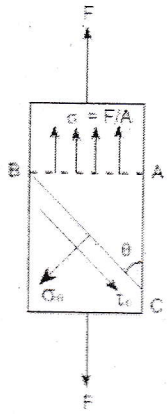
a. I am 15
b. I am 20
c. I am Default I am 15 I am 20
d. I am Default

Q46. What is the output of the following program?

```
main( )
{
        int i;
        for(i=1;i<5;i++)
        {
                if(i==4)
                  break;
                printf("%d",i);
        }
}
```

a. 12345
b. 124
c. 1245
d. 123

Q47. If an axial tensile load of 105 *Kn* is acts on a circular bar of cross-section A m^2, then what is the value of shear stress, τ_θ on a plane BC ($\theta = 50.6^o$) on which the values of the normal stress, σ_θ is 50 MN/m^2.

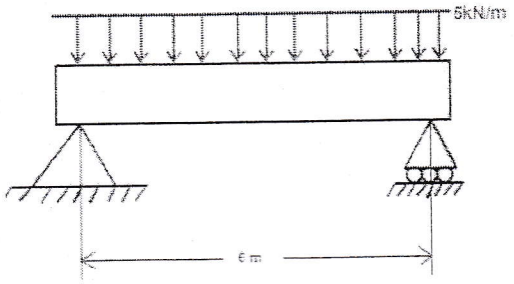


a. $40.5/A\ Kn/m^2$
b. $40.9/A\ MN/m^2$
c. $51.5/A\ Kn/m^2$
d. $51.5/A\ MN/m^2$

Q48. If the poison's ratio is given by $\frac{Laterial\ contraction}{Longitudional\ elongation}$, then

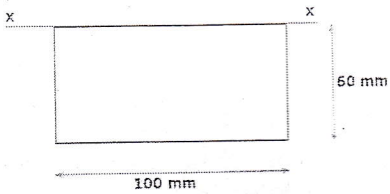
a. *Longitudional elongation* is negative *strain* and *Laterial contraction* is a positive *strain*
b. *Longitudional elongation* is positive *strain* and *Laterial contraction* is a negative *strain*
c. *Longitudional elongation* is negative *strain* and *Laterial contraction* is a negative *strain*
d. None of the above

Q49. What is the cross-sectional area of 6 m long beam subjected to uniform loading of 5 kN/m, if the maximum shear stress τ_{max} is given by $1.5\frac{V}{A}$, where V is the vertical shear?



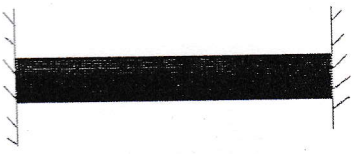
a. 1500 mm^2
b. 2,000 mm^2
c. 2,500 mm^2
d. 3,000 mm^2

Q50. What is the moment of inertia for the rectangular plane shown in figure about x-x axis?



a. 1800000 mm^4
b. 7200000 mm^4
c. 5000000 mm^4
d. 3600000 mm^4

Q51. The steel bar shown in the figure is initially at 20°C. If it is heated to a temperature of 50°C, then which of the following statements is correct? The Young's Modulus and Coefficient of thermal expansion of steel are 'E' and 'α' respectively.



a. Both thermal stress and thermal strain will be zero.
b. Thermal stress will be zero and thermal strain will be 30 $E\alpha$.
c. Thermal stress will be 30 $E\alpha$ and thermal strain will be zero.
d. Both thermal stress and thermal strain will be 30 $E\alpha$.

Q52. What is the diameter of the shaft when the torque (twisting moment) T produces the maximum shear stress of 48 N/mm^2

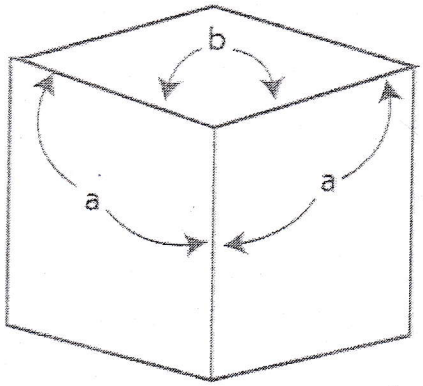
a. $\sqrt[2]{\frac{0.33\,T}{\pi}}$
b. $\sqrt[3]{\frac{0.33\,T}{\pi}}$
c. $\sqrt[3]{\frac{0.99\,T}{\pi}}$

d. $2\sqrt{\frac{0.99\,T}{\pi}}$

Q53. The location of center of gravity or the centroid represent a balance between
a. the sum of moments of all the parts of the system and the moment of the "resultant" for the system.
b. the sum of forces of all the parts of the system and the moment of the "resultant" for the system.
c. the sum of moments of all the parts of the system and the forces of the "resultant" for the system.
d. All of the above

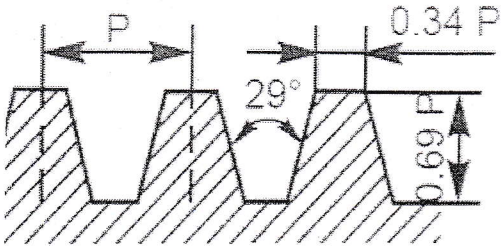
Q54. A line in the first quadrant is parallel to horizontal plane and inclined to the vertical plane. Which of the following statements is correct?
a. True length of the line can be seen in top view only.
b. True length of the line can be seen in front view only.
c. True length of the line can be seen in both front and top view.
d. True length of the line can be seen neither in front view nor in top view.

Q55. The drawing shown below represents which kind of axonometric view, where 'a' and 'b' represent the angles between the axes.



a. Isometric
b. Dimetric
c. Trimetric
d. None of the above

Q56. The screw thread profile shown in the figure below is



a. Square
b. Buttress
c. Knuckle
d. Acme

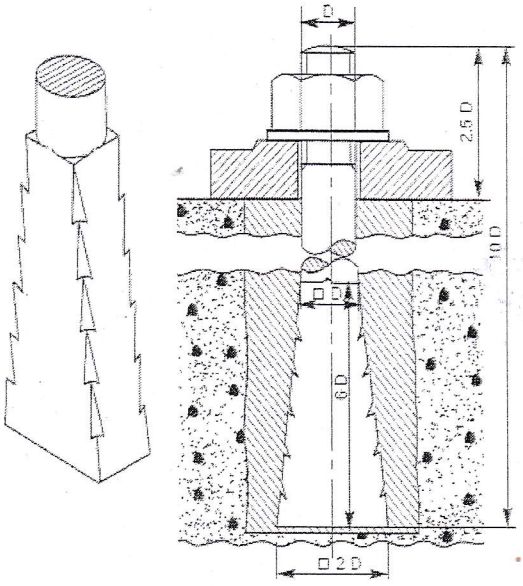
Q57. Consider a solid cylinder with its base resting on horizontal plane. The cylinder is cut by a section plane perpendicular to vertical plane and inclined at 45° to horizontal plane. The sectional side view will be a/an

a. Circle
b. Ellipse
c. Parabola
d. Hyperbola

Q58. What will be the length of the edge of a cube in isometric projection, if the true length of the edge is 30 cm?

a. 30.00 cm
b. 36.80 cm
c. 27.34 cm
d. 24.45 cm

Q59. The foundation bolt shown in the figure below is



a. Rag Foundation Bolt
b. Eye Foundation Bolt
c. Lewis Foundation Bolt
d. Bent Foundation Bolt

Q60. Which of the following bearings is used to resist radial load on shafts?
a. Collar thrust bearing
b. Journal Bearing
c. Foot-Step bearing
d. None of the Above

1. The Normality of 0.3 M Phosphoric acid (H_3PO_3) is :

(A) 0.1

(B) 0.9

(C) 0.3

(D) 0.6

2. Two solutions of a substance (non electrolyte) are mixed in the following manner. 480 ml of 1.5 M first solution +520 ml of 1.2 M second solution. What is the molarity of the final mixture ?

(A) 2.7 M

(B) 1.34 M

(C) 1.50 M

(D) 1.20 M

3. The pKa of acetyl salicylic acid (aspirin) is 3.5. The pH of gastric juice in human stomach is about 2-3 and pH in the small intestine is about 8. Aspirin will be :

(A) unionized in the small intestine and in the stomach

(B) completely ionized in the small intestine and in the stomach

(C) ionized in the stomach and almost unionized in the small intestine

(D) ionized in the small intestine and almost unionized in the stomach

4. The ionic product of the water changes when :

(A) an acid is added to it

(B) a base is added to it

(C) either a base or an acid is added to it

(D) temperature is raised

5. The boiling point of *P*-nitrophenol is higher than that of *o*-nitrophenol because :

(A) NO_2 group at *P*-position behaves in a different way from that at *o*-position

(B) intramolecular hydrogen bonding exits in *P*-nitrophenol

(C) intermolecular hydrogen bonding exits in *P*-nitrophenol

(D) P-nitrophenol has a higher molecular weight than *o*-position

6. What is the dominant intermolecular force or bond that must be overcome in converting liquid CH_3OH to a gas ?

(A) Dipole-Dipole interactions

(B) Covalent bond

(C) Hydrophilic interactions

(D) Hydrogen bonds

7. The enthalpy of vaporization of liquid is 30kJ mol^{-1} and entropy of vaporization is 75J mol^{-1} K. The boiling point of the liquid at 1 atm is :

(A) 250 K

(B) 400 K

(C) 450 K

(D) 600 K

8. The difference between heats of reaction at constant pressure and constant volume for the reaction :

$2C_6H_{6(l)} + 15O_{2(g)} \longrightarrow 12CO_{2(g)} + 6H_2O_{(l)}$ at 25°C in kJ is:

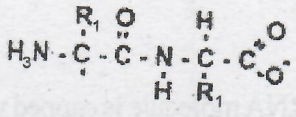
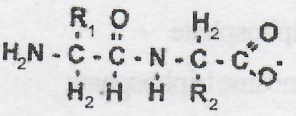
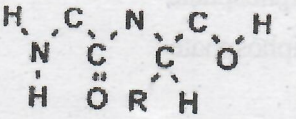
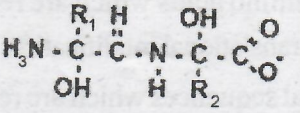
(A) –7.43

(B) +3.72

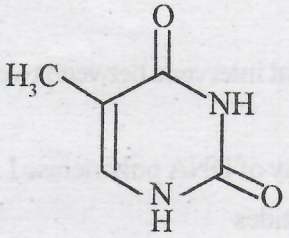
(C) –3.72

(D) +7.43

9. Aspartic acid and lysine in proteins are linked together by :
   (A) Glycosidic bond
   (B) Peptide bond
   (C) Phosphodiester bond
   (D) Ester bond

10. Which of the following is a Dipeptide ?
   (A) 
   (B) 
   (C) 
   (D) 

11. The illustration shown below is which nitrogen base ?



   (A) Thymine
   (B) Guanine
   (C) Uracil
   (D) Cytosine

12. Which of the following is correct ?
   (A) A=T
   (B) C=G
   (C) G=A
   (D) A=C

13. All of the following organelles can be isolated from the cells in their intact form except :
   (A) Endoplasmic Reticulum
   (B) Nucleus
   (C) Mitochondria
   (D) All of the above

14. Function of Golgi apparatus in animals include :
   (A) Exocytosis of thyroxine hormone
   (B) Exocytosis of melanin
   (C) Sorting and packaging
   (D) All of the above

15. Clathrin coated pits are associated with :
   (A) Phagocytosis
   (B) Pinocytosis
   (C) Receptor mediated endocytosis
   (D) Exocytosis

16. Which of the following *does not* occur within mitochondria ?
   (A) Glycolysis
   (B) Krebs cycle
   (C) Electron transport chain
   (D) ATP synthesis

17. The beta-oxidation of a molecule of palmitic acid :
   (A) Yields 8 molecules of acetyl Co-A
   (B) Yields 16 molecules of acetyl Co-A
   (C) Yields 32 molecules of acetyl Co-A
   (D) Yields carbon dioxide and water only

18. It is very important to feed the baby very soon after the birth because during the first few hours after birth the enzyme phosphoenolpyruvate carboxykinase is present in very low amounts, and this fact inhibits the :
   (A) Glycogenolysis
   (B) Gluconeogenesis
   (C) Glycogenesis
   (D) Glucose Phosphorylation

19. The amino acids are said to be ketogenic when the carbon skelton is finally degraded to :
(A) Succinyl-CoA
(B) Fumarate
(C) Acetyl-CoA
(D) Pyruvate

20. Lesch-Nyhan syndrome, the sex linked, recessive absence of HGPRTase, may lead to :
(A) Compulsive self destructive behaviour with elevated levels of urate in serum
(B) Hypouricemia due to liver damage
(C) Failure to thrive and megaloblastic anemia
(D) Protein intolerance and hepatic encephalopathy

21. In metabolism, NAD is involved in :
(A) Spontaneous reaction
(B) Elimination reaction
(C) Redox reactions
(D) None

22. The effect of increased levels of hydrogen ions in the inter-membrane space of the mitochondria is :
(A) Increased ATP production
(B) Decreased levels of oxidative phosphorylation
(C) Increased levels of water in inter-membrane space
(D) Decreased levels of chemiosmosis

23. Which of the following *is not* a feature of oxidative phosphorylation ?
(A) Direct transfer of phosphate from a substrate molecule to ADP
(B) An electrochemical gradient across the inner mitochondrial membrane
(C) A membrane bound ATP synthase
(D) A proton motive force

24. A child has accidentally ingested a chemical and has presented with high fever. The chemical is known to affect the ATP formation in electron transport chain, which among the following could cause the similar manifestations ?
(A) Cyanide
(B) 2,4 Dinitrophenol
(C) Malonate
(D) Rotenone

25. 5'-Terminus of mRNA molecule is capped with :
(A) Guanosine triphosphate
(B) 7-Methylguanosine triphosphate
(C) Adenosine triphosphate
(D) Adenosine diphosphate

26. Introns in genes :
(A) Encode the amino acids which are removed during post-translational modification
(B) Encode signal sequences which are removed before secretion of the proteins
(C) Are the non-coding sequences which are not translated
(D) Are the sequences that intervene between two genes

27. 3'→5' Exonuclease activity of DNA polymerase I :
(A) Removes ribonucleotides
(B) Adds deoxyribonucleotides
(C) Corrects errors in replication
(D) Hydrolyses DNA into mononucleotides

28. The first amino acyl tRNA which initiates translation in prokaryotes is :
(A) Methtionyl tRNA
(B) Formylmethionyl tRNA
(C) Tyrosinyl tRNA
(D) Alanyl tRNA

29. Which of the following is a palindromic sequence ?
(A) 5'-ATGCAG-3'
(B) 3'-TACGTC-5'
(C) 5'-CGAAGC-3'
(D) 3'-GCTTCG-5'

30. Genomic libraries are made from :
(A) DNA of an organism
(B) Total RNA of an organism
(C) mRNA of an organism
(D) cDNA of an organism

31. To clone into a plasmid vector, both the plasmid and foreign DNA are cut :
(A) With the same restriction enzymes and mixed together
(B) With different restriction enzymes and mixed together
(C) With the same proteases and mixed together
(D) With different protease and mixed together

32. Which of the following vector(s) was extensively used for human genome project ?
(A) Plasmid
(B) Yeast artificial chromosome
(C) Cosmid
(D) (B) and (C)

33. Innate immunity involves all except :
(A) Phagocytosis
(B) Anatomic Barriers
(C) Inflammatory Mechanism
(D) Antibody production

34. T cells can recognize :
(A) Free antigens
(B) Antigens bound to cells
(C) Antigens bound to antibodies
(D) Antigens bound to MHC proteins

35. Which of the following statements is true ?
(A) All immunogens are antigens but all antigens are not immunogens
(B) All immunogens are antigens and all antigens are immunogens
(C) All immunogens are not antigens but all antigens are immunogens
(D) All immunogens are proteins and all proteins are immunogens

36. The following is characteristic of B- but not T-cells :
(A) Class I MHC
(B) CD3
(C) Polyclonal activation by concanavalin A
(D) Surface immunoglobulin

37. DNA polymerase of T. aquatics is preferred to that of E. coli in PCR because :
(A) It replicates DNA more efficiently
(B) It doesn't require primers
(C) It is not denatured at the melting temperature of DNA
(D) It doesn't cause errors in replication

38. A particular protein in a mixture can be detected by :
(A) Southern blotting
(B) Northern blotting
(C) Western blotting
(D) None of these

39. What is the role of SDS in SDS PAGE ?
(A) Protein denaturation and imparting net negative charge
(B) Imparting overall negative charge to the protein
(C) Imparting equal mass to all the proteins
(D) Protein unfolding and imparting net negative charge

40. Using a standard curve, it you know the absorbance of an unknown sample, what else can be determined about the unknown ?
(A) The wavelength of maximum absorbance
(B) The molecular weight of the sample
(C) The concentration of the sample
(D) The identity of the sample

41. The most important example of point mutation is found in a disease called :
(A) Thalassemia
(B) Night blindness
(C) Sickle cell anemia
(D) Down's syndrome

42. A mother of blood group O has a group O child, the father could be of blood type :
(A) A or B
(B) AB only
(C) A or B or O
(D) O only

43. If inheritance of disease to next generation is only possible through females. The probable inheritance is :
(A) Sex-linked
(B) Mendelian
(C) Organellar
(D) Autosomal

44. In a genetic test, 9:7 ratio in F2 generation represents :
(A) Epistasis
(B) Co-dominance
(C) Incomplete dominance
(D) Complete dominance

45. Source of EEG is :
(A) A potential of pyramidal cells
(B) A potential of ganglion cells
(C) EPSP and IPSP of cortical cells which behave like dipoles
(D) After potential of Parietal cortex

46. In a 30 year old woman evaluated for infertility, the following data are obtained on a blood sample obtained on 21st day of her menstrual cycle: estradiol, TSH, Prolactin and progesterone. Which of the following would best indicate if this cycle was ovulatory or not ?
(A) Estradiol
(B) Prolactin
(C) Progestrone
(D) TSH

47. A low auxin:cytokinin ratio leads to :
(A) Shoot formation
(B) Root formation
(C) Fruit formation
(D) All of the above

48. Starch content of potatoes can be increased by using a bacterial gene, known as :
(A) Sucrose phosphate synthase gene
(B) ADP glucose pyrophosphorylase gene
(C) Polygalactouranase gene
(D) None of the above

49. Differential staining of bacteria on Grams staining is due to :
(A) Difference in cell wall layer components of Gram positive and Gram negative bacteria
(B) Difference in the cell structure of Gram positive and Gram negative bacteria
(C) Difference in mode of nutrition of Gram positive and Gram negative bacteria
(D) None of the above

50. Tetracyclines inhibit binding of amino acyl tRNAs to :
(A) 30 S ribosomal subunits
(B) 40 S ribosomal subunits
(C) 50 S ribosomal subunits
(D) 60 S ribosomal subunits

51. In turbidimetric measurement the growth is normally expressed as :

(A) Cells per ml

(B) CFU/ml

(C) Optical density

(D) mg/ml

52. A culture broth tube was very turbid at the surface but clear throughout the rest of the tube indicating that the :

(A) Organism are aerobes

(B) Organism should be grown in an anaerobic chamber

(C) Organism cannot produce superoxide dismutase and/or catalase

(D) Organism cannot tolerate oxygen

53. When [s] is equal to Km, which of the following conditions exist?

(A) Half the enzyme molecules are bound to substrate

(B) The velocity of the reaction is equal to Vmax

(C) The velocity of the reaction is independent of substrate concentration

(D) Enzyme is completely saturated with substrate

54. In competitive inhibition which of the following kinetic effect is true ?

(A) Decreases both Km and Vmax

(B) Increases both Km and Vmax

(C) Decreases Km without affecting Vmax

(D) Increases Km without affecting Vmax

55. Trypsin has no action on :

(A) Hemoglobin

(B) Albumin

(C) Histone

(D) DNA

56. If a coenzyme is required in an enzyme reaction, the former usually has the function of :

(A) Acting as an acceptor for one of the cleavage products of the substrate

(B) Enhancing the specificity of the apo enzyme

(C) Increasing the number of receptor sites of the apo enzyme

(D) Activating the substrate

57. Ames assay is a rapid method for detection of :

(A) Oncoviruses

(B) Retroviruses

(C) Chemical carcinogens

(D) Typhoid

58. The basic difference between a normal cell and cancer cell is :

(A) Cancer cells divide continuously but normal cells do not

(B) Normal cells are bigger than the cancer cells

(C) Normal cells are mortal but cancer cells are immortal

(D) Cancer cells divide but do not differentiate like Normal cells

59. p53 gene is :

(A) A proto-oncogene

(B) An oncogene

(C) A tumor suppressor gene

(D) None of these

60. Which second messenger signals the release of Ca+2 from endoplasmic reticulum ?

(A) IP3

(B) 1,2 diacyl glycerol

(C) cAMP

(D) cGMP

Sr. No. 242

ENTRANCE TEST-2017

SCHOOL OF BIOLOGICAL SCIENCES
BIOTECHNOLOGY
Paper—I

Question Booklet Series **B**

Total Questions : 60
Time Allowed : 70 Minutes

Roll No. : | | | | | | |

Instructions for Candidates :

1. Write your Roll Number in the space provided at the top of this page of Question Booklet and fill up the necessary information in the spaces provided on the OMR Answer Sheet.
2. OMR Answer Sheet has an Original Copy and a Candidate's Copy glued beneath it at the top. While making entries in the Original Copy, candidate should ensure that the two copies are aligned properly so that the entries made in the Original Copy against each item are exactly copied in the Candidate's Copy.
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10. Calculators and mobiles shall not be permitted inside the examination hall.
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12. OMR Answer sheet must be handled carefully and it should not be folded or mutilated in which case it will not be evaluated.
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SEAL

1. Ramachandran plot is obtained simply by plotting
   (A) N-C_α bond & C_α-C bond
   (B) C-N bond & C_α-C bond
   (C) N-C_α bond & C-N bond
   (D) N-C_α bond & C-O bond
2. The nucleic acid base with no oxygen in its molecule is
   (A) Adenine
   (B) Cytosine
   (C) Guanine
   (D) Thymine
3. Which of the following function is NOT associated with the smooth endoplasmic recticulum?
   (A) Synthesis of steroid hormones
   (B) Detoxification of toxic compounds in liver
   (C) Regulation of calcium in skeletal & cardiac muscles
   (D) None of the above
4. Which component is present in higher concentration in the inner leaflet of the plasma membrane?
   (A) Sphingomyelin
   (B) Phosphatidylcholine
   (C) Phosphatidylserine
   (D) Cholesterol
5. Which of the following is correct regarding the organization of hydrophobic tails of the phospholipids in the lipid bilayer of the plasma membranes of eukaryotic cells?
   (A) They are present on the cytosolic surface of the plasma membrane
   (B) They are present on the outer surface of the plasma membrane
   (C) They are present towards the middle of lipid bilayer, both away from the outer surface and the inner surface
   (D) Both (A) and (B)
6. The sodium-potassium pump functions by the following process:
   (A) Simple diffusion
   (B) Facilliated diffusion
   (C) Active transport
   (D) Passive transport
7. Which of the following metabolic pathways end-product is used for the *de novo* synthesis of the nucleotides?
   (A) Pentose phosphate pathway
   (B) Gluconeogeneis
   (C) Glycogeneis
   (D) All the above
8. Which of the following is an anaplerotic reaction?
   (A) Conversion of pyruvate to lactate by lactate dehydrogenase
   (B) Conversion of pyruvate to acetyl-CoA by pyruvate dehydrogenase
   (C) Conversion of pyruvate to oxaloacetate by pyruvate carboxylase
   (D) All the above
9. In the majority of the animals, the beta oxidation of the fatty acids occurs in the:
   (A) Nucleus
   (B) Cytoplasm
   (C) Golgi-bodies
   (D) Mitochondria
10. Brown fat of an adipose tissue is "brown" due to the presence of:
   (A) Anthocynins
   (B) Cholesterol
   (C) Cytochrome
   (D) Lipoproteins
11. Cytochrome oxidase of the electron transport chain is inhibited by:
   (A) Rotenone
   (B) Carbon monoxide
   (C) Antimycin A
   (D) Oligomycin
12. Rubisco have an ability to bind with:
   (A) O_2
   (B) CO_2
   (C) Both O_2 & CO_2
   (D) None of the above

13. Cyclic photophosphorylation produces:
    (A) NADPH
    (B) ATP
    (C) Oxygen
    (D) None of the above
14. Suppose a double-stranded DNA of a single bacterial cell was allowed to replicate in a media containing heavy isotope of nitrogen (N^{15}) for two generations. If the DNA replicates by semi-conservative mode, what will be the ratio N^{14}/N^{15} (Hybrid) and the N^{15}/N^{15} (Heavy) DNA:
    (A) 1:1
    (B) 2:1
    (C) 1:2
    (D) 2:0
15. Translation of the eukaryotic mRNA occurs in the following direction:
    (A) From the poly-A tail
    (B) From the 3' to 5' end
    (C) Both (A) and (B)
    (D) From the 5' to 3' end
16. During induction of the lac operon, the inducer directly binds to:
    (A) Promoter
    (B) Operator
    (C) Repressor
    (D) Enhancer
17. Which of the following is the correct order of events that occur during the homologous recombination?
    (A) Strand invasion-Holliday junction formation-branch migration-resolution.
    (B) Resolution-branch migration-Holliday junction formation-strand invasion.
    (C) Branch migration-resolution-strand invasion-Holliday junction formation.
    (D) Holliday junction formation, resolution-branch migration-strand invasion.
18. A blunt-end cutter restriction enzyme leaves:
    (A) 3' over hang
    (B) 5' over hang
    (C) Both (A) and (B)
    (D) No over hangs
19. Which of the following vector has maximum capacity to take-in the foreign DNA?
    (A) Plasmid
    (B) Insertional lambda phage
    (C) Cosmid
    (D) pUC vector
20. Which of the following Polymerase chain reaction (PGR) program is sequentially followed each cycle for the amplification of the DNA?
    (A) Denaturation-annealing-extension
    (B) Annealing-denaturation-extension
    (C) Extension-annealing-denaturation
    (D) Denaturation-extension-annealing
21. Cosmid vectors possess *cos* sites, that are inherited from:
    (A) Plasmid
    (B) M13-phage
    (C) Lambda-phage
    (D) YACs
22. C3b of complement system is:
    (A) Chemotactic
    (B) An anaphylatoxin
    (C) Opsonise bacteria
    (D) That directly injuries bacteria
23. Which of the following is NOT true about an antigen?
    (A) It contains epitopes
    (B) It contains paratopes
    (C) It reacts with immunoglobulins
    (D) It elicits Immune response
24. Fc and Fab fragments of IgG are produced upon digestion with:
    (A) Chymotrypsin
    (B) Papain
    (C) Trypsin
    (D) Lysozymes
25. The class of heavy chain is determined by:
    (A) Carbohydrate attached to the light chain
    (B) Heavy chain type
    (C) Antigen
    (D) J-chain

26. Which of the following is NOT correct regarding the gel exclusion chromatography?
(A) It can be used for the desalting of protein solution
(B) The smaller molecular weight proteins are eluted first, followed by the larger molecular weight proteins
(C) It can be used for the determination of the molecular weight of the proteins
(D) It can be used for the separation of proteins

27. Which of the following is NOT correct regarding the SDS-polyacrylamide gel electrophoresis (PAGE)?
(A) The proteins are separated on the basis of their size
(B) The proteins have same mass/charge ratio after SDS treatment
(C) Two Polyacrylamide gels, having different pore size are stacked one above the another
(D) All proteins move towards the cathode of the gel apparatus

28. For the Southern blotting, the probe used is:
(A) RNA only
(B) DNA only
(C) DNA as well as RNA
(D) Primary antibodies

29. In Lambert-Beer's law, the percent transmittance is the percentage of light:
(A) Reflected by the sample
(B) Emitted by the sample
(C) Not absorbed by the sample
(D) Absorbed by the sample

30. F2 progeny of the monohybrid cross shows:
(A) Two phenotypes and two genotypes.
(B) Two phenotypes and three genotypes.
(C) Two genotypes and three phenotypes.
(D) One phenotype and two genotypes

31. A test cross distinguishes between:
(A) Two heterozygous plants
(B) Two homozygous plants
(C) Homozygous recessive and heterozygous-recessive.
(D) Homozygous dominant and heterozygous dominant

32. In mutation, if purine is replaced by pyrimidines & vice versa, it is called as:
(A) Transition
(B) Transversion
(C) Insertion
(D) Inversion

33. Deficiency of Hexosaminidase-A leads to:
(A) Phenylketonuria
(B) Cystic fibrosis
(C) Tay-sachs disease
(D) None of the above

34. Enzyme adenosine phosphate -Isopenteyl transferase (IPT) is involved in the biosynthesis of which hormone?
(A) Auxin
(B) Gibberellin
(C) Cytokinin
(D) ABA

35. Infection of Agrobacterium tumefaciens to the plant cell leads to:
(A) Increase in both the Auxin & Cytokinin concentration
(B) Decrease in both the Auxin & Cytokinin concentration
(C) Increase in the Auxin but decrease in the cytokinin concentration
(D) Increase in the cytokinin but decrease in the Auxin concentration

36. Organ of corti is concerned with:
(A) Touch
(B) Taste
(C) Vision
(D) Hearing

37. Nissl granules of the nerve cells are made up of:
(A) Dynein proteins
(B) Rough endoplasmic recticulum with rosettes of free ribosomes
(C) DNA-RNA hybrid
(D) Lipid granules

38. Ability of a bacterial cell to take up DNA fragment from the surroundings is called as:
(A) Fitness
(B) Fecundity
(C) Competency
(D) Reproducibility

39. If the F factor is attached to bacterial genome, the donor is called as:
(A) F-strain
(B) Hfr strain
(C) F- prime
(D) F-super strain

40. Which of the following amino acid is found both in D and L forms in the peptidoglycan?
(A) Lysine
(B) Glutamine
(C) Glutamic acid
(D) Alanine

41. The repressor protein of lambda phage bind to the bacterial DNA acts as a:
(A) Monomer
(B) Dimer
(C) Trimer
(D) Tetramer

42. Which of the following "term" is used to denote the enzymes that differ in amino acid sequences, but catalyze the same reaction?
(A) Apo-enzymes
(B) Holo-enzymes
(C) Co-enzymes
(D) Isoenzymes

43. Enzyme class that use ATP or a similar co-factor for the formation of C-C, C-S, C-O and C-N bonds is called:
(A) Ligases
(B) Oxidoreductases
(C) Isomerases
(D) Lyases

44. Binding of an inhibitor, both to the enzyme and enzyme substrate complex results in:
(A) Competitive inhibition
(B) Uncompetitive inhibition
(C) Mixed inhibition
(D) None of the above

45. Two enzymes "X" and "Y", having K_m values of 9.5×10^{-5}M and 1.2×10^{-2}M respectively. Which of the above enzyme will achieve maximum catalytic efficiency at low substrate concentration?
(A) X
(B) Y
(C) Both (A) and (B)
(D) There is no relation between K_m and catalytic efficiency

46. Which of the following is NOT correct regarding the molecular basis of the cancer?
(A) Activation of the proto-oncogene to oncogene leads to cancer
(B) Inactivation of the proto-oncogene leads to cancer
(C) Inactivation of the tumor suppressor gene leads to cancer
(D) Over-expression of the oncogene, due to gene amplification leads to cancer

47. Which of the cell-cycle component shows significant differential expression during mammalian cell cycle?
(A) Innexins
(B) Cyclins
(C) Pannexins
(D) Connexins

48. Which of the following is NOT considered secondary messenger?
2
(A) cGMP
(B) Ca^{2+}
(C) Diacylgycerol
(D) Gal4p

49. The adenylatecyclase performs the following function:
(A) It converts ATP to 3',5'-cyclic AMP
(B) It converts ATP to ADP and then to AMP
(C) It converts ADP to AMP
(D) It converts AMP to ADP.

50. In the glucose-alanine cycle, the alanine in the skeletal muscle is formed from:
(A) Oxaloacetate
(B) Pyruvate
(C) Alpha-ketoglutrate
(D) Glycine

51. 100ml of 1 molar glucose solution was taken and dissolved in 900ml of pure water. The molarity of glucose in the new solution is:
(A) 100 mM
(B) 50 mM
(C) 200 mM
(D) 150 mM

52. What is the median and mode for the following set of numbers: 9, 4, 45, 4,18,13, 7, 4?
(A) 4 median, 18 mode
(B) 18 median, 4 mode
(C) 8 median, 4 mode
(D) 18 median, 18 mode

53. What will be the molarity of $[H]^+$ and $[OH]^-$ ions in an aqueous solution having pH of 2?
(A) 10^{-2} M $[H]^+$ and 10^{-12} M $[OH]^-$
(B) 10^{-12} M $[H]^+$ and 10^{-2} M $[OH]^-$
(C) 10^{-4} M $[H]^+$ and 10^{-10} M $[OH]^-$
(D) 10^{-1} M $[H]^+$ and 10^{-13} M $[OH]^-$

54. Which of the following is the free search engine database of references and abstracts on life sciences and biomedical topics?
(A) Ensemble
(B) Endnote
(C) ORE
(D) Pubmed

55. The indicator of reaction spontaneity is determined by the Gibb's free energy reaction: $\Delta G = \Delta H - T\Delta S$. If a reaction has negative ΔH and positive ΔS, the reaction is:
(A) Enthalpicaly favored, but entropicaly opposed
(B) Enthalpicaly opposed, but entropicaly favored
(C) Enthalpicaly as well as entropicaly favored
(D) Enthalpicaly as well as entropicaly opposed

56. Which of the following functional group(s) can form hydrogen bond with water?
(A) Keto- group
(B) Amino-group
(C) Both (A) and (B)
(D) None of the above

57. Which of the following is an amphiphilic molecule?
(A) Fatty acid
(B) Glucose
(C) Glycine
(D) Both (B) and (C)

58. In the following reaction: $HA + H_2O \rightarrow H_3O^+ + A^-$, the H_2O acts as a:
(A) Bronsted acid
(B) Bronsted base
(C) Both (A) and (B)
(D) Neither acid nor base

59. Benedict's test was done to a carbohydrate solution, the result was negative, the carbohydrate present is:
(A) Glucose
(B) Fructose
(C) Lactose
(D) Sucrose

60. n-Octadecanoic acid is commonly known as:
(A) Arachidonic acid
(B) Palmitic acid
(C) Stearic acid
(D) Laurie acid

Sr. No. 009

ENTRANCE TEST-2016

FACULTY OF BIOLOGICAL SCIENCES

M.Sc. BIOTECHNOLOGY

Paper–I

Total Questions : 60
Time Allowed : 70 Minutes

Question Booklet Series A

Roll No. :

Instructions for Candidates :

1. Write your Roll Number in the space provided at the top of this page of Question Booklet and fill up the necessary information in the spaces provided on the OMR Answer Sheet.
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SEAL

1. Which of the following is true ?
   (A) Standard deviation is variance divided by N – 1
   (B) Standard deviation is the 'average' variance
   (C) Standard deviation is the square root of variance
   (D) Standard deviation is the square of the variance

2. 45.0 g of $Ca(NO_3)_2$ was used to prepare a 1.3 M solution. What is the approximate volume of the solution ?
   (A) 0.21 ml (B) 210 ml
   (C) 360 ml (D) 4.7 ml

3. How many moles are present in 1.20×10^{25} silver atoms ?
   (A) 0.9 (B) 1.0
   (C) 1.9 (D) 19.9

4. 100 ml of 1.0 M solution of a compound with 2 ionizable groups (pKa's = 6.2 and 9.5) has pH of 6.8. If 60 ml of 1.0 M HCl are added to this solution, pH will change to :
   (A) 5.60 (B) 8.90
   (C) 9.13 (D) 9.32

5. For every 10 degree Celsius increase in temperature, the rate of a chemical reaction will be :
   (A) Half (B) Double
   (C) Four times (D) 10-fold

6. The second law of thermodynamics essentially says :
   (A) Heat is energy
   (B) Motion energy converts to heat energy
   (C) At the atomic level, motion is continuous
   (D) Entropy increases

7. Detergents with branched hydrocarbon chains are less likely to be :
   (A) Effective (B) Synthetic
   (C) Sulfonates (D) Biodegradable

8. Le Chatelier's principle states that, If a chemical system at equilibrium is subjected to a change in conditions, the system will :

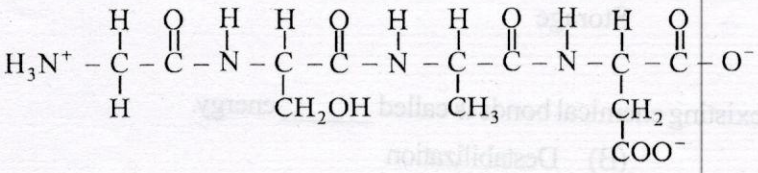
(A) React in a way that neutralises the change incurred

(B) Adjust to re-establish equilibrium in such a way as to partially counteract the imposed change

(C) Not respond in any way

(D) React in a way that quickly returns all reactant and product concentrations to their original values

9. The given structure best describes which of the following ?



(A) An amino acid

(B) A tripeptide

(C) A tetrapeptide

(D) A lipid

10. Vitamins often function as :

(A) Apoenzymes

(B) Holoenzymes

(C) Cofactors

(D) Coenzymes

11. Starch consists of :

(A) Unbranched amylose and branched amylopection

(B) Branched amylose and branched amylopection

(C) Unbranched amylose and unbranched amylopection

(D) All of these

12. What holds sugar monomer units together in complex carbohydrates ?

(A) Peptide bonds

(B) Disulfide linkages

(C) Ionic bonds

(D) Ether linkages

13. Which of the following contains digestive enzymes and produces oxygen radicals ?

(A) Mitochondria

(B) Lysosome

(C) Golgi apparatus

(D) Smooth endoplasmic reticulum

14. The proton motive force is considered a stored form of energy because :

(A) It is a chemical gradient

(B) It is an electrical gradient

(C) It can be used to perform chemical work

(D) All of these

15. Which of the following correctly matches an organelle with its function ?

(A)	Nucleus	Cellular respiration
(B)	Ribosome	Synthesis of lipids
(C)	Lysosome	Cell movement
(D)	Central vacuole	Storage

16. The energy required to destabilize existing chemical bonds is called _____ energy.

(A) Activation (B) Destabilization

(C) Kinetic (D) Free

17. Which of the following metabolic products produced by erythrocytes under normal conditions and by muscle cells during intense exercise is recycled through liver in the Cori cycle ?

(A) Oxaloacetate (B) Alanine

(C) Glycerol (D) Lactate

18. Muscle glycogen cannot release glucose into the blood for which of the following reasons ?

(A) Muscle plasma membrane contain no glucose transporters

(B) Muscle contains no glucose-6-phosphatase

(C) Muscle contains no $\alpha(1-6)$–glucosidase

(D) Muscle contains no phosphoglucomutase

19. Which of the following statements is true about the digestion of triglyceride in stomach ?

(A) The enzymes responsible have a pH optimum around 7.0

(B) Colipase is required for efficient digestion

(C) Lingual lipase cleaves a fatty acid from triglyceride, producing diglyceride

(D) Triglyceride droplets are dispersed by the action of bile salts

20. The reaction catalysed by aldol reductase :

(A) Reduces galactitol to galactose (B) Reduces lactose to sorbitol

(C) Converts sorbitol to fructose (D) Reduces glucose to sorbitol

21. The molecule that functions as the reducing agent in a redox or oxidation-reduction reaction :

(A) Gains electrons and gains potential energy

(B) Loses electrons and loses potential energy

(C) Gains electrons and loses potential energy

(D) Loses electrons and gains potential energy

22. Which of the following statements describes NAD^+ ?

(A) NAD^+ is reduced to NADH during glycolysis

(B) NAD^+ has more chemical energy than NADH

(C) NAD^+ is oxidized by the action of hydrogenases

(D) NAD^+ can donate electrons for use in oxidative phosphorylation

23. Which of the following inhibitors inhibit complex-IV of electron transport chain ?

(A) Antimycin (B) Rotenone

(C) Amytal (D) Carbon monoxide

24. Which organism is not correctly matched to its energy source ?

(A) Chemoautotroph : Iron

(B) Photoheterotroph : Light

(C) Photoautotroph : CO_2

(D) Anoxygenic autotroph : Light

25. In prokaryotes, the lagging strand primers are removed by :

(A) 3′ to 5′ exonuclease (B) DNA ligase

(C) DNA polymerase I (D) DNA polymerase III

26. In methyl directed mismatch repair in E.coli, the daughter strand containing the mismatched base is nicked by :

(A) MutH endonuclease (B) UvrABC endonuclease

(C) AP endonuclease (D) 3′ to 5′ exonuclease

27. In the process of translation :

(A) A strand of mRNA is formed with nucleotide sequences complementary to those of DNA

(B) Nucleotide sequences of tRNA are established

(C) A polypeptide is formed in response to the rRNA nucleotide sequence

(D) A polypeptide is formed as dictated by the nucleotide sequence in mRNA

28. Which of the following statements about E.coli RNA polymerase is false ?

(A) The holoenzyme includes the sigma factor

(B) The core includes the sigma factor

(C) It requires Mg^{2+} for its activity

(D) It requires Zn^{2+} for its activity

29. Which of the following characteristics is not true of a plasmid ?

(A) It is a circular piece of DNA

(B) It is required for normal cell function

(C) It is found in bacteria

(D) It can be transferred from cell to cell

30. The synthetic unit of the polymerase chain reaction is called :

(A) Annealer (B) Ligase

(C) Amplicon (D) Primer

31. Expression vectors differ from cloning vectors in having :

(A) An origin of replication (B) Suitable marker genes

(C) Unique restriction sites (D) Control elements

32. In pBR 322, pBR stands for :

(A) Plasmid bacterial recombination

(B) Plasmid bacterial replication

(C) Plasmid Bolivar and Rodriguez

(D) Plasmid Baltimore and Rodriguez

33. Which of the following molecules or structures is not associated with innate immunity ?

(A) Phagocytes
(B) Lysozyme
(C) Antibodies
(D) Skin

34. The primary role of Th-2 cells is to :

(A) Function as T-killer cells
(B) Activate NK cells
(C) Activate macrophages
(D) Activate B-cells

35. Th-1 cells do not:

(A) Express CD4
(B) Produce IFN-gamma
(C) Bind soluble antigens
(D) Activate macrophages

36. The process whereby neutrophils and other white blood cells are attracted to an inflammatory site is called :

(A) Diapedesis
(B) Chemotaxis
(C) Margination
(D) Phagocytosis

37. A patient has been diagnosed with abetalipoproteinemia. Such a disorder can be determined by which of the following techniques using samples obtained from the blood ?

(A) Western blot
(B) Northern blot
(C) Southern blot
(D) PCR analysis

38. Which DNA fragment will be close to the top (negative pole) of an electrophoretic gel ?

(A) 450 bp
(B) 3,560 bp
(C) 5 kb
(D) 1,500 bp

39. Which of the following techniques does not involve electrophoresis for the separation of biomolecules ?

(A) Dot blotting
(B) Southern blotting
(C) Northern blotting
(D) Western blotting

40. In which of the following separation methods does protein separation take place on the basis of their net charge ?

(A) Affinity chromatography (B) Ion-exchange

(C) Dialysis (D) Gel-filtration

41. A researcher isolated a previously unknown virus. Analysis of its genome revealed that it is composed of a double stranded DNA molecule containing 14% T (thymine). Based on this information, what would you predict the %C (cytosine) to be ?

(A) 14% (B) 28%

(C) 36% (D) 72%

42. Certain types of muscular dystrophy are sex-linked. If wife is carrier for the disease, and the husband has the disease, what is the probability their children will get the disease ?

(A) 50% for boys and 50% for girls (B) 50% for boys and 0% for girls

(C) 100% for boys and 50% for girls (D) 100% for boys and 0% for girls

43. Which of these statements would indicate that the trait in question has a genetic component ?

(A) Several adopted individuals living in the same family all have exceptionally strong fingernails

(B) In the last two weeks, every child at your daughter's daycare has had a cold

(C) Your brother, two cousins, and a great uncle all have been diagnosed with Duchenne muscular dystrophy

(D) All of these indicate a genetic component

44. What are the possible blood groups for the offsprings from a type A mother and a type AB father?

(A) A, B, AB and O (B) A, B and AB

(C) A and AB (D) A only

45. Which part of the brain is most important to your recall of information for success on this test ?

(A) Cerebrum (B) Cerebellum

(C) Medulla (D) Thalamus

46. The control of our natural biorhythms and daily cycle is by :

(A) Dim light
(B) Insulin
(C) Thyroxin
(D) Melatonin

47. To produce plants that are homozygous for all traits, the best choice is :

(A) Cell suspension culture
(B) Callus culture
(C) Anther/pollen culture
(D) Plant organ culture

48. The hormone responsible for phototropic responses in the growing tips of plants is :

(A) Ethylene
(B) Auxin
(C) Gibberellin
(D) Abscisic acid

49. Antimicrobial resistance is facilitated by which of the following ?

(A) The inappropriate use of medicines
(B) Use of low-quality medicines
(C) Using poor infection prevention and control methods
(D) All of the above

50. What do transduction, transformation, and conjugation have in common ?

(A) All require presence of an outside factor to facilitate gene transfer
(B) In all the 3 processes, DNA is transferred as a single stranded molecule
(C) They all transfer extremely large pieces of DNA into the recipient cells
(D) None of the above

51. Which of the following is absent in the cell wall of gram negative bacteria ?

(A) Lipoproteins
(B) Lipopolysaccharide
(C) Teichoic acid
(D) Peptidoglycan

52. An experiment began with 4 cells and ended with 128 cells. How many generations did the cells go through ?

(A) 64
(B) 32
(C) 6
(D) 5

53. Succinate dehydrogenase converts Succinate to Fumarate, it can be inhibited by addition of Malonate, the inhibition caused is a classical example of :

(A) Allosteric inhibition
(B) Competitive inhibition
(C) Non-competitive inhibition
(D) Uncompetitive inhibition

54. The amount of enzyme catalyzing the conversion of one mole of substrate to product in one second is :

(A) One International Unit (B) One Katal

(C) Specific activity (D) Catalytic power

55. The transition state of a catalyzed reaction is :

(A) Lower in energy than that of an uncatalyzed reaction

(B) Lower in energy than the reaction substrate

(C) Bound very weakly to the catalyst

(D) A highly-populated intermediate on the reaction pathway

56. Which of the following amino acid side chains is most likely to act as both a weak acid and a nucleophile in enzyme-catalysed reactions ?

(A) Glutamine (B) Histidine

(C) Serine (D) Lysine

57. Genes which promote cancer are called :

(A) Tumor suppressors (B) Oncogenes

(C) Growth factors (D) Malignancy enhancers

58. During which stage of mitosis does cytokinesis usually occur in animals ?

(A) Prophase (B) Metaphase

(C) Anaphase (D) Telophase

59. Which of the following compounds is synthesized by macrophages for killing bacterial cells ?

(A) Nitric oxide (B) Glutathione

(C) Melatonin (D) Melanin

60. Migration of cancerous cells from the site of origin to other part of body forming secondary tumors is called:

(A) Diapedesis (B) Metastasis

(C) Proliferation (D) Differentiation

1. Following is the mean, median and mode respectively of the data ; 13, 18, 13, 14, 13, 16, 14, 21, 13 :
   (A) 15, 14, 13
   (B) 13, 17, 18
   (C) 15, 13, 14
   (D) 13, 18, 17

2. In bio-informatics, the tool "BLAST" is used for :
   (A) Translating mRNA sequence to Protein sequence
   (B) Finding restriction endonuclease sites in a given DNA sequence
   (C) Finding open reading frame of a given DNA sequence
   (D) The sequences alignment of a given nucleotide sequence

3. The volume (in ml) of 20 mM NaCl solution required to prepare 100 ml of 5 mM NaCl solution is :
   (A) 4 ml
   (B) 50 ml
   (C) 25 ml
   (D) 10 ml

4. Molarity of 15% glucose solution in water is :
   (A) 1.2 M
   (B) 0.88 M
   (C) 1.5 M
   (D) 0.5 M

5. Heterolytic cleavage of carbon-hydrogen bond (-C-H) results in the formation of carbon-cation and :
   (A) Hydride ion
   (B) Proton
   (C) Hydrogen free radical
   (D) None of the above

6. If the ΔH is positive and ΔS is negative, the reaction is :
   (A) Spontaneous only below $T = \Delta H/\Delta S$
   (B) Endergonic at all temperatures
   (C) Spontaneous only above $T = \Delta H/\Delta S$
   (D) Exothermic at all temperatures.

7. At pH < 2, the glycine will be mostly :
   (A) Zwitter ion
   (B) Neutral
   (C) Negatively charged
   (D) Positively charged

8. Micelles in aqueous solution are formed by :

(A) Hydrophobic molecules
(B) Hydrophilic molecules
(C) Amphiphilic molecules
(D) None of the above

9. In Ramachandran diagram, the torsional degree of freedom in a peptide unit is measured between the angles :

(A) C – N and C – C
(B) C = N and C = O
(C) C_β – C and C – N
(D) C_β – C and C = O

10. Which of the following is directly required for DNA synthesis ?

(A) Linoelic acid
(B) Folic acid
(C) Oelic acid
(D) None of the above

11. In a double-standard DNA having Watson-Crick base pairing, if guanine is 10% , what will be the percentage of adenine ?

(A) 90%
(B) 40%
(C) 20%
(D) 10%

12. In sucrose, the glycosidic bond is formed between :

(A) C1 of glucose and C2 of fructose
(B) C1 of glucose and C4 of fructose
(C) C2 of glucose and C4 of fructose
(D) C4 of glucose and C1 of fructose

13. Which of the following is NOT the component of a typical mammalian biological membrane ?

(A) Saturated phospholipids
(B) Cholesterol
(C) Unsaturated phospholipids
(D) None of the above

14. Which of the following is NOT correct regarding Na^+–K^+ pump ?

(A) It moves the Na^+ and K^+ across the membrane against their concentration gradients

1.

(B) It pumps Na^+ inside cell and K^+ outside cell

(C) It uses ATP

(D) It helps in maintaining the resting potential of the cells

2. 15. Which of the following is NOT true about mitochondria ?

(A) Inner membrane has large number of infoldings

(B) Transcription of genes does not occur in mitochondria

(C) F_0F_1 particles are meant for ATP synthesis

(D) It plays role during apoptosis

3.

16. Which of the following is TRUE about euchromatin ?

(A) It is densely packed chromatin

(B) It is often part of less-active transcriptional unit of chromatin

4 (C) It is often part of more-active transcriptional unit of chromatin

(D) Both (A) and (B)

17. Conversion of glycogen to glucose–1 phosphate is called as :

(A) Gluconeogenesis (B) Glycolysis

(C) Glycogenesis (D) Glycogenolysis

18. If NAD^+/NADH ratio increases, the TCA cycle will be :

(A) Inhibited (B) Activated

(C) Neither activated, nor inhibited (D) First inhibited and then activated

19. In humans, the metabolic degradation of most of the standard amino acids results in the formation of :

(A) TCA cycle intermediates (B) Uric acid

(C) Both (A) and (B) (D) None of the above

20. Which of the following is correct regarding pentose phosphate pathway (PPP) ?

(A) It is active in actively growing cells

(B) It is active in adipose tissue

(C) It is active in cells with oxidative stress

(D) All the above

21. During oxidation-reduction reactions, the reducing agent is :

(A) Oxidized and gains electrons

(B) Oxidized and loses electrons

(C) Reduced and gains electrons

(D) Reduced and loses electrons

22. Which of the following is the initial electron donor for the non-cyclic photophosphorylation ?

(A) H_2O

(B) ATP

(C) $NADPH_2$

(D) None of above

23. Which of the following is NOT correct regarding chemiosmotic theory of oxidative phosphorylation ?

(A) An electrochemical gradient is formed across the inner mitochondrial membrane

(B) For the creation of electrochemical gradient, the protons move from inter-membrane space to mitochondrial matrix

(C) The electron transport chain complexes are present in the inner mitochondrial membrane.

(D) ATP synthesis by Fo F1 ATP synthase occurs by forming bond between inorganic phosphate and ADP.

24. In most of the biological reactions, the NAD^+ gets reduced by accepting :

(A) Two electrons and a proton

(B) One electron and a hydrogen atom

(C) One hydride ion

(D) Both (B) and (C)

25. In E.coli Promoter, the Pribnow box is mostly located at :

(A) +10 position relative to transcriptional start site

(B) –10 position relative to translational start site

(C) –35 position relative to transcriptional start site

(D) –10 position relative to transcriptional start site

26. DNA replication, catalyzed by DNA polymerase occurs in :

(A) 5` -3` direction

(B) 3` -5` direction

(C) In one stand 5`-3` and in other 3`-5` direction

(D) 5`-5` direction

27. Which of the following is m^7 G-cap binding protein of eukaryotic mRNA ?

(A) eIF3 (B) eIF4G

(C) eIF4A (D) eIF4E

28. *Chi*-sequence are mostly involved in :

(A) Transcription

(B) Recombination

(C) Replication origin recognition

(D) End replication of eukaryotic DNA

29. Type–II restriction enzymes are :

(A) Endonucleases that recognizes specific DNA sequence and break phosphodiester bond within the sequence

(B) Exonucleases that recognizes specific DNA sequences and break phosphodiester bond outside it

(C) Enzymes that recognize specific DNA sequences and break glycosidic bond within the sequence

(D) Both (B) and (C)

30. Beta-lactamase selectable marker gene used in vectors gives resistance against :

(A) Kanamycin (B) Tetracycline

(C) Ampicillin (D) Chloramphenicol

31. In DNA recombinant technology, DNA ligases are used to :

(A) Join two DNA strands by forming the phosphodiester bond

(B) Join two DNA strands by forming the Hydrogen bond

(C) Join two DNA strands by forming the glycosidic bond

(D) Both (B) and (C)

32. Which of the following is NOT required during polymerase chain reaction ?

(A) DNA polymerase (B) Primase

(C) dNTPs (D) Template DNA

33. Which of the following is the central molecule in complement pathway of immune system ?

(A) C1 (B) C2

(C) C3 (D) C5

34. A typical monomeric antibody has :

(A) Two Fab regions and two Fc regions

(B) Two Fab regions and One Fc region

(C) One Fab region and One Fc region

(D) One Fab region and two Fc regions

35. Clonal selection occurs when antigen is encountered by :

(A) Neutrophil (B) Basophil

(C) Eosinophil (D) None of the above

36. Individuals with AB-blood group possess :

(A) A and B antigen and no anti-A and B antibodies

(B) A antigen and anti-B antibodies

(C) No antigen and anti-A and B antibodies

(D) B antigen and antie -A antibodies

37. In gel-exclusion chromatography, the protein are mainly separated on the basis of :

(A) Charge (B) Adsorption to matrix

(C) Affinity with ligand (D) None of above

38. Which of the following is true regarding the electrophoretic mobility of ion during gel electrophoresis ?

(A) It is directly proportional to charge of ions

(B) It is inversely proportional to frictional coefficient of the medium

(C) It is inversely proportional to square of charge of ions

(D) Both (A) and (B)

39. During isopycnic density centrifugation, when the density of particle becomes equal to that of medium, the particle will :

(A) Move towards the bottom of tube

(B) Move upwards

(C) Depict zero sedimentation

(D) First move upwards and then downwards

40. For the detection of specific mRNA by Northern Blot, the probe used is :

(A) Sense DNA strand of that particular gene

(B) Template DNA strand of that particular gene

(C) RNA sequence of same mRNA

(D) All the above

41. The mutations that result in a protein, which "poisons" or otherwise counteracts the wild type protein are known as :

(A) Hypomorphic (B) Null

(C) Dominant negative (D) Loss of function

42. Which of the following is NOT the genetic disorder ?

(A) Phenylketonuria (B) Cystic Fibrosis

(C) Hemophilia (D) None of the above

43. The number of types of gametes produced by a homozygous individual is :

(A) 1 (B) 2

(C) 3 (D) 4

44. When an offspring of F1 generation is crossed with one of its parents, it is called as :

(A) F1 cross
(B) F0 cross
(C) Back cross
(D) Both (A) and (B)

45. Which of the following is a glial cell (s) of the central nervous system ?

(A) Microglia
(B) Oligodendrocytes
(C) Astrocytes
(D) All of the above

46. Which of the following is "Fight or Flight" hormone ?

(A) Glucagon
(B) Epinephrine
(C) Insulin
(D) None of above

47. Which of the following is correct regarding cyclic photophosphorylation ?

(A) O_2 is produced
(B) Only ATP is produced
(C) Photolysis of water occurs
(D) Both photosystem II and I are involved

48. Following is the precursor of naturally occurring Auxin :

(A) Methionine
(B) Tryptophan
(C) Alanine
(D) Glycine

49. Transduction is :

(A) Bacterial mediated viral recombination
(B) Viral mediated viral recombination
(C) Bacterial mediated bacterial recombination
(D) Viral mediated bacterial recombination

50. Clavulanic acid added to amoxicillin preparations is meant for :

(A) Increasing the absorption of the amoxicillin
(B) Preventing the degradation of amoxicillin by beta-lactamase
(C) Increasing the excretion of amoxicillin
(D) All the above

1.

51. The growth of the bacterial culture in turbidometric measurement is normally expressed as :

(A) Cells per milliliter
(B) Colony forming units per milliliter
(C) Optical density
(D) None of the above

2.

52. Which of the following is NOT directly used in the treatment of viral diseases ?

(A) Interferon
(B) Penicillium
(C) Acyclovir
(D) Antibodies

53. Feedback inhibition for a particular enzyme catalyzed reaction is mediated by :

(A) The product
(B) The substrate
(C) Enzyme of the next reaction
(D) Enzyme of the previous reaction

3.

54. Which of the following is most appropriate feature of allosteric enzymes ?

(A) They are non-Proteinaceous in nature
(B) They contain binding site for molecules other than the substrate binding site
(C) They catalyze the reactions that are usually non-regulatory in nature
(D) Most of these enzymes have hyperbolic enzyme -substrate curve.

55. Binding of an inhibitor to enzyme -substrate complex and not to free enzyme is an example of :

(A) Mixed inhibition
(B) Competitive inhibition
(C) Un-competitive inhibition
(D) Both (A) and (B)

42

56. Generally enzymes act by :

(A) Reducing the energy of activation
(B) Increasing the energy of activation
(C) Reducing the pH
(D) Increasing the pH

43.

57. Contact inhibition is usually NOT the feature of following cells :

(A) Normal cells
(B) Primary cells
(C) Malignant cells
(D) Both (A) and (B)

CNW

55. During G-protein coupled receptor activation, the adenylate cyclase enzyme is activated by :

(A) $G_s\alpha$–GTP
(B) $G_i\alpha$–GDP
(C) cAMP
(D) cGMP

58. Which of the following molecules directly regulate the activity of CDKs during eukaryotic cell cycle ?

(A) Connexins
(B) Cyclins
(C) Pannexins
(D) Cadherins

60. Which of the following amino acid (s) is the target of protein kinases ?

(A) Threonine
(B) Methionine
(C) Tryptophan
(D) Both (B) and (C)

M.Sc. Bio-Technology/A

1. Which of the following substances is never a Bronsted-Lowry acid in an aqueous solution ?
   (A) Hydrogen fluoride, HF(g)
   (B) Sodium phosphate, $Na_3PO_4(s)$
   (C) Ammonium chloride, $NH_4Cl(s)$
   (D) Hydrogen bromide, HBr(g)

2. If a distribution has a mean of 35 and an SD of 5, what value would be +1.5 SD from the mean ?
   (A) 36.5 (B) 41.5
   (C) 42.5 (D) 47.5

3. Based on the Henderson-Hasselbalch equation, calculate the pH when the ratio of acetic acid to acetate is 10 to 1 (the pK_a of acetic acid is 4.76) :
   (A) 3.76 (B) 4.76
   (C) 5.76 (D) 7.0

4. Glycine is an example of :
   (A) Nonprotic acid (B) Monoprotic acid
   (C) Diprotic acid (D) Triprotic acid

5. At pH 7.0, which of the following amino acids will fall under the polar, uncharged R-group category ?
   (A) Leucine, methionine (B) Serine, asparagine
   (C) Lysine, histidine (D) Aspartate, glutamate

6. For coupled reactions, the K'_{eq} of the final reaction, is calculated by _____ the values of K'_{eq} of the individual reactions.
   (A) Adding (B) Subtracting
   (C) Multiplying (D) Dividing

7. Under standard conditions, when value of K'_{eq} is 1.0, $\Delta G'^{\circ}$ (kj/mol) is zero, the value of $\Delta G'^{\circ}$ (kcal/mol) will be :
   (A) 0 (B) 1
   (C) –5.7 (D) +5.7

8. When NAD^+ or $NADP^+$ undergo reduction to NADH or NADPH respectively, they accept the following from the oxidizable substrate :

(A) One electron and one proton (B) Two electrons and one proton

(C) One electron and two protons (D) None of the above

9. Which one of the following amino acids has a higher propensity for cis peptide bond formation ?

(A) Histidine (B) Cysteine

(C) Glycine (D) Proline

10. Which of the following is never (as far as we know) moved across a lipid bilayer by a carrier protein ?

(A) Ca^{2+} (B) Glucose

(C) H_2O (D) K^+

11. Cellulose, the structural polysaccharide of plant, is a polymer of :

(A) β-D-Glucose (B) α-D-Glucose

(C) β-D-Galactose (D) α-D-Galacturonic acid

12. As far as the absorbance of DNA at 260nm, which of the following is correct ?

(A) Individual nucleotides>ssDNA>dsDNA

(B) dsDNA>ssDNA> individual nucleotides

(C) ssDNA>dsDNA> individual nucleotides

(D) Absorbance remains same

13. Molecules that are lipophilic generally :

(A) Can cross cell membranes directly through the lipid bilayer

(B) Can cross cell membranes only through active transport

(C) Can cross cell membranes only through carrier proteins

(D) Can cross cell membranes only through channel proteins

14. You would expect a cell with an extensive Golgi apparatus to :

(A) Make a lot of ATP (B) Secrete a lot of material

(C) Perform photosynthesis (D) Store large quantities of food

15. Which of the following statements is **NOT** correct about centrioles ?

(A) Centrioles are found in animal cells but not in plant cells
(B) Animals cells have two centrioles
(C) The two centrioles lie parallel to each other
(D) Centrioles lie within the centrosome

16. Which of the following organelles is the largest and most easily observed with the light microscope ?

(A) Mitochondria
(B) Chloroplast
(C) Nucleus
(D) Ribosomes

17. During the biosynthesis of urea in the urea cycle, the two nitrogen atoms are derived from :

(A) Two free ammonium groups
(B) Free ammonium group and aspartate
(C) Both nitrogen atoms are derived from arginine
(D) One nitrogen atom is derived from citrulline and one from glutamate

18. Which of the following modifications is common to both protein and DNA ?

(A) Methylation
(B) SUMOylation
(C) Ubiquitination
(D) Nitrosylation

19. Acyl carrier protein of E.Coli (a small protein), contains which of the following as prosthetic group ?

(A) Biotin
(B) Malonyl CoA
(C) Ascorbic acid
(D) 4′-phosphopantetheine

20. Infants suffering from phenylketoneuria lack the following enzyme :

(A) Tyrosine ketoneurase
(B) Phenylalanine pyruvase
(C) Phenylalanine hydroxylase
(D) Phenylalanine ketonase

21. Pyruvate kinase has which of the following characteristics ?

(A) It is inhibited by ATP
(B) It is activated by phosphorylation
(C) It is dependent on thiamine pyrophosphate
(D) It is located in mitochondria

22. Addition of which inhibitor inhibits FAD-linked oxidation in electron transport chain ?

(A) Amytal
(B) Antimycin
(C) Cyanide
(D) All of the above

23. Swapping an inactivated allele for a gene of interest produces a _____ mouse while replacing a gene with another that has an altered function creates a _____ mouse.

(A) Knockout, knockdown
(B) Knockout, gene targeted
(C) Knockout, knockin
(D) Gene targeted, knockin

24. "Naked" DNA :

(A) Is free of nucleic acids
(B) Is free of the cell
(C) Is free of protein
(D) Contains just the sugar-phosphate backbone

25. The RNA primer synthesized during the replication process in bacteria is removed by :

(A) DNA gyrase
(B) Primase
(C) DNA polymerase I
(D) DNA polymerase II

26. Shine Dalgarno's sequence present in mRNA binds to :

(A) 3′ end of rRNA
(B) 5′ end of rRNA
(C) 5′ end of tRNA
(D) 3′ end of tRNA

27. In mismatch correction repair, the parental DNA strand is distinguished from the daughter strand by :

(A) Acetylation
(B) Phosphorylation
(C) Methylation
(D) Glycosylation

28. In zinc finger proteins, the amino acid residues that coordinate zinc are :

(A) Cys and His
(B) Asp and Glu
(C) Arg and Lys
(D) Asp and Arg

29. Fragment of about 500 kb can be accommodated by :

(A) Plasmid vectors
(B) Phagemids
(C) BACs
(D) YACs

30. In the blue-white screening procedure, bacteria that are transformed with recombinant plasmid and cultured in media containing ampicillin and X-gal will :

(A) Not grow in this medium
(B) Produce blue colonies
(C) Grow more rapidly than cells without recombinant DNA
(D) Produce white colonies

31. Assume a cloning vector contains an antibiotic resistance gene and an appropriate restriction enzyme recognition site in the lacZ site. The gene of interest, if inserted, will :

(A) Activate the antibiotic resistance gene
(B) Inactivate the antibiotic resistance gene
(C) Inactivate the beta-galactosidase gene
(D) Activate the beta-galactosidase gene

32. Which of the following events occurs in the reaction catalysed by ribonucleotide reductase ?

(A) Inhibition of ribonucleotides
(B) Reduction of ribonucleotides by thioredoxin and NADH
(C) Reduction of purine and pyrimidine ribonucleoside diphosphates
(D) Regeneration of tetrahydrofolate (THF) by NADPH

33. The membrane of mature B cells have :

(A) Both IgG and IgM
(B) Both IgG and IgD
(C) Both IgM and IgE
(D) Both IgM and IgD

34. Endogenous antigens are presented on to the cell surface alongwith :

(A) MHC-I
(B) MHC-II
(C) Fcγ receptor
(D) Complement receptor

35. Both BCRs and TCRs share the following properties, except :

(A) They are integral membrane proteins

(B) They are present in thousands of identical copies exposed at the cell surfce

(C) They are made only when the cell encounters an antigen

(D) They are encoded by genes assembled by the recombination of segments of DNA

36. The TCR is composed of two different protein chains. In minority of T cells, this consists of :

(A) An alpha (α) and beta (β) chain

(B) An alpha (α) and gamma (γ) chain

(C) A beta (β) and delta (δ) chain

(D) A gamma (γ) and delta (δ) chain

37. Chromatography is based on the :

(A) Different rate of movement of the solute in a column

(B) Separation of one solute from other constituents by being captured on the adsorbent

(C) Different rate of movement of the solvent in the column

(D) None of the above

38. Most proteins bind SDS in the same ratio, approximately one molecule of SDS binds :

(A) 1 amino acid residue (B) 2 amino acid residues

(C) 4 amino acid residues (D) 0.5 amino acids

39. On denaturation the frictional coefficients of globular proteins :

(A) Decreases (B) Increases

(C) Remains same (D) Changes by a factor of 100

40. Cation exchangers bind :

(A) Cations (B) Anions

(C) Both (D) None

41. Frederick Griffith used smooth (S) and rough (R) strains of Streptococcus pneumoniae in his classical experiment that showed DNA might be the genetic element. Which one of the following observations gave the clue for this discovery ?

(A) R strain became S strain when mixed with heat killed S strain
(B) R strain remained R strain when mixed with heat killed S strain
(C) S strain became R strain when mixed with heat killed R strain
(D) R strain became S strain when mixed with live S strain

42. A protein is phosphorylated at a serine residue. A phosphomimetic mutant of the protein can be generated by substituting that serine with :

(A) Glycine
(B) Alanine
(C) Aspartate
(D) Threonine

43. A _____ mutation originates during meiosis while a _____ mutation originates during mitosis.

(A) Germinal, somatic
(B) Germinal, spontaneous
(C) Somatic, germinal
(D) Spontaneous, point

44. A frameshift mutation :

(A) Replaces one amino acid with another
(B) Removes part of the protein
(C) Introduces a section of amino acids not normally found
(D) Joins two different proteins

45. Consider two compartments, A and B, divided by a membrane permeable only to chloride ions. In compartment A we put 2.0 M NaCl, and in B we put 1.0 M NaCl. Which choice below best describes the pattern of ion diffusion ?

(A) Equal concentrations of Cl^- in both compartments at equilibrium; no change in Na^+ concentrations from the initial state
(B) Some net movement of Cl^- from A into B; no change in Na^+ concentrations from the initial state
(C) Some net movement of Cl^- from A into B; lesser net movement of Na^+ from B into A
(D) Some net movement of Cl^- from A into B; lesser net movement of Na^+ from A into B

46. Pain receptors are also known as :

(A) Chemoreceptors
(B) Mechanoreceptors
(C) Nociceptors
(D) Proprioceptors

47. Steroid hormones activate :

(A) G-protein pathways
(B) Membrane-bound enzymes
(C) Intracellular receptors that activate enzymes
(D) Intracellular receptors that affect gene expression

48. The final step in ethylene synthesis in plants requires O_2 and results in release of :

(A) CO_2 and hydrogen cyanide
(B) CO and hydrogen cyanide
(C) CO_2 and H_2O
(D) CO and H_2O

49. The usefulness of antibiotics is mostly hampered by :

(A) Their inability to kill specific bacteria
(B) Difficulties encountered in mass production
(C) The emergence of antibiotic-resistant bacteria
(D) The limited types of antibiotic available

50. Which one of the following was the most significant difference in the experiments that resulted in Pasteur's proof of biogenesis being accepted over Needham's proof ?

(A) Microbes were never grown in the broth
(B) Air was present
(C) The broth could support life
(D) Microbes did not grow until the broth was inoculated

51. Which of the following mechanisms is antifungal ?

(A) Inhibit 70S ribosomes
(B) Interfere with anaerobic metabolism
(C) Inhibit peptidoglycan synthesis
(D) Inhibit ergosterol synthesis

52. To which one of the following groups, the antibiotics kanamycin, streptomycin and gentamicin belong :

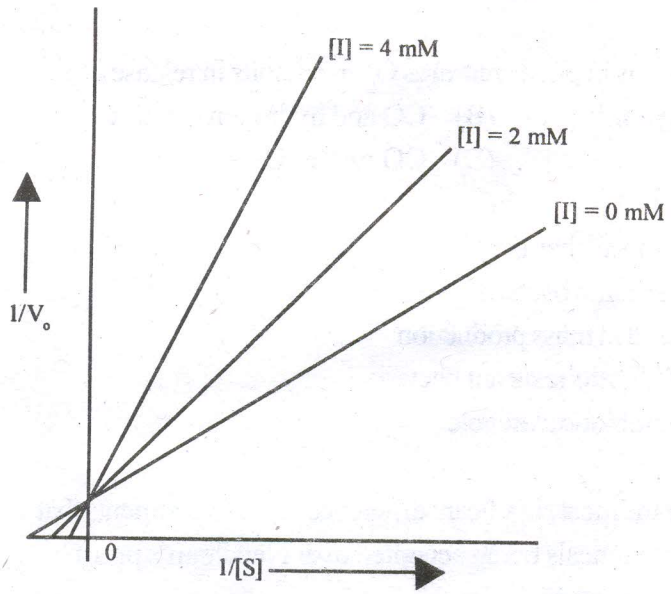
(A) Cephalosporins
(B) Macrolides
(C) Aminoglycosides
(D) Quinolones

53. The catalytic efficiency for an enzyme is defined as :

(A) K_{cat} (B) V_{max}/K_{cat}

(C) K_{cat}/K_m (D) K_{cat}/V_{max}

54. The activity of an enzyme was measured by varying the concentration of the substrate (S) in the presence of three different concentrations of inhibitor [I] 0, 2 and 4 mM. The double reciprocal plot given below suggests that the inhibitor (I) exhibits :



(A) Substrate inhibition (B) Uncompetitive inhibition

(C) Mixed inhibition (D) Competitive inhibition

55. The activity of an enzyme is expressed in International Units (IU). However, the S.I. unit for enzyme activity is Katal. One Katal is :

(A) 1.66×10^4 IU (B) 60 IU

(C) 6×10^7 IU (D) 10^6 IU

56. CTP preferentially binds to Aspartate transcarbamoylase when the enzyme is in :

(A) R-state (B) T-state

(C) Z-state (D) Any state

57. The pair of amino-acids which does **NOT** undergo post-translational modification is :

(A) Asn-His
(B) Tyr-Ser
(C) Asn-Ser
(D) Ala-Gly

58. Which one of the following aminoacids in proteins does **NOT** undergo phosphorylation ?

(A) Ser
(B) Thr
(C) Pro
(D) Tyr

59. About 50% of all human cancers may involve an abnormal or missing :

(A) Oncogene
(B) Proto-oncogene
(C) p53 gene
(D) BRCA-1 gene

60. Carcinomas are tumors arising from :

(A) Epithelial tissue
(B) Bone
(C) Muscle
(D) Connective tissue

M.Sc. Biotechnology

Note :– All questions carry equal marks (2 each), to be answered in a short and precise manner in the space provided.

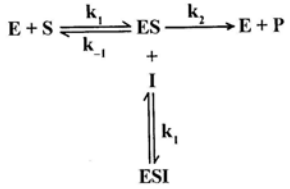
1. **A protein was purified to homogeneity. Gel exclusion chromatography yielded a molecular weight of 60 kDa, but chromatography in presence of 6 M urea yielded a 30-kDa species. When the chromtography was repeated in the presence of 6 M urea and 10 mM betamercaptoethanol, a single peak corresponding to a molecular weight of 15 kDa resulted. Describe the structure of the molecule.**

2. **The absorption coefficient of myoglobin (Mol Weight = 17.8 kDa) at 580 nm is 15,000 $M^{-1}cm^{-1}$. What is the absorbance of a 1 mg ml^{-1} solution across a 1–cm path ? What percentage of the incident light is transmitted by this solution ?**

3. **The gene encoding a protein with a single disulfide bond undergoes a mutation that changes a serine residue into a cysteine residue. You want to find out whether the disulfide pairing in this mutant is the same as in the original protein. Propose an experiment to directly answer this question.**

4. **The amino acid sequences of a yeast protein and a human protein carrying out the same function are found to be 60% identical. However, the corresponding DNA sequences are only 45% identical. Account for this differing degree of identify.**

5. The following reaction represents the mechanism of action of an uncompetitive inhibitor.



Draw a standard Michaelis-Menton curve in the absence and in the presence of increasing amounts of inhibitor. Also show the sketch of a double-reciprocal plot.

6. What do you understand by semi discontinuous replication ? Why does this mode suit DNA replication in a cell ?

7. **Draw an arbitrary titrarion curve for 0.1 M leucine with 0.1 M NaOH. Make sure that axes are properly labelled. Indicate the points for pK1, pK2 and pI. Also show the region of maximum buffering capacity.**

8. **What quantity of acetic acid and sodium acetate will be required to prepare 50 ml of 0.05 M acetate buffer having pH of 5.0 (Given pK = 4.76) ?**

9. **Describe the various bonds other than the peptide bond that make up the backbone of a polypeptide chain. Write a few lines about their role in structure determination.**

10. **A negative standard free energy change ($\Delta G^{0\prime}$) does not always reflect the spontaneity of a reaction ? Comment.**

11. **Give structural representation indicating condensation of Cysteine residues to form Cystine.**

12. **What is the mechanistic basis for the observation that the inhibitors of ATP synthase also lead to an inhibition of the electron-transport chain ?**

13. **Briefly write down the salient features of B–DNA. Point out the differences with Z–DNA.**

14. **What is the difference between unidirectional and bi-directional modes of replication ? Which of the two modes of replication is followed by prokaryotes and eukaryotes ?**

15. **The enzyme aldolase catalyzes the following reaction in the glycolytic pathway :**

Fructose 1, 6, bisphosphate $\overset{\text{Aldolase}}{\rightleftharpoons}$

dihydroxyacetone phosphate + glyceraldehyde 3–phosphate

The ΔG° for the reaction is + 5.7 kcal mol^{-1}, whereas the ΔG in the cell is -0.3 kcal mol^{-1}. Calculate the ratio of reactants to products under equilibrium and intracellular conditions.

16. Determine the initial velocity (V_0) of an enzyme catalyzed reaction for which Vmax = 2000 micromol /ml.sec., Km = 2 mM and [S] = 20 mM.

17. What is mutarotation ? Describe with an example.

18. Indicate whether each of the following pairs of sugars consists of anomers, epimers, or an aldose-ketose pair :

(a) d-glyceraldehyde and dihydroxyacetone

(b) d-glucose and d-mannose

(c) d-glucose and d-fructose

(d) α-d-glucose and β-d-glucose

19. Define the terms : transcription unit, coding strand, template strand and the start point of transcription.

20. Describe the role of sigma factor of RNA polymerase.

1. Digestion of an immunoglobulin by the enzyme papain produces :
   (A) One Fab and one Fc (B) Two Fab and one Fc
   (C) One Fab and two Fc (D) Two fab and two Fc

2. Which of the following statements is correct for thin layer chromatography ?
   (A) TLC is time consuming taking 8–12 hours
   (B) TLC is not well suited for dectection of carbohydrates
   (C) TLC is used to identify drugs, contaminants and adulterants
   (D) The carbohydrate separation by TLC is based on the principle of partition chromatography

3. During polymerization of acrylamide, TEMED catalyses the :
   (A) Decomposition of persulphate ion to generate free radical
   (B) Decomposition of sulphate ion to generate free radical
   (C) Union of two sulphate ions to generate free radical
   (D) Union of persulphate and sulphate ion to generate free radical

4. A technique to transfer DNA separated by agarose gel electrophoresis to a nitrocellulose filter for analysis is called :
   (A) Western blotting (B) Northern blotting
   (C) Southern blotting (D) Eastern blotting

5. Spectrophotometry is based on the principle of :
   (A) Beer's law (B) Beer-Lambert's law
   (C) Lambert's law (D) Dubois law

6. Which of the following types of oxidoreductase enzymes usually form hydrogen peroxide as one of its products ?
   (A) Dehydrogenases (B) Oxygenases
   (C) Oxidases (D) Peroxidases

7. In case of competitive inhibition :
   (A) Km for the substrate shows an increase in presence of inhibitor
   (B) Km for the substrate shows an decrease in presence of inhibitor
   (C) Km remains unchanged in presence of inhibitor
   (D) Km increases or decreases depending upon the nature of substrate

8. Which of the following amino acid residue is concerned with metal binding at the active site of many proteins like carboxypeptidase A, alkaline phosphatase ?
   (A) Histidine
   (B) Methionine
   (C) Cysteine
   (D) Proline

9. Which of the following necessarily results in the formation of an enzyme-substrate intermediate ?
   (A) Allosteric regulation
   (B) Covalent catalysis
   (C) Substrate strain
   (D) Acid-base catalysis

10. The *gag* gene (oncogene) in Rous Sarcoma Virus codes for :
   (A) Group specific antigens
   (B) Reverse transcriptase
   (C) Glycoproteins
   (D) Tyrosine kinase

11. Which of the following statements is incorrect about P53 tumor suppressor gene ?
   (A) Gene is located on short arm of chromosome 15
   (B) Product is nuclear phosphoprotein of 53 KDa
   (C) P53 is not required for normal cell development
   (D) P53 acts as a transcriptional regulator

12. *Ras* protein is a plasma membrane G protein that plays a central role :
   (A) In the transmission of signals from external growth factors to the cell interior
   (B) In the transmission of signals from internal growth factors to the cell exterior
   (C) Both (A) and (B)
   (D) None of the above

13. Chronic myelogenous leukemia caused by *abl* oncogene is produced by :
   (A) Amplification
   (B) Point mutation
   (C) Rearrangement
   (D) Translocation

14. The black and yellow pigments in coats of cats are determined by an X-linked pair of alleles, c^b (black) and c^y (yellow). Males are either black (c^b) or yellow (c^y), and females are either black (c^bc^b), calico with patches of black and patches of yellow (c^bc^y), or yellow (c^yc^y). What genotypes and phenotypes would be expected among the offsprings of a cross between a black female and a yellow male ?
   (A) Genotype of female offsprings c^bc^y and phenotype calico and genotype of male offsprings c^b and phenotype black
   (B) Genotype of female offsprings c^b and phenotype black and genotype of male offsprings c^bc^y and phenotype calico
   (C) Genotype of female and male offsprings c^b and phenotype black
   (D) Genotype of female and male offsprings c^bc^y and phenotype calico

15. The chromatids of a chromosome are usually not identical sisters along their entire length because of :

(A) Crossing over
(B) Formation of chiasmata
(C) Crossing over and formation of chiasmata in prophase I
(D) Crossing over and formation of chiasmata in prophase II

16. Shuttle vector is a genetically engineered plasmid containing sequences from :

(A) E. coli and yeast
(B) E. coli and retrovirus
(C) Yeast and retrovirus
(D) E. coli and Salmonella

17. During mutation when pyrimidine base is replaced with a purine or the other way around. This is called :

(A) Transition mutation
(B) Transversion mutation
(C) Silent substitution
(D) Frame shift mutation

18. Which of the following algae is non-photosynthetic ?

(A) Prototheca
(B) Chlorella
(C) Euglena
(D) Diatoms

19. Which of the following drugs is responsible for inhibition of transcription of mRNA from DNA by binding to and inactivating bacterial mRNA polymerase ?

(A) Erythromycin
(B) Tetracycline
(C) Trimethoprin
(D) Rifampin

20. In staphylococci with non-conjugative resistance (r) factors, penicillin resistance is caused by an inducible :

(A) Beta-Lactamase
(B) Alpha-Lactamase
(C) Beta-Galactamase
(D) Alpha-Galactamase

21. When the donor DNA that is injected into the recipient cells does not integrate into the recipient DNA, the transduction is termed as :

(A) Generalized transduction
(B) Specialized transduction
(C) Restricted transduction
(D) Abortive transduction

22. In certain types of potato (*Solanum tuberosum*), formation of tubers :
    (A) Is independent of length of days and night temperature
    (B) Starts only when short days and relatively low night temperatures are dominant
    (C) Starts only when long days and relatively high night temperatures are dominant
    (D) Starts only when long days and relatively low night temperatures are dominant

23. Transpiration is regulated by the movement of :
    (A) Epidermal cells of the leaves (B) Guard cells of the stomata
    (C) Subsidiary cells (D) Mesophyll cells

24. Tricuspid valve lies :
    (A) Between left atrium and left ventricle
    (B) Between right atrium and right ventricle
    (C) At entrance to pulmonary trunk
    (D) At entrance to aorta

25. Which of the following does not play role as secondary messenger in hormonal action ?
    (A) Cyclic AMP (B) Protein kinase
    (C) Phosphoinositides (D) Cyclic CMP

26. Water has a biological significance because it is :
    (A) Amphoteric in nature (B) Neutral in nature
    (C) Amphipathic in nature (D) Dipolar in nature

27. 3.01×10^{23} HCl molecules are dissolved in water and the solution is diluted to a volume of 4 litres. The molar concentration of the solution is :
    (A) 1M
    (B) 2M
    (C) 0.125M
    (D) 1.25M

28. The site that provides information on properties of amino acids, bond geometry and prediction about protein structure is :
    (A) PROWL (B) Cn3D
    (C) PDB (D) NCBI

29. In a positively skewed distribution results :

(A) The mode will have smallest value, mean extremely large and median will lie between the values of the mode and the mean

(B) The mode will have large, mean small and median will lie between the value of the mode and the mean

(C) The mean will have same value as the mode and median will lie between them

(D) Median will have small value as compared to mean and the mode will lie in between them

30. The unit of entropy is :

(A) $J K^{-1} mol^{-1}$ (B) $J mol^{-1}$

(C) $J^{-1} K^{-1} mol^{-1}$ (D) $J K mol^{-1}$

31. The pair of molecules having similar geometry :

(A) BF_3 and NH_3 (B) H_2O_2 and C_2H_2

(C) CO_2 and SO_2 (D) NH_3 and PH_3

32. Which of the following interactions is not a part of van der Waals interactions ?

(A) Dipole–dipole interactions

(B) Dipole induced–dipole interactions

(C) Dispersion forces

(D) Ion-dipole interactions

33. The principal buffer present in human blood :

(A) $NaH_2PO_4 + Na_2HPO_4$ (B) $CH_3COOH + CH_3COONa$

(C) $H_3PO_4 + NaH_2PO_4$ (D) $H_2CO_3 + HCO_3^-$

34. Alpha–D–Glucose and Beta–D–Glucose are the two :

(A) Epimers (B) Anomers

(C) Racemers (D) Mesomers

35. G_{M1} ganglioside is known to be the receptor in human intestine for :

(A) Cholera toxin (B) E. coli

(C) VitaminA (D) Carotenoids

36. Vitamin A deficiency causes :

(A) Beri beri
(B) Pernicious anemia
(C) Pellagra
(D) Xerophthalmia

37. Peptide bonds that involve the imino nitrogen of proline readily attain the :

(A) *trans* configuration
(B) *cis* configuration
(C) E-configuration
(D) Z-configuration

38. Biological membranes are associated with all of the following except :

(A) Prevention of free diffusion of ionic solutes
(B) Release of proteins when damaged
(C) Specific systems for the transport of uncharged molecules
(D) Free movement of proteins and nucleic acids across the membrane

39. Which of the following is both a Bronsted acid and a Bronsted base in water ?

(A) $H_3PO_4^-$
(B) H_2CO_3
(C) NH_4^+
(D) NH_3

40. Mitochondria are associated with all of the following except :

(A) ATP synthesis
(B) Protein synthesis
(C) Hydrolysis of various molecules at low pH
(D) Apoptosis

41. Lysosomal membrane disruption within cells can lead to pathological condition :

(A) Arthritis
(B) Allergic responses
(C) Muscle disease
(D) All the above

42. Succinate dehydrogenase is inhibited by :

(A) Oxaloacetate
(B) Malonate
(C) Both (A) and (B)
(D) None of the above

43. In glycolysis ATP synthesis is catalyzed by :

(A) Hexokinase
(B) 6-phosphofructo-1-kinase
(C) Glyceraldehyde-3-phosphate dehydrogenase
(D) Phosphoglycerate kinase

44. Which of the following is not regarded as gluconeogenic enzymes ?

(A) Fructose 1, 6-bisphosphatase (B) Glucose 6-phosphatase

(C) Phosphoglucomutase (D) Pyruvate carboxylase

45. Phospholipases A_1 and A_2 :

(A) Have no role in phospholipid synthesis

(B) Remove a fatty acid in *sn*–1 or *sn*–2 position so that it can be replaced by another in phopholipid synthesis

(C) Hydrolyse phophatidic acid to a diglyceride

(D) Are responsible for initial insertion of fatty acids in *sn*–1 and *sn*–2 positions during synthesis

46. Copper is an essential component, participating in the transfer of electrons of :

(A) Complex I (B) Complex II

(C) Complex III (D) Complex IV

47. Which of the following is the most dangerous reactive oxygen species (ROS) ?

(A) H_2O_2 (B) O_2^-

(C) OH (D) O_2

48. Stimulation of oxygen uptake by ADP during oxidative phosphorylation is inhibited by :

(A) Oligomycin

(B) Dinitrophenol

(C) Carbonyl cyanide-p-trifluoromethoxy phenyl hydrazone

(D) All the above

49. Using the equation :

$\Delta G^{o'} = nF \Delta E_o'$ (Faraday constant = 96.5 KJV^{-1})

The free energy change for the mitochondrial electron transfer reactions between NAD^+ – NADH couple ($E_o' = -0.32$ V) and $\frac{1}{2} O_2 - H_2O$ couple ($E_o' = +0.82$ V) is :

(A) –220 $KJmol^{-1}$ (B) +220 $KJmol^{-1}$

(C) –110 $KJmol^{-1}$ (D) +110 $KJmol^{-1}$

50. Replication :
    (A) Is semi conservative
    (B) Requires only protein with DNA polymerase activity
    (C) Requires a primer in eukaryotes but not in prokaryotes
    (D) All the above

51. Methylation of bases in DNA usually :
    (A) Facilitates the binding of transcription factor to the DNA
    (B) Makes a difference in activity only if it occurs in an enhancer region
    (C) Inactivates DNA from transcription
    (D) Prevents chromatin from unwinding

52. Termination of protein synthesis :
    (A) Requires a stop codon to be located at P site of the large ribosomal subunit
    (B) Occurs when a non-ribosomal protein release factor binds to the ribosomes
    (C) Does not require energy
    (D) Coincides with the degradation of the ribosomes

53. A group of operons that are controlled by a common repressor is called :
    (A) Regulon (B) Transposon
    (C) Meselson (D) Morgan

54. A technique for defining gene arrangement in very long stretches of DNA (50 – 100 Kb) is :
    (A) RFLP (B) Chromosome walking
    (C) Nick translation (D) Southern blotting

55. Development of recombinant DNA methodologies is based on discovery of :
    (A) PCR (B) Restriction endonucleases
    (C) Plasmids (D) Yeast artificial Chromosomes

56. A sequence of duplex DNA that is the same when the two strands are read in opposite direction :
    (A) Primosome (B) Splicosome
    (C) Palindrome (D) None of the above

57. The plasmid vector pB322 has :

(A) Tetracycline resistant gene
(B) Ampicilin resistant gene
(C) Both (A) and (B)
(D) Tetracycline and ampicilin sensitive gene

58. Haptens :

(A) Can function as antigens
(B) Never act as antigenic deteminants
(C) Strongly bind to antibodies specific for them
(D) Can directly elicit the production of specific antibodies

59. IgG :

(A) Has the highest molecular weight of all the immunoglobulins
(B) Is found primarily in mucosal secretions
(C) Plays an important role in allergic responses
(D) Contains carbohydrate covalently attached to the H chain

60. Hybridoma technology was developed by :

(A) Kohler and Milstein (B) Sanger and Maxwell
(C) Meselson and Stahl (D) Watson and Crick

M.Sc. Biotechnology–I/A

1. According to Coulomb's law, the solubility of a solute increases when :
   (A) Dielectric constant of the solvent is increased
   (B) Dielectric constant of the solvent is decreased
   (C) Charge of the ions is increased
   (D) Both (B) and (C)

2. Proton in aqueous solution mainly exists as :
   (A) Hydride ion
   (B) Proton
   (C) Hydronium ion
   (D) All of the above

3. $[OH]^-$ in aqueous Solution A is 10^{-6}M, Solution B is 10^{-7} M and Solution C is 10^{-8}M, which of the following is true :
   (A) Sol. A is basic, B is neutral and C is acidic
   (B) Sol. A is acidic, B is neutral and C is basic
   (C) Sol. A is neutral, B is acidic and C is basic
   (D) Sol. A is acidic, B is basic and C is neutral

4. Isoelectric point is a point at which :
   (A) Net charge of a protein is maximum
   (B) Net charge of a protein is zero
   (C) Net charge of a protein is positive
   (D) Net charge of a protein is negative

5. Which of the following aminoacid can establish a covalently linkage between two subunits of a protein ?
   (A) Proline
   (B) Tyrosine
   (C) Serine
   (D) Cysteine

6. Phosphodiester bond in RNA is formed between phosphoric acid and :
   (A) 2′–OH of one ribose and 5′–OH of adjacent ribose
   (B) 3′–OH of one ribose and 5′–OH of adjacent ribose
   (C) 3′–OH of one ribose and 3′–OH of adjacent ribose
   (D) 3′–OH of one ribose and 4′–OH of adjacent ribose

7. Which of the following technique is NOT used for protein separation ?

(A) Isoelectric focussing

(B) Gel-exclusion chromatography

(C) Denaturating polyacrylamide gel electrophoresis

(D) Southern blotting

8. Which of the following chemical can reduce disulphide bonds of proteins ?

(A) β-mercaptoethanol

(B) Sodium dodecayl sulphate (SDS)

(C) Urea

(D) Sodium thiocynate

9. Which of the following is inversely related with the electrophoretic mobility of ion in a medium ?

(A) Charge on ion

(B) Electric force

(C) Viscosity of medium

(D) All of the above

10. Ultracentrifugation is used for :

(A) Protein separation

(B) Nucleic acid separation

(C) Protein molecular weight determination

(D) All of the above

11. Partial double bond character of peptide bond is because of the following reason :

(A) Its carbon is bonded to electronegative atom and the nitrogen has loan pair of electrons

(B) Its carbon is bonded to carbon side chain

(C) Its nitrogen is bonded to carbon side chain

(D) Both (B) and (C)

12. Glycosidic bond is present in the following :

(A) Amino acids

(B) Nucleotides

(C) Monosaccharide

(D) Fatty acids

13. Red colour of blood is because of :

(A) Globin part of hemoglobin

(B) Heme part of hemoglobin

(C) Plasma

(D) Antibodies

14. Which of the following is NOT true about triglycerides ?

(A) They form major part of biological membranes

(B) They are non-polar in nature

(C) They act as energy reservoirs in animal cells

(D) They are esters of fatty acids and glycerol

15. The determinants of blood groups are :

(A) Glycoproteins (B) Phospholipid

(C) Nucleic acid (D) Lipoproteins

16. Which of the following statement is NOT true about enzymes ?

(A) They are mostly proteinaceous in nature

(B) Their activity is regulated

(C) They act as catalysts by increasing the activation energy

(D) They are mostly sterospecific

17. An enzyme performs catalysis by using nucleophilic attack on the substrate, which of the following amino acid is the most likely candidate for performing such attack :

(A) Valine (B) Isoleucine

(C) Serine (D) Proline

18. If thyroid stimulating hormone (TSH) is found raised above the normal value, it indicates :

(A) Hyperthyroidism

(B) Hypothyroidism

(C) Both (A) and (B)

(D) Raised TSH has no relation with thyroid function

19. Cells not responsive to insulin hormone is because of the following reason :

(A) Cell lacks insulin receptors

(B) Cell lacks the Protein channel through which insulin enters the cell

(C) Cell membrane of a cell lacks a special phospholipid which binds insulin

(D) Cell has specific proteases which destroy insulin

20. In Muscle, during vigorous activity and depleted oxygen conditions, glucose is mostly converted to :

(A) Acetyl-CoA

(B) Lactate

(C) Ethanol

(D) Both (B) and (C)

21. During action potential (depolarization) in the neurons, the movement of Na^+ ions occurs in the following direction :

(A) Na^+ moves from outside to inside of neuron

(B) Na^+ moves from nucleus to cytosol of neuron

(C) Na^+ moves from inside to outside of neuron

(D) Na^+ moves from cytosol to nucleus of neuron

22. Following conditions favour photorespiration over photosynthesis :

(A) Presence of low O_2 and raised CO_2 near the chloroplast

(B) Presence of low O_2 and low CO_2 near the chloroplast

(C) Presence of raised O_2 and low CO_2 near the chloroplast

(D) Presence of raised O_2 and raised CO_2 near the chloroplast

23. Which of the following is NOT true about bile salts ?

(A) They help in lipid aggregation

(B) They help in lipid digestion

(C) They help in lipid absorption

(D) They help in absorption of lipid soluble vitamins

24. Following combination is the best for the individuals suffering from severe salt and water depletion :

(A) Proteins, salts and water

(B) Salts and water

(C) Vitamins, salt and water

(D) Glucose, salt and water

25. Which of the following metabolic pathway leads to glucose synthesis ?

(A) Phospho pentose pathway
(B) Gluconeogenesis
(C) TCA cycle
(D) None of the above

26. Majority of the chemotherapeutic agents used in cancer treatment are :

(A) Protein translation inhibitors
(B) Transcription inhibitors
(C) DNA synthesis inhibitors
(D) Repair system inhibitors

27. Which of the following statement is NOT correct for DNA Replication ?

(A) It is semi-discontinuous
(B) It is semi-conservative
(C) DNA polymerase synthesizes DNA in 3′ to 5′ direction
(D) DNA polymerase require oligonucleotide to start DNA synthesis

28. Which of the following statement for prokaryotic transcription is NOT correct ?

(A) mRNA transcribed has same sequence as that of template strand of its gene
(B) mRNA transcribed has same sequence as the sense strand of its gene
(C) Prokaryotic mRNAs can be polycistronic
(D) Transcription and translation in prokaryotic is coupled

29. Starting from first nucleotide, how many amino acid coding codons are present in the following synthetic mRNA, 5′–AUGACCACACAGGACUAGUAACAC–3′ :

(A) 5
(B) 6
(C) 7
(D) 8

30. Which of the following is NOT correct about type-II restriction endonucleases ?

(A) They cleave phosphodiester bond between two nucleotides
(B) They cleave both strands of DNA
(C) They recognize specific DNA sequences
(D) They cleave bond between nitrogenous base and the deoxyribose

31. The unique feature of the enzyme Taq polymerase used in Polymerase chain reaction is :

(A) High fidelity
(B) High thermal stability
(C) No cofactor requirement
(D) All of the above

32. Which of the following is NOT correct about clonning vectors ?

(A) They have selectable marker gene

(B) They have multiple cloning site

(C) They do not have any restriction endonuclease site

(D) They have origin of replication

33. Telomeres perform the following function(s) :

(A) They help in end replication of linear DNA

(B) They prevent ligation of chromosomal ends

(C) They prevents exonucleases from attacking the chromosomal ends

(D) All of the above

34. Which of the following is NOT a membrane bound cell organelle ?

(A) Peroxisome (B) Nucleosomes

(C) Glyoxysomes (D) Lysosomes

35. If you have a chloroplast in an aqueous solution, which of the following conditions will make the chloroplast produce oxygen :

(A) Illuminating the chloroplast containing solution

(B) Placing the chloroplast containing solution in dark

(C) ATP addition

(D) NADPH addition

36. Which of the following is NOT present inside mitochondria ?

(A) DNA (B) RNA

(C) Ribosomes (D) None of the above

37. Phosphorylase is an enzymes that :

(A) Add inorganic phosphate to other substrates

(B) Transfer phosphate from ATP to other substrates

(C) Removes phosphate from substrates

(D) All of the above

38. If a husband has A blood group and the wife has B blood group, their offspring's may have the following blood group :

(A) A only (B) B only

(C) AB only (D) A, B, AB and O

39. If a plant, homozygous for red flowers and heterozygous for tallness is bred with a plant homozygous for yellow flowers and homozygous for dwarfness (Red colour and tallness are dominant over yellow colour and dwarfness). What will be the percentage of plants in F1 progeny having red flowers and being tall ?

(A) 25% (B) 50%
(C) 75% (D) 100%

40. Which of the following represents the interphase ?

(A) S, M, G1 (B) G1, S, G2
(C) M, G2, S (D) G1, M, G2

41. Mismatch DNA repair system is able to distinguish newly synthesized DNA strands from older strands because :

(A) New strands do not contain Cytosine bases
(B) Old strands are methylated while new strands are not
(C) New strands are methylated while old strands are not
(D) New strand has some Uracil bases incorporated

42. Which of the following is having the highest antigenicity ?

(A) Proteins (B) Carbohydrates
(C) Lipids (D) Fatty acids

43. Which of the following terms is NOT related to antibody ?

(A) Constant region (B) Fab fragment
(C) Hinge region (D) Epitope

44. Which of the following antibodies are mainly found in secretions ?

(A) IgG (B) IgM
(C) IgA (D) IgE

45. Which of the following pathways of complement system is activated by antibody ?

(A) Classical pathway (B) Alternate pathway
(C) Lectin pathway (D) All of the above

46. How many ml of one molar NaCl solution are required to prepare 10ml of 200mM NaCl solution ?

(A) 8 ml (B) 2 ml
(C) 11.7 ml (D) 0.0117 ml

47. Which of the following molecular events can lead to cancer ?

(A) Chromosomal rearrangement
(B) Altered regulatory sequences
(C) Gene amplifications
(D) All of the above

48. Cancer is often as the result of following events :

(A) Activation of oncogene to proto-oncogene
(B) Activation of Tumor suppressor gene to proto-oncogene
(C) Activation of oncogene to tumor suppressor gene
(D) Activation of proto-oncogene to oncogene

49. Homolytic cleavage of –C–H– bond results in the formation of :

(A) Carbon radical and hydrogen atom
(B) Carbanion and proton
(C) Carbocation and hydride ion
(D) Carbanion and hydride ion

50. Addition of groups to double bonds or formation of double bonds by removal of groups is performed by the following class of enzymes :

(A) Ligases (B) Mutases
(C) Lyases (D) Epimerases

51. Which of the following is the unit of K_m in the Michaelis-Menten equation ?

(A) μM (B) μM/Sec
(C) 1/second (D) Second

52. Oxidative phosphorylation is favoured when :

(A) NAD^+/NADP ratio is high
(B) NADH/NAD^+ ratio is high
(C) NAD^+/NADP ratio is low
(D) Both (B) and (C)

53. Which of the following is a plant stress hormone ?

(A) Auxin (B) Gibberlin
(C) Abscisic acid (D) Cytokinin

54. Which of the following microorganism is used as a host for Ti plasmids so as to produce transgenic plants ?

(A) Nostoc
(B) Thermus aquatics
(C) Agrobacter staphylococcus albus
(D) Agrobacterium tumefaciens

55. The resistance of 4 ohm, 8 ohm and 16 ohm are connected in parallel, the equivalent resistance is :

(A) 16/7
(B) 16/9
(C) 7/16
(D) 7/9

56. Which of the following is correct for the oxidation-reduction reaction : $Fe^{3+} + Cu^{+} \rightarrow Fe^{2+} + Cu^{2+}$:

(A) Cu^{+} acts as reductant and is oxidized
(B) Fe^{3+} acts as reductant and is oxidized
(C) Cu^{+} acts as oxidant and is reduced
(D) Both (B) and (C)

57. Boat and chair conformations are found :

(A) In pyranose sugars
(B) In furanose sugars
(C) Both (A) and (B)
(D) None of the above

58. Following virus has a single-stranded circular genome :

(A) Bacteriophage lambda
(B) ϕX174
(C) Simian virus 40
(D) Herpes simplex virus

59. Ampicillin resistance is conferred by :

(A) Streptokinase
(B) Amylase
(C) β-lactamase
(D) Primase

60. A bacterial strain is designated as High frequency recombination (Hfr) when :

(A) F factor is integrated in its chromosome
(B) F factor DNA alone exists as extra chromosomal DNA
(C) F factor and some bacterial chromosomal DNA with it and remains as extra chromosomal DNA
(D) F factor DNA is absent.

Bio-technology

1. How much current will an electric bulb draw from a 220 V source, if the resistance of a bulb filament is 1200Ω ?

   (a) 0.11 A (b) 0.2 A

   (c) 0.18 A (d) 1.0 A

2. 200 ml of 0.3 M NaCl is prepared by dissolving the following amount of NaCl :

   (a) 3.51 gms (b) 35.1 gms

   (c) 0.35 gms (d) 0.03 gms

3. How many micro litres (µl) of 1m M solution of NaCl is required to make 20 ml of 1µM NaCl solution ?

   (a) 200 (b) 20

   (c) 0.2 (d) 0.02

4. Which of the following is a programming language ?

   (a) Lotus (b) Pascal

   (c) Netscape (d) MS-Outlook

5. Ice is less dense than liquid water, because :

   (a) In ice H_2O molecules make more hydrogen bonds with each other than in liquid state

   (b) In ice H_2O molecules make less hydrogen bonds with each other than in liquid state

   (c) Hydrogen bonding has no role to play in the density of ice

   (d) Hydrogen bonds between H_2O molecules in liquid state are stronger than in ice

6. Formation of native structure of proteins from its denatured form has :

   (a) $\Delta H > 0$ and $\Delta S < 0$ (b) $\Delta H < 0$ and $\Delta S = 0$

   (c) $\Delta H = 0$ and $\Delta S > 0$ (d) $\Delta H < 0$ and $\Delta S < 0$

58. Which of the following amino acid is the most often target of protein kinases activated by growth factors receptors ?

(a) Serine
(b) Tyrosine
(c) Threonine
(d) Histidine

59. Adenylate cyclase is involved in :

(a) Conversion of cAMP to AMP
(b) Conversion of cAMP to ADP
(c) Conversion of ATP to cAMP
(d) All the above

60. Just prior to G2 phase of cell cycle, the diploid human body cell contains :

(a) 23 chromatids
(b) 46 chromatids
(c) 69 chromatids
(d) 92 chromatids

7. On titration, which of the following substances will have three different pK values ?

(a) Acetic Acid
(b) Glycine
(c) Glutamate
(d) Alanine

8. Arginine in acidic medium will have net :

(a) Positive charge
(b) Negative charge
(c) Neutral charge
(d) Zero charge

9. If you have to incorporate an amino acid in a protein where sharp turn occurs, with which of the following groups you will replace the "R" of a general amino acid (R–CH (NH_2)–COOH) :

(a) $-CH_3$
(b) $-CH_2OH$
(c) –H
(d) $-CH_2-CH_3$

10. Following is the relative percentage of single bases obtained from the double stranded DNAs isolated from different bacteria. Using this data, which DNA will have highest melting temperature ?

(a) Adenine (20%)
(b) Guanine (30%)
(c) Cytosine (25%)
(d) Thymine (15%)

11. Trans-fatty acids found in various fast foods have all the following characteristics, except :

(a) They increase the shelf life of vegetable oils
(b) They are made by partial hydrogenation of unsaturated fatty acids
(c) They prevent rancidity of fatty acids
(d) None of the above

12. In aqueous solution, D-glucose exists as a mixture of :

(a) α-D-Glucopyranose and Linear D-Glucose
(b) β-D- Glucopyranose and Linear D-Glucose
(c) Only Linear D-Glucose
(d) α-D-Glucopyranose, β-D-Glucopyranose and Linear D-Glucose

13. Eukaryotic cells are physically linked by intercellular channels made of following proteins :

(a) Chalthrins
(b) Integrins
(c) Connexins
(d) Caderins

14. Proteins with KEDL amino acid signature are destined to :

(a) Endoplasmic reticulum
(b) Golgi bodies
(c) Mitochondria
(d) Lysosomes

15. Cytoskeleton includes all the following, except :

(a) Microtubules
(b) Myosin filaments
(c) Actin filaments
(d) Intermediate filaments

16. Nucleic acids are NOT present in the following cell compartment :

(a) Nucleus
(b) Cytosol
(c) Mitochondria
(d) None of the above

17. Anaerobic degradation of glucose in muscle, *via* glycolysis leads to the formation of :

(a) Lactate
(b) Ethanol
(c) Pyruvate
(d) Acetyl CoA

18. During starvation which of the following metabolic pathways does not occur ?

(a) Gluconeogenesis
(b) Glycogen synthesis
(c) Glycogen breakdown
(d) All the above

19. SGOT enzyme, a diagnostic marker of liver damage is indicative of disturbance in :

(a) Nucleotide metabolism
(b) Carbohydrate metabolism
(c) Amino acid metabolism
(d) Fatty acid metabolism

20. Gout is caused by the deficiency of following :

(a) HGPRT
(b) Glucose-6- Phosphatase
(c) Both (a) & (b)
(d) None of the above

21. In the following oxidation-reduction reaction,
$NADH+H^+ + E\text{-}FMN \rightarrow NAD^+ + E\text{-}FMNH_2$ catalyzed by NADH dehydrogenase, which one is electron acceptor and oxidizing agent ?

(a) NAD^+
(b) $E\text{-}FMNH_2$
(c) NADH
(d) E-FMN

22. Chemiosmotic hypothesis of oxidative phosphorylation requires all the following, except :

(a) Increase in the permeability of the inner mitochondrial membrane to ions
(b) Impermeability of the inner mitochondrial membrane to ions
(c) Intact inner mitochondrial membrane
(d) Generation of proton gradient across inner mitochondrial membrane

23. Which of the following is produced more during the cyclic photophosphorylation of light reaction ?

(a) NADPH
(b) O_2
(c) ATP
(d) All the above

24. In the biological oxidation-reduction reaction, the oxidised form of nicotinamide adenine dinucleotide can accept :

(a) One electron and one proton
(b) One electron and two protons
(c) Two electrons and one proton
(d) Two electrons and two protons

25. *E.coli* was grown for two generations in a media containing ^{15} Nitrogen source. Based on semi-conservative mode of DNA replication, the ratio of $^{14}N\ ^{14}N : {}^{14}N\ {}^{15}N : {}^{15}N\ {}^{15}N$ will be respectively :

(a) 1:1:0
(b) 0:1:1
(c) 1:0:1
(d) 0:0:2

26. Operon has all the following characteristics, except :

(a) All genes in an operon are under the control of single promoter

(b) All genes in an operon are under the control of single transcription terminator

(c) The operon mRNA has single translational start and stop signals

(d) The operon mRNA has more than one Shine-Dalgarno signal

27. Following will be the approx. molecular weight (in Daltons) of the peptide coded by the longest open reading frame of eukaryotic mRNA; 5′-CAAUCCACCAUGGUUUACGAACAGACGUACUAAACAGAAAAAAAA-3′

(a) 770 (b) 880

(c) 1320 (d) 1650

28. Which of the following protein is NOT involved in DNA repair system ?

(a) Uracil-N-Glycosylase (b) RNA Polymerase II

(c) Mut S (d) None of the above

29. How many linear DNA fragments will be obtained, if E. coli genomic DNA is digested with a restriction endonuclease, whose restriction site is present once :

(a) Two

(b) One

(c) None, because all DNA will be degraded

(d) Unknown number

30. Multiple cloning site (MCS) present in a vector is a :

(a) DNA region in a vector containing many unique restriction endonuclease sites

(b) DNA region in a vector where multiple genes can be cloned simultaneously

(c) DNA region in a vector where origin of replication is present to make multiple copies of a vector

(d) DNA region in a vector where selectable marker gene is cloned

31. Which of the following vectors has highest DNA intake capacity ?

(a) Plasmid
(b) Phagemid
(c) Cosmid
(d) Bacteriophage lambda

32. During Polymerase chain reaction, following enzyme (s) is NOT required :

(a) DNA ligase
(b) DNA helicase
(c) Primase
(d) All the above

33. Serum of the person with blood group of "AB" will have antibodies against antigen :

(a) Both "A" and "B"
(b) "O" and "B"
(c) Only "O"
(d) Neither "A" nor "B"

34. Which of the following cell is NOT present in Immune system ?

(a) Cytotoxic T-cell
(b) Natural Killer Cell
(c) Dendritic Cell
(d) None of the above

35. Which of the following is NOT the accurate description of B cells ?

(a) B cells are involved in respiratory burst
(b) B cells produce antibodies
(c) B cells mediate humoral immunity
(d) None of the above

36. Which of the following statement regarding antibodies is Incorrect ?

(a) Antibodies cross placenta
(b) Antibodies are glycosylated
(c) Antibodies have disulphide bond between light chain and heavy chain
(d) None of the above

37. In non-reducing SDS-PAGE, a protein after electrophoresis showed a band of 50 Kda and under reducing conditions same protein showed a band of 25 Kda. On the basis of this observation, the protein is composed of :

(a) Homodimer covalently linked together
(b) Homodimer non-covalently linked together
(c) Heterodimer of different molecular weight subunits
(d) None of the above

38. Gel exclusion chromatography can be used for the following application :

(a) Desalting of protein solution

(b) Separation of proteins in a mixture

(c) Studying protein-protein interactions

(d) All the above

39. Protein dissolved in pure water can be quantified by using :

(a) Spectrophotometry (b) Colorimetry

(c) Both (a) and (b) (d) None of the above

40. Ribosomes are designated as 70S or 80S. The term "S" denotes :

(a) Electrophoteric property of ribosomes

(b) Light scattering property of ribosomes

(c) Gel exclusion chromatographic property of ribosomes

(d) None of the above

41. How are mitochondrial genes inherited ?

(a) Paternally (b) Maternally

(c) During foetal development (d) All the the above

42. Life of the individuals with one of these genetic disorders can be saved and improved using diet modifications :

(a) Cystic fibrosis (b) Down syndrome

(c) Phenylketonuria (d) Sickle Cell anaemia

43. Linkage of genes on same chromosome is never complete, because of :

(a) Mutations

(b) Crossing over between homologous chromosomes

(c) Re-arrangement of genes on chromosomes

(d) All the above

44. Frequency of recombination between two genes will be highest for the map units :

(a) 5 (b) 7

(c) 10 (d) 13

45. Which of the following is NOT the characteristic feature of C_4 plants ?

(a) Their Rubis CO enzyme do not have oxygenase activity

(b) Atmospheric CO_2 is taken up by mesophyll cells which lack Rubis CO enzyme

(c) Rubis CO enzyme is present in Bundle sheath cells

(d) Malate is transported from mesophyll cells to Bundle sheath cells

46. Which of the following function is NOT stimulated by insulin hormone ?

(a) Blood glucose uptake by the cells (b) Protein synthesis

(c) Fatty acid synthesis (d) Glycogen breakdown

47. Transgenic Bt Brinjal is more resistant to :

(a) Fungal infection (b) Bacterial infection

(c) Insects (d) Viral infection

48. Decarboxylation product of the following amino acid acts as inhibitory neurotransmitter in central nervous system :

(a) Glutamate (b) Tyrosine

(c) Trytophan (d) Glycine

49. E. coli is :

(a) Obligate aerobe (b) Facultative anaerobe

(c) Obligate anaerobe (d) None of above

50. Commonly used Amoxicillin drug contains antibiotic which kills bacteria by inhibiting :

(a) Cell wall formation (b) Protein Translation

(c) DNA replication (d) mRNA synthesis

51. Bacteria can acquire antibiotic resistance by :

(a) Mutation (b) Insertion of transposon

(c) Acquiring plasmid (d) All the above

52. Which of the following is NOT present in bacteria ?

(a) Gas vacoule
(b) Magnetosomes
(c) Carboxysome
(d) None of the above

53. To prevent blindness in persons who consume methanol, the patients are given intravenous infusion of ethanol. What is the enzymatic basis of this therapy ?

(a) Ethanol reacts with methanol and makes it less effective
(b) Ethanol competes with methanol for binding the substrate binding site of alcohol dehydrogenase
(c) Ethanol acts an uncompetitive inhibitor of alcohol dehydrogenase
(d) All the above

54. The typical saturation curve for an enzyme catalysed reaction is sigmoidal. This indicates that the enzyme is :

(a) Regulatory enzyme
(b) Non regulatory enzyme
(c) Both (a) & (b)
(d) None of the above

55. A competitive inhibitor of an enzyme :

(a) Increases Km without effecting Vmax
(b) Decreases Km without effecting Vmax
(c) Increases Vmax without effecting Km
(d) Decreases Vmax without effecting Km

56. Among the following which is the wrong pair ?

(a) Transferase-Kinase
(b) Lyase-decarboxylase
(c) Hydrolase-pepsin
(d) Oxidoreductase-epimerase

57. A loss of function mutation in gene was reported to be associated with tumorogenesis. What could be the most probable function of the protein ?

(a) Oncogene
(b) Proto-oncogene
(c) Tumor suppressor
(d) Both (a) & (b)

BIOTECHNOLOGY - 2010

1. 16 is represented in the binary system as :
   (a) 10001 (b) 10000
   (c) 01011 (d) 10100

2. One liter of milk will weigh :
   (a) Equal to one Kg of water
   (b) Less than one Kg of water
   (c) More than one Kg of water
   (d) There is no relation between the two

3. Which of the following nuclei will have a magnetic moment ?
   (a) $^{16}O_8$ (b) $^{2}D_1$
   (c) $^{12}C_6$ (d) $^{32}S_{16}$

4. If equal volumes of solid, liquid or vapour state of water is filled in thermos. Molecules of which state of matter will possess maximum mean kinetic energy :
   (a) Solid (b) Liquid
   (c) Vapour (d) All will have same

5. A closed system is the one which :
   (a) Exchanges energy but not matter with surroundings
   (b) Exchanges neither matter nor energy with surroundings
   (c) Exchanges both energy and matter with surroundings
   (d) Exchanges matter but not energy with surroundings

6. High specific heat of water is useful to cells because :
   (a) It increases the buffering capacity of water
   (b) It helps it to keep the cell environment warm
   (c) It increases the hydrogen bonding capacity of water
   (d) It makes it a good heat buffer

7. Overnight burning of a domestic gas heater in a poorly ventilated room resulted in a death of a person. What could be the possible reason ?
   (a) Release of poisons gaseous (b) Depletion of oxygen
   (c) Overheating (d) Dehydration

8. For spontaneous chemical reactions, which of the following is incorrect ?
   (a) Free energy change is negative (b) Change in enthalpy is negative
   (c) Change in entropy is positive (d) None of the above

9. Molecules dissolve in water because of :
   (a) The properties associated with the solute
   (b) Weak water-water interaction
   (c) The properties associated with water
   (d) Strong solute-solute interaction

10. During melting of ice into water :
   (a) Enthalpy change is negative
   (b) Entropy change is positive
   (c) Both (a) and (b)
   (d) None of above

11. Two uncharged atoms close to each other can stabilize due to :
   (a) Hydrogen bonds
   (b) Ionic bonds
   (c) Hydrophobic force
   (d) Van der Walls force

12. Dielectric constant of formamide, water, ethanol and benzene is 110.0, 78.5, 24.3 and 2.3 respectively. In which of the above solvents force between two electric charges will be highest ?
   (a) Formamide
   (b) Water
   (c) Ethanol
   (d) Benzene

13. Molarity of 1 liter of pure water at 25°C is :
   (a) 55.5 M
   (b) 18 M
   (c) 25 M
   (d) 10 M

14. If equal amount of NaCl and glucose are added to water, which of the above will affect the colligative property of water more ?
   (a) NaCl
   (b) Glucose
   (c) Both will affect equally
   (d) None of above

15. Which of the following is an incorrect statement ?
   (a) Chemical synthesis of chiral molecules produces racemic mixtures
   (b) Biosynthesis of chiral molecules produces a pure stereoisomers
   (c) All amino acids have asymmetric centers
   (d) Chiral molecules are non-superimposible mirror images

16. Sucrose doesn't exist in its anomeric form while its hydrolyzed products glucose and fructose have anomers. The reason is :
   (a) C1 of glucose and C1 of fructose are bonded in glycosidic linkage
   (b) C1 of glucose and C2 of fructose are bonded in glycosidic linkage
   (c) Sucrose is polysaccharide
   (d) Both (b) and (c)

17. Which of the following is likely to obey Charagaff's rule ?
    (a) Double stranded RNA
    (b) Single stranded RNA
    (c) Single-stranded DNA
    (d) None of above

18. Which of the following does not possess nucleic acids ?
    (a) Ribozyme
    (b) Ribosomes
    (c) Nucleosomes
    (d) None of above

19. De-methylated thymine is :
    (a) Cytosine
    (b) Uracil
    (c) Hypoxanthine
    (d) Xanthine

20. Which of the following is correct regarding type-II restriction endonucleases ?
    (a) Both endonuclease and methylase activities are present on single protein molecule
    (b) They cleave DNA at specific sites within the recognition sequence
    (c) They cleave DNA at a site located 1000 the bp away from recognition sequence
    (d) They cleave DNA at site located 24 to 26 bp away from recognition site

21. Which of the following is not a cloning vector ?
    (a) Bacteriophages
    (b) Phagemids
    (c) E.coli
    (d) Bacterial artifical chromosomes

22. Which of the following technique is NOT linked with nucleic acids ?
    (a) Western Blotting
    (b) Polymerase chain reaction
    (c) Southern blotting
    (d) Northern blotting

23. Purifying mRNA using oligo dT tagged column chromatography is an example of :
    (a) Molecular sieve chromatography
    (b) Ion-exchange chromatography
    (c) Affinity chromatography
    (d) High performance liquid chromatography

24. In gel electrophoresis, molecular separation is based on :
    (a) Gel sieving effect
    (b) Electrophoretic mobility of molecules
    (c) Both (a) and (b)
    (d) None of above

25. β-mercapto-ethanol in SDS-PAGE is used :
    (a) To reduce di-sulphide bonds (b) To denature protein
    (c) To give equal charge to proteins (d) Both (b) and (c)

26. Which of the following is NOT true regarding peptide bond ?
    (a) Peptide bond is planar in structure
    (b) Peptide bond has partial double bond characteristics
    (c) Peptide bond assumes a trans configuration
    (d) Peptide bond is a pure single bond

27. Which of the following forces significantly contribute to the structure of proteins ?
    (a) Ionic interactions (b) Van der Walls interactions
    (c) Hydrogen bonding interactions (d) None of above

28. During diarrhea, glucose is recommended to be given orally as opposed to intravenously, because :
    (a) Glucose needs to be digested
    (b) To enhance the secretion of digestive enzymes
    (c) To enhance resorption of Na^+ from intestine
    (d) All the above

29. Blood cells placed in water will have following fate :
    (a) Will become functionally more active
    (b) Will lose water and shrink
    (c) Will have no effect
    (d) Will imbibe water and will lyse

30. Clones are :
    (a) Genotypically and phenotypically similar
    (b) Phenotypically but not genotypically similar
    (c) Genotypically but not phenotypically similar
    (d) None of the above

31. Which of the following ion plays important role in the excocytosis of synaptic vesicles into synaptic cleft ?
    (a) Ca^{2+} (b) Na^+
    (c) K^+ (d) Both (b) and (c)

32. If the outflow of K^+ ions from a neuron is inhibited, it will result in :
    (a) Depolarization (b) Hyperpolarization
    (c) No effect (d) None of above

33. C_4 plants prevent photorespiration by :
    (a) Removing O_2 from their photosynthetic cells
    (b) Removing CO_2 from their photosynthetic cells
    (c) By concentrating CO_2 in their photosynthetic cells
    (d) By concentrating O_2 in their photosynthetic cells

34. Metabolic fate of pyruvate is :
    (a) Lactate
    (b) Acetyl CoA
    (c) Ethanol
    (d) All of the above

35. Expressing more LDL receptors on the cell membrane will prevent :
    (a) Hypocholesterolemia
    (b) Hypercholesterolemia
    (c) Excess of triglycerides in blood
    (d) Septicemia

36. During prolonged starvation, brain's energy requirements are mainly met by :
    (a) Glucose
    (b) Proteins
    (c) Fatty acids
    (d) Acetoacetate and β-hydroxbutyrate

37. Derivative of following amino acid is used to cure Parkinson's disease :
    (a) Glutamate
    (b) Tryptophan
    (c) Tyrosine
    (d) Histidine

38. C-value paradox suggests us about :
    (a) Colinearity between genome size and complexity of organism
    (b) No-colinearity between genome size and complexity of organism
    (c) Dosage compensation
    (d) Number of chromosomes

39. If the K_m of enzyme for substrate A is 1×10^{-6} and for substrate B is 4×10^{-8}, it means :
    (a) Enzyme has more affinity for substrate A than substrate B
    (b) Enzyme has equal affinity for substrate A and substrate B
    (c) Enzyme is non-specific
    (d) Enzyme has more affinity for substrate B than substrate A

40. Which of the following vitamins is NOT a co-enzyme precursor ?
    (a) Pyridoxine
    (b) Biotin
    (c) Pantothenate
    (d) Vitamin A

41. Most common reason for the genetic variation from one generation to next generation among humans is :
    (a) Homologous recombination
    (b) Non-homologous recombination
    (c) Mutations
    (d) Transposition

42. Exception to the concept of central dogma of genetic information flow is :
    (a) DNA viruses
    (b) RNA viruses
    (c) Both (a) and (b)
    (d) None of above

43. During DNA replication, hydroxyl group at the 3' end of primer attacks the :
    (a) Glycosidic bond of incoming nucleotide
    (b) β-phosphate of incoming nucleotide
    (c) γ-phosphate of incoming nucleotide
    (d) α-phosphate of incoming nucleotide

44. Which of the following statement regarding promoters is incorrect ?
    (a) Promoters are always present upstream of transcriptional start site
    (b) Promoters is a DNA sequence which binds RNA polymerase
    (c) Promoters are orientation dependent
    (d) None of above

45. Which of the following DNA polymerase lacks 3' to 5' exonuclease activity ?
    (a) DNA Pol I
    (b) Taq DNA Pol
    (c) DNA Pol III
    (d) Klenow fragment

46. Telomerase is NOT present in :
    (a) Somatic cells
    (b) Germ cells
    (c) Embryonic stem cells
    (d) Cancer cells

47. Among the following choose the wrong combination :
    (a) 16S rRNA, 23S rRNA, Shine-Dalgarno sequence, 50S ribosomal subunit
    (b) 5.8S rRNA, Kozak sequence, eIF4E, 40S ribosomal subunit
    (c) 5' Guanosine cap, 28S rRNA, eIF4G, 60S ribosomal subunit
    (d) Poly A tail, 18S rRNA, N-formyl methionine tRNA, Kozak sequence

48. mRNA of 500 nucleotides with open reading frame of 400 nucleotides will code for a protein having approx. molecular weight of :
    (a) 14.6 kDa
    (b) 10.33 kDa
    (c) 18.33 kDa
    (d) 22.6 kDa

49. Hypertrichosis, hairiness of the pinna of the ear, is inherited as a Y-linked recessive in humans. If a man with hypertrichosis marries a normal woman, what types of children may they have ?

(a) All of their children of both sexes have hypertrichosis
(b) All the sons have hypertrichosis, but none of their daughters
(c) Half of their sons, but none of their daughters will have hypertrichosis
(d) None of their children have hypertrichosis.

50. The most rapid method to resynthesize ATP during exercise is through :

(a) Glycolysis
(b) Phosphocreatine breakdown
(c) Glycogenolysis
(d) TCA cycle

51. Which of the following is NOT the steroid hormone ?

(a) Estrodiol
(b) Glucocorticoids
(c) Mineralocorticoids
(d) None of above

52. Which of the following is an oncogene ?

(a) *c-jun*
(b) *c-myc*
(c) *v-fos*
(d) All the above

53. Which of the following is NOT a secondary messenger ?

(a) Diacylglycerol
(b) Phospholipase C
(c) Ca^{2+}
(d) Inositol triphosphate

54. Ramachandran explained the possibility of the protein structure on the basis of :

(a) Inductive effect
(b) Endomeric effect
(c) Steric hindrance
(d) All of the above

55. Which of the following represents the nullisomic and trisomic condition ?

(a) $2n + 2, 2n + 4$
(b) $2n - 2, 2n + 1$
(c) $2n - 1, 2n + 1$
(d) $2n - 2, 2n + 2$

56. HIV- the human immunodeficiency virus belongs to which of the following viral groups ?

(a) Reoviruses
(b) Retroviruses
(c) Rhabdoviruses
(d) None of the above

57. Which of the following is multimeric antibody ?

(a) IgG
(b) IgE
(c) IgA
(d) None of above

58. CDR determines the :

(a) Antibody specificity
(b) Antibody structure
(c) Shape of the antigen
(d) It is an unrelated term

59. Cobalamin is a vitamin synthesized by :

(a) Animals only
(b) Plants only
(c) Both animals and plants
(d) Bacteria

60. How many grams of glucose are required to make 2 ml of 10% glucose solution ?

(a) 38 g
(b) 2.0 g
(c) 1.5 g
(d) 0.5 g

BIO-TEGHNOLOGY 2006

Note:-Attempt 70 questions in all.
1. Section A is compulsory for all comprising 1-30 questions.
2. Section B is for Medical Stream comprising 31-70 questions.
3. Section C i for Non-medical Stream comprising 31-70 questions.
Section A' compulsory for all candidates
However candidates shall exercise their option to attempt questions either from section B or Section C.
The relevant box as given below has essentially to be tick-marked by a candidate that the question paper is evaluated as per the option offered by him/her, otherwise the question paper shall render redundant.

Section B
(Medical Stream)

Section C
(Non-medical Stream)

Section A

1. Which of the following is *not* a computer language ?
(a) PASCAL
(b) COBOL
(c) LOTUS
(d) BASIC

2. Decimal equivalent of binary number 1010 is
(a) 2
(b) 10
(c) 13
(d) 16

3. Which of the following is *not* a storage device?
(a) Floppy
(b) Hard disk
(c) Register
(d) ROM

4. Dimensions of moment of inertia are
(a) ML2T
(b) MOLoTl
(c) M2LT
(d) MOLT2

5. Four resistors each of value. 4 ohm is connected as shown in figure. The equivalent resistance between points A and B is':

(a) 1ohm
(b) 3 ohm
(c) 4 ohm
(d) 16 ohm

6. An air bubble under water shines brightly because of the phenomenon of:
(a) dispersion
(b) interference
(c) diffraction
(d) total internal reflection

7. Balmer series in hydrogen ga~ spectrum is emitted when electro higher orbits to the:
(a) first orbit
(b) second orbit
(c) third orbit
(d) fourth orbit

8. The maximum height attained by a projectile equals its horizontal range.
The angle with the horizontal with which it was projected is :
(a) tan-1 1
(b) tan-1 2
(c) tan-1 3
(d) tan -1 4
9. In a spherical bubble of radius R, the excess pressure is :

10. Which of the g the biggest ion?
(a) Al^{3+}
(b) Ba^{2+}
(c) Mg^{2+}
(d) Na^{+}

11. Conditions that will favour the exo e ic ammonia synthesis reaction:

$N_2(g) + 3H_2(g) \equiv 2.\ aI_3(g)$
(a) high temperature and high pressure
(b) high temperature and low pressure
(c) low temperature and high pressure
(d) low temperature and low pressure

.
12. Which one of the following is blue vitriol?
(a) $CuS0_4 \cdot 7H_2O$
(b) $CuS0_4 \cdot 5H_2O$

(c) $FeS0_4 \cdot 7H2O$

(d) $ZnS0_4 \cdot 7H2O$

13. pH of 10-3 M HCI is :
(a) 2
(b) 3
(c) 4
(d) 11

14. An alcohol is formed when nitrous acid reacts with:
(a) CH3NH2
(b) (CH3)2NH
(c) CH3NHC2Hs
(d) (CH3)3N

15. The edible part of the fruit apple is :
(a) peduncle
(b) thalamus
(c) pericarp
(d) embryo

16. The F2 ratio resulting from a dihybrid cross will be :
(a) 9 : 3 : 3 : 1
(b) 1 : 1
(c) 3 : 1
(d) 1 : 1 : 1 1

17. Application of gibberellic acid induces flowering in
(a) long day plants
(b) short day plants
(c) both (a), (b)
(d) neither of the two

18. The chief nitrogenous waste in human is
(a) urea
(b) ammonia
(c) , uric acid
(d) ammonium nitrate

19. Fluid mosaic mode of biological membranes was given by
(a) Robert on
(b) Danielli and Davison
. (c) inger and icolson
(d) Gorter and Grendel

20. Phyllum Annelida includes
(a) unsegmented triploblastic coelomates

(b) unsegmented triploblastic acoelomates
(c) segmented triploblastic coelomates
(d) segmented triploblastic acoelomates

2l. Which of the following is *not* correct ?
(a) sucrose is a carbohydrate ,
(b) ribonuclease is an enzyme
(c) phosphorus is a component of DNA
(d) anticodon is present on *rRNA*

22. The correct taxonomic hierarchy is reflected in :
(a) phylum, class, order and family
(b) kingdom, family, class and order
(c) kingdom, family, order and class
(d) kingdom, class, species and genus

23. The soil type with the poor water holding capacity is
(a) silty
(b) loamy
(c) clay
(d) sandy

24. The missing term in the series 2, 3, 5, ..., 12 is :
(a) 7
(b) 8
(c) 9
(d) 11

25. In a certain language WORK is coded as 4567 and MAN as 328, then in that Language WOMAN is coded as :
(a) 43528
(b) 82354
(c) 32845
(d) 45328

26. $\sin^2 38° + \cos^2 38° = ?$
(a)1/2
(b) 3.32
(c) 1
(d)1/3

27. In a right-angled triangle, the sides perpendicular to each other are 15 cm and 8 em. Its perimeter is:
(a) 46 em
(b) 60 em
(c) 120 em
(d) 40 em

28. A alone completes a piece of work " days. If A and B work together the same work can be completed in 6 day . In how many days can B alone complete that work?
(a) 24
(b) 12
(c) 7
(d) 5

29. The critical temperarure a which an unsaturated air becomes saturated is called:
(a) dew point
(b) frost
(c) condensaation
(d) absolute humidity

30. In the SARS
(a) and
(b) acute
(c) asthma
(d) anti

Section B

31. The uncertainty in the velocity of a ball of mass 100 g when its uncertainty in position is 1 A is :
(a) 3.24 * 10-24 *mls*
(b) 5.23 * 10-24
(c) 6.14 * 10-12 *mls*
(d) 10-12

32. Which of the following favours the pontaneity of change?
(a) ~H is - ve
(b) ~S is + ve
(c) ~G is -ve
(d) All of the above

33. EOfor a cell Zn IZn2+(aq)IICu2+(aqIC) O is 1.10 V at 25°C. The equilibrium constant for the reaction Zn + Cu^{2+}(aq)= Cu + Zn^{2+}(aq) is of the order' of :
(a) 10^{-28}
(b) 10^{-37}
(c) 10^{18}
(d) 10^{17}

34. "In a given photochemical reaction, each molecule of a reaction absorbs only one quantum of radiation causing tha particular reaction." It is a statement of :
(a) Stark-Einstein law

(b) Lambert-Beer's law
(c) Grothus-Draper law
(d) None of the above

35. The decreasing order of stability of carbonium ions is given by
(a) tertiary > primary > secondary
(b) primary > secondary > tertiary
(c) tertiary> secondary> primary
(d) secondary> primary> tertiary

36. Glucose on warming with excess of phenyl hydrazine forms a yellow crystalline compound called :
(a) fructose
(b) glucosone
(c) glucosazone
(d) arabino e

37. The following reaction is an example of :
C_6H_6CHO KOH/100 degree $C_6H_6COO\text{-}K+C_6H_5CH_2OH$
(a) Perkin reaction
(b) Witting reaction
(c) Aldol condensation
(d Cannizaro reaction

38. Which of the following metal ions is green coloured ?

40. XeF_2 involve hybridization
(a) *sp3d*
(b) *dsp2*
(c) *sp3d2*
(d) *sp2*

4l. African sleeping sickness is caused by :
(a) Giardia
(b) Trypanosome
(c) Trichomonas
(d) Leishmania

42. The major immunoglobin in normal human serum IS
(a) IgG
(b) . IgM
(c) IgD
(d) IgE

43. Which of the following *does not* secrete silk ?
(a) Bombyx mori
(b) Apis indica

(c) Attacus atlas
(d) Apis indica

44. Which of the following is meant for reproduction in *Taenia solium* ?
(a) Scolex
(b) Strobila
(c) Rostellum
(d) None of the above

45. The diploid number of an organism is 12. Number of chromosomes expected to be in monosomic is
(a) 11
(b) 10
(c) 9
(d) 13

46. Modern horse is
(a) Pliohippus
(b) Equs
(c) Merychippus
(d) Mesohippus

47. Loss of water as drops of liquid from the surface of plant is called :
(a) Transpira tion •
(b) Evaporation
(c) . Guttation
(d) Condensation

48. The main body of ovule is called:
(a) nucellus
(b) integument
(c) embryo sac
(d) micropyle

49. In pinus, each sporophyll of male cone has
(a) one sporangia
(b) two sporangia
(c) four sporangia
(d) eight sporangia

50. Tropopause eparates troposphere from:
(a) Strate phere
(b) Meso phere
(c) Thermosphere
(d) Exosphere

51. "Growth is dependent on amount of food-stuff that is present in- minimum quantity" is a statement of :

(a) Shelford's law
(b) Liebig's law
(c) Vant Hoffs law
(d) None of the above

52.' Which of the following is lotic system ?
(a) lake
(b) pond-
(c) marshes
(d) stream

53. The most mono-unsaturated fatty acids have double bond between:
(a) C-8 and C-9
(b) C-9 and C-10
(c) C-1O and C-l1
(d) C-12 and C-13

54. Which of the following is sulfur containing amino acid ?
(a) Leucine
(b) Tyrosine
(c) Serine
(d) None of the above

55. The enzyme that moves along the DNA and separates the strands is
(a) prnnase
(b) helicase
(c) topoisomerase
(d) ligase

56. When the base composition of DNA from bacterium Mycobacterium tuberculosis was determined, 18% of the bases were found to be adenine. What is the [G] + [C] content ?
(a) 18%
(b) 32%
(c) 36%
(d) 64%

57. Red algae differ from the green algae and brown algae in having
(a) no chlorophylla •
(b no differentiated cells
c) no phycocyanin within their cells
d) no flagellated stages in their life cycles

58. Oxy en content reduction makes the glycolyse(glycogenesis)intensity increased due
(a) increase of ADP concentration in cell
(b) increase of ...~*AD*+concentration in cell
(c) increa e o ATP concentration in cell
(d) increase of concentration of peroxides and free radicals

59. A bacterial m-R A ith a length of 360 nucleotides in length codes for a proteirr of :
(a) roughly 360 amino acids
(b) roughly 1080 amino acids
(c) exactly 120 amino acids
(d) less than 120 amino acid

60. Nitrogen is fixed in ecosystems in ways stated below. One of the statements below is false. Which one?
(a) by cyanobacteria
(b) by electrical discharges in the atmosphere
(c) by industrially synthesized fertilizer
(d) by denitrification

61. When sunlight is on the chloroplast, pH is the lowest in the
(a) stroma
(b) cytosol
(c) space enclosed by the thylakoid membranes
(d) space enclosed by the inner and outer membranes

62. Tissues that form long, tough stands, as in the leaf stalk of celery, are
(a) epidermis
(b) collenchyma
(c) sclerenchyma
(d) parenchyma

63. Which reactions are made with the help of the system of giant axons ? slow differential reactions

64. In the blood of an adult man the total content of haemoglobin is, roughly:
(a) several hundred gram
(b) tens of gram (10-100 g)
(c) several gram
(d) several hundred milligram

65. A mollusc sample is given to a biologist. After examining the sample he says that it belongs to Bivalvia. Which of the following may be the key that makes him to reach this conclusion ?
(a) gills
(b) absence of radula
(c) body symmetry
(d) mantle

66. When a muscle cell ha a shortage of oxygen this is associated with a change in pH. What substance is responsible for this change in pH?
(a) decreased carbon dioxide
(b) decreased lactate (lactic acid)

(c) increased carbon dioxide .
(d) increased lactate (lactic acid)

67. Which one of the following pairs is *correctly* matched?
a)chloroplast-storage of enzymes •
b)peroxisomes-cellular transportation
c)nucleolus-site 'of ribosomal subunit synthesis
d)lysosomes-power house of cell

68. The belonging of a human erythrocyte to serotypes A, B, 0 is determined by chemical markers on its surface. These markers are
a. lipid molecules
b. oligosaccharides
c. polypeptides
d. antibodies

69. C4-plants can start photo ynthesis with a lower concentration of CO_2 in the atmosphere than C3-plants. This is because:
a) respiration of C4-plants is higher
b).respiration of C4-plants is lower
c) C_4 plants do not have photorespiration
d) C4-plants have photorespiration

70. the most important factor regulating seasonal migration is
a) the change in average air temperature
b) the change in day length
c) the reduced availability of food
d) the increased predator pressure

Section C

31. Current flow in semiconductor depends on the phenomenon of :
(a) drift
(b) diffusion
(c) recombination
(d) All of the above

32. A transistor connected in common base configuration has
(a) a low input resistance and high output resistance
(b) a high input resistance and low output resistance
(c) a low input resistance and low output resistance
(d) a high input resistance and high output resistance

33. The Q-point in voltage amplifier is selected in the middle of active region because:
(a) it gives distortionless output
(b) the operating point becomes very stable

(c) the current then requires less number of re i tors
(d) it then requires a small d.c. voltage

34. Tuned voltage amplifiers are *not* used
(a) in public addre s system
(b) in radio receivers
(c) where a band of frequencies is to be selected and amplified
(d) in television receivers

35. In AMtransmission with $m = 1$, suppression of carrier cuts power dissipation by a factor of :
(a) 6
(b) 2
(c) 3
(d) 4

36. One of the serious disadvan ages of FM transmission is its
(a) high static no' e
(b) limited line-of- ight range
(c) expensive equipment
(d) adjacen channel interference

37. An XOR gate produces an output only when its two inputs are
(a) high
(b) low
(c) different
(d) same

38. A half adder can be constructed from
(a) two XNOR gates only
(b) one XOR and one OR gate with their outputs connected in parallel
(c) one XOR and one OR gate with their inputs connected in parallel
(d) one XOR gate and one NOR gate

39. A blocking oscillator :
(a) IS a triggered oscillator
(b) 1 an amplifier with negative feedback
(c) generates sinusoidal waves
(d) produce sharp and narrow pulses

40. A relaxation 0 cillatcr is one which
(a) ha two able states
(b) relaxes inde .tel
(c) produce non- inu oidal output
(d) oscillates continuously

41. Binary equivalent of octal number 527 is
(a) 101010111
(b) 111011010
(c) 101010101

(d) 111000110

42. Intel 8085 is an :
(a) 4-bit microprocessor
(b) 8-bit microprocessor
(c) 16-bit microprocessor
(d) 64-bit microprocessor

43.. Which of the following languages is sui able for artificial intelligence ?
(a) ALGOL
(b) PASCAL
(c) PROLOG
(d) PILOT

44. A conventional electric current flows d e east in a high voltage power line.
What would be the direction of the resulting magnetic field directly below the power line ? -
(a) north
(b) east
(c) south
(d) west

45. An electron travels so that its total energy is twice its rest energy (0.511MeV).
What is the speed of the electron ?
(a) V=1/2c
(b) B) v=3/4c
(c) C) 3/2c
(d) D) 8/9c

46. An object is placed 60 cm from a convex converging lens. The image produced is inverted and half the size of the object. What would be focal length of the lens?
{a) 90 cm
(b) 60 cm
(c) 45 cm
(d) 20 c

47. An ide eat engine takes in heat energy at a high temperature and exhausts energy at a lower temperature. If the amount of energy exhausted at the 10 temperature is 3 times the amount of work done by the heat engine, what efficiency?
a) 0.25
b) 0.33
c) 0.67
d) 0.9

48. Consider a simple circuit containing a battery and three light bulbs. Bulb parallel with bulb B and this combination is wired in series at would happen to the brightness of the other two bulbs if bulb A were burn out ?

a) Only bulb B would get brighter
b) Both would get brighter
c) Bulb B would get brighter and bulb C would get dimmer
d) Bulb B would get dimmer and bulb C would get brighter

49. The root mean square velocity of oxygen gas (atomic mass 16) is *v* at room temperature. The root mean square velocity of Helium (atomic mass 4) at the same temperature is :
(a 4v
(b 2v
(b) v
(d) v/2

50. An object is projected straight upward from ground level with a velocity of *50 m/s*. Ignoring air resistance, it will return to ground level in approximately
(a) 2.5 s
(b) 5.0 s
(c) 7.5 s
(d) 10 s

51. The eccentricity of the ellipse $16x^2 + 7y^2 = 112$ IS
(a) 4/3
(b) 7/16
© 3/7
(e) ¾

52. If $a + b + c = 0$, then the quadratic equation $3ax^2 + 2bx + c = 0$ has
(a) At least one root in (0 1)
(b) One root in [1 2] and other in (-1, 0)
(c) Both roots are imaginary
(d) None of the above

53. The value of $\int_{-1}^{1} x|x|\,dx$ is
(a) 2/3
(b) 1
(c) 0
(d) 2

54. If A and B are an *two* non-singular matrices of the same order, then:
(a) Adj(AB) = (AdjA) (AdjB)
(b) Adj(AB) = (AdjB) (AdjA)
(c) Adj(Ad·A. = A
(d) one 0 he above

55. The func 'on f defined on R by
.r = *x* , when *x* is rational

= 1- *x* ,when *x* is irrational

r; ontinuous for all *x,* except at :

x = O

x = 1

c .r = 0 and *x* = 1

(d =

56. The - 1z - 41 < 1z - 21, represents the region given by :

O

a) ReZ >0

b) ReZ < 0

c) ReZ > 2

d) None of the above

57. If = 0 *(x, y)* = (0, *b)* then at gill :

(a) *fX)* =

(b) *fxy* ~

(c) *fxy* = 0

(d) *fyx* = 0

58. The polynomial equation $10Z^5 + 8Z^4 + 6Z^3 + 4Z^2 + 2Z + 1 = 0$ has all roots In:

(a) Iz I s 1

(b) I z I .~ 1

(c) 1 s I z I s 10

(d) None of the above

60. For negative skewed distribution :

(a) mean = median < mode

(b) median < mean < mode

(c) mean < median < mode

(d) mode < mean < media

61. The uncertainty in the velocity of a ball of mass 100 g when its uncertainty in position is 1 A is :

(a) 3.24 * 10^{-24} *mls*

(b) 5.23 * 10^{-24}

(c) 6.14 * 10^{-12} m/s

(d) 10^{-12}

62. Which of the following favours the spontaneity of change?

(a) ~H is - ve

(b) ~S is + ve

(c) , ~G is - ve

(d) All of the above

63. EOfor a cell Zn I Zn2+(aq)\lCu2+(aqI)Cu is 1.10 V at 25°C. constant for the reaction Zn + Cu2+(aq) === Cu + Zn2+(aq) is of the order of :
(a) 10^{-2}
(b) 10^{-37}
(c) 10^{18}
(d) 10^{17}

64. "In a given photochemical reaction, each molecule of a reaction absorbs only one quantum of radiation causing that particular reaction." It is a statement of :
(a) Stark-Einstein law
(b) Lambert-Beer's law
(c) Grottus-Draper law
(d) None of the above

65. The decreasing order of stability of carbonium ions is given by
(a) tertiary > primary' > secondary
(b) primary > secondary > tertiary
(c) tertiary> secondary> primary
(d) secondary > primary > tertiary

66. Glucose on warming with excess of phenylhydrazine forms a yellow crystalline compound called
(a) fructose
(b) glucosone
(c) glucosazone
(d) arabinose

67. The following reaction is an example of
C6H6CHO KOH/100 C6H5COO-K+C6H5CH2OH
(a) Perkin reaction
(b) Wittig reaction
(c) Aldol condensation
(d) Cannizaro reaction

68. Which of the following metal ions is green co cured?
(a) Cr^{3+}
(b) Cu^{2+}
(c) Zn^{2+}
(d) Ti^{4+}

69. Deficiency of which of the following cau e anemia
(a). Molybdenum
(b) Cobalt
(c) . Chromium
(d) Tin

70. XeF_2 involves hybridization
(a) sp^3d

(b) *dsp2*
(c) *sp3d,2*
(d) *sp2*
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Section A

1. Two bullets are fired horizontally with different velocities from the same height. Which will reach the ground first?
(a) Slower one
(b) Faster one
(c) Both will reach simultaneously
(d) Cannot be predicted

2. Two bodies A and B of equal mass have an elastic collision. Initially B is at rest and A moves with velocity V. After the collision:
(a) The body A traces its path back with same speed
(b) The body A comes to rest and B moves away in the direction of A's approach with the velocity V
(c) The body A comes to rest and B moves away in the direction of A's approach with the velocity 2V
(d) Both the bodies stick and are at rest

3. A cycle tyre bursts suddenly. This represents an
(a) Isothermal process
(b) Isobaric process
(c) Isochoric process
(d) Adiabetic process

4. As one penetrates a uniformly charged metallic sphere, the electric field strength E:
(a) Increases
(b) Decreases
(c) Remains the same at the surface
(d) Is zero at all points?

5. If a power of 100 W is being supplied across a potential difference of 200 V, the current flowing is
(a) 2 A
(b) 0.5 A
(c) 1 A
(d) 20 A

6. Number of unpaired electro~s in N2+ is :
(a) 2
(b) 0
(c) 1
(d) 3

7. Hybridisation in 802 is :
(a) *sp*
(b) *sp2*
(c) *sp3*
(d) *sp3d*

8. Which of the following is the weakest base ?
(a) NaOH
(b) Ca(OH)2
(c) KOH
(d) Zn(OH)2

9. Which of the following behaves both as electrophile and a nucleophile ?
(a) CH3NH2
(b) CH3Cl
(c) CH3CN
(d) CH30H

10. Aspirin is:
(a) Anti-inflammatory
(b) Analgesic.
(c) Anticoagulant
(d) All of the above

11. Life supporting zone of earth is:
(a) Ecosystem
(b) Ecosphere
(c) Hydrosphere
(d) Lithosphere

12. Insulin may be used as a therapy in
(a) Type I Diabetes
(b) Type II Diabetes
(c) Both type I and type II Diabetes
(d) Gout

13. A food product rich in fructose is:
(a) Table sugar
(b) Honey
(c) Turnip
(d) Grapes

14. Global warming is caused by:
(a) CO_2
(b) CH_4
(c) 0_3
(d) All of the above

15. CPR is:
(a) an imaging technique commonly used in clinical diagnosis
(b) a physical exercise aimed at restoring heart beat
(c) a device that records sound wave data
(d) a ratio of calcium and phosphorous in serum

16. Athlete's foot is a condition caused by:
(a) Ringworm infection
(b) Sweat gland abnormality
(c) Muscular injury
(d) All of the above

17. Bovine spongiform encephalopathy (BSE) is caused by.
(a) Severe viral infection
(b) Septicemia
(c) Tapeworm infection
(d) Abnormal protein production

18. The sound we hear during cracking of knuchles is due to
(a) Grinding of the upper and lower part of the joint
(b) Burst of muscular contraction and relaxation
(c) Release of gas from the fluid surrounding the joint
(d) None of the above

19. Decimal equivalent of binary number 1010 is
(a) 2
(b) 4
(c) 8
(d) 10

20. Which of the following is a part of computer hardware?
(a) Bus
(b) Register
(c) RAM
(d) All of the above

Section B
21. The median of scores 25, 45, 35, 35, 40, 30 is:
(a) 45
(b) 40
(c) 35

(d) 30

22. What is the probability that a value chosen at random from a particular population is larger than the median of the population:
(a) 0.25
(b) 0.5
(c) 1.0
(d) 0.67

23. The mean, mode and median are related by the relation (Approximate)
(a) Mode = 3 median - 2 mean
(b) Mean = 3 mode - 2 median
(c) Mode = 3 mean - 2 median
(d) None of the above

24. For a normal curve with ~ = 55 and σ = 10, how much area will be found under the curve to the right of the value 55
(a) 1.0
(b) 0.68
(c) 0.5
(d) 0.32

25. For a two tailed test of hypothesis at a = 0.10, the acceptance region is the entire region:
(a) To the right of the negative critical value
(b) Between the two critical values
(c) Outside the two critical values
(d) To the left of positive critical value

26. If sample 1 has 13 elements with 8_1= 17 and sample 2 has 9 elements with 8_2 = 22, then pooled 8_2 is:
(a) 19
(b) 361
(c) 367
(d) 1~.5

27. In double sampling we reject the batch if :
(a) $d_1 > C_2$
(b) $d_2 > C_2$
(c) Either (a) or (b)
(d) Neither (a) nor (b)

28. Assume that chi square test is to be performed on a contingency table with four rows and four columns. How many degrees of freedom should be used?
(a) 10
(b) 8
(c) 9
(d) 6

29. The sum of first *n* natural numbers is:

(a) $n(n + 1)/2$
(b) $n(n + 1)\ (2n + 1)/6$
(c) $n(n + 1)\ (n + 2)/2$
(d) n^2

30. The number of proper subsets of a set of order 3 is :
(a) 3
(b) 6
(c) 8
(d) 9

31. If $f(x) = \log x$, then which of the following is *true:*
(a) $f(x + y) = f(x) + f(y)$
(b) $f(x + y) = f(x).f(y)$
(c) $f(xy) = f(x)f(y)$
(d) $f(xy) = f(x) + f(y)$

32. $nC_1 + nC_2 + nC_3 + \ldots + nC_n =$
(a) $2nc_1$
(b) $n.+ tC_n$
(c) $2n$
(d) $2n\_ 1$

33. If $f(x) = x^2 - 2x + 4$, then $f\{x)$ has :
(a) Minimum at $x = 1$
(b) Maximum at $x = 1$
(c) No maximum
(d) No minimum

34. lim $\sin 2n / x$
$x \to 0$ 34.
(a) 0
(b) 1
(c) 12
(d) 2

35. The range of the function $y = lIx$ is :
(a) $x > 0$
(b) $x < 0$
(c) $-l < x < l$
(d) $x > 0, x < 0$

36. One root of the equation $5x^2 + 13x + K = 0$ is the reciprocal of the other, if:
(a) K= 0
(b) K= 5
(c) K= 6

(d) K= 1/6

37. Number of covalent bonds in P_4O_{10} is
(a) 10
(b) 12
(c) 14
(d) 16

38. The bond order of H_2, H_2^+ and He_2^+
(a) 1, 0.5 and 0.5
(b) 1, 0.5 and 1.5
(c) 1.5, 0.5 and 1
(d) 0.5, 0.5 and 1

39. When reduced with lithium aluminium hydride, amino acids form
(a) Amines
(b) Amino alcohols
(c) Salts
(d) Esters

40. The relationship between diethyl ether and methyl propyl ether is that they are:
(a) Metamers
(b) Functional isomers
(c) Position isomers
(d) Chain isomers
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41. The Van't Hoff factor for 0.1 M $Ba(NO_3)_2$ solution is 2.74. The degree of dissociation is:
(a) 91.3%
(b) 87%
(c) 100%
(d) 74%

42. An example of double salt is
(a) .Bleaching powder
(b) $K_4Fe(CN)_6$
(c) .Hypo
(d) Potash alum

43. The dry cell has an e.m.f. of 1.5 V and internal resistance of 0.5 Q. If the cell sends a current of 1A through an external resistance, the p.d. of the cell will be
(a) 1.5 V
(b) 1V
(c) 0.5 V
(d) 0 V

44. The expression of magnetic induction inside a solenoid of length L, carrying a current I and having N number of turns. is
(a) *flO/4n* x *Mlr2*
(b) *flo/4n* x *Mlr3*
(c) *flo/4n* x *2M1r2*
(d) *flo/4n* x *2M1r3*

45. The Fermi level lies midway between conduction and valence bands in
(a) Intrinsic semiconductor
(b) P-type semiconductor
(c) N-type semiconductor
(d) Extrinsic semiconductor

46. Zener breakdown occurs:
(a) Mostly in Germanium junctions
(b) Due to rupture of covalent bonds
(c) In lightly doped junctions
(d) Due to thermally generated minority carriers

47. Which of the following is unipolar device?
(a) P-N junction
(b) Zener diode
(c) Tunnel diode
(d) Schottky diode

48. The ripple factor of half wave rectifier is
(a) 1.21
(b) 1.11
(c) 0.48
(d) 0.406

49. In a transistor, the resistance of base region is of the order of:
(a) 1 Q
(b) 100 Q
(c) 1 kQ
(d) 100 kQ

50, FET can be used as
(a) Variable capacitor
(b) Variable resistor
(c) Constant voltage source
(d) Negative resistance

51. An ideal amplifier has noise factor of :
(a) 0db
(b) More than 0 db

(c) Unity
(d) None of the above

52. Turn off time of thyristor :
(a) Depends upon junction temperature and forward current
(b) Is a constant
(c) Depends on load
(d) All of the above

53. If H is Hubble's constant, the age of universe is
(a) V = Hr2
(b) V= Hr
(c) V= Hfr
(d) V = H/r^2

54. The velocity of projection of a body is increased by 2%. Other factors remaining unchanged, what will be the percentage change in the maximum height attained?
(a) 1%
(b) 2%
(c) 4%
(d) 8%

55. Maximum value of static friction is called:
(a) Limiting fraction
(b) Rolling friction
(c) Normal friction
(d) Coefficient of friction

56. The work done in moving a body up a rough inclined plane is given by
(a) mg sine x S
(b) mg cosa x S
(c) (mg sine + umg coss) x S
(d) (mg sine - mg cosfl) x S

57. A body of mass 0.5 kg executes S.H.M. of frequency 4 Hz. The amplitude of S.H.M. is 1 cm. The maximum resting force is (take $n^2 = 10$)
(a) 0.32 N
'(b) 3.2 N
(c) 32 N
(d) 320 N

58. For measuring temperature near absolute zero, the thermometer used is :
(a) Thermo-electric thermometer
(b) Radiation thermometer
(c) Magnetic thermometer
(d) Resistance thermometer

59. The maximum wavelength of radiation emitted at 200 K is 4 urn. What will be the maximum wavelength of radiation emitted at 2400 K.
(a) *3.33* urn
(b) *0.66* urn
(c) *l/lm*
(d) 1 m

60. Positive rays are
(a) Ions
(b) electrons
(c) neutrons
(d) electromagnetic waves

Section C

61: Which of the following shows correct order of decreasing inductive effect?
(a) F> Cl > Br > I
(b) I> Br> Cl> F
(c) Cl> F> I > Br
(d) Br> I > F> Cl

62. Number of chiral carbons in tartaric acid is
(a) 1
(b) 2
(c) 3
(d) 4 .

63 Which of the following methods is *not* employed in the preparation of dicarboxylic acids?
(a) Oxidation of glycols and hydroxy acids using K2Cr207
(b) Subjecting dicyanides to hydrolysis
(c) Hydrolysis of malonic esters
(d) Oxidation of cyclic alkenes

64. Which of the following is used in the determination of R.M. value of fat?
(a) 1.5 N KOH
(b) 1.0 N KOH
(c)0.1 N KOH
(d) 0.005 N KOH

65. The compound in which C* uses *spa* hybridisation for bond formation is:
(a)
(b)
(c)
(d)

66. Oxidation number of S in 803- is :
(a) '2
b)3
(c) 4
(d) 5

67. Calgon, used as water softener is :
(a) Na2[Na4(P03)6]
b) Na4[Na2(P03)6]
(c) Na2[Na4(P04)5]
(d) Na4[Na4(P04)6]

68. Mark the smallest atom:
(a) F
B)Cl
(c) Br
(d) I

69. Which of the following is standard amino acid ?
(a) Ornithine
(b)Homocysteine
(c) Citrulline
(d) None of the above

70. Proteins absorb light in:
(a) Visible range
(b) IR range
(c) UV range
(d) All of the above

71. In Lineweaver Burk plot, when 1/v is plotted against 1/[8]
(a) Straight line is obtained
(b) Sigmoidal curve is obtained
(c) , Hyperbolic curve is obtained
(d) None of the above

72. ·Concentrated acids cause dehydration of sugars to
(a) Trans-enediol
(b) Cis-enediol
(c) Furfural
(d) Furanose

73. Sphingosine is :
(a) Branched sugar
(b) Fatty acid
(c) Amino alcohol
(d) Ceramide

74. Terminator gene technology exploits the use of:
(a) Promoter sequence
(b) Operator sequence
(c) Repressor
(d) Transcription terminator

75. Glucose and fructose can be distinguished by
(a) Molish test.
(b) Acetyl Chloride
(c) Phenylhydrazine
(d) Concentrated solution of alkali

76. An example of water soluble vitamin is
(a) Vitamin- A
(b) Vitamin C
(c) Vitamin D
(d) Vitamin E

77. Supposeyou delete operator site from lac operon ofE. coli.Which of the following effects would be observed ?
(a) No expression of lac gene
(b) Constitutive expression of lac gene
(c) Regulated expression of lac gene
(d) Basal expression of lac gene

78. Which of the following binds ammo acid ?
(a) Acceptor arm
(b) D arm
(c) Anticodon arm
(d) T\jfC-arm

79. In lac and Gal operons, CAP is responsible for :
(a) De-repression
(b) Constitutive activation
(c) Regulated activation
(d) None of the above

80. Si-RNA is an important tool to study:
(a) Translation regulation
(b) Gene silencing
(c) Gene simulation
(d) Gene amplification

81 Which of the following antibiotics inhibits translation?
(a) Tetracycline
(b) Puromycin
(c) Chloramphenicol
(d) All of the above

82. DNA fragment of interest can be detected by
(a) Western blotting
(b) Northern blotting

(c) outhern blotting
(d) DNA fingerprinting

83. Which of the following could be a co-translational modification?
(a) Phosphorylation
(b) Glycosylation
(c) Methylation
(d) Acetylation

84. Immunoglobulin released in allergies IS
(a) IgA
(b) IgG
(c) IgD
(d) IgE

85. Test cross is used to test:
(a) Whether an individual is homozygous or heterozygous
(b) Whether an individual is dominant or recessive
(c) Whether parents were true breeding
(d) All of the above

86. Which' is '*not* a non-degradable pollutant?
(a) **DDT**
(b) Sewage
(c) Plastics
(d) Heavy metals

87. A direct food relation between two species of animals in which one animal kills and feeds on another is referred to as :
(a) Predation
(b) Parasitism
(c) Symbiosis
(d) Scavenging

88. Cycas differs from pteris in having
(a) Vessels and tracheids
(b) Motile sperms
(c) Pollen tube
(d) Archegonia

89. Crassulacean acid metabolism (CAM) makes it possible for plants to survive **in:**
(a)
(b)
(c)
(d)

90. The genotypic ratio of F2 progeny of dihybrid cross is
(a) 1:2:1
(b) 9:3:3:1

(c) 3:1
(d) 1:2:1:2:4:2:1:2:1

91. In areas where the incidence of malaria is high, healthier individuals should be:
(a) Heterozygous for Hb"
(b) Homozygous for Hbs
(c) Either (a) or (b)
(d) Neither (a) nor (b)
92. Rhesus monkey belongs to
(a) Even toed ungulates
(b) Odd toed ungulates
(c) Edentates
(d) Primates

93. Study of molluscs is called:
(a) Malacology
(b) Conchology
(c) Mycology
(d) Phycology

94. Heart of amphibians is:
(a) Two chambered
(b) Three chambered
(c) Four chambered
(d) Without chamber

95: Tube-within-tube plan is shown by
(a) Coelentrates
(b) Flatworms
(c) Roundworms
(d) Sponges

96. Hepatic portal vein is formed by
(a) Lineogastric vein
(b) Deodenal vein
(c) Anterior mesenteric vein
(d) All of the above

97. The optic nerve pierces through the retina, choroids and sclera at
(a) Fovea
(b) Blind spot
(c) Pupil
(d) Cornea

98. Removal of parathyroid results in
(a) Calcium deficiency
(b) Bone fracture

(c) Death of the individual
(d) Retardation of teeth formation

99. Lower aquatic animals are:.
(a) Ammonotelic
(b) Ureotelic
(c) Uricotelic
(d) Can be all the above depending upon climatic conditio-ns

100. Conversion of fibrinogen into fibrin is catalysed by:
(a) Prothrombin
(b) Thromboplastin
(c) Thrombin
(d) Thrombinase

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1. The contents of these chips are lost when the computer is switched off?
(A) RAM chips
(B) DRAM chips
(C) ROM chips
(D) None of the above

2. What would the binary number 1011 be in decimal notation?
(A) 10
(B). 11
(C) 12
(D) 13

3. Heat required to melt 1 g of ice is 80 cal. A man melts 60 g of ice by chewing in 1 min. His power is. :
(A) 4800 W
(B) 336 W
(C) 1.33 W
D) 0.75 W

5. If 5 mL of 0.15 M aCl is diluted to a [mal volume of 5 L what is the final concentration of NaCl?
(A) 0.00015 M
(B) 0.0015 M
(C) 15000 M
(D) None of the above

4. If $f(x) = xn$ then $d/dx\ f(x)$ *is :*
(A) $Xn - 1$
(B) $Xn + Iln + 1$
(C) $nXn - 1$
(D)None of the above

6. Why does the vapor pressure of a solution decrease when an ionic compound is added to it ?
(A) The mole fraction of solvent is higher, causing a lower vapor pressure.
(B) There are fewer solvent molecules at the surface, so fewer can vaporize and leave the solution.
(C) Most solutes have a positive heat of solvation, causing the temperature of the solution to decrease.
(D) none of the above

7. The molecular weight of glucose is 180. Express a blood glucose concentration of 80 mg per 100 ml in molarity.

(A) 0.44 M
(B) 0.044 M
(C) 0.0044 M
(D) 04.40 M

8. Which of the following is the closest to the pH of a solution that contains 5 millimoles per litre of H+ ions?
(A) 1.2
(B) 2.3
(C) 3.7
(D) 6.5

9. What is the pKa of triethyl-ammonium in water, if the base ionization constant Kb for triethylamine is 7.4×10^{-5} ? (Log $7.4 \times 10^{-5} = 4.13$)
(A) -4.13
(B) 2.87
(C) 4.13
(D)9.17

10. Which of the following is *not* a chaotropic agent?
(A) Lithium chloride
(B) Urea
(C) Sodium chloride
(D) Aluminium chloride

11. Solution properties of a phospholipid most appropriately match that of :
(A) Glutamic acid
(B) A purine base
(C) Starch
(D) All of the above

12. In its hydrogen bonding capacity water is followed by
(A) Methanol

(B) Urea
(C) Chloroform
(D) Glycerol

13. Phosphorolysis is a form of:
(A) Hydrolysi
(B) Pho phorylation
(C) Electrolytic breakdown of ATP
(D) Spontaneous accumulation of inorganic phosphate

14. Microsatellite sequence is:
(A) A small palindrome
(B) Extrachromosomal DNA
(C) Short repetitive DNA
(D) Looped-DNA
15. A DNA fragment is 5.7 kilo bases, if the entire fragment codes for polypeptide, the approximate number of amino acids in polypeptide would be
(A) 1900
(B) 2500
(C) 5700
(D) 170

16. In humans, right-handedness is dominant to left-handedness and the gene is autosomal. If A right-handed man, whose father was left-handed, married a left-handed woman, which of the following statements is *true?*
(A) Man was homozygous and his wife was heterozygous
(B) Man was heterozygous, his father was homozygous.
(C) Man and his father were both homozygous
(D) Man and his wife were both heterozygous

17. Small lipid soluble molecules move in and out of the cells by
(A) Simple diffusion
(B) Active transport
(C) Facilitated diffusion
(D) Pinocytosis

18. Plasmodesmata most closelyresemble which of the followingstructure in animal cells?
(A) Desmosomes
(B) Gap junctions
(C) Tight junctions
(D) Ion channels

19. During which of the following stages of the cell cycle will a diploid cell contain twice the amount of DNA found in a gamete?
(A) Prophase
(B) Entire S phase

(C) Entire G1 phase
(D) Entire G2 phase

20. All of the following amino acids are converted to succinyl -CoA, *except*
(A) Methionine
(B) Isoleucine
(C) Valine
(D) Histidine

21. Major objective of glucose breakdown by glycolysis is
(A) Energy production
(B) Production of pyruvate
(C) Production of 3 carbon intermediates
(D) Regeneration of oxidized NAD+

22. A vitamin that has an important role in the formation of collagen fibers is :
(A) Thiamine
B)Tocopherol
(C) Ascorbic acid
D) Riboflavin

23. When human immunodeficiency virus (HIV) attaches to a host cell, what material is released into the host cell cytoplasm?
(A) Viral toxins
(B) RNA
(C) DNA
(D) Proteins

24. The main determinant of blood pressure is
(A) Blood volume
(B) Elasticity of arteries
(C) Cardiac output
(D) Peripheral resistance

25. The blood flows in the body because of :
(A) Beating of the heart
(B) Establishment of a pressure gradient
(C) Contraction and relaxation of peripheral muscles
(D) Elasticity of arteries

26. All of the following are associated with inspiration in mammals *except*
(A) Increase in thoracic pressure
(B) Contraction of external intercostal muscles
(C) Lowering of diaphragm
(D) Relaxation of internal intercostal muscles

27. In an acid environment oxygen splits more, readily from haemoglobin. This is governed by :
(A) Dalton's Law
(B) Henry's Law
(C) Charles' Law
(D) Bohr Effect

28. Cardio-acceleratory centre IS located in
(A) Cerebrum
(B) Pons
(C) Medula
(D) Wall of the right atrium

29. Urine formation requires which of the following?
(A) Glomerular filtration and tubular secretion only
(B) Glomerular filtration and tubular reabsorption only
(C) Glomerular-filtration, tubular reabsorption, and tubular secretion'
(D) Tubular reabsorption and secretion only

30. Ethylene oxide finds an important use in Medical and Biological research as a
(A) Long-term preservative
(B) Respira tory aid.
(C) Sterilizing agent
(D) Anaesthetic agent

31. If an enzyme has a small value of K_M, (Michaelis Menten constant) then it achieves maximal catalytic efficiency at
(A) High substrate concentration
(B) Low substrate concentration
(C) Intermediate substrate concentration
(D) None of the above

32. Which of the following element is least likely to be found on any + strand viral genomic RNA?
(A) A cap
(B) A packing ite
(C) A binding ite for RNA Polymerase II
(D) A binding site for ribosomes

33. Guttation in plants is favoured by
(A) High humidity and dim light
(B) Low humidity and dim light
(C) Dim light only
(D) None of the above

34. Which form of phytochrome pigment predominates during the day light in plant ?
(A) **P_R** (phytochrome red)
(B) P_{FR} (ph tochromefar red)

(C) Both are predominate
(D) None of the above

35. Which of the following effects is brought about by gibberellins but not by auxins?
(A) Breaking of dormancy in leaf buds
(B) Stimulation of cambial activity
(C) Inhibition of leaf abscission
(D) Stimulation of fruit development

36. Many organisms which are morphologically complex have much lesser genome than those which looks morphologically simple, this is called:
(A) P-value paradox
(B) C-value paradox
(C) D-value paradox
(D) G-value paradox

37. When the helices of a double the linking number stranded circular DNA molecule' are opened,
(A) Decreases
(B) Increases
(C) Does not change
(D) Is always zero

38. Intrinsic torsion potential' refers to :
(A). Freedom of rotation around a C-C single bond
(B) Restriction of rotational freedom around C-N single bond in a nucleotide
(C) Accommodation of some rotation around peptide bond
(D) Reflection rotational capacity around <p and 'I' angles

39. Protein solubilization by salting in is associated with :
(A) Excessive heat loss
(B) Protein denaturation
(C) Increase in protein ionization
(D) All of the above

40. "A" form of DNA can be converted to "B" form by
(A) Denaturation
(B) Dehydra tion
(C) De-salting
(D) De-proteination

41. Which of the following *cannot* have a helical structure?
(A) *r-RNA*
(B) Protein
(C) *m-RNA*
(D) None of the above

42. The following are known to exist as a stable triple helix in nature?
(A) Few forms of DNA
(B) Some types of RNA
(C) A few proteins
(D) Specialized polysaccharides

43. In molecular sieve chromatography, separating multiple species the internal volume:
(A) Is uniformly accessible to all species
(B) Is predominantly accessible to a species with highest concentration
(C) Is predominantly accessible to a species with least molecular size
(D) Is not accessible to any of the species

44. In gel filtration chromatography, smaller molecules will be fractionated in a
(A) Larger elution volume
(B) Smaller elution volume
(C). Elution volume is not dependent on size
(D) Smaller molecules come into void volume

45. Ionic detergents can increase the solubility of a species by
(A) Increasing the dielectric constant of the solvent
(B) Binding the hydrophobic portion of the species
(C) Reducing the solute-solute interaction
(D) All of the above

46. SDS-PAGE separates proteins based on the principle of :
(A) Iso-electric focussing
(B) Passage of current through an electrolyte
(C) Gel filtration chromatography
(D) Electromotive force

47. A solution shows transmittance of 10 on spectrophotometer, what is the absorbance of the solution ?
(A) 1.0
(B) 0.1
(C). 10
(D) 0.01-.

48. If a RNA solution is heated the absorbance will
(A) Increase
(B) Decrease
(C) Will first increase and then decrease
(D) Will not change

49. Base paring in nucleic acid strands is studied using a technique
(A) X-ray diffraction
(B) Infrared spectroscopy

(C) MALDI
(D) Scanning electron microscopy

50. X (chi) is the angle of rotation between:
(A) Various bonds in phosphate group of nucleic acid backbone
(B) C5' and the' phosphate
(C) C1' and the nitrogenous base
(D) C1' and oxygen of the sugar

51. An E.coli strain lacking DNA polymerase I would be deficient in DNA
(A) Repair
(B) Methylation
(C) Transcription
(D) All of the above

52. Water of highest purity used in Molecular Biology research is indicated by the absence of :
(A) Salt ions
(B) Nucleases
(C) Bacteria
(D) Viruses

53. Isopropyl thiogalactoside is a
(A) Physiological inducer
(B) Repressor
(C) Gratuitous inducer
(D) None of the above

54. With respect to the *mRNA* start site, promoter of a gene can be located:
(A) Upstream
(B) Downstream
(C) Either upstream or downstream
(D) May not be present

55. Alkaline breakdown of nucleic acid is prevented by
(A) Double stranded nature
(B) 2'OH group
(C) Deoxyribose sugar
(D) Proteins associated with nucleic acid

56. When DNAis extracted from cells of E.coli and analyzed for base composition, it is found that 38% of the bases are cytosine. What percent of the bases are adenine ?
(A) 12%
(B) 24%
(C) 38%
(D) 62%

57. A severe winter storm kills many chicks. An investigation comparing the body size of dead birds with that of survivors reveals that the dead birds included mainly the largest and the smallest members of the population. This winter storm exemplifies:

(A) Kin selection
(B) Stabilizing selection
(C) Directional selection
(D) Balanced selection

58. Which of the following IS NOT characteristic of all VIruses with DNA genome?
(A) Replication occurs only in a living cell
(B) Replication involves translation on cellular ribosomes
(C) The viral nucleocapsid is surrounded by lipid envelope
(D) The viral genome is surrounded by protein coat

59. Incubation of Gram-negative bacteria' with lysozyme in an isotonic medium causes rod shaped bacteria to assume a spherical shape. The cause of this phenomenon is :
(A) Absorption of water
(B) Destruction of the cell wall
(C) Destruction of the cytoskeleton
(D) .Damage to the plasma membrane

60. Which of the following six-membered ring compounds, has the most planar structure?
(A) Glucose
(B) Cytosine
(C) Cyclohexane
(D) Mannose