MODEL TEST PAPER

CSIR NET LIFESCIENCES

IFAS JODHPUR

This Test Booklet will contain 145 (20 Part "A"+ 50 Part "B" + 75 Part "C") Multiple Choice Questions (MCQs). Candidates will be required to answer 15 in part "A", 35 in Part "B" and 25 questions in Part C respectively (No. of questions to attempt may vary from exam to exam).

In case any candidate answers more than 15, 35 and 25 questions in Part A, B and C respectively only first 15, 35 and 25 questions in Parts A, B and C respectively will be evaluated. Questions in Parts "A" and "B" carry two marks each and Part "C" questions carry four marks each. There will be negative marking @25% for each wrong answer. Below each question, four alternatives or responses are given. Only one of these alternatives is the "CORRECT" answer to the question.

For any query or suggestion regarding solutions.

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WE ALSO PROVIDE STUDY MATERIAL AND PRACTICE QUESTIONS FOR CSIR NET LIFESCIENCES

REGULAR BATCHES FOR CSIR NET LIFESCIENCES DECEMBER 2011

STARTS

11 JULY 2011 (I BATCH)

21 JULY 2011 (II BATCH)

1. A sign is hammered into tree 2 m above the tree's base, It the tree is 10 m tall and elongates 1 m each year, how height will be sign be after 10 years?
(1) 12 m   (2) 4 m
(3) 2 m   (4) 7m

2. Two holes are punched in a circle of diameter D with the holes touching each other at the centre of the outer circle. What is the area of remaining part of the outer circle?
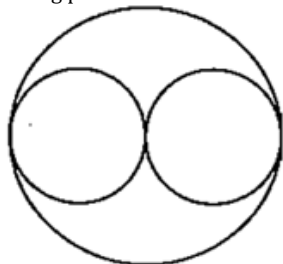
(1) $\pi D^2/8$ (2) $\pi D^2/16$
(3) $\pi D^2/2$ (4) $\pi D^2/4$

3. If two solution have pH of 3 (solution A) and 6 (solution B), the difference in their hydrogen ion concentration is
(1) A<B by $[10^3]$ (2) A>B by $[10^3]$
(3) A<B by $[10^{-3}]$ (4) A>B by $[3]$

4. Plutonium decays with half life of 24000 years. If it is scored for 72000 years the fraction that remains is-
1. ½   2. ¼
3. 1/3   4. 1/8

5. A cheetah can sprint with a maximum speed of 120 km/h, but has to stop after every 20 seconds. The maximum speed of a gazelle can achieve is 75 km/h, but it can maintain it-for several minutes. What is the maximum distance between the cheetah and gazelle at which the cheetah could still catch the gazelle by sprinting at the maximum speed?
1. 250 meters   2. 175 meters
3. 240 meters   4. 225 meters

6. Which one of the following is found only in plants?
1. Tight junctions   2. Gap junctions
3. Desmosomes   4. Plasmodesmata

7. For equilibrium reaction the value for ΔG will be -
1. Zero   2. Negative
3. Positive   4. Infinity

8. The tetrahedral geometry of carbon is best explained by-
1. Monochoro methane   2. Dichloro methane
3. Choloroform   4. Carbon tetrachloride

9. About Habers process for ammonia production, the false statement is-
1. It is second order reaction
2. Slow at room temperature
3. High pressure is required
4. Al_2O_3 is used as catalyst

10. Which is a celestial phenomenon occurring due to stars-
1. Ozone hole   2. Black hole
3. Rainbow   4. Comet

11. More than 90 % of the rocks forming mineral in the earth crust consist of –
1. Silicates   2. Oxides

3. Carbonates   4. Sulphides

12. Consider the following statement regarding the earth quakes:
1. The intensity if earthquake is measured on Mercalli scale.
2. The magnitude of an earthquake is a measure of energy released.
3. Earthquakes magnitudes are based on direct measurement of amplitude of seismic waves.
4. In the Richter Scale, each hole number demonstrates a hundred fold increase in energy released.
Which of these statements are correct-
1. 1, 2 & 4   2. 2, 3
3. 1 & 4   4. 1 & 3

13. A clock seen through a mirror shows quarter past three. What-is the correct- time shown by the clock?
1. 03.15   2. 09.15
3. 08.45   4. 09.45

14. The ground state electronic configuration of iron is [Ar] $3d^64S^2$. The electronic configuration of ferric ion will be-
1. [Ar] $3d^64S^0$.   2. [Ar] $3d^44S^2$.
3. [Ar] $3d^54S^0$.   4. [Ar] $3d^34S^2$.

15. How much litre of 1.2 Molar solution be added to one litre of 0.6M Nacl to make it 0.75 molar
1. 0.30 lit   2. 0.33 lit
3. 0.36 lit   4. 0.15 lit

16. The BLACK is coded KCALB, then the white will be-
1. TIEHW   2. HTWIE
3. ETIHW   4. ETHIW

17. Solve the following quadratic equation: $4x^2 + 2x -2 = 0$
1. −2/3   2. 3/2
3. ½   4. −1/2

18. A litre of helium at 2 atmospheric pressure and 27^0 C is heated until both pressure and volume are doubled . The final temperature of gas will be-
1. 108^0 C   2. 927^0 C
3. 1000^0 C   4. 1200^0 C

19. Which among the following is not physical component of computer
1. MS Word   2. CU
3. ALU   4. VDU

20. Binary equivalent of 15.5 is-
1. 1111.101   2. 1001.1
3. 1111.1   4. 1111.01

21. During protein synthesis, L-amino acid binds to t-RNA through
1. α-amino group.
2. hydrophobic side chain.
3. α–carboxyl group.
4. carboxyl group of the side chain.

22. The peptide bond is planar
1. due to restriction caused by rotation around cα–N bond
2. due to restriction around c_α–c⊠ bond
3. due to delocalization of the lone pair of electrons of the nitrogen onto carbonyl oxygen
4. because amide protons and carbonyl oxygen are involved in hydrogen bonding.

23. Hydrogen bond length will NOT be
1. independent of the nature of donor and acceptor atoms.
2. dependent on donor and acceptor atoms.
3. dependent on the solvent in which the molecule is dissolved.

4. dependent on the other atoms bonded with the donor and acceptor atom.

24. Why a DNA duplex melts at a specific temperature (Tm) on heating?
1. Loss of base stacking energy
2. The double helix is intrinsically unstable
3. The single helix is more stable as compared to the double helix
4. The DNA double helix is a co-operative structure stabilized by hydrogen bonds and base pairing

25. Lipid bilayers can be formed by phospholipids which have variable head groups and fatty acyl chains. The fluidity of the membrane will depend on
1. only the nature of head groups.
2. only the length of the fatty acid chains irrespective of the extent of unsaturation.
3. only unsaturation irrespective of the length of the fatty acid chains.
4. length and degree of unsaturation of fatty acid chains.

26. Which one of the following RNA molecules is involved in regulation of gene expression?
1. miRNA   2. rRNA
3. 5S RNA   4. tRNA

27. In which organelle is NADP+ the final electron acceptor?
1. Only chloroplast
2. Only mitochondrion
3. Both chloroplast and mitochondrion
4. Lysosome

28. When the K'q = 1, ΔG° is equal to
1. –1.   2. 0.
3. +1.   4. 10.

29. Which one of the following human pathogen is a flagellated protozoan?
1. Trypanosoma   2. Plasmodium
3. Paramecium   4. Entamoeba

30. Which of the following mammalian cells usually does NOT divide in adult life?
1. Epithelial cells in lung   2. Nerve cells in brain
3. Liver cells   4. Osteoblast cells

31. What happens to the Cdk-cyclin B complex at metaphase?
1. Both cyclin B and Cdk remain undegraded
2. Only Cdk is degraded
3. Only cyclin B is degraded
4. Both cyclin B and Cdk are degraded

32. In eukaryotes, the interaction of enhancer and promoter elements is brought closer by
1. zinc finger.   2. DNA looping.
3. helix turn helix.   4. palindrome.

33. Which of the following cytoskeleton elements guides the movement of vesicles containing cell wall precursors from their site of formation in Golgi to the site of new wall formation in a growing pollen tube?
1. Myosin   2. Actin
3. Kinesin   4. Dynein

34. ELISA assay
1. uses complement mediated cell lysis.
2. uses a radiolabeled second antibody.
3. involves addition of substrate which is converted to coloured end product.
4. requires specialized red blood cells.

35. In mosaic development, the prospective potency of cells
1. equals its prospective fate.
2. is greater than prospective fate.
3. is less than prospective fate.
4. and fate are unrelated.

36. Experiments with sea urchin demonstrated species specific sperm-egg recognition through the protein
1. bindin.   2. avidin.
3. activin.   4. hyalin.

37. Exposing a regenerating limb to which of the following chemicals results in the blastema proximalization?
1. Ascorbic acid   2. Thyroxine
3. Retinoic acid   4. Glutamic acid

38. Temperature-dependent sex determination is observed in
1. Drosophila.   2. amphibians.
3. reptiles.   4. sea urchins.

39. Some plants require vernalization (prolonged cold treatment) for transition to flowering. For floral induction, vernalization signal is perceived primarily by
1. young leaves subtending the apical meristem.
2. mature leaves near the root-shoot junction.
3. all vegetative parts.
4. shoot apical meristem.

40. Which phase of embryogenesis in plants is characterized by the initiation of deposition of storage reserves?
1. Globular stage   2. Heart stage
3. Torpedo stage   4. Cell enlargement stage

41. Which of the following statements is NOT true in relation to growth of animals?
1. When all body parts grow at the same rate, it is called isometric growth.
2. When different body parts grow at different rates, it is called allometric growth.
3. Two-fold change in weight will cause a 1.26-fold expansion in length if growth is allometric.
4. Isometric growth cannot create dramatic changes in the structure of organisms.

42. Abnormalities during development caused by exogenous agents are called disruptions and the agents are specifically called
1. morphogen.   2. teratogen.
3. allergen.   4. mutagen.

43. At which of the following steps does application of dichlorophenyl-dimethyl urea(DCMU) inhibit electron flow during photosynthesis?
1. P680* ⬜ Pheophytin
2. QA ⬜ QB
3. QB ⬜ Cytb6f complex
4. Cytb6f complex ⬜ plastocyanin

44. The Rht mutations in wheat that were pivotal for 'Green Revolution cause reduction in plant height due to impairment in
1. gibberellic acid biosynthesis pathway.
2. gibberellic acid signaling pathway.
3. auxin biosynthetic pathway.
4. auxin response pathway.

45. Which of the following phytochrome controlled responses displays red/far-red reversibility?
1. Very low-fluence responses
2. Low-fluence responses

3. High-irradiance responses

4. Very high-irradiance responses

46. At permanent wilting point, plants cannot regain turgor pressure even if transpiration stops because

1. water potential of soil (ψ_w) is less than or equal to osmotic potential (ψ_S) of the plant.

2. ψ_w is higher than ψ_S.

3. ψ_w and ψ_S are unaltered.

4. ψ_S remains unaltered.

47. Alkaloid production in plants is regulated by a change in the endogenous pool of

1. gibberellins.   2. jasmonates.

3. brassinosteroids.   4. abscisic acid.

48. Two fruitflies with mutant eye color were crossed. All progenies obtained from this cross had wild type eye colour as

1. the mutations are allelic.

2. one mutation is dominant over the other.

3. the mutations are co-dominant.

4. the mutations are in two different genes.

49. Which of the following pair of relatives will have the highest genetic correlation?

1. First double cousins   2. Half siblings

3. Brothers   4. Brother-sister

50. UAG and UAA are both nonsense codons. What kind of single point mutation would cause reversion of UAG to a meaningful codon?

1. Transition   2. Transversion

3. Frameshift   4. Inversion

51. Which of the following hormones stimulates the reabsorption of Na$^+$ and the secretion of K$^+$ in the kidney?

1. Vasopressin   2. Thyroxine

3. Prolactin   4. Aldosterone

52. The correct sequence in vertebrate embryonic development is

1. gastrocoel – blastocoel – notochord – neural crest.

2. blastocoel – gastrocoel – neural crest – notochord.

3. gastrocoel – blastocoel – neural crest – notochord.

4. blastocoel – neural crest – gastrocoel – notochord.

53. A person has a vision problem caused by the image of an object at infinity getting focused in front of retina. The error can be corrected by the use of

1. biconvex lens.   2. cylindrical lens.

3. plano convex lens. 4. biconcave lens.

54. Among the extant reptiles which group is phylogenetically closely related to Aves?

1. Turtles   2. Lizards

3. Snakes   4. Crocodiles

55. The group of organisms that is now separated from the other groups of fungi based on their motile spores and cellulose-rich cell wall is

1. Myxomycetes.   2. Zygomycetes.

3. Deuteromycetes.   4. Oomycetes.

56. Some floristic elements common to both India and China are in the genus

1. Ginkgo.   2. Rhododendron.

3. Poeciloneuron. 4. Erinocarpus.

57. The difference between Indian and African wild herbivore fauna is that there are no

1. antelopes in India.

2. deer in Africa.

3. odd-toed animals in India.

4. even-toed hoofed animals in Africa.

58. Which of the following bird species is endangered?

1. Hill myna   2. Great Indian bustard

3. Crow-pheasant   4. Grey hornbill

59. In spite of the prevalence of herbivory, the earth continues to be largely green because

1. the number of herbivore species is low.

2. herbivores are very inefficient feeders.

3. herbivore numbers are kept low by their predators.

4. herbivory promotes plant growth.

60. Which of the following reproductive strategies is characteristic of marine invertebrates?

1. Long generation time, small clutch size

2. Short generation time, small clutch size

3. Long generation time, large clutch size

4. Short generation time, large clutch size

61. Bergmann's Rule refers to a general tendency of mammals to be

1. larger in size in colder areas of their distribution.

2. smaller in size in areas of their distribution.

3. darker-pigmented in warmer areas of their distribution.

4. lighter-pigmented in warmer areas of their distribution.

62. When removal of a species from an ecosystem affects persistence of many other species and the impact of that species removal is disproportionate to its abundance, the species is known as

1 indicator species.   2. keystone species.

3. flagship species.   4. umbrella species.

63. Biomass turnover time is the ratio between biomass and productivity of an ecosystem. Which of the following forests should have highest biomass turnover time?

1. Tropical dry forests

2. Tropical wet forests

3. Temperate deciduous forests

4. Boreal forests

64. Conversion of nitrite to nitrate in soil is done by the bacteria of genus

1. Azotobacter.   2. Nitrosomonas.

3. Nitrobacter.   4. Pseudomonas.

65. In a population with two alleles 'a' and 'b' of a genotype in a ratio of 0.2 and 0.8 in Hardy-Weinberg equilibrium, how many individuals in a sample of 300 can be expected to be homozygous for allele 'a'?

1. 192   2. 12

3. 64   4. 96

66. The copy number of a transgene in plants can be deciphered by

1. Southern blotting.   2. northern blotting.

3. south western blotting. 4. far western blotting.

67. Function of a monochromator in a spectrophotometer is

1. focusing a straight beam of light.

2. dividing a light beam into its component wavelengths.

3. selecting a desired wavelength.

4. creating a light source.

68. Which of the following methods is the most appropriate for estimating the population density of burrowing animals?

1. Quadrat sampling

2. Line transect sampling

3. Tag-recapture method

4. Nearest neighbour distance method

69. Ionophores are small hydrophobic molecules that can partition into the lipid bilayer and increase their permeability to specific inorganic ions. Which of the following is a channel forming ionophore?
1. Valinomycin.
2. Actinomycin.
3. Gramicidin A.
4. Nicin.

70. The correct expression of Hamilton rule for the evaluation of altruism is [C = the cost of a behavioral act to the actor, b = the benefit of that act to a beneficiary, and r = the genetic relatedness between the actor and the beneficiary]
1. c < b⬚r
2. c < b
3. c⬚r < b
4. r < b⬚c

71. Incubation of a cell extracts containing all enzymes of glycolysis with [γ-^{32}P] ATP and unlabelled inorganic phosphate results in the formation of which of the following labeled compounds (assume that pyruvate kinase is inactivated)
I. Glucose-6-^{32}Phosphate
II. (3-^{32}P)-phosphoglycerate
III. (1-Phospho-3-^{32}Phospho)-Bisphoshoglycerate
IV. (1-Phospho-6-^{32} Phospho)-Fructobisphosphate
(1) I and III
(2) I, II and III
(3) II and IV
(4) only IV

72. Nucleotide composition of four molecules is given below

Molecule	% A	% G	% T	% U	% C
P	33	17	33	0	17
Q	33	33	17	0	17
R	26	24	0	26	24
S	30	20	0	20	30

From the above data find out the double stranded nucleic acid molecule with the lowest T_m
(1) P
(2) Q
(3) R
(4) S

73. Enzyme [E] reacts with substrate [S] to form an [ES] complex at normal temperature to produce the product. In the presence of inhibitor the rate of reaction changes. Which of the following statement are INCORRECT about enzyme mediated reaction in presence of inhibitor?
A. Competitive inhibition causes rise in K_m value without altering V_{max}
B. Noncompetitive inhibition causes decrease in V_{max} and rise in K_m
C. Uncompetitive inhibition causes decrease in V_{max} without altering K_m
D. Uncompetitive inhibition is rare and causes a decrease in both V_{max} and K_m
(1) A, B
(2) B, C
(3) A, C
(4) A, D

74. In the Lineweaver-Burk plots for an enzyme, substrate, and inhibitor below, plot B is for
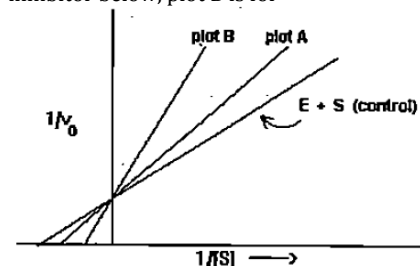
(1) A noncompetitive inhibitor at higher concentration than in plot A
(2) A competitive inhibitor at lower concentration than in plot A
(3) A competitive inhibitor at higher concentration than in plot A
(4) An uncompetitive inhibitor

75. Consider the following four statements
A. The solubility of a protein is lowest at its isoelectric point
B. At low ionic strengths, solubility of a protein increases with increasing salt concentration
C. Tyrosine, tryptophan and phenylalanine have aromatic side chains capable for forming hydrogen bonds
D. Oxygen binds to hemoglobin decreases when pH is increased from 7.2 to 7.6
Of these statements
(1) Only A and B are correct
(2) A, B and D are correct
(3) All are correct
(4) Only B is correct

76. An enzyme (Molecular weight=5,500 Da) has a concentration of 93.5 g/L and maximum velocity of 0.875 M^{-1} Sec^{-1}. What is the specificity constant for the enzyme and substrate if K_m is 0.438 M?
(1) 22.54 M^{-1} Sec^{-1}
(2) 117.5 M^{-1} Sec^{-1}
(3) 6.52 M^{-1} Sec^{-1}
(4) 225.4 M^{-1} Sec^{-1}

77. A Michaelis-Menten enzyme with sugar isomerase activity was purified from a species of *Streptomyces*. The steady state parameters were measured for several different sugars.

Sugar	K_m (in M)	K_{cat} (in Sec^{-1})
Arabinose	5 x 10^{-3}	20
Xylose	1 X 10^{-3}	10
Ribose	1 x 10^{-1}	100
Glucose	5 x 10^{-4}	50

Which sugar is used up the fastest when it is present at low concentration?
(1) Arbinose
(2) Xylose
(3) Ribose
(4) Glucose

78. A second order reaction of the type A+B→P was carried out in a solution that was initially 0.05 M in A and 0.08 M in B. After 1.0 hours, the concentration of A had fallen to 0.02 M. The half life of A is
(1) 7380 sec
(2) 2560 sec
(3) 3690 sec
(4) 5120 sec

79. In animal cells concentration of sodium ions is higher outside the cell and less inside the cell, yet sodium does not enter the cells. Digitoxigenin, a cardiotonic steroid that inhibits ATPas when applied on extracellular face of membrane, helps in accumulation of Ca^{2+} inside the cardiac muscle cells by
(1) activating Na$^+$-K$^+$ pump and blocking Na$^+$-Ca^{2+} exchanger
(2) inhibiting Na$^+$-K$^+$ pump and blocking Na$^+$-Ca^{2+} exchanger
(3) having no effect on Na$^+$-K$^+$ pump
(4) increasing passive diffusion

80. Protein transport through the secretory pathway can be visualized by fluorescence microscopy of cells pproducing a GFP-tagged membrane protein. Cultured cells were transfected with a hybrid gene encoding the viral membrane glycoprotein VSV G protein linked to the gene for green fluorescent protein (GFP). A mutant version of the viral gene was used so that newly made hybrid protein (VSVG-GFP) is retained in the ER at 40 ^{0}C but is released for transport at 32 ^{o}C.
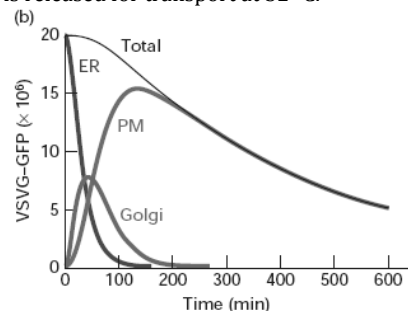
Figure shows plot of the levels of VSVG-GFP in the endoplasmic reticulum (ER), Golgi, and plasma membrane (PM) at different times after shift to lower temperature (The decrease in total fluorescence that occurs at later times probably results from slow inactivation of GFP fluorescence). The kinetics of transport from one organelle to another can be reconstructed by analysis of these data as follows
(1) Golgi→PM→ER   (2) PM→Golgi→ER
(3) ER→Golgi→PM   (4) Golgi→PM→Virus

81. Match some of the known sorting signal that directs proteins to specific transport vesicles
Group I
A. Mannose-6-Phosphate (M6P)
B. Lys-Lys-X-X (KKXX)
C. Leu-Leu (LL)
D. Asn-Pro-X-Tyr (NPXY)
E. Lys-Asp-Glu-Leu (KDEL)
Group II
1. ER-resident luminal proteins
2. ER-resident membrane proteins
3. Plasma membrane proteins
4. Soluble lysosomal enzymes
5. LDL receptor in the plasma membrane
(1) A-4 B-1 C-5 D-3 E-1   (2) A-4 B-2 C-3 D-5 E-1
(3) A-4 B-1 C-5 D-3 E-2   (4) A-5 B-2 C-3 D-4 E-2

82. Which of the following statement is TRUE about eukaryotic cell cycle?
I. Cyclin-CDK complexes, composed of a regulatory cyclin-dependent kinase subunit and a catalytic cyclin subunit regulate progress of a cell through the cell cycle.
II. Large multisubunit ubiquitin ligases polyubiquitinate key cell-cycle regulators, marking them for degradation by proteasomes.
III. Diffusible mitotic cyclin-CDK complexes cause chromosome condensation and disassembly of the nuclear envelope in G1 and G2 cells when they are fused to mitotic cells.
IV. S-phase cyclin-CDK complexes stimulate DNA replication in the nuclei of G1 cells when they are fused to S-phase cells.
V. In Xenopus laevis oocytes develop in the frog ovary, they replicate their DNA and become arrested in G2 for 8 months. When stimulated by a male, an adult female's ovarian cells secrete the steroid hormone progesterone, which induces the G2-arrested oocytes to enter meiosis I and progress through meiosis to the second meiotic metaphase.
(1) I, II and V only   (2) I, II, III and IV only
(3) II, III and IV only   (4) II, III, IV and V

83. Consider the following statement about plasma membrane.
I. Biological membranes usually contain both integral (transmembrane) and peripheral membrane proteins, which do not enter the hydrophobic core of the bilayer.
II. Most integral membrane proteins contain one or more membrane-spanning hydrophobic α helices and hydrophilic domains that extend from the cytosolic and exoplasmic faces of the membrane
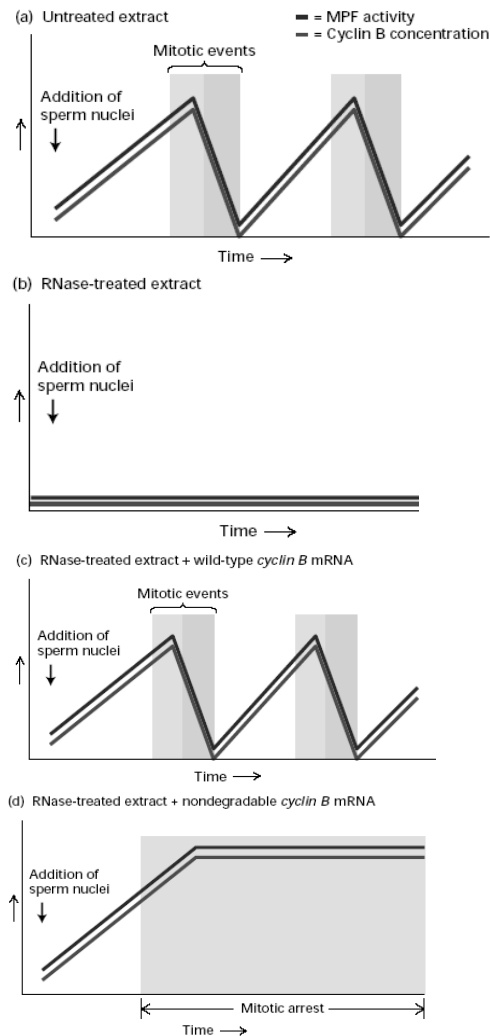III. The porins, unlike other integral proteins, contain membrane spanning β sheets that form a barrel-like channel through the bilayer.
IV. Long-chain lipids attached to certain amino acids anchor some proteins always to inner membrane leaflet
Among the following correct statements are
(1) I and II only   (2) II and III only
(3) II, III and IV   (4) I, II and III

84. To test the functions of cyclin B in these cell-cycle events following experiments were performed as shown in diagrams.

(a) Untreated extract — MPF activity, Cyclin B concentration, Mitotic events, Addition of sperm nuclei, Time
(b) RNase-treated extract — Addition of sperm nuclei, Time
(c) RNase-treated extract + wild-type cyclin B mRNA — Mitotic events, Addition of sperm nuclei, Time
(d) RNase-treated extract + nondegradable cyclin B mRNA — Addition of sperm nuclei, Mitotic arrest, Time

All of the following are valid conclusion drawn from above experiment EXCEPT:
(1) Cyclin B is crucial protein whose synthesis is required to regulate MPF activity and the cycles of chromosome condensation and nuclear envelope breakdown
(2) Degradation of cyclin B is required for exit from mitosis
(3) Synthesis of cyclin B occurs prior to mitosis
(4) Presence of cyclin B is essential to complete mitosis

85. Choose the right combination from the following statements with respect to the amino acid activation during protein synthesis.
A. A single aminoacyl-tRNA synthetase can catalyze the coupling of all amino acids to appropriate tRNAs
B. The energy during the activation step is provided through GTP hydrolysis
C. The energy during the activation step is provided through ATP hydrolysis
D. The aminoacyl-tRNA synthetase catalyzed reaction attaches amino acid to the 3'-end of the tRNA
(1) AC   (2) AD
(3) BD   (4) CD

86. Telomerase adds 6 nucleotide repeats to the end of chromosomes called telomeres. The telomeric repeat sequence of Tetrahymena is TTGGGG. The telomeric repeat sequence of yeast is GTGTGT. Propagation of Tetrahymena chromosomes in yeast will result in extension as follows
(1) TTGGGG TTGGGG TTGGGG
(2) GTGTGT GTGTGT GTGTGT
(3) GTGTGT TTGGGG GTGTGT
(4) TTGGGG GTGTGT TTGGGG

87. Which of the following statements is NOT correct with respect to elongation step of prokaryotic protein biosynthesis?
(1) fMet-tRNA$_f$ is recognized by EF-Tu-GTP
(2) Binary complex of EF-Tu-GTP binds aminoacyl-tRNA to form a ternary complex
(3) Binary complex ET-Tu-GDP is inactive
(4) Kirromycin is an antibiotic that inhibits the function of EF-Tu

88. The correct match between Group I and Group II is

Group I	Group II
P. Amphotericin B	1. Reverse transcriptase inhibition
Q. Azidothymidine (AZT)	2. Sterol binding and disruption of membrane permeability
R Nalidixic acid	3. Blocks glycosylation
S. Tunicamycin	4. DNA gyrase inhibition

(1) P-2, Q-1, R-4, S-3   (2) P-1, Q-4, R-3, S-2
(3) P-4, Q-1, R-3, S-2   (4) P-3, Q-2, R-4, S-1

89. A mRNA coding for a secretory protein, when translated using free ribosome under *in vitro* conditions, resulted in a 40 kDa protein. The same mRNA when translated using the rough endoplasmic reticulum resulted in a 36 kDa protein. The difference in the molecular weight of the two polypeptides is due to the loss of a
(1) 2 kDa peptide from N-terminus and a 2 kDa peptide from the C-terminus
(2) 1 kDa peptide from N-terminus and a 3 kDa peptide from the C-terminus
(3) 4 kDa peptide from the N-terminus
(4) 4 kDa peptide from the C-terminus

90. Choose the correct match

Group I	Group II
P. 5' capping	1. 5-methyl guanosine
Q. Ribozyme	2. Polyadenylate transferase
R. Promoter	3. Spliceosome
S. Poly-(A) tail	4. 7-methyl guanosine
	5. RNA polymerase
	6. Catalytic RNA
	7. Polyadenylate polymerase

(1) P-1 Q-6 R-5 S-2   (2) P-4 Q-6 R-5 S-7
(3) P-1 Q-5 R-3 S-7   (4) P-4 Q-3 R-6 S-2

91. Nearly 46% of 45s pre-rRNA is unstable. The remaining portion of it forms mature 5.8s, 18s and 28s rRNA having length 160 bases, 1.9 kb and 5.1 respectively. The content of pre rRNA per human genome is 7.8 x 10^{-15} g. The molecular weight of 45s pre-rRNA is
(1) 2 x 10^6 (2) 4.5 x 10^5
(3) 4.5 x 10^6 (4) 3.9 x 10^7

92. The organization of an eukaryotic gene expressed at high levels in liver is diagrammatically represented below:
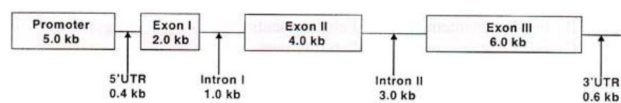
The size of mature mRNA generated by the transcription followed by normal splicing of this gene will be (assume that this mRNA is not polyadenylated; 5'-UTR and 3'-UTR refers to the 5' and 3' untranslated regions, respectively)
(1) 12.4 kb   (2) 13.0 kb
(3) 12.0 kb   (4) 12.6 kb

93. In the presence of a compound X, protein synthesis can initiate, but only dipeptides are formed that remain bound to the ribosome. Therefore, compound X affect eukaryotic protein synthesis by blocking
(1) The activation of elongation factor
(2) The activation of amino acids

(3) The recognition of stop signal
(4) The formation of peptide bond

94. A mutant of E. coli with a heat sensitive DNA ligase (25^0C permissive, 37^0C non-permissive) has been used two show that DNA synthesis is discontinuous. Examination of DNA replication in the presence of [^{3}H]-Thymidine in the mutant would demonstrate the accumulation of short segments of
(1) unlabeled DNA at 25^0C and 37^0C
(2) unlabeled DNA at 25^0C but not at 37^0C
(3) radioactive DNA at 37^0C but not at 25^0C
(4) radioactive DNA at 25^0C but not at 37^0C

95. The time required for two replication forks traveling in opposite directions to transverse the entire E. coli chromosomes at 37^0C is 40 min, regardless of the culture conditions. However, in a rich medium, the cells divide every 20 min. Which of the following statements is true for cell growing in rich medium?
(1) Half the daughter cells are nonviable
(2) There is an average of four replication forks per chromosome
(3) There is an average of six replication forks per chromosome
(4) One fourth of the daughter cells are non-viable

96. Match the following and choose the correct combinations

i. Rho and Rac proteins	a. Serine/threonine kinase
ii. Raf	b. Tumor suppressor gene
iii. Rb	c. GTP-binding protien
iv. MAPKs	d. Apoptic factor
v. Bad	e. Regulate the activity of transcription factors

(1) i-c; ii-a; iii-b. iv-e, v-d   (2) i-b; ii-a; iii-e; iv-c; v-d
(3) i-c; ii-d; iii-b; iv-e; v-a   (4) i-c; ii-b; iii-a; iv-c, v-d

97. Choose the correct match

Group I	Group II
P. IgA	1. Basophils
Q. IgE	2. δ heavy chain
R. IgG	3. Secretory component
S. IgM	4. Pentamer
	5. Crosses placenta

(1) P-3 Q-1 R-5 S-4   (2) P-3 Q-5 R-2 S-1
(3) P-2 Q-3 R-5 S-4   (4) P-2 Q-1 R-3 S-5

98. Choose the correct combination of statements from the following for MHC II protein
A. Has α1, α 2, β1 and β 2 domains
B. α 1 and β 1 are the polymorphic domains
C. Involved in presenting antigen to cytotoxic T cells
D. Only α chain is glycosylated
(A) BC   (B) CD
(C) AD   (D) AB

99. Among the following which statement is false about tumor suppressor genes?
(1) Tumor-suppressor genes encode proteins that directly or indirectly slow progression through the cell cycle, checkpoint control proteins that arrest the cell cycle, components of growth-inhibiting signaling pathways, pro-apoptotic proteins, and DNA-repair enzymes.
(2) The first tumor-suppressor gene to be recognized, RB, is mutated in retinoblastoma and some other tumors.
(3) Inheritance of a single mutant allele of RB will always lead to a specific kind of cancer to develop, as is the case for many other tumor-suppressor genes (e.g., APC and BRCA1).
(4) In individuals born heterozygous for a tumor-suppressor gene, a somatic cell can undergo loss of heterozygosity (LOH) by mitotic recombination, chromosome missegregation, mutation, or deletion

100. Ligand binding usually can be viewed as a simple reversible reaction,

$$R + L \underset{k_{off}}{\overset{k_{on}}{\rightleftharpoons}} RL$$

which can be described by the equation

$$K_d = \frac{[R][L]}{[RL]}$$

where [R] and [L] are the concentrations of free receptor and ligand, respectively, at equilibrium, and [RL] is the concentration of the receptor-ligand complex. Kd, the dissociation constant of the receptor-ligand complex, measures the affinity of the receptor for the ligand. This equilibrium binding equation can be rewritten as

$$\frac{[RL]}{R_T} = \frac{1}{1 + \dfrac{K_d}{[L]}}$$

Where, $RT = [R] + [RL]$, the total concentration of free and bound receptors; therefore, [RL]/RT is the fraction of receptors that have a bound ligand. The lower the Kd value, the higher the affinity of a receptor for its ligand. The Kd value is equivalent to the concentration of ligand at which half the receptors contain bound ligand. Suppose, for instance, that the normal concentration of a hormone in the blood is 10^{-9} M and that the Kd for its receptor is 10^{-7} M, then the fraction of receptors with bound hormone, [RL]/RT, at equilibrium will be
(1) 1 %   (2) 10 %
(3) 0.1 %   (4) 0.01 %

101. Match the signaling receptors with appropriate ligands to which they bind
Group-I
A. G protein–coupled receptors
B. TGF β receptors
C. Cytokine receptors
D. Receptor tyrosine kinases
E. Receptor guanylyl cyclases
F. Nuclear receptor
Group-II
1. Steroid hormones, thyroxine, retinoids, and fatty acids in mammals and ecdysone in Drosophila
2. Atrial natriuretic factor and related peptide hormones
3. Insulin, epidermal growth factor (EGF), fibroblast growth factor (FGF), neurotrophins,
4. Interferons, erythropoietin, growth hormone, some interleukins (IL-2, IL-4).
5. activin, inhibins
6. Epinephrine, glucagon, serotonin, vasopressin, ACTH, adenosine, and many others (mammals); odorant molecules, light; mating factors (yeast)
(1) A-6 B-2 C-4 D-3 E-5 F-1   (2) A-5 B-4 C-3 D-2 E-6 F-1
(3) A-1 B-2 C-3 D-4 E-5 F-6   (4) A-6 B-5 C-4 D-3 E-2 F-1

102. Which combination of following statements is true?
A. Hox genes have undergone multiple duplication during animal evolution
B. For some reptiles, sex is determined by environmental factor(s)
C. Metamorphosis in amphibian is regulated by nuclear hormone receptor signaling
(1) A and B   (2) A and C
(3) B and C   (4) A, B and C

103. The following paired terms are not correctly paired. Which one of the four option is the correct pairing?
Group I
a. Hedgehog signalling
b. Wnt signaling
c. Notch signaling
d. hox genes

Group II
1. Anterior-posterior axis development
2. Cyclopic eye of lambs
3. Vertebrate limb development
4. Nematode germ line proliferation
(1) a-1, b-2, c-3, d-4   (2) a-3, b-4, c-1, d-2
(3) a-4, b-1, c-2, d-3   (4) a-2, b-1, c-4, d-3

104. Consider the following statement.
A. We can determine the temporal and spatial locations where RNAs are expressed by running an RNA blot (often called a Northern blot).
B. Detailed map of gene expression patterns can be obtained by using a process called RNA in situ hybridization. Instead of using a DNA probe to seek mRNA on a filter, the probe is hybridized with the mRNA in the organ itself.
C. The polymerase chain reaction (RT-PCR) can be used for cloning a specific gene or for determining whether a specific gene is actively transcribing RNA in a particular organ or cell type.
D. In Mouse, new genes can be carried into a fly via P elements. These DNA sequences are naturally occurring transposable elements that can integrate like viruses into any region of the genome.
The correct statements are
(1) B and C   (2) B, C and D
(3) A, B and C   (4) A, B, C and D

105. Confirmation that the Bicoid protein is crucial for initiating head and thorax formation came from experiments in which purified bicoid RNA was injected into early-cleavage embryos. Which of the following are TRUE outcome of such experimets
A. When injected into the anterior of bicoid-deficient embryos (whose mothers lacked bicoid genes), the bicoid RNA rescued the embryos and caused them to have normal anterior-posterior polarity.
B. If bicoid RNA was injected into the center of an embryo, that middle region became the head, and the regions on either side of it became thorax structures.
C. If a large amount of bicoid RNA was injected into the posterior end of a wild-type embryo (with its own endogenous bicoid message in its anterior pole), two heads emerged, one at either end.
(1) A only   (2) A and B only
(3) A, B and C   (4) B and C only

106. Which of the following statement are correct regarding development in plants?
I. The male gamete, pollen, arrives at the style of the female gametophyte and effects fertilization through the pollen tube. Two sperm cells move through the pollen tube; one joins with the ovum to form the zygote, and the other is involved in the formation of the endosperm.
II. Early embryogenesis is characterized by the establishment of the shoot-root axis and by radial patterning yielding three tissue systems. Pattern emerges by regulation of planes of cell division and the directions of cell expansion, since plant cells do not move during development.
III. Leaves produce a graft-transmissible substance that induces flowering. The phytochrome pigments transduce these signals from the external environment.
IV. LFY is the homologue of FLO in snapdragons, and its down regulation during development is key to the transition to reproductive development
(1) I and II only   (2) II and III only
(3) I, II and III only   (4) I, II, III and IV

107. Identify the correct statements
A. Bundle sheath containing chloroplast present in C_4 plants
B. Annual rings differentiate into barks and woods
C. Sap wood is important for biological functions and heart wood is economical important as it contains gums, resins, oils, tannins, etc.
D. Clonal propagation leads to somaclonal variation
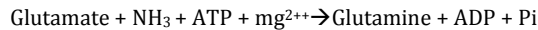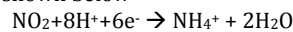(1) A, B   (2) B, C
(3) C, D   (4) A, C

108. Following are the features of one type of C_4 mechanism
- The mitochondria is responsible for malate decarboxylation
- The mesophyll cell tends to form aspartate rather than malate from oxaloacetate
- Presence of double bundle sheath
Identify the correct one
(1) NADP-ME Type   (2) NAD-ME type
(3) PCK-type   (4) CAM-type

109. The two important biochemical reactions of nitrogen metabolism are shown below
$$NO_2 + 8H^+ + 6e^- \rightarrow NH_4^+ + 2H_2O$$
Glutamate + NH_3 + ATP + mg^{2+} $\rightarrow$ Glutamine + ADP + Pi
Which one of the following pairs of enzymes is correct for the above reaction respectively
(1) Nitrate reductase and Glutamate dehydrogenase
(2) Nitrite reductase and Glutamine synthetase
(3) Nitrate reductase and Glutamine synthetase
(4) Nitrite reductase and glutamate synthase

110. Match the secondary metabolites with their precursors
Group I (Secondary metabolite)	Group 2 (Precursor)
P. Coniine	1. Tryptophan
Q. Morphine	2. Phenyl alanine
R. Quinine	3. Lysine
S. Chalcone	4. Tyrosine
	5. Ornithine
	6. Agmatine

(1) P-1 Q-5 R-3 S-4   (2) P-3 Q-4 R-1 S-2
(3) P-2 Q-1 R-2 S-3   (4) P-4 Q-3 R-6 S-5

111. Choose the correct match
Group I	Group II
P. Epinephrine	1. Uterine contractions
Q. Parathormone	2. Water resorption
R. Oxytocin	3. Ca^{2+} uptake
S. Luteinizing hormone	4. Glycogen breakdown
	5. Thyroid hormone synthesis
	6. Progesterone secretion

(1) P-1 Q-2 R-5 S-6   (2) P-5 Q-6 R-1 S-2
(3) P-5 Q-2 R-3 S-4   (4) P-4 Q-3 R-1 S-6

112. Synthetic progesterone and estrogen are commonly used as birth control pills. Based on your understanding of hormonal regulation of reproduction, answer the following 2 questions. These two hormones act by
(1) Negative feedback to stop the release of GnRH
(2) Positive feedback by increasing the release of LH and FSH hormones
(3) Increasing the level of LH and decreasing the level of FSH
(4) Determining the level of LH and increasing the level of FSH

113. The figure shows the oxygen binding curves for hemoglobin (Hb) and myoglobin (Mb). Identify the correct curves for Hb and Mb
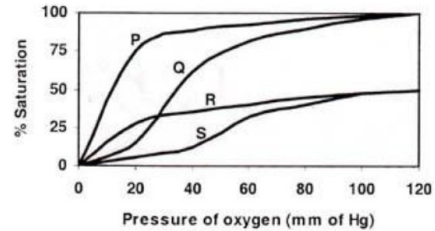
(1) P: Mb Q: Hb   (2) Q: Mb P: Hb
(3) R: Mb Q: Hb   (4) S: Mb R: Hb

114. The approximate total number of red blood cells (RBC) in a human body is 25×10^{12}. About 2×10^{11} RBCs are produced per day. Therefore, the RBC on an average survives for
(1) 12.5 days   (2) 2.5 days
(3) 125 days   (4) 200 days

115. Transmission at many synapses in central nervous system is mediated by acetyl choline. Acetyl choline is cleaved to acetate and choline by enzyme acetyl choline esterase which can be inhibited by di isopropyl phosphor fluoridate (DIPF). The mode of action of DIPF is by
(1) Modifying histidine residue
(2) Covalently modifying a crucial serine residue
(3) Inducing a conformational change in the protein
(4) Forming a complex with choline

116. Mutation in glyoxylate amino-transferase enzyme leads to primary hyperoxaluria Type I, a rare genetic disease in which calcium oxalate "stones" accumulate in the kidney. The mutation mapped at N-terminus of the enzyme altered 'Gly' to 'Arg'. The biochemical analysis indicates that the mutant enzyme is expressed and folded properly. The phenotype associated with such patients is due to
(1) mutation leading to dimerization of the enzyme
(2) turnover rate of mutant enzyme is increased
(3) mutant phenotype not directly linked to the enzyme
(4) mutation leading to mis-targeting of the protein

117. When an animal of the genotype AaBb was mated with another of the genotype aabb (test cross), the following progeny were observed:
AaBb-980   aabb-976
Aabb-287   aaBb-291
Which of the following statements MOST accurately describes the test cross result mentioned above?
(1) Genes A and B are on different chromosome
(2) Genes A and B are probably on the same chromosome
(3) Inheritance of A is modified by B
(4) Genes A and B assort independently

118. In the fruit fly, Drosophila cinnabar and brown refer to two mutant eye coloration in the adult eye which are otherwise dark brown in the wild type flies. In a genetic cross, mutant male flies with cinnabar eye color were mated with females with brown eye colors. Following results were seen in F1 and F2 progeny: All F1 flies displayed wild type eye color while of the 465 F2 progeny derived by intercross of F1 progeny, 274 were wild type. 85 were cinnabar, 95 were brown and finally, 11 flies displayed no eye color (white eyed). F1 progeny display wild type eye color due to
(1) Additive effect of two mutation; each mutant version being only part of the wild type eye color
(2) complementation between the two mutation since they represents two separate genes
(3) lack of complementation between the two mutation since they are on the same eye coloration gene
(4) because these mutation represents two different genes which recombine in the progeny
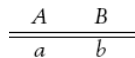
119. Human pedigrees are shown in the accompanying illustration. The black symbols represent an abnormal phenotype.
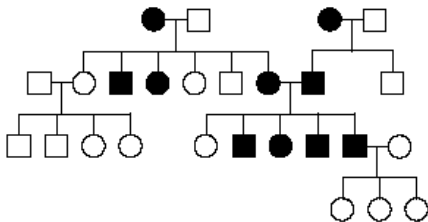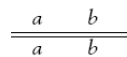

What is probable mode of inheritance?
(1) X-linked dominant   (2) Y linked dominant
(3) Autosomal dominant   (4) Cytoplasmic inheritence

120. A plant of genotype

$$\frac{A \quad B}{a \quad b}$$

is test crossed to

$$\frac{a \quad b}{a \quad b}$$

If the two loci are 10 m.u. apart, what proportion of progeny will be A B/a b?
(1) 0 %   (2) 10 %
(3) 45 %   (4) 90 %

121. Find the correct statements for Linnaeus system of classification.
A. It is also known as artificial sexual system of classification
B. It was published in the male of "Genera Plantarum"
C. In his system plant belonging to widely distant natural groups are placed under one order of a class
D. In this system Gymnospermae and Angiospermae are placed in two taxa of equal ranks
(1) A, B   (2) B, C
(3) C, D   (4) A, C

122. Which of the following statements are true on ecological point of view?
A. 'Pyramid of numbers' can sometimes be inverted
B. Standing crop is not a reliable measure of productivity
C. Primary productivity should always be calculated on dry matter rather than on fresh biomass
D. The total solar energy trapped in food material by photosynthesis is referred to as net primary production
(1) A. B   (2) B, C
(3) C, D   (4) A, C

123. Consider the following:
1. Bandipur Wildlife Sanctuary
2. Manas Wildlife Sanctuary
3. Simlipal Wildlife Sanctuary
Which of the above are tiger reserves under the Project Tiger?
(1) 1 and 2 only   (2) 2 and 3 only
(3) 1 and 3 only   (4) 1, 2 and 3

124. The alignment below is thought to be part of a protein-coding gene. Which of the four conclusions would you draw?

```
Wombat      :  GTTAATGAGTGGTTATCCAGAAGTGACATA  :  30
Opossum     :  GTTAATGAGTGGTTATTCAGAAGTGACATA  :  30
Rhinoceros  :  GTTAATGAGTGGTTTTCCAGAAGTGAAATA  :  30
Pig         :  GTTAATGAGTGGTTTTCTAGAAGCGAAATA  :  30
Hedgehog    :  GTGAATGAATGGCTTTCCAGAAGTGAACTG  :  30
Human       :  GTTAATGAGTGGTTTTCCAGAAGTGAACTG  :  30
Hare        :  GTTAACGAGTGGTTCTCCAGAAGTGAAATG  :  30
```

(1) This is probably part of a pseudogene.
(2) This is more likely to be part of an RNA-coding gene than a protein.
(3) There is evidence that transversions occur more frequently than transitions.
(4) There is evidence that synonymous substitutions occur more frequently than non-synonymous substitutions.

125. Consider the following:
1. Alanine
2. Glycine   3. Aspartic acid
Which of the above amino acids were produced in Miller's experiment to produce organic molecules from the gaseous composition of early/primitive atmosphere of earth?
(1) 1 and 2 only   (2) 2 and 3 only
(3) 1 and 3 only   (4) 1, 2 and 3

126. Males of a species of guppy in a pond are multi-colored, with each fish sporting a combination of red, yellow and blue spots. Females do not possess these spots. When a species of predator was introduced into the pond, over the generations, males in the guppy population sported only red and yellow, but no blue, spots. In the control situation (a similar pond with the same species of guppy where no predator was introduced), the colors of the male spots did not change over the generations. The change in male morphology seen in the first case is likely due to
(1) Sexual selection   (2) Natural selection
(3) Adaptive radiation   (4) Genetic drift
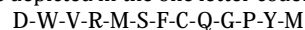
127. Match the terms with the correct description
Group-I
a. Gene flow
b. Natural selection
c. Mutation
d. Genetic drift
Group-II
i. Source of new alleles
ii. Changes in a population's allele frequencies due to chance alone
iii. Allele frequencies change due to immigration, emigration or both
iv. Outcome of differences in survival and reproduction among individuals that vary in forms shared traits
(1) a-iii; b-iv; c-i; d-ii   (2) a-iv; b-iii; c-ii; d-i
(3) a-ii; b-i; c-iv; d-iii   (4) a-ii; b-iv; c-iii; d-i

128. Consider the following peptide sequence in which the amino acids are depicted in the one letter code:
$$D-W-V-R-M-S-F-C-Q-G-P-Y-M$$
When this peptide is treated with
(i) chymotrypsin   (ii) cyanogens bromide
(iii) trypsin separately,
The fragments generated would be
(1) D; W-V-R-M-S; F-C-Q-G-P; M; D-W-V: R-M-S-F-C-Q-G-P-Y-M; D-W-V-R and M-S-F-C-Q-G-G-P-Y-M
(2) D-W; V-R-M-S-F; C-Q-G-P-Y; M; D-W-V-R; M-S-F-C-Q-G-P-Y-M; D-W-V-R-M; S-F-C-Q-G-P-Y-M
(3) D; V-R-M-S-F; D-W-V; R-M-S-F-C-Q-G-P-Y-M; M-S-F-C-Q-G-P-Y-M; S-F-C-Q-G-P-Y-M; M
(4) V-R-M-S-F; C-Q-G-P-Y; R-M-S-F-CQ-G-P-Y-M; F-C-Q-G-P; S-F-C-Q-G-P-Y-M; C-Q-G-P-Y

129. The mass and extinction coefficient of a protein are 11237 Da and 15 mM^{-1} cm^{-1} respectively. A solution of this protein, upon a 1:100 dilution shows an absorbance of 0.35. What is the concentration of this protein in moles/L and in mg/ml?
(1) 0.23 X 10^{-3} M and 25.8 mg/ml
(2) 2.3 x 10^{-3} M and 25.8 mg/ml
(3) 23 x 10^{-3} M and 25.8 mg/ml
(4) 0.23 x 10^{-3} M and 2.58 mg/ml

130. A Caenorhabditis contig for one region of chromosome 2 contains contiguous location marked 1, 2, 3, 4, 5, 6, 7, 8 and 9. Cosmid clones a, b, c, d and e overlap the location 2-4, 3-5, 4-6, 5-8, 8-9 respectively. A cloned pBR322-x hybridize to cosmids b, c, d and pUC18-y hybridize to cosmids d and e. The appropriate location of x and y are
(1) 4 and 7   (2) 5 and 8
(3) 4 and 8   (4) 5 and 7

131. Heterosis helps in crop improvement. Identify the correct statements.
A. Parental lines improvement by diversification of cms and restorer sources for higher yield
B. Development of fortified food to satisfy market demand
C. Improved hybrid crop developed for dual function-salinity tolerance and fungal resistance
D. Reciprocal crosses of an improved isogenic line for a better yield
(1) B, D   (2) A, D
(3) A, B   (4) A, C

132. Encapsulated somatic embryo in alginate beads produce artificial seeds. Identify the correct statements.
A. Artificial seed is a genetically modified agricultural product
B. Artificial seed is a patented product for pharmaceutical industry
C. Artificial seed can be stored and transferred to soil for germination
D. Somatic embryo of single cell origin produce genetically uniform plants
(1) A, C   (2) A, B
(3) B, C   (4) C, D

133. A disease tomato plant was planted in soil contained with *Agrobacterium tumefaciens* harboring Ti plasmid that lacks VirA gene. Provided all other conditions are optimum for the bacterial infections, identify the appropriate consequence
A. Octapine synthesis by bacterium will enhance
B. Acetysringone receptors will not be synthesized
C. The bacterial will fail to transfer T-DNA to the plant
D. A fragmented T-DNA will be transferred to the tomato plant
(1) A, D   (2) B, D
(3) A, C   (4) B, C

134. A restriction fragment obtained with a type II endonuclease that recognizes a six base pair site, was subjected to Maxam-Gilbert Sequence with results as shown in the autoradiogram below.

The restriction site is
(1)   TAGCTA   (2)   TAGGTA
       ATCGAT   ATCCAT
(3)   ATCCAT   (4)   GATACC
       TAGGTA   CTATGG

135. Experiments carried out has shown that Rohu and Catla, two common edible fresh water fish have the equal chance of being caught in net. In a small lake, 100 tagged Rohu were released. Next day, fisherman caught 10 tagged Rohu, 12 untagged Rohy and 8 catla in net. The fish population remaining in the lake is
(1) 120 Rohu and 60 Catla
(2) 220 Rohu and 80 Catla
(3) 198 Rohu and 72 Catla
(4) 108 Rohu and 72 Catla

136. A guinea pig was given a single injection of ^{24}NaCl. Periodically, blood samples were withdrawn and analyzed immediately for radioactivity. The data are shown below. Calculate the biological half-life of ^{24}Na in the blood stream

Time of injection (hr)	Specific activity (CPM/ml)
1	3604
2	2908
5	2376
10	1412
16	756
24	329

(1) 3 hour   (2) 6 hour
(3) 9 hour   (4) 12 hour

137. Electrophoresis of a purified protein called X in the presence of sodium dodecyl sulfate (SDS) and beta-mercaptoethanol shown a single band of 60 kDa. In gel filtrations experiment, protein X elutes between alcohol dehydrogenase (160 kDa) and beta amylase (190 kDa). How many identical subunits protein X is composed of?
(1) One   (2) Two
(3) Three   (4) Four

138. Three polypeptides (A, B, C) whose masses are 55 kDa, 50kDa and 75 kDa with pI of 6.5, 7.0 and 8.0, respectively, were subjected to standard reducing SDS-PAGE. The order of their separation from top to bottom would be
(1) A, B and C   (2) B, A and C
(3) A, C and B   (4) C, A and B

139. A solution containing Aspartic acid (pI=2.98), Glycine (pI=5.97), Threonine (pI=6.53) and Lysine (pI=9.74) in 50 mM citrate buffer pH 3.0 was applied to a cation exchange column equilibrated with the same buffer and fraction collected. The order of elution of these amino acids from the column is
(1) Lysine, Threonine, Leucine, Glycine, Aspartic acid
(2) Asprtic acid, Threonine, Glycine, Leucine, Lysine
(3) Aspartic acid, Glycine, Leucine, Threonine, Lysine
(4) Aspartic acid, Threonine, Leucine, Glycine, Lysine

140. E. coli cells were simultaneously infected by two rII bacteriophage mutants. From the progeny obtained after lysis of the E. coli cells it was observed that some of the bacteriophages showed a wild type phenotype. These were obtained at extremely low frequency. This is due to
1. complementation of the two mutations.
2. recombination between the two mutant chromosomes.
3. transposition of the mutation.
4. incomplete penetrance.

141. The figure below shows the distribution of tail lengths in a population of birds.
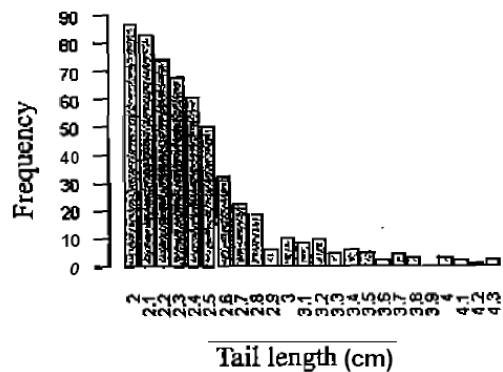
For such a distribution, measures of central tendency will show the following pattern:
1. mean > median > mode   2. median > mode > mean
3. mode >median > mean   4. mode = median = mean

142. The average human genome has approximately 3×10^9 base pairs coding for various proteins. If an "average" protein contains 400 amino acids, what is the maximum number of proteins that can be encoded by the human genome?
1. 2.5×10^6.
2. 2.5×10^7.
3. 3.0×10^6.
4. 3.5×10^7.

143. It is hypothesized that the mean (μ) longevity of a **Drosophila** strain is 18 days, with a variance (σ) of 3 days. What values of longevity in a sampled population will lead to rejection of the null hypothesis at 95% confidence level?
1. Only values less than 15.
2. Values less than 15 and more than 18
3. Only values more than 21
4. Values less than 12 and more than 24

144. Normalized Differential Vegetation Index (NDVI) in remote sensing refers to the following spectral band derivation:
1. Near IR – Red
2. Red / Near Red
3. (Near IR – Red) / (Near IR + Red)
4. (Near IR – Red) / Red

145. In a transgenic mouse experiment a founder male produces 100 pups and only 20 of these are transgenic. This result leads to the conclusion that the
1. founder transgenic animal is chimeric.
2. founder animal is mosaic.
3. transgene is integrated on Y–chromosome.
4. transgene is integrated on X–chromosome.

ANSWER KEY

1 2	2 1	3 2	4 4	5 1	6 4	7 1	8 4	9 1	10 2
11 1	12 2	13 3	14 3	15 2	16 3	17 3	18 2	19 1	20 3

PART-B

21 3	22 3	23 4	24 4	25 4	26 1	27 1	28 2	29 1	30 2
31 3	32 2	33 3	34 3	35 1	36 1	37 3	38 3	39 1	40 1
41 3	42 2	43 2	44 1	45 2	46 1	47 2	48 4	49 3	50 2
51 4	52 2	53 4	54 4	55 4	56 2	57 4	58 2	59 4	60 2
61 1	62 2	63 2	64 1	65 2	66 1	67 3	68 3	69 3	70 1

PART-C

71 2	72 1	73 4	74 3	75 1	76 4	77 4	78 2	79 2	80 3
81 2	82 4	83 4	84 4	85 4	86 2	87 1	88 1	89 3	90 2
91 2	92 2	93 1	94 3	95 2	96 1	97 1	98 4	99 3	100 1
101 4	102 4	103 2	104 3	105 3	106 3	107 4	108 2	109 2	110 4
111 4	112 1	113 1	114 3	115 2	116 4	117 2	118 4	119 3	120 3
121 3	122 4	123 4	124 4	125 4	126 2	127 1	128 2	129 2	130 2
131 2	132 4	133 4	134 1	135 3	136 3	137 3	138 4	139 3	140 2
141 1	142 1	143 4	144 3	145 2					