**GAT-B EXAM 2022**
**(IFAS SOLVED PAPER)**

Subject: GAT SECTION S1 A

1. If A is the set of even natural numbers less than 8 and B is the set of prime numbers less than 7, then the number of relations from A to B is
1. 9,
2. $9^2$,
3. $2^9$,
4. $2^3$,

2. Which one of the following describes the relation between the acceleration of a body in space and the distance (r) of the body from the center of the earth?
1. $1/r$,
2. $1/r^3$,
3. $1/r^4$,
4. $\sqrt{r}$,

3. Glycosidic linkages are the bonds between:
1. sugars,
2. nucleotides,
3. amino acids,
4. lipids,

4. The straight line 2x+3y+4=0 touches the x-axis at:
1. -2.0,
2. +2.0,
3. -1.0,
4. +1.0,

5. Two trains running in opposite directions pass by a man standing on the platform in 20 seconds and 10 seconds respectively and they completely cross each other in 15 seconds. The ratio of their speeds is:
1. 1: 3,
2. 1:2,
3. 1:1.5,
4. 1:1,

6. The alkaline nature of amines is due to the:
1. small size of nitrogen.,
2. higher stability of nitrogen molecule at room temperature.,
3. presence of unshared pair of electrons on nitrogen.,
4. pyramidal geometry of nitrogen in amines.,

7. What is the molarity of pure acetic acid? Assume density of acetic acid 1 g/ml.
1. 12.7,

2. 16.7,
3. 20.7,
4. 55.5,

8. Moving electron (velocity v) produces a magnetic field B such that:
1. B is perpendicular to v.,
2. B is parallel to v.,
3. Angle between B and v is 45 degrees.,
4. B is opposite in direction to v.,

9. If the price of the sugar is raised by 25%, find by how much percent a homemaker should reduce the consumption of sugar so as not to increase his/her expenditure?
1. 10%,
2. 12%,
3. 20%,
4. 15%,

10. Histones are tightly bound to DNA because:
1. histones are positively charged proteins.,
2. histones are negatively charged proteins.,
3. histones get acetylated by the action of acyltransferases.,
4. histones are highly hydrophobic in nature.,

11. The limit of resolution of a light microscope is determined by:
1. wavelength of light,
2. material of the lens,
3. polarization of light,
4. intensity of light,

12. Starting with three different amino acids, how many different tripeptides can be made, assuming that each amino acid can be used more than once?
1. 3,
2. 6,
3. 9,
4. 27,

13. The rate of a reaction, $2\ A + B \rightarrow$ Products, is given by the rate equation $Rate = k\ [A]^2\ [B]$
The value of the rate constant can be increased by:
1. increasing the concentration of A alone.,
2. increasing the concentration of B alone.,
3. increasing the concentrations of A and B simultaneously.,
4. increasing the temperature.,

14. The average of the first five multiples of 9 is:
1. 20,

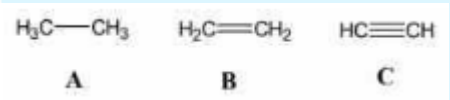
2. 27,
3. 28,
4. 30,

15. Three taps A, B, and C together can fill an empty cistern in 10 minutes, the tap A alone can fill it in 20 minutes and the tap B alone in 40 minutes. How long will the tap C alone take to fill it?
1. 40 minutes,
2. 24 minutes,
3. 32 minutes,
4. 16 minutes,

16. The magnetic susceptibility is negative for:
1. paramagnetic materials.,
2. ferromagnetic materials.,
3. superconducting materials.,
4. diamagnetic materials.,

17. Interferons secreted by virus-infected cells induce:
1. antiviral response,
2. pro-viral response,
3. apoptosis,
4. cell proliferation,

18. The correct order of increasing acidic behavior of the following compounds is




1. A>B>C,
2. C>B>A,
3. A>C>B,
4. B>C>A,

19. Which one of the following force does not act on a cyclist when he/she bends on a horizontal turn?
1. Weight (Mg),
2. Centrifugal force (Mv2/r),
3. Friction (f),
4. Torque ($\bar{\tau}$)

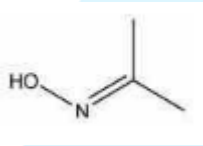
20. Which one of the following attributes of an electromagnetic wave remains constant when it enters from air to water?
1. Wavelength,
2. Velocity,
3. Frequency,
4. Colour,

21. Given below are two statements: one is labelled as Assertion A and the other is labelled as Reason R.

Assertion A: Inhibition of succinate dehydrogenase by malonate represents competitive inhibition.
Reason R: Malonate and succinate bind at different sites of the enzyme.
In light of the above statements, choose the most appropriate answer from the options given below.
1. Both A and R are correct and R is the correct explanation of A
2. Both A and R are correct but R is NOT the correct explanation of A,
3. A is correct but R is not correct,
4. A is not correct but R is correct,

22. When 4 fair coins are tossed together what is the probability of getting at least 3 heads?
1. 1/4,
2. 3/4,
3. 5/16,
4. 3/8,

23. The following structure represents




1. An oxime,
2. A hydrazone,
3. An imine,
4. A Schiff's base,

24. A box contains 5 pink, 3 green, and 2 yellow balls. Three balls are picked up randomly. What is the probability that none of the balls drawn is green?
1. 3/16,
2. 7/24,
3. 5/13,
4. 4/23,

25. Point charges, +q each is placed at the corners of a triangle, square and regular pentagon. If the sides of the triangle, square and pentagon are a each, the electric field at the center will be:
1. zero in all three cases,
2. maximum at the center of the pentagon,
3. minimum at the center of the triangle,
4. zero for square and positive for triangle and pentagon, Option ID: 1688,

26. Match items in List I with items in List II

| List I | List II |
|---|---|
| A. Incomplete dominance | I. LABO Blood types |
| B. Recessive epistasis | II. Flower color in 4 o'clock plant |
| C. Dominant epistasis | III. Coat color in mice |
| D. Co-dominance | IV. Fruit color in summer squash |

Choose the correct answer from the options given below:
1. A-II, BIV, C-III, D - I,

2. A-I, B-IV, C-III, D-II,
3. A-I, B-III, C-IV, D-II,
4. A-II, B - III, C-IV, DI,

27. How many numbers between 100 and 999 can be formed with the digits 1, 4, 7, 8, and 9 if the digits are not repeated?
1. 20,
2. 60,
3. 12,
4. 120,

28. What is the sum of the first 10 terms of the sequence 1,2,4,8,16, ...?
1. 1024,
2. 1023,
3. 1017,
4. 1026,

29. Energy of a photon of wavelength 410 nm is equal to the band gap between valence and conduction band of a semi conductor. What is the minimum energy required to create an electron- hole pair? (Planck's constant (h) = 4.1x10-15 eV.s) (velocity of light = 3x108 m/s)
1. -0.03 eV,
2. 0.3 eV,
3. 3.0 eV,
4. 30.0 eV,

30. Given below are two statements:
Statement I: The boiling point of p-nitrophenol is higher than the o-nitrophenol.
Statement II: Alcohols are less acidic than the Phenols.
In the light of the above statements, choose the most appropriate answer from the options given below.
1. Both Statement I and Statement II are correct.,
2. Both Statement I and Statement II are incorrect,
3. Statement I is correct but statement II is incorrect.,
4. Statement I is incorrect but Statement II is correct.,

31. Given below are two statements: one is labelled as Assertion A and the other is labelled as Reason R.
Assertion A: Hematopoietic stem cells are considered multipotent precursors.
Reason R: They have the ability to differentiate into different types of blood cells.
In light of the above statements, choose the most appropriate answer from the options given below.
1. Both A and R are correct and R is the correct explanation of A
2. Both A and R are correct but R is not the correct explanation of A,
3. A is correct but R is not correct,
4. A is not correct but R is correct,

32. Which one of the following is NOT due to total internal reflection?
1. Brilliance of a diamond.,

2. Working of an optical fibre,
3. Mirage on a hot summer day.,
4. Difference between apparent and real depth of a water body. ,

33. The boiling points of four liquids are shown below:

| Compound | Boiling point |
|---|---|
| Acetone | 56°C |
| Ethanol | 78 °C |
| Diethyl ether | 35 °C |
| Water | 100 °C |

Which liquid has the highest vapor pressure at 25°C?
1. Acetone,
2. Ethanol,
3. Diethyl ether,
4. Water,

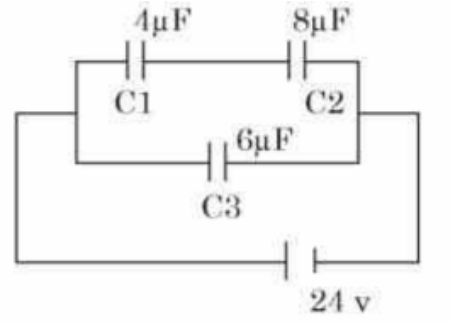
34. What is the chance that a leap year, selected at random, will NOT have 53 Sundays as well as 53 Mondays?
1. 1/7,
2. 2/7,
3. 5/7,
4. 0,

35. Given below are two statements:
Statement I: Activation energy is the difference between the energy level of substrate and its transition state during the reaction.
Statement II: Enzymes increase the activation energy enhancing the rate of reaction.
In the light of the above statements, choose the correct answer from the options given below.
1. Both Statement I and Statement II are true,
2. Both Statement I and Statement II are false,
3. Statement I is true but statement II is false,
4. Statement I is false but Statement II is true,

36. The primary enzyme responsible for the rapid and accurate replication of the genome in E. coli is:
1. DNA Pol V,
2. DNA Pol II,
3. DNA Pol III,
4. DNA Pol IV

37. Which one of the following is NOT a property of a LASER?
1. It is monochromatic.,
2. It is coherent.,
3. It is directional.,
4. It exhibits spontaneous emission.

38. What is the net capacitance of the circuit given below?




1. 8.6 HF,
2. 4.6 HF,
3. 6.6 μF,
4. 3.0 μF,

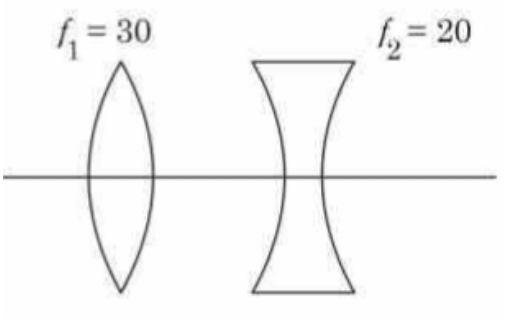
39. Which one of the following statements correctly describes type IIP restriction enzymes?
A. They cut nucleotides only from the ends of the DNA.
B. They act on only palindromic nucleotide sequences in the DNA.
C. They recognize only GC rich sequences.
D. They recognize only AT rich sequences.
Choose the correct answer from the options given below.
1. A and B Only,
2. B Only,
3. A, B and C Only,
4. A, B and D Only,

40. An organic compound contains 69.77% C, 11.63% H and 18.6% O. Its molecular formula is same as its empirical formula. The number of carbon atoms present per molecule would be:
1. 4,
2. 5,
3. 6,
4. 7,

41. Find the area of the triangle with vertices A(5,4), B(-2,4) and C(2,14).
1. 34 sq. units,
2. 35 sq. units,
3. 36 sq. units,
4. 32 sq. units,

42. Lung cancer can be detected at an early stage by:
1. bone marrow test,
2. blood test,
3. MRI scans,
4. Gene sequencing,

43. What is the focal length (f) of a combination of lenses (convex and concave) as given below?




1. 30 cm,
2. 20 cm,
3. 10 cm,
4. 60 cm,

44. Choose the correct order of increasing acidity for the following compounds:
A. Benzoic acid
B. 4-Methoxybenzoic acid
C. 4-Nitrobenzoic acid
1. A>B>C,
2. B>C>A,
3. C>B>A,
4. A>C>B,

45. Which one of the following represents the correct electronic orbital configuration of Phosphorus $(+3)\ ion\ (p^{3+})$?
1. 1s2 2s2 2p6 3s2,
2. 1s2 2s2 2p6 3s1,
3. 152 252 2p4 352,
4. 1s2 2s2 2p5 3s1,

46. What is the approximate vapor pressure of an isopropanol solution containing 9.2 g of a non volatile solute, glycerol $(C_3H_8O)$and 60 g of isopropanol $(C_3H_8O)$ at 82°C? Given vapor pressure of isopropanol at 82°C is 100 kPa.
1. 81 kPa,
2.91 kPa,
3. 101 kPa,
4. 111 kPa,

47. What will happen when the pressure is doubled in an isothermal process for a closed system containing a fixed amount of an ideal gas?
1. Volume will double,
2. Volume will halve,
3. Temperature will increase slightly,
4. Temperature will decrease slightly,

48. In uniform circular motion, which one of the following properties changes with time?
1. Momentum,
2. Speed,

3. Mass,
4. Kinetic Energy,

49. Given below are two statements:
Statement I: A single gene can affect multiple phenotypic expressions.
Statement II: In a polygenic trait, multiple genes contribute to a phenotypic expression.
In the light of the above statements, choose the most appropriate answer from the options given below.
1. Both I and II are correct,
2. Both I and II are incorrect,
3. I is correct but II is incorrect,
4. I is incorrect but II is correct,

50. The ratio of the velocity of the hydrogen molecule to that of the oxygen molecule under identical conditions is:
1. 1:1,
2. 1:2,
3. 1:4,
4. 1:16,

51. In a class of 35 students, 24 like to play cricket and 16 like to play football. Also, each student likes to play at least one of the two games. How many students like to play both cricket and football?
1. 11,
2. 5,
3. 8,
4.13,

52. What is the bond that can form between two cysteines in a protein?
1. Ionic bond,
2. Hydrogen bond,
3. Disulfide bond,
4. Amide bond,

53. Find the modal age from the given data:

| Age | 10 | 11 | 12 | 14 | 15 | 16 | 18 | 20 |
|---|---|---|---|---|---|---|---|---|
| No. of boys | 12 | 9 | 8 | 6 | 6 | 5 | 4 | 3 |

1 10,
2. 2,
3. 15,
4. 20,

54. In a class of 60 students comprising girls and boys, 30% are boys. On a given day 10% of the class is absent and all the absentees are boys. What is the percentage of girls in this class on that given day?
1. 66.66,
2. 77.77,
3. 88.88,
4. 100,

55. Which one of the following is an autosomal dominant disorder?
1. Sickle cell anaemia,
2. Cystic fibrosis,
3. Tay-Sachs disease,
4. Huntington's disease,

56. Which one of the following properties is primarily responsible for spreading of oil uniformly on water?
1. Viscosity,
2. Partition coefficient,
3. Dipole moment,
4. Surface tension,

57. What is the half-life of a zero order reaction that takes 25 minutes for 80% completion?
1.150.25 seconds,
2. 937.50 seconds,
3. 950.50 seconds,
4. 156.25 seconds,

58. Given below are two statements: one is labelled as Assertion A and the other is labelled as Reason R.
Assertion A: Bt toxin does not kill Bacillus thuringiensis.
Reason R: The Bt toxin gets activated due to the alkaline pH of the insect gut.
In the light of the above statements, choose the most appropriate answer from the options given below.
1. Both A and R are correct and R is the correct explanation of A
2. Both A and R are correct but R is not the correct explanation of A,
3. A is correct but R is not correct,
4. A is not correct but R is correct,

59. In the following reaction
$P_4(g) + 6\,Cl_2\,(g) = 4\,PCl_3\,(g)$
equilibrium is established by adding equal moles of $P_4(g)$ and $Cl_2(g)$; therefore, at equilibrium:
1. $[Cl_2] > [PCl_3]$,
2. $[Cl_2] < [P_4]$,
3. $[PCl_3] > [P_4]$,
4. $[P_4] = [PCl_3]$,

60. Cystic fibrosis is caused due to:
1. mutation in a gene encoding G protein,
2. deficiency of adenyl cyclase,
3. mutation in a gene encoding an ABC transporter,
4. over activation of the Ca++ ATPase pump,

**Subject: GAT SECTION S1 B**
61. Given below are two statements:

Statement I: The fragments of DNA generated after cleavage with a restriction enzyme have a phosphate group on their 3' ends and a -OH group on their 5' ends.
Statement II: Cohesive ends generated by restriction digestion reanneal with complementary DNA fragment.
Choose the correct answer:
1. Both Statement I and Statement II are true.
2. Both Statement I and Statement II are false.
3. Statement I is true but Statement II is false.
4. Statement I is false but Statement II is true.

62. Match List I with List II- Match the industrial application of the following enzymes:

| List I | List II |
|---|---|
| A. Pencillinase | L Pharmaceutical |
| B. Pectinase | II. Leather |
| C. Trypsin | III. Wine |
| D. Renin | IV. Dairy |

Choose the correct answer from the options given below.
1. A-IV, B-III, C-I, D-II,
2. A-I, B-III, C-II, D-IV,
3. A-I, B-II, C-III, D-IV,
4. A-IV, B-II, C-III, D-I,

63. Match items in List I with items in List II

| List I | List II |
|---|---|
| A. Rickettsia prowazekii | I. Relapsing fever |
| B. Variola major | II. Epidemic typhus |
| C. Varicella zoster Virus | III. Smallpox |
| D. Borrelia recurrentis | IV. Shingles |

Choose the correct answer from the options given below.
1. A-I, B-II, C-III, D-IV,
2. A-IV, B-I, C-II, D-III,
3. A-III, B-IV, C-I, D-II,
4. A-II, B-III, C-IV, D-I,

64. Which is the correct order of progressively higher levels of chromatin organization?
A. Nucleosome
B. 30 nm chromatin fibre
C. Looped domain
Choose the correct answer:
1. ABC,
2. CB-A,
3. CA-B,
4. A-C-B,

65. A double-stranded genomic DNA has 40% (A+T) content. What is the average size (base pairs) of the fragments generated by digestion with the restriction enzyme HaeIII (GGCC)?

1. 81,
2. 123,
3. 256,
4. 4096,

66. Immobilization of enzymes:
A. increases the specificity of the enzyme in batch reaction
B. leads to an increase in the apparent Km.
C. makes it unsuitable for its use in a continuous reactor system
D. decrease the operational cost of the industrial process
Choose the correct answer from the options given below:
1. B and D Only,
2. A and D Only,
3. A and C Only,
4. C and D Only,

67. Once the cell passes the G1 checkpoint and enters s phase:
1. the cell cycle is completed bypassing the M phase.,
2. the cell cycle is completed bypassing the G2 checkpoint.,
3. completion of cell cycle will depend on 62 checkpoint.,
4. the cell will next enter M phase bypassing the G2 checkpoint.,

68. Knockout mice are usually created by:
1. chemically mutagenizing a mouse and selecting for mutant offspring.,
2. creating a chimera by fusing cells from two different cell lines.,
3. infecting the mouse with a retrovirus.,
4. transfecting embryonic stem cells with an inactivated gene.,

69. Match items in List I with items in List II

| List I | List II |
|---|---|
| A. Cytochrome oxidase | I. Molybdenum ions |
| C. Nitrate reductase | II. Nickel ions |
| B. DNA polymerase | III. Magnesium ions |
| D. Urease | IV. Copper ions |

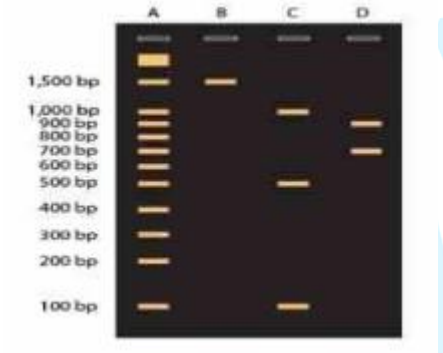
Choose the correct answer from the options given below.
1. A-IV, B-III, C-II, D-I,
2. A-IV, B-III, C-I, D-II,
3. A-III, B-I, C-IV, D-II,
4. A-II, B-III, C-IV, D-I,

70. The growth pattern that you will obtain for a media containing two different carbon sources one of which is preferentially utilized will be a:
1. diauxic growth.,
2. exponential growth.,
3. linear growth.,

4. lag phase followed by log phase growth.,

71. Assume that height in a plant is controlled by three genes (A, B and C) and each additive allele contributes equally. The base height of plant is 20 cm and the maximum possible height is 38 cm. The height of a plant with genotype AAbbcc will be:
1. 32 cm,
2. 29 cm,
3. 19 cm,
4. 25.4 cm,

72. The following figure shows agarose gel electrophoresis of linear DNA, after digestion with BamHI in lane C and EcoRI in lane D. The uncut DNA is shown in lane B.




Statement I: This DNA has two restriction sites for BamHI and one restriction site for EcoRI.
Statement II: Double digestion with BamHI and EcoRI will yield 5 fragments.
In the light of the above statements, choose the correct answer from the options given below.
1. Both Statement I and Statement II are true,
2. Both Statement I and Statement II are false,
3. Statement I is true but Statement II is false,
4. Statement I is false but Statement II is true,

73. NK cells are immunologically significant as they recognize and kill:
1. intracellular bacteria reservoirs.,
2. cells with upregulated MHC-I molecules.,
3. cells with downregulated MHC-I molecules.,
4. cells with self-marker on their surface.,

74. Match items List I with items in List II

| List I | List II |
|---|---|
| A. Northern Hybridization | I. Transcriptome analysis |
| B. Next generation sequencing | II. Detection of proteins in specific cell types |
| C. Sanger's DNA sequencing | III. Analysis of splice variants |
| D. In-situ immunolocalization | IV. Capillary sequencers |

Choose the correct answer from the options given below:
1. A-II, B-III, C-IV, D-III,
2. A-IV, B-I, C-II, D-III,
3. A-III, B-I, C-IV, D-II,

4. A-IV, B-III, C-I, D-II,

75. In a random mating population, the frequency of allele A1 and A2 in the gene pool is 0.8 and 0.2, respectively. In a population of 200 plants, how many will have the genotype A1A2?
1. 8,
2. 128,
3. 64,
4. 32,

76. Given below are two statements: one is labelled as Assertion A and the other is labelled as Reason R.
Assertion A: Attenuation of the trp operon is possible in bacteria
Reason R: Transcription and translation are coupled.
In the light of the above statements, choose the correct answer from the options given below.
1. Both A and R are true and R is the correct explanation of A,
2. Both A and R are true but R is not the correct explanation of
3. A is true but R is false,
4. A is false but R is true,

77. Which is the class of Nitrogen containing plant secondary metabolites?
1. Terpenoids,
2. Flavonoids,
3. Alkaloids,
4. Brassinosteroids,

78. The hormone that activates the enzyme adenylate cyclase is:
1. Epinephrine,
2. Insulin,
3. Estrogen,
4. Progesterone,

79. Which protein is required to seal a nick during Okazaki fragment maturation?
1. DNA Ligase,
2. DNA helicase,
3. DNA topoisomerase,
4. DNA polymerase,

80. RNA Viruses are entirely dependent on the host for:
1. replication machinery,
2. transcriptional machinery,
3. RNA capping machinery,
4. protein translation machinery,

81. Major limitation of using NMR to determine protein structure is:
1. resolution is poor.,
2. resolved structure is not reliable.,

3. difficult to interpret the data for larger proteins (>50 kDa).,
4. difficult to interpret the data for smaller proteins (<15 kDa).

82. Identify the statement that is NOT applicable to enzyme catalyzed reaction.
1. The reaction proceeds with the conversion of the substrate to a higher energy transition state.
2. Enzymes alter the equilibrium constant of the reaction.
3. Enzymes decrease the energy of activation required for the reaction.
4. Some enzymes involve multiple steps of electron transfer.

83. The percentage of sequence identity for the following aligned sequence is:
VKSFLWTQAL
VPSFRWTQSL
1. 10%,
2. 80%,
3. 30%,
4. 70%,

84. A plant species nearing its extinction due to virus infection has been given for tissue culture and micro-propagation. What should scientists choose from the following four explants for culturing?
1. Shoot apical meristem,
2. Internode
3. Leaf disc
4. Root tip

85. The following statement is NOT true for the receptor binding site of a virus.
1. Binds specifically to a cellular receptor.
2. Cannot bind to neutralizing antibodies.
3. Interacts with the cellular receptor leading to activation of endocytosis.
4. Is composed of unique structural domains.

86. Match the coefficients in List I with their corresponding downstream processing steps given in List II.

| List I | List II |
|---|---|
| A. Sedimentation coefficient | I. aqueous two-phase extraction |
| B. Partition Coefficient | II. ultrafiltration |
| C. Rejection coefficient | III. dialysis |
| D. Activity coefficient | IV. centrifugation |

Choose the correct answer from the options given below.
1. A-III, B-I, C-IV, D-II
2. A-II, B-I, C-IV, D-III
3. A-IV, B-III, C-I, D-II
4. A-IV, B-I, C-II, D-III

87. The primary function of the class I and class II MHC molecules is:
1. binding peptide antigens for recognition by antigen-specific receptors on T-cells.
2. mediation of T-independent B-cell responses.

3. helping in endocytosis of antigens by phagocytic cells.
4. aid opsonization of foreign particle.

88. Which of the following amino acids are both glucogenic and ketogenic?
A. Isoleucine
B. Serine
C. Tryptophan
D. Proline
E. Phenylalanine
Choose the correct answer from the options given below.
1. A, B and C only
2. A, C and E only
3. C and E only
4. B and D only

89. A peptide containing only aromatic amino acids (tryptophan, phenylalanine, and tyrosine) has a molecular weight of 11,000. The likely number of amino acid residues in the peptide is:
1. 60
2. 100
3. 125
4. 150

90. In which of the following genotypes of lac operon the enzyme synthesis would be constitutive?
A. $I^+O^+Z^+Y^+/I^+O^+Z^+Y^+$
B. $I^+O^CZ^+Y^+/I^+O^CZ^+Y^+$
C. $I^-O^+Z^+Y^+/I^+O^+Z^+Y^+$
D. $I^-O^+Z^+Y^+/I^-O^+Z^+Y^+$
Choose the correct answer from the options given below.
1. A and B Only
2. B and C Only
3. B and D Only
4. C and D Only

91. In a family, if the father is affected by X-linked dominant trait and mother is normal, then
1. some of the daughters can be normal.
2. all the daughters will be affected.
3. all the daughters and none of the sons will be affected.
4. all the sons and some of the daughters will be affected.

92. During replication, DNA polymerases distinguish between ribonucleoside and deoxyribonucleoside triphosphates (rNTPs and dNTPs) while synthesizing new DNA strand. Although rNTPs are present at approximately 10-fold higher concentration in the cell, they are incorporated at a rate that is more than 1000-fold lower than dNTPs. This is because:
1. DNA polymerases selectively cleave rNTPs.
2. rNTPs are cyclized by DNA polymerase.
3. Steric exclusion of rNTPs from the DNA polymerase active site.

4. dNTPs are more stable than rNTPs.

93. Match items in List I with items in List II

| List I | List II |
|---|---|
| A. Inactivated Vaccines | I. Based on the poisonous protein made by the pathogen |
| B. Live attenuated Vaccines | II. Based on the killed or altered disease-causing germ. |
| C. Conjugate Vaccines | III. Based on the weakened form of the pathogen. |
| D. Toxoid Vaccines | IV. Based on the combination of the weak antigen coat of Pathogen and strong carrier proteins. |

Choose the correct answer from the options given below.

1. A-II, B-I, C-III, D-IV
2. A-II, B-III, C-I, D-IV
3. A-III, B-I, C-IV, D-II
4. A-II, B-III, C-IV, D-I

94. A mutant bacterial cell has a defective aminoacyl synthetase that attaches a lysine to tRNAs with the anticodon AAA instead of the normal phenylalanine. During protein synthesis:

1. none of the proteins in the cell will contain phenylalanine.
2. lysine will partially replace phenylalanine at certain positions.
3. the cell will compensate for the defect by attaching phenylalanine to tRNAs with lysine-specifying anticodons.
4. lysine will replace phenylalanine at all amino acids positions.

95. Given below are two statements:

Statement I: Virulence trait of Agrobacterium tumefaciens is borne on genomic DNA.

Statement II: The technique used to introduce genes in dicot is Ti-plasmid infection.

Choose the correct answer:

1. Both Statement I and Statement II are true.
2. Both Statement I and Statement II are false.
3. Statement I is true but statement II is false.
4. Statement I is false but Statement II is true.

96. Which of the following phagocytic cells is NOT a tissue-specific macrophage cell?

1. Histiocyte
2. Kupffer cell
3. Langerhans cell
4. Dendritic cell

97. Which one of the following are Professional Antigen Presenting Cells?

1. Fibroblasts
2. Neutrophils
3. Dendritic cells
4. Epithelial cells

98. Self splicing introns are an example of:

1. Spliceosomes

2. Ribozymes
3. Mitrons
4. Inteins

99. Acid Fast bacteria:
1. have cell wall with mycolic acid
2. thrive well in acidic environment
3. are fastidious bacteria
4. cause acid depletion is soil

100. Which of the following statements is NOT TRUE about myeloma cells used in the hybridoma technique for the production of monoclonal antibodies?
1. These are cancerous B cells
2. They can divide indefinitely in a culture
3. Their HGPRT gene is non-functional
4. They can produce antibodies

101. Given below are two statements:
Statement I: After immobilization, plant cells are subjected to stress to induce secondary metabolite production.
Statement II: Cells derived from different explants in culture always produce the same set of secondary metabolites.
Choose the correct answer:
1. Both Statement I and Statement II are true.
2. Both Statement I and Statement II are false.
3. Statement I is true but Statement II is false.
4. Statement I is false but Statement II is true.

102. Which of the following hypersensitivity reactions involves the complement activation?
1. Both Type I and Type III hypersensitivity
2. Only Type I hypersensitivity
3. Both Type I and Type II hypersensitivity
4. Both Type II and Type III hypersensitivity

103. Which enzyme catalyzes strand separation at the replication fork?
1. Replication protein A
2. DNA helicase
3. DNA topoisomerase
4. DNA polymerase

104. Match items in List I with items in List II

| List I | List II |
|---|---|
| A. Silent mutation | I. Amino acid codon is changed to a stop codon. |
| B. Missense mutation | II. Amino acid sequence beyond the site of mutation is changed. |
| C. Nonsense mutation | III. Amino acid sequence is changed in one amino acid. |
| D. Frameshift mutation | IV. Amino acid sequence is unchanged. |

Choose the correct answer from the options given below:

1. A-I, B-II, C-III, D-IV
2. A-IV, B-I, C-III, D-II
3. A-IV, B-III, C-I, D-II
4. A-III, B-I, C-II, D-IV

105. Lac repressor of E. coli contains _____ DNA binding motifs.
1. Helix turn helix
2. Helix loop helix
3. Leucine zipper
4. Zinc finger

106. RNAi or post-transcriptional gene silencing is a conserved biological response to the presence of:
1. ssDNA
2. dsDNA
3. ssRNA
4. dsRNA

107. Why is golden rice pale yellow in color?
1. It is rich in chlorophyll a.
2. It is rich in beta-carotene.
3. It is rich in chlorophyll b.
4. It is rich in phycobilins.

108. Regulation of lac operon is negative as:
1. operon is expressed at low level to allow lactose entry.
2. lactose binds with the inducer to activate the operon.
3. expression of operon is blocked by an active repressor.
4. lactose needs a transporter to enter the cell.

109. Given below are two statements:
Statement I: The recombination frequency of genes vary from 50% to 80%.
Statement II: Recombination can occur anywhere along the length of chromosome.
Choose the correct answer from the options given below:-
1. Both statement I and statement II are correct
2. Both statement I and statement II are incorrect
3. Statement I is correct but statement II is not correct
4. Statement I is not correct but statement II is correct

110. Which of the following is NOT a mucopolysaccharide?
1. Chondroitin
2. Inulin
3. Hyaluronic acid
4. Heparin

111. Given below are two statements:

Statement I: In plants, the genes for smaller subunit of ribulose-1, 5-bisphosphate carboxylase/ oxygenase (Rubisco) enzyme is present in the plastid genome.
Statement II: The genes for larger subunit of Rubisco enzyme is present in the nuclear genome.
Choose the most appropriate answer from the options given below:
1. Both Statement I and Statement II are correct.
2. Both Statement I and Statement II are incorrect.
3. Statement I is correct but statement II is incorrect.
4. Statement I is incorrect but statement II is correct.

112. The level of expression of recombinant protein can be gauged by
1. number of transformants obtained.
2. nutrient utilization rate.
3. the level of resistance to antibiotic.
4. Western blotting.

113. Match items in List I with items in List II

| List I | List II |
|---|---|
| A. bar | I. virus-free plants |
| B. meristem culture | II. herbicide resistance |
| C. Chalcone Synthase | III. dwarf wheat |
| D. gai | IV. flower color |

Choose the correct answer from the options given below:
1. A-III, B-I, C-IV, D-II
2. A-IV, B-III, C-II, D-I
3. A-III, B-IV, C-I, D-II
4. A-II, B-I, C-IV, D-III

114. The fractional conversion from an immobilized enzyme continuous stirred tank reactor under steady state operation increases with an increase in agitation speed. This behavior can be attributed to:
1. reduced internal pore diffusion.
2. Reduced external film diffusion.
3. decrease in energy of activation for the enzyme.
4. enhanced enzyme activity due to mechanical shear.

115. The stop codons lead to termination of translation because:
1. there are no tRNAs corresponding to stop codons.
2. the corresponding tRNA do not have an amino acid.
3. the corresponding tRNA cannot bind to ribosome binding site.
4. stop codon codes for pseudo amino acid.

116. Which of the following describes cyclin-dependent kinase (Cdk)?
A. Cdk is inactive, or "turned off", in the presence of cyclin
B. Cdk is present throughout the cell cycle
C. Cdk is an enzyme that attaches phosphate groups to other proteins
Choose the correct answer from the options given below.

1. A and B Only
2. B Only
3. B and C Only
4. C Only

117. Which of the following mechanisms of antibiotic action is/are NOT correct?
A. Tetracycline: Inihibits aminoacyl-tRNA binding to A-site.
B. Rifampicin: Blocks correct positioning of A-site aminoacyl- tRNA for peptidyl transfer reaction
C. Chloramphenicol: Inhibits EF-Tu function
D. Ciproflaxicin: Inhibits Topoisomerases
E. Puromycin: Causes premature chain termination during translation; mimics 3' end of aminoacyl-tRNA in A-site and acts as acceptor.
1. B only
2. A, C and D only
3. B and C only
4. D and E only

118. In Michaelis-Menten kinetics to increase the reaction velocity by 9 fold from 10% of $V_{max}$ to 90% of $V_{max}$ the substrate concentration has to increased by:
1. 3 fold
2. 9 fold
3. 27 fold
4. 81 fold

119. Subtractive hybridization is useful to:
1. eliminates incomplete cDNA from a gene library.
2. create expression libraries based on genes that are currently being expressed.
3. identify and construct new probes for southern hybridization.
4. identify sets of genes that are only expressed under certain conditions.

120. The vector which is most commonly used in crop improvement is:
1. Bacterial Artificial Chromosome (BAC)
2. Agrobacterium
3. T4 phage
4. Cosmid

121. In Michaelis-Menten kinetics what value of [S], as a fraction of $K_m$, is required to obtain a velocity equal to 80% $V_{max}$?
1. 2 $K_m$
2. 4 $K_m$
3. 0.8 $K_m$
4. $K_m$

122. Which one of the following techniques can be used to determine the copy number of a gene?
1. Chromatin Immunoprecipitation

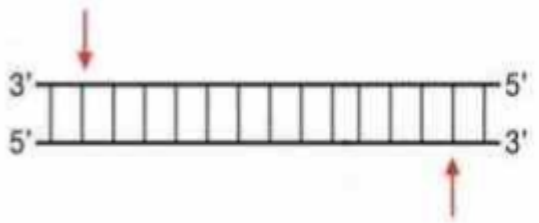
2. Northern Blotting
3. ELISA
4. Real time PCR

123. RNA virus generally replicates in:
1. Cytoplasm
2. Nucleus
3. Mitochondria
4. Late endosomes

124. Given below are two statements:
Statement I: Bisexual flowers promote self-pollination.
Statement II: Self-incompatibility and male-sterility prevent self-pollination.
Choose the most appropriate answer:
1. Both Statement I and Statement II are correct
2. Both Statement I and Statement II are incorrect
3. Statement I is correct but statement II is incorrect
4. Statement I is incorrect but Statement II is correct

125. The selection of cells whose T-cell receptors respond to self-MHC is known as:
1. Negative selection
2. MHC restriction
3. Affinity maturation
4. Lineage commitment

126. The following diagram represents a restriction enzyme site:




Statement I: After digestion cohesive ends will be formed.
Statement II: These cohesive ends will have phosphate groups at 3' and 5' ends.
Choose the most appropriate answer from the options given below.
1. Both Statement I and Statement II are correct
2. Both Statement I and Statement II are incorrect
3. Statement I is correct but Statement II is incorrect
4 Statement I is incorrect but statement II is correct

127. Which of the following is an inactivated vaccine?
1. Covishield
2. Sputnik V
3. Covaxin
4. Moderna mRNA-1273

128. Recombinants with insertional inactivation of β-galactosidase are identified by their inability to:
1. grow on the galactose-rich medium
2. grow on lactose rich medium
3. develop resistance to antibiotics
4. produce color in the presence of a chromogenic substrate,

129. Which of the following can be a restriction site for type II restriction enzyme?
1. 5’ AAGG 3’
3’ TTCC 5’
2. 3’ AGTC 5’
5’ TCAG 3’
3. 5’ GGCC 3’
3’ CCGG 5’
4. 5’ ACCA 3’
3’ TGGT 5’

130. Which of the following represents the correct sequence of MAP kinase signal transduction pathway?
A. Ras
B. Raf
C. ERK
D. Mek
Choose the correct answer from the options given below.
1. $\mathrm{A} \rightarrow \mathrm{B} \rightarrow \mathrm{C} \rightarrow \mathrm{D}$
2. $\mathrm{A} \rightarrow \mathrm{B} \rightarrow \mathrm{D} \rightarrow \mathrm{C}$
3. $\mathrm{A} \rightarrow \mathrm{C} \rightarrow \mathrm{B} \rightarrow \mathrm{D}$
4. $\mathrm{B} \rightarrow \mathrm{A} \rightarrow \mathrm{C} \rightarrow \mathrm{D}$

131. The rate of sedimentation of a particle is dependent on the:
1. density of the particle only.
2. size of the particle only.
3. viscosity of the medium only.
4. size and density of the particle along with the viscosity of the medium.

132. Given below are two statements:
Statement I: Sickle cell trait protects humans from malaria.
Statement II: Sickle cell trait can be transmitted even if both the parents are heterozygous for the β-globin gene.
In the light of the above statements, choose the most appropriate answer from the options given below.
1. Both Statement I and Statement II are correct
2. Both Statement I and Statement II are incorrect.
3. Statement I is correct but statement II is incorrect.
4. Statement I is incorrect but statement II is correct.

133. The probability of mutation in a base-pair per round of replication is $5 \times 10^{-10}$ and the genome length of bacteria is 5 Mb. The number of bacterial cells required so that there is one mutation on an average per replication cycle is:

1.1000
2. 10000
3. 100000
4. 1000000

134. Simple sequence repeats (SSRS) are best utilized for:
1. Phenotyping
2. Genotyping
3. Karyotyping
4. Gene Silencing

135. Increasing the agitation rate in a reactor breaks larger bubbles into smaller bubbles. If gas hold-up does not change and the average bubble diameter reduces to half; then the gas-liquid interfacial area:
1. reduces by 50%
2. remains unchanged
3. increases by 100%
4. increases by 300%

136. The melting point of fatty acids in plant derived oils is influenced by:
1. length and degree of unsaturation of hydrocarbon chain
2. degree of unsaturation only
3. length of hydrocarbon chain only
4. Number of side and branch chains present

137. Arrange the following in correct sequence of steps in erythrocytic cycle of malarial parasite.
A. Parasite feeds on the hemoglobin in the RBCs
B. Parasite forms a schizont by multiple fissions
C. The nucleus of the parasite moves on one side
D. The food vacuole of the parasite increases in size
E. The haemozoin granules are formed
Choose the correct answer from the options given below.
1. $B \rightarrow C \rightarrow E \rightarrow D \rightarrow A$
2. $A \rightarrow D \rightarrow C \rightarrow E \rightarrow B$
3. $C \rightarrow A \rightarrow E \rightarrow B \rightarrow D$
4. $D \rightarrow E \rightarrow B \rightarrow C \rightarrow A$

138. Given below are two statements:
Statement I: Fatty acid synthase is an example of a tetramer of a multienzyme polypeptide.
Statement II: Each polypeptide harbors seven independent enzymatic functions.
In light of the above statements, choose the correct answer from the options given below.
1. Both Statement I and Statement II are true
2. Both Statement I and Statement II are false
3. Statement I is true but statement II is false
4. Statement I is false but Statement II is true

139. Given below are few statements related to plant tissue culture:
A. Regeneration frequencies of different types of explants derived from the same plant would always be identical.
B. A higher auxin: cytokinin ratio would induce production of roots under culture conditions.
C. Embryos can be obtained from somatic tissues of plants under in vitro culture conditions.
D. Since plants can photosynthesize, addition of a carbon source in tissue culture media is not advisable.
Choose the correct statements:
1. A and C Only
2. B and D Only
3. B and C Only
4. A and D Only

140. Given below are two statements:
Statement I: BLAST compares protein as well as nucleotide sequences in order to identify areas of similarity.
Statement II: Genbank is a repository of data on the phenotypic results of gene knockouts in humans.
In light of the above statements, choose the most appropriate answer from the options given below:
1. Both Statement I and Statement II are correct
2. Both Statement I and Statement II are incorrect
3. Statement I is correct but Statement II is incorrect
4. Statement I is incorrect but Statement II is correct

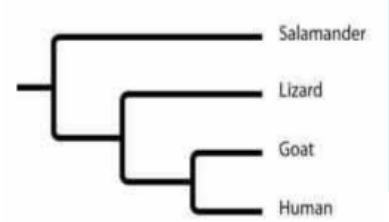
141. Given below are two statements: one is labelled as Assertion A and the other is labelled as Reason R.
Assertion A: The major source of energy for the basic functioning of the cell is derived from oxidative metabolism.
Reason R: Mitochondria oxidize substrates to $CO_2$, transferring the high energy electron from molecular oxygen to glucose.
In light of the above statements, choose the correct answer from the options given below.
1. Both A and R are true and R is the correct explanation of A
2. Both A and R are true but R is not the correct explanation of A
3. A is true but R is false
4. A is false but R is true

142. During protoplast fusion, the product has the nucleus of one of the parents in which the chromosome elimination took place in subsequent cell division and the cytoplasm was contributed by both the parents. Such a product will be called:
1. Symmetric hybrid
2. Asymmetric hybrid
3. Cybrid
4. Homokaryons

143. In power law model for fluid rheology, if the value of the flow behavior index (n) is <1, then with increase in shear stress, the apparent viscosity:
1. remains unchanged.
2. increases.
3. decreases.
4. increases initially followed by a decrease.

144. In the human ABO blood group system, the alleles A and B are dominant to o, what will be the number of different possible genotypes?
1. 4
2. 8
3. 6
4. 12

145. Based on this phylogenetic tree, which statement is NOT correct?




1. The salamander lineage is a basal taxon.
2. Salamanders are a sister group to the group containing lizards, goats, and humans.
3. Salamanders are as closely related to goats as to humans.
4. Lizards are more closely related to salamanders than to humans.

146. How many clones must you get to make a representative genomic library of a plant with a genome of a billion base pairs (bp), provided your vector carrying capacity is 10 kbp. Remember to allow a redundancy of at least one order of magnitude.
1. Thousand
2. Million
3. Lakh
4. Hundred

147. Which one the following is a protein prediction server based on artificial intelligence?
1. M-fold
2. Alpha-fold
3. PDB
4. Swiss-Model

148. Given below are two statements: one is labelled as Assertion A and the other is labelled as Reason R.
Assertion A: A linear DNA molecule containing three recognition sites for a restriction enzyme will generate multiple DNA fragments on partial digestion.
Reason R: Partial digestion by restriction enzymes leads to a heterogeneous population of DNA fragments.
Choose the most appropriate answer:
1. Both A and R are correct and R is the correct explanation of A.
2. Both A and R are correct but R is not the correct explanation of A.
3. A is correct but R is not correct.
4. A is not correct but R is correct.

149. The 'Flavr Savr' tomato was the first genetically engineered crop product commercialized for human consumption. This transgenic tomato is known for:
1. increased bioactive compounds.

2. fortified Fe and Zn contents.
3. enhanced shelf-life.
4. bigger and pulpier fruits.

150. Corona virus is a:
1. positive sense single stranded RNA virus
2. negative sense single stranded RNA virus
3. double stranded RNA virus without segmented genome,
4. double stranded RNA virus with segmented genome

151. At the time of completion of protein synthesis, the sequence in which they leave the ribosome is:
1. Polypeptide chain, m-RNA, t-RNA
2. t-RNA, m-RNA, Polypeptide chain
3. Polypeptide chain, t-RNA, m-RNA
4. m-RNA, Polypeptide chain, t-RNA

152. Which is a type of multigenic interaction?
1. Lethal allele
2. Co-dominance
3. Epistasis
4. ABO genotype

153. Resolution power of transmission electron microscope is of the sub nanometer level. This is because:
1. the focal length of the electron microscope is significantly larger.
2. the contrast is enhanced by staining with atoms of heavy metal.
3. electron beams have much shorter wavelengths than visible light.
4. the electron microscope has a much greater ratio of image size to real size.

154. Given below are two statements: one is labelled as Assertion A and the other is labelled as Reason R.
Assertion A: Polyclonal antibodies bind to the same antigen but recognize different epitopes.
Reason R: Polyclonal antibodies are produced by different B cell clones in the body.
In the light of the above statements, choose the most appropriate answer from the options given below.
1. Both A and R are correct and R is the correct explanation of A
2. Both A and R are correct but R is not the correct explanation of A
3. A is correct but R is not correct
4. A is not correct but R is correct

155. In animal cell culture, a $CO_2$ enriched atmosphere in the incubation chamber is used:
1. for supplying $CO_2$ for the metabolic reaction.
2. to control pH by generating carbonic acid.
3. to control pH by generating bicarbonate.
4. to aid photosynthetic reaction.

156. What is the advantage of using the neo gene to disrupt the function of a gene in knockout mice?
1. The neo gene produces an antibiotic that kills unwanted cells.

2. The neo gene is the right size for disabling other genes.
3. The neo gene provides a selectable marker.
4. The neo gene produces a repressor that inhibits transcription of the target gene.

157. Penicillin consists of a thiazolidine ring fused to a β-lactam ring to which a variable R group is attached. This antibiotic inhibits cell wall synthesis by inhibiting:
1. β-lactamase
2. Phosphodiesterase
3. Transesterase
4. Glycopeptide transpeptidase

158. For a batch microbial process the specific rate of substrate utilization is 0.25 $h^{-1}$ and specific product formation rate is 0.20 $h^{-1}$. The yield of product based on substrate consumed will be:
1. 0.80
2. 1.25
3. 0.05
4. 0.45

159. Given below are two statements about hnRNA processing:
Statement I: Capping occurs by addition of methyl adenosine triphosphate to the 5' end.
Statement II: During tailing, about 200-300 adenylate residues are added to its 3' end.
Choose the correct answer:
1. Both Statement I and Statement II are true.
2. Both Statement I and Statement II are false.
3. Statement I is true but statement II is false.
4. Statement I is false but Statement II is true.

160. Which one of the following small RNAs in plants DO NOT regulate gene expression by cleavage of mRNAs?
1. MicroRNAs (miRNAs),
2. Short interfering RNA (siRNA),
3. Heterochromatin siRNAs (hcsiRNAs),
4. Trans-acting siRNAs (tasiRNAs),