1. कब्जे लगनी होगा समय अंत: है। इस प्रश्न पत्र का विश्लेषण (20 मन 'A' तथा 50 मन 'B' 

tथा 25 मन 'C') ही है। प्रश्न पत्र 'A' के अंतर्गत 15 
विभाग 'B' के 35 प्रश्न तथा पत्र 'C' के 25 प्रश्न हैं। इसके 
क्रमिक से प्रश्न पत्र 'A' के 15, 'B' के 35 तथा 'C' के 25 चरणों का 
तत्परता है जो आपकी जानकारी 
2. कयांतरे सहित प्रश्न उत्तर दी गेहूँ है। कारण नस्ल और भूकंप का प्रभाव निर्देशित 
करता है जिसके तहत भूकंप के कारण निर्देशित 
करता है जिसके तहत भूकंप के कारण निर्देशित 
करता है जिसके तहत भूकंप के कारण निर्देशित 
करता है जिसके तहत भूकंप के कारण निर्देशित 

3. मांसल समस्याओं या अन्य विचारों का उत्तर दी 
होगा जिसके तहत भूकंप के कारण निर्देशित 
होगा जिसके तहत भूकंप के कारण निर्देशित 
होगा जिसके तहत भूकंप के कारण निर्देशित 

4. कयांतरे सहित प्रश्न उत्तर दी गेहूँ है। कारण नस्ल और भूकंप का प्रभाव निर्देशित 
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करता है जिसके तहत भूकंप के कारण निर्देशित 

5. इस प्रश्न पत्र का विश्लेषण 'A' या 'B' प्रश्न पत्र के 2 अंतर्गत 50 मन 'C' 
प्रश्न पत्र 'A' तथा 'B' के प्रश्न पत्र के अंतर्गत 50 मन 'C' 

6. कयांतरे सहित प्रश्न उत्तर दी गेहूँ है। कारण नस्ल और भूकंप का प्रभाव निर्देशित 
करता है जिसके तहत भूकंप के कारण निर्देशित 
करता है जिसके तहत भूकंप के कारण निर्देशित 

7. इस प्रश्न पत्र का विश्लेषण 'A' या 'B' प्रश्न पत्र के 2 अंतर्गत 50 मन 'C' 
प्रश्न पत्र 'A' तथा 'B' के प्रश्न पत्र के अंतर्गत 50 मन 'C' 

8. कयांतरे सहित प्रश्न उत्तर दी गेहूँ है। कारण नस्ल और भूकंप का प्रभाव निर्देशित 
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9. कयांतरे सहित प्रश्न उत्तर दी गेहूँ है। कारण नस्ल और भूकंप का प्रभाव निर्देशित 
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11. कयांतरे सहित प्रश्न उत्तर दी गेहूँ है। कारण नस्ल और भूकंप का प्रभाव निर्देशित 
करता है जिसके तहत भूकंप के कारण निर्देशित 
करता है जिसके तहत भूकंप के कारण निर्देशित 

12. कयांतरे सहित प्रश्न उत्तर दी गेहूँ है। कारण नस्ल और भूकंप का प्रभाव निर्देशित 
करता है जिसके तहत भूकंप के कारण निर्देशित 
करता है जिसके तहत भूकंप के कारण निर्देशित 

कयांतरे सहित प्रश्न उत्तर दी गेहूँ है। कारण नस्ल और भूकंप का प्रभाव निर्देशित 
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संतुलन/उत्तर दी गेहूँ है। कारण नस्ल और भूकंप का प्रभाव निर्देशित 
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करता है जिसके तहत भूकंप के कारण निर्देशित 

नाम: 

उत्तरदाता का नाम और जन्माह्न का साहित्यिक 
क्रम: 

3-B-H
INSTRUCTIONS

1. This Test Booklet contains one hundred and forty five (20 Part A + 50 Part B + 35 Part C) Multiple Choice Questions (MCQs). You are required to answer a maximum of 15, 35 and 25 questions from Part 'A', 'B' and 'C', respectively. If more than required number of questions are attempted, only first 15, 35 and 25 questions in Parts 'A', 'B' and 'C' respectively, will be taken up for evaluation.

2. OMR answer sheet has been provided separately. Before you start filling up your particulars, please ensure that the booklet contains requisite number of pages and that these are not torn or mutilated. If it is so, you may request the Invigilator to change the booklet of the same code. Likewise, check the OMR answer sheet also. Sheets for rough work have been appended to the test booklet.

3. Write your Roll No., Name and Serial Number of this Test Booklet on the OMR answer sheet in the space provided. Also put your signatures in the space earmarked.

4. You must darken the appropriate circles with a black ball pen related to Roll Number, Subject Code, Booklet Code and Centre Code on the OMR answer sheet. It is the sole responsibility of the candidate to meticulously follow the instructions given on the Answer Sheet, failing which the computer shall not be able to decipher the correct details which may ultimately result in loss including rejection of the OMR answer sheet.

5. Each question in Part 'A' and 'B' carries 2 marks and Part 'C' questions carry 4 marks each respectively. There will be negative marking @ 0.50 marks for each wrong answer in Part 'A' and 'B' and @ 1 mark for Part 'C'.

6. Below each question in Part 'A', 'B' and 'C' four alternatives or responses are given. Only one of these alternatives is the 'correct' option to the question. You have to find, for each question, the correct or the best answer.

7. Candidates found copying or resorting to any unfair means are liable to be disqualified from this and future examinations.

8. Candidate should not write anything anywhere except on answer sheet or sheets for rough work.

9. Use of calculator is NOT permitted.

10. After the test is over, at the perforation point, tear the OMR answer sheet, hand over the original OMR answer sheet to the Invigilator and retain the carbonless copy for your record.

11. Candidates who sit for the entire duration of the exam will only be permitted to carry their Test booklet.
1. The dimensions of the pinholes of two otherwise identical cameras A and B are 500 μm and 200 μm, respectively. Then the image in camera A will be
   1. sharper than in B
   2. darker than in B
   3. less sharp and brighter than in B
   4. sharper and brighter than in B

2. If $y = 2x^2$ and $y = 4x$, find the points of intersection.

3. The curves of $y = 2x^2$ and $y = 4x$ intersect each other at
   1. only one point
   2. exactly two points
   3. more than two points
   4. no point at all

4. The curves of $y = 2x^2$ and $y = 4x$ intersect each other at
   1. only one point
   2. exactly two points
   3. more than two points
   4. no point at all

5. A rectangular photo frame of size 50 cm × 40 cm has a photograph mounted at the centre leaving a 5 cm border all around. The area of the border is
   1. 600 cm²
   2. 350 cm²
   3. 400 cm²
   4. 700 cm²

6. A rectangular photo frame of size 50 cm × 40 cm has a photograph mounted at the centre leaving a 5 cm border all around. The area of the border is
   1. 600 cm²
   2. 350 cm²
   3. 400 cm²
   4. 700 cm²
6. A tourist drives 20 km towards east, turns right and drives 6 km, then drives 6 km towards west. He then turns to his left and drives 4 km and finally turns right and drives 14 km. Where is he from his starting point?
   1. 6 km towards east
   2. 20 km towards west
   3. 14 km towards north
   4. 10 km towards south

7. A company is to produce a total of 100 pens. The production is to be divided equally. If the production is to be divided into 4 equal parts, which of the following numbers cannot be used as the number of pens in each part?
   1. 25
   2. 20
   3. 30
   4. 40

8. A circular running track has six lanes, each 1 m wide. How far ahead (in metres) should the runner in the outermost lane start from, so as to cover the same distance as the runner in the innermost lane?
   1. 6 x
   2. 10 x
   3. 12 x
   4. 26 x

9. Given the following data on the marks of 10 students in mathematics:
   - Marks: 60, 65, 70, 70, 75, 80, 85, 90, 95, 100
   - Which of the following statements is true?
     1. Mean < Median < Mode
     2. Mean < Mode < Median
     3. Median < Mean < Mode
     4. Mode < Median < Mean

10. A rectangle has length 10 cm and width 5 cm. What is the area of the rectangle?
    1. 50 cm²
    2. 10 cm²
    3. 25 cm²
    4. 50 cm³

11. A round table has a radius of 30 cm. What is the area of the table?
    1. 28.26 cm²
    2. 38.46 cm²
    3. 31.42 cm²
    4. 21.99 cm²
11. Two solutions X and Y containing ingredients A, B and C in proportions a:b:c and a:b:c, respectively, are mixed. For the resultant mixture to have A, B and C in equal proportion, it is necessary that:

1. \( b = \frac{ac}{2} \)
2. \( c = \frac{ab}{2} \)
3. \( b = \frac{ac}{2} \)
4. \( b = \frac{ac}{2} \)

12. A test in a class A with y = 5 and y with x = 2 determine a graphing plot for each class. The graph is shown in the figure:

![Graph showing relationship between x and y](image)

Which of the following is suggested by the plots?

1. Correlation between x and y is stronger in A than in B.
2. Correlation between x and y is absent in B.
3. Correlation between x and y is weaker in A than in B.
4. y and x have a cause-effect relationship in A, but not in B.

13. In the context of tiling a plane surface, which of the following polygons is the odd one out?
1. Equilateral triangle
2. Square
3. Regular pentagon
4. Regular hexagon

14. A pendulum is oscillating with an angle of 30° from the vertical. If it is observed that the angle of deviation from the vertical is most likely to be
1. 30°
2. 10°
3. 15°
4. 30°

15. If ‘SELDOON’ means ‘NOODLES’ then what does ‘SPUOS’ mean?
1. SALAD
2. SOUPS
3. RASAM
4. ONION

3-B-H
16. A student is free to choose only Chemistry, only Biology or both. If out of 32 students, Chemistry has been chosen by 16 and Biology by 25, then how many students have chosen Biology but not Chemistry?

1. 18
2. 24
3. 36
4. 108

18. Areas of three parts of a rectangle are given in unit of cm². What is the total area of the rectangle?

1. 18
2. 24
3. 36
4. 108

19. Find the missing figure in the following sequence.

1. 2. 3. 4. 5.

19. The lift (upward force due to air) generated by the wings and engines of an aircraft is:

1. positive (upwards) while landing and negative (downwards) while taking off.
2. negative (downwards) while landing and positive (upwards) while taking off.
3. negative (downwards) while landing as well as while taking off.
4. positive (upwards) while landing as well as while taking off.
20. In triangle $ABC$ with $AB = 11$, $BC = 61$, $AC = 60$, and $O$ is the midpoint of $BC$. Then $AO$ is:

![Triangle Diagram]

1. 15.5  
2. 24.0  
3. 30.5  
4. 36.0

21. Which one of the following statements is true about human chromosomes?

1. The chromosomes that have highest gene density generally localize towards the centre of the nucleus.
2. The chromosomes that have highest gene density generally localize near the nuclear periphery to facilitate rapid transport of the gene products.
3. The centromeres of different chromosomes tend to cluster together at the centre of the nucleus.
4. Chromosomal positioning in the nucleus is absolutely random.

22. If one of the two fatty acyl chains is removed from the phosphoglyceride by hydrolysis in solution, such phospholipids will form:

1. liposomes  
2. mierelles  
3. phospholipid bilayer  
4. symmetric phospholipid bilayer

3-B-H
24. Which one of the following activities is NOT involved in protein folding in the endoplasmic reticulum?
1. Peptidyl prolyl isomerase
2. Protein disulfide isomerase
3. Protein glycosylation
4. Protein ubiquitination

25. Which of the following statements is correct?
1. The specific rotation of an optically active compound is always identical.
2. The rate constant of a first order reaction has only time but no concentration units.
3. The value of pH + pOH depends on temperature.
4. The bond dissociation energy (kcal/mol) of C=O is likely to be greater than C=C.

27. Which one of the following statements is correct?
1. An optically active compound can have only one chiral center.
2. The temperature at which a reaction occurs changes the equilibrium constant.
3. The pH of a buffer solution is independent of the temperature.
4. The pH of a buffer solution is independent of the concentration of the acid.

28. Which one of the following statements is true?
1. The digestion of proteins in the stomach is aided by pepsin.
2. The absorption of amino acids occurs in the small intestine.
3. The synthesis of proteins occurs in the lysosomes.
4. The transport of proteins across the cell membrane is passive.

29. Which one of the following statements is true?
1. The DNA double helix is held together by hydrogen bonds.
2. The RNA secondary structure is maintained by disulfide bonds.
3. The protein tertiary structure is stabilized by ionic interactions.
4. The protein quaternary structure is determined by the shape of the subunits.
28. Which one of the following statements is NOT true?
1. The conformation of ribose in DNA is 2-deoxy-D-ribose.
2. Hydrolysis of RNA takes place under alkaline conditions unlike DNA, as the 2'-hydroxyl in RNA acts as a nucleophile in an intramolecular displacement.
3. DNA can occur in different three-dimensional forms.
4. In RNA, determination of cytosine to uracil can occur in a non-enzymatic manner.

30. Which of the following is the correct sequence of amino acids of a polypeptide chain?
1. Arg-Asp-Glu-Leu
2. Phe-Trp-Leu
3. Ser-Val-Thr
4. Val-Asp-Glu

31. Which of the following statements is NOT true?
1. DNA is a linear polymer.
2. RNA is transcribed from DNA.
3. DNA is the genetic material.
4. RNA is the genetic material.

32. What is the correct sequence of the tryptic peptide produced by translation of the transcript produced by the following DNA sequence?
1. Arg-Glu-Asp
2. Phe-Val-Leu
3. Ser-Asp-Leu
4. Val-Glu-Asp

33. Which of the following statements is NOT true?
1. DNA is a linear polymer.
2. RNA is transcribed from DNA.
3. DNA is the genetic material.
4. RNA is the genetic material.

34. Which of the following statements is NOT true?
1. DNA is a linear polymer.
2. RNA is transcribed from DNA.
3. DNA is the genetic material.
4. RNA is the genetic material.
33. Which one of the following statements is generally not about RNA polymerase II? (IB)
1. It is dedicated to transcribing RNA from a single transcription unit, generally a large transcript which is then processed to yield three types of ribosomal RNA.
2. It transcribes a variety of small non-coding RNAs which are expressed in all cell types.
3. It generally synthesizes various types of mRNAs and small non-coding RNAs.
4. It is exclusively involved in synthesis of tRNA and rRNA.

34. Which one of the following strategies adopted by viruses to suppress immune response of the host? Which one of the following statements is NOT correct?
1. Human Immunodeficiency Virus (HIV) destroys CD4+ T cells.
2. Epstein-Barr Virus (EBV) produces a homolog of human IL-10.
3. Human influenza virus directly infects CD8+ T cells.
4. Human Cytomegalovirus (CMV) establishes latent infection in bone marrow stem cells.

35. Which one of the following inactivates the serine/threonine protein kinase, mTOR, related to cell growth in mammalian system?
1. Rifampicin
2. Rasagiline
3. Erythromycin
4. Chloramphenicol

36. Which one of the following antibiotics is not effective against the causative bacteria of tuberculosis?
A. Papillomavirus
B. EBV
C. IL-10
D. CD24+ T-cells

1. A-a, B-c, C-d, D-b
2. A-d, B-a, C-b, D-c
3. A-c, B-b, C-d, D-a
4. A-b, B-d, C-a, D-c
36. Match the following tumor cell origin with their nomenclature.

<table>
<thead>
<tr>
<th>TUMOR CELL ORIGIN</th>
<th>NOMENCLATURE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Malignant cells</td>
<td>a. Carcinoma</td>
</tr>
<tr>
<td>Germ cells</td>
<td>b. Carcinoma</td>
</tr>
<tr>
<td>Epithelial cells</td>
<td>c. Carcinoma</td>
</tr>
<tr>
<td>White blood cells</td>
<td>d. Carcinoma</td>
</tr>
</tbody>
</table>

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

37. विलोकित धातु से अभेद से कोई की पीसी का बुखार की संकेतन की जा सकती है?

1. जोड़ीज
2. कार्भनिक अभ्यास
3. शरीर
4. कच्चा

38. निचलतादिक में से कौन सा एक ऐसा अंशि रूपद दक्षता नहीं होता?

1. फ्रॉप्स्टोइन
2. ग्ल्यूमेन
3. प्रोटोमेसा
4. सायनोफ्रीन
5. आटूराइन

39. रसायन में आपके तेजस्व अनुप्रयोग होने का कारण है?

1. तकनीक का प्रयोग और आवश्यकता
2. निर्माण और निर्माण
3. तंतुल द्वारा वितरण क्रिया अवधि के प्रतिक
4. बंधन प्रथित

39. The “Magic wands” in the blood pressure originate due to:

1. systole and diastole of ventricle
2. inspiration and expiration
3. reflex oscillation of neural pressure
4. Bainbridge reflex

40. 1. समस्तों के लिए मेयरी संधि का स्वरूप
2. एक विलोकन इैकेनेसिस का स्वरूप
3. वर्तमान विशेषज्ञता वाला का स्वरूप
4. स्वरूप विशेषज्ञता वाले का स्वरूप

41. In case of Hydra, the major head inducer of the hypostome organizer is a set of Wnt proteins acting through the canonical β-catenin pathway. What would be the result if a transgenic Hydra is made to globally misexpress the downstream Wnt effector β-catenin?

1. Endodermal nodules will be formed all along the body axis and even on the top of the newly formed buds.
2. Endodermal nodules form at all levels.
3. Both endodermal tendrils and body would be formed along the body axis.
4. There would be no change observed.
3. BMP plays a crucial role in the development of the neural tube and other germ layers.
4. Both TGF-β and Sonic hedgehog signals play important roles in both neural induction and cell fate patterning of the neural tube. Which one of the following statements is true?
   1. High levels of BMP specify the cells to become epidermis.
   2. Very low levels of BMP specify the cells to become epidermis.
   3. High levels of BMP specify the cells to become neural plate.
   4. Intermediate levels of BMP do not affect the formation of neural crest cells.

42. Which of the following is/are true about the formation of BMP?
   1. BMP is produced by parietal endoderm.
   2. BMP acts as a chemoattractant for neural crest cells.
   3. BMP regulates the fate of neural progenitor cells.
   4. BMP is involved in the formation of neural tube.

43. Which one of the following mineral deficiencies will first be visible in younger leaves?
   1. Calcium
   2. Nitrogen
   3. Zinc
   4. Molybdenum

44. Which of the following bases is/are involved in the genetic code?
   1. Uracil
   2. Thymine
   3. Cytosine
   4. Guanine

45. Which one of the following best describes the function of Casparian bands during transport of nutrients and water across the root?
   1. Block apoplastic nutrient transport
   2. Block symplastic nutrient transport
   3. Act as a nutrient carrier
   4. Help in creating passage cells

46. Which of the following statements is/are correct about the process of desiccation?
   1. Dehydration occurs in the cytoplasm.
   2. Proteins are denatured in the vacuole.
   3. Cellulosic wall structure is maintained.
   4. Membrane permeability increases.

47. Which of the following statements is/are true about the process of desiccation?
   1. Dehydration occurs in the cytoplasm.
   2. Proteins are denatured in the vacuole.
   3. Cellulosic wall structure is maintained.
   4. Membrane permeability increases.

48. Which of the following is/are true about the process of desiccation?
   1. Dehydration occurs in the cytoplasm.
   2. Proteins are denatured in the vacuole.
   3. Cellulosic wall structure is maintained.
   4. Membrane permeability increases.
47. The maturation of red blood cells does not depend on:
1. folate acid
2. vitamin B₁₂
3. pyridoxine
4. tocopherol

48. Which of the following is NOT a function of angiotensin II:
1. Facilitates the release of angiotensin from post-ganglionic sympathetic neurons
2. Increases the sensitivity of baroreceptors by acting on brain
3. Promotes arteriolar constriction
4. Increases the secretion of vasopressin

49. Which one of the following is a function of angiotensin II?
1. Facilitates the release of thyroid hormone from post-ganglionic sympathetic neurons
2. Increases the sensitivity of baroreceptors by acting on brain
3. Promotes arteriolar constriction
4. Increases the secretion of vasopressin

50. The allele I in Drosophila is recessive, sex-linked and lethal when homozygous or hemizygous. If a female of the genotype II is crossed with a male, what is the ratio of females : males in the progeny?
1. 3:1
2. 2:1
3. 1:2
4. 1:1

51. The pedigree below represents the inheritance of an autosomal recessive trait.
51. Given below are some statements related to lower eukaryotes. Select the INCORRECT statement.
1. Chlorophylls are diplospastic with radial symmetry.
2. Ciliates, with weakly differentiated tissue layers, are not diplospastic.
3. Ciliates are diplospastic with two stages in their life cycle.
4. Hydrozoans, a Ciliata class, often have colonial polyps in their life cycle.

52. What is the ratio of 2000 to 2000 in a population of a plant species, genetic difference at a single locus leads to different flower colours. The allele frequencies are incompletely dominant. The population has 100 individuals with the genotype RR (white flowers), 200 individuals with the genotype Rr (pink flowers) and the remaining have genotype rr (red flowers). What is the frequency of the R allele in the population?
1. 0.25
2. 0.50
3. 0.75
4. 1.00

53. Which of the following plastid coding regions have been recommended as a core barcode for Plant Working Group of the Barcode of Life?
1. COI and rbcL
2. rbcL and matK
3. COI and matK
4. rbcL only

54. The following statements about the Yarnall experiment with females and males in which the following animal mating systems, which of the following animal mating systems?
1. Monogamy
2. Polygyny
3. Polyandry
4. Sequential monogamy

55. Which of the following is correct about the Yarnall experiment with females and males in which the following animal mating systems?
1. 1.00
2. 0.50
3. 0.75
4. 1.00

56. Which one of the following will have the least impact on allele frequencies in small populations?
1. Inbreeding
2. Random mating
3. Genetic drift
4. Outbreeding
56. Given below is a marker profile for two parental lines (P1 and P2) and their derived F1 progeny:

\[ \begin{array}{c|c|c|c}
P1 & P2 & F1 \\
- & - & - \\
- & - & - \\
\end{array} \]

The marker that is represented in the above figure is most likely to be:
1. RFLP or SSR
2. SSR only
3. SSR or RAPD
4. RAPD only

57. A fungus grows in the rhizosphere of a leguminous plant. Which of the following statements is correct?
1. The fungus is a mycorrhizal fungus.
2. The fungus is a parasitic fungus.
3. The fungus is a nitrogen-fixing fungus.
4. The fungus is an endophytic fungus.

58. A diploid species with 46 chromosomes is crossed with a tetraploid species with 92 chromosomes. What is the ploidy of the hybrids formed?
1. Diploid
2. Triploid
3. Tetraploid
4. Hexaploid

59. In a species of angiosperm, which of the following is true regarding the flower structure?
1. The flower is monocious.
2. The flower is perfect.
3. The flower is incomplete.
4. The flower is imperfect.

60. Which of the following is the correct order for the daily net primary productivity (NPP) per unit leaf area in different ecosystems?
1. Deserts < Tropical forests < Temperate forests
2. Deserts < Temperate forests < Tropical forests
3. Tropical forests < Deserts < Temperate forests
4. Tropical forests < Temperate forests < Deserts

61. The following combinations of groups of organisms and type of excretion select the correct combination:
1. Protozoa, adult amphibiaans, carilaginous fishes are amnonotic.
2. Ascaris, cockroaches, pine cones are urinothetic.
3. Pariquenda, amphibian tadpoles, crocodiles are mostly amnonotic.
4. Turtles, snakes and aquatic animals are urinothetic.
60. The equilibrium model of island biogeography proposed by MacArthur and Wilson assumes that the number of species on an island represents a balance between:
1. Resource consumption rate and predation rate.
2. Birth rate and death rate.
3. Colonization rate and extinction rate.
4. Speciation rate and hybridization rate.

61. A population grows according to the logistic growth equation: \( \frac{dN}{dt} = rN \left(1 - \frac{N}{K}\right) \) where \( \frac{dN}{dt} \) is the rate of population growth, \( r \) is the intrinsic rate of increase, \( N \) is population size, and \( K \) is the carrying capacity of the environment. According to this equation, population growth rate is maximum at:
1. \( \frac{N}{K} = \frac{1}{2} \)
2. \( K \)
3. \( 2K \)

62. Sandhii: A population grows according to the logistic growth equation: \( \frac{dN}{dt} = rN \left(1 - \frac{N}{K}\right) \) where \( \frac{dN}{dt} \) is the rate of population growth, \( r \) is the intrinsic rate of increase, \( N \) is population size, and \( K \) is the carrying capacity of the environment. According to this equation, population growth rate is maximum at:
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2. \( K \)
3. \( 2K \)

63. What is the significance of upwelling zones for marine ecosystems?
1. It is responsible for uniformity of temperature in the ocean to support the marine life.
2. It brings nutrients from deeper zones to the surface, thus increasing marine productivity.
3. It is responsible for uniform oxygenation of marine waters, thus increasing marine productivity.
4. It helps in circulating decomposers from the bottom of the ocean to the surface for proper decomposition of dead material on the surface.

<table>
<thead>
<tr>
<th>Table</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>A B</td>
<td>B A [Shared Resource]</td>
</tr>
<tr>
<td>A B</td>
<td>B A [Herbivore]</td>
</tr>
<tr>
<td>A B</td>
<td>B A [Secondary Consumers]</td>
</tr>
<tr>
<td>A B</td>
<td>B A [Carnivore]</td>
</tr>
</tbody>
</table>

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1. \( \frac{N}{K} = \frac{1}{2} \)
2. \( K \)
3. \( 2K \)

64. Abhishek and his family went to a local market. They bought:
1. 3 kg of potatoes for Rs. 5 per kg
2. 2 litres of milk for Rs. 6 per litre
3. 1 kg of onions for Rs. 4 per kg
4. 0.5 kg of tomatoes for Rs. 7 per kg

65. What is the significance of upwelling zones for marine ecosystems?
1. It is responsible for uniformity of temperature in the ocean to support the marine life.
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4. Speciation rate and hybridization rate.

67. A population grows according to the logistic growth equation: \( \frac{dN}{dt} = rN \left(1 - \frac{N}{K}\right) \) where \( \frac{dN}{dt} \) is the rate of population growth, \( r \) is the intrinsic rate of increase, \( N \) is population size, and \( K \) is the carrying capacity of the environment. According to this equation, population growth rate is maximum at:
1. \( \frac{N}{K} = \frac{1}{2} \)
2. \( K \)
3. \( 2K \)
63. Consider a single locus with 2 alleles which are in Hardy-Weinberg equilibrium. If the frequency of one of the homozygous genotypes is 0.64, what is the frequency of heterozygous in the population?
1. 0.16
2. 0.20
3. 0.32
4. 0.36

65. Which one of the following statements regarding restriction-modifying enzymes used in recombinant DNA technology is correct?
1. Endonucleases remove nucleotides, one at a time, from the ends of a sequence.
2. Type II class of restriction enzymes do not recognize palindromic sequences.
3. Mung bean nucleases acts on double stranded DNA or RNA termini.
4. Type II class of restriction enzymes can generate either “sticky” (staggered) or “blunt” ends.

66. Which one of the following is used as a source of excitation in a confocal microscope?
1. Lasers
2. Electron beam
3. Mercury lamp
4. Lasers
67. DNA रूपक अभाव उपरांत रूपक पत्रिकाओं की सृजना में अनेक सुधारों का प्रदर्शन होता है। DNA रूपक नियमित तथा संक्रमण प्रमाण दोनों में से कोई भी भीतरी नहीं है।
1. प्रवाह स्वयं अरुचनुक्त DNA युक्त अरुचनुक्त प्रवाह को विविधता करता है और विविधता के तथा अरुचनुक्त प्रवाहों का श्रेणी धारी कैसे हैं।
2. DNA रूपक रूपक के अवस्था अवस्था की स्वयं के अवस्था को विविधता करता है जिसके अंतररात्र अवस्था द्वारा प्रभावित होता है।
3. DNA रूपक का प्रवाह के साथ अवस्था चक्र के साथ क्रियाप्रवेश का श्रेणी धारी कैसे है?
4. DNA रूपक का विविधता इस उपयोग के कहने पर खुला है जो रूपक का अवस्था को संभालते हैं।

67. DNA vaccines offer several advantages over other existing vaccine approaches. Which one of the following statements related to DNA vaccine is NOT correct?
1. The immune response is directed to the antigen encoded by the DNA and able to induce both humoral and cell-mediated immunity.
2. DNA vaccine can induce prolonged expression of the antigen, enhancing the induction of immunological memory.
3. DNA vaccine could remain stable and potent for long time without refrigeration, eliminating the challenges of storage and transportation.
4. DNA vaccine construct can be engineered to carry several antigens to infect host and replicate in neuronal cells.

68. नियमित रूपक के प्रवाहक नियम के प्रवाह के नियम हेतु अभिमुक्तिकरण किया जाता है:

SoH: स्थिति का हेतु, Got: के नियम पुस्तक
71. Spermatozoa are removed from a 2 ml/ml sample of semen. Determine the number of spermatozoa per ml of semen.

72. A single protuberance of microtubules grows at the speed of 2 μm/min. Considering that there is no catastrophe in the microtubule nucleation and the size of the tubulin unit is of the order of 5 nm, how many tubulin units are added to the growing microtubule per minute?

73. Choose the correct answer from the statements indicated below:
1. Chi-square test is parametric.
2. Non-parametric test assumes normal distribution.
3. Results can be significantly affected by outliers in a parametric test.
4. Non-parametric test is more powerful as compared to parametric test.
72. mRNA of a gene was depleted in human cells using siRNA that arrest cells in the G1 phase of the cell cycle. In order to test whether the G1 arrest is due to an off-target or an on-target effect of siRNA mediated mRNA depletion, an investigator can:

A. re-introduce an ectopic copy of the gene coding for the wild-type mRNA and protein
B. re-introduce an ectopic copy of the gene that is different in its mRNA sequence at the siRNA target site but encodes for the same protein
C. re-introduce an ectopic copy of the gene that codes for different mRNA and protein
D. utilize fewer siRNAs targeting different regions of the mRNA in question

**Choose the combination with correct statements**
1. A, B, C only
2. C and D only
3. B and D only
4. B, C, D only

73. E.coli is known to have polymorphism in its ribosomes. Which of the following statements is correct?

1. Ribosomes of E.coli and S.cerevisiae are identical in enzyme composition and function.
2. Ribosomes of E.coli and S.cerevisiae differ in the rate of translation of mRNA.
4. Ribosomes of E.coli and S.cerevisiae differ in the length of the L1 stalk.

**Choose the combination with all correct statements**
1. A, B
2. A, C
3. A, D
4. B, C

74. Following are statements on β-turns:
A. All the 20 coded amino acids have equal propensity to form β-turns.
B. Pro cannot occur in β-turns.
C. Pro-Gly sequence strongly favours β-turns.
D. In Asn-Gly β-turns, Asn can have positive ψ, ϕ values.

**Choose the combination with all correct statements**
1. B, D
2. A, C
3. A, D
4. B, C
75. DNA of a normal (T_m) 47°C, the DNA melting temperature (T_m) of a sample 0.032 kJ/gaa was 45°C. The entropy change would be:
1. 2 x 10^{-3} kJ
2. 2 x 10^{-3} kJ
3. 3 x 10^{-2} kJ
4. 3 x 10^{-2} kJ

76. The following are some statements regarding glycolysis:
A. Glycolysis is not regulated by pyruvate kinase.
B. Lactate can be an end product of glycolysis.
C. Glycolysis cannot function anerobically.
D. In erythrocytes, the second site in glycolysis for ATP generation can be bypassed.

From the above, choose the combination with both INCORRECT statements:
1. A and B
2. B and D
3. C and D
4. A and C

77. Match the following bonds with their approximate energies:

<table>
<thead>
<tr>
<th>(a)</th>
<th>Hydrogen bond</th>
<th>(i)</th>
<th>0.5 kcal</th>
</tr>
</thead>
<tbody>
<tr>
<td>(b)</td>
<td>Van der Waals forces</td>
<td>(ii)</td>
<td>40 kcal</td>
</tr>
<tr>
<td>(c)</td>
<td>Covalent bond</td>
<td>(iii)</td>
<td>80 kcal</td>
</tr>
<tr>
<td>(d)</td>
<td>Ionic bond</td>
<td>(iv)</td>
<td>3 kcal</td>
</tr>
</tbody>
</table>

78. Which of the following statements is INCORRECT?
A. Glycolysis is a process that generates ATP.
B. Lactate is a product of glycolysis.
C. Glycolysis cannot function in the absence of oxygen.
D. In erythrocytes, the second site in glycolysis for ATP generation can be bypassed.

From the above, choose the INCORRECT statements:
1. A and B
2. B and D
3. C and D
4. A and C
78. For a reversible non-competitive inhibition of an enzyme, choose the plot that you would use to determine $K_i$:

79. An investigator expresses a GFP-fused protein that localizes to the outer membrane of Golgi apparatus. Upon visualizing GFP-signal in the fluorescence microscope, it was noted that GFP is pericentromere in its localization (Fig A). Treatment of such GFP expressing cells with a newly identified drug disrupted the Golgi into small vesicles (Fig B).

Following is a list of potential targets of the drug:

A. Dynein complex
B. Myosin
C. Microtubules
D. Dicer

Choose the combination with all correct targets:
1. A, B and D only
2. B and D only
3. A and C only
4. A only

80. A 37-year-old woman develops fever and an increase in the white blood cell count. The patient was admitted to the hospital and was started on antibiotics. The patient's condition improved, but a follow-up examination revealed an increase in the white blood cell count.

79. An investigator expresses a GFP-fused protein that localizes to the outer membrane of Golgi apparatus. Upon visualizing GFP-signal in the fluorescence microscope, it was noted that GFP is pericentromere in its localization (Fig A). Treatment of such GFP expressing cells with a newly identified drug disrupted the Golgi into small vesicles (Fig B).

Following is a list of potential targets of the drug:

A. Dynein complex
B. Myosin
C. Microtubules
D. Dicer

Choose the combination with all correct targets:
1. A, B and D only
2. B and D only
3. A and C only
4. A only
80. Following observation was made when a mammalian cell in one phase of cell cycle was fused with a cell in another phase of cell cycle:
A. Fusion of a cell in G1 phase with S phase caused the G1 nucleus to enter S phase.
B. Upon fusion of a G1 cell with an S phase cell, G1 cell does not enter S phase.
C. Upon fusion of a G1 cell with G1 cell, G1 nucleus enters G1 phase.
D. Upon fusion of an S phase cell with a M phase causes the S phase cell to immediately enter mitosis.

Choose the combination with all correct statements.
1. A, B, C
2. A, C, D
3. B, C, D
4. A, B, D

81. In an experiment, intact chromatin was isolated and digested with micrococcal nuclease in independent tubes for 30 min. 1 h, 2 h, and 4 h. Further, the DNA was purified from each tube, separated on agarose gel and Southern hybridization was performed with rRNA gene probe and a centromeric DNA probe. Which one of the following patterns of signal intensity from both the probes is likely to be obtained following Southern hybridization?
1. With increasing time, compared to centromeric probe, a rapid increase in signal intensity of rRNA gene probe was observed.
2. With increasing time, compared to centromeric probe, a rapid decrease in signal intensity of rRNA gene probe was observed.
3. Irrespective of incubation period, both probes produced identical band intensities.
4. Treatment with micrococcal nuclease would instantly degrade the DNA, hence, no hybridization signal would be obtained in any of the samples.

82. निम्नलिखित से सबसे बड़ी आधार अवधारना के आवरण स्थान पर बाले जम अंडुक्ष की सबसे अधिक संदर्भ है। एक पट्टी जो कि बुड़त है।
1. एक N-दिर्घत्र अंडाधनी अंडुक्का एवं।
2. एक N-दिर्घत्र अंडाधनी अंडुक्का एवं।
3. एक रेखीय अंडाधनी अंडुक्का के साथ जो कि के 22 नियुक्त को देखा जाता है।
4. एक पट्टी, एक बाले हितस्वर अंडाधनी अंडुक्का सरकार एवं साथ में बैठके एक अंडाधनी लिदित अंडुक्का।
82. Which one of the following proteins is most likely to be found in the inner-membrane space of mitochondria? A protein that contains:
1. an N-terminal matrix targeting sequence followed by hydrophobic stop transfer anchor sequence.
2. an N-terminal matrix targeting sequence followed by a cleavable hydrophobic sequence that blocks complete translocation.
3. a protein with multiple internal sequences that are recognized by Tim 22 complex.
4. a protein with an outer membrane localization sequence followed by a matrix targeting signal.

83. Susceptible individuals were infected with pathogen A and pathogen B separately. Pathogen A has a very short incubation period and disease symptoms are already underway by the time memory cells are activated. Pathogen B on the other hand has a long incubation period which allows the memory cells to be activated and respond. Which one of the following will be the most appropriate vaccination strategy against both pathogens A and B?
1. Repeated vaccination against both A and B for maintaining high levels of neutralizing antibodies.
2. Repeated vaccination against A and a single injection of pathogen B vaccine for maintaining high levels of neutralizing antibodies.
3. Single injection of pathogen A vaccine and repeated vaccination against pathogen B for maintaining high levels of neutralizing antibodies.
4. Single injection of both pathogens A and B vaccines so that memory cells can respond by producing high levels of serum antibodies.

84. Human sperm are allowed to fertilize only having non-functional ovum. The following possibilities may be of significance in the fusion of these gametes:
A. The sperms will not fertilize ova.
B. The sperms will bind and penetrate the zona pellucida but will not be able to fuse with ovum membranes.
C. ZP2 will not be chirped by cortical granule protease.
D. CD9 protein of egg membrane microvilli will not be able to interact with sperm membrane proteins in the absence of ovulation.
E. Polyspermy may occur frequently.
Which combination of statements represent the outcome of the above events?
1. A and B
2. C and D
3. B and C

286. N-cadherin can mediate aortic smooth muscle cell adhesion. What is the evidence for this claim?
A. Less adhesion
B. More adhesion
C. No change in adhesion

284. N-cadherin is expressed in mesenchymal cells. Where is it expressed in these cells?
A. Cartilage
d) Brain
c) Skin
d) Muscle

285. N-cadherin is expressed in mesenchymal cells. What is the role of N-cadherin in these cells?
A. Adhesion
B. Migration
C. Differentiation
D. Differentiation

286. A DNA segment was cloned into the active site region of lacZ gene and the recombinant plasmid introduced into lacZ- strain of E. coli and plated on a medium containing X-gal. The colonies showed blue color. Which one of the following statements is correct?
1. The nature of the cloned DNA segment need not be special as cloning of any DNA in lacZ will result in disruption of its reading frame and production of blue-colour on X-gal plates.
2. The cloned DNA segment could be a Group I intron whose removal from the pre messenger transcript in E. coli results in production of mature lacZ mRNA which can then produce active LacZ protein.

3. The cloned sequence is likely to be lacY sequence which is a part of lac operon in E. coli.

4. The cloned sequence is likely to be an antisense terminator sequence which allows full length transcription of lacZ.

87. An intron in a yeast reporter gene carries a mutation in the splice site branch point (UAUGA to UAAG A). To suppress the mutation, a library of point mutants of siRNAs was introduced into the yeast strain. The suppressor is most likely to have a point mutation in:

1. U$_{1}$ siRNA
2. U$_{2}$ siRNA
3. RNAi P
4. U$_{1}$ siRNA

88. A researcher wanted to identify the enhancer sequences of a newly discovered gene. Shown below are the relevant regions of some of the reporter constructs. The researcher designed to identify the enhancer.

Which of the above constructs can be used to identify the enhancer?

1. A only
2. B only
3. Both A and C
4. C only

89. A researcher was interested in identifying the DNA regions that are involved in the regulation of a specific gene. The researcher designed reporter constructs with lacZ reporter gene. The constructs were transfected into yeast cells and the expression of lacZ was monitored.

Which of the above constructs can be used to identify the regulatory DNA regions?

1. Yeast reporter construct A
2. Yeast reporter construct B
3. Yeast reporter construct C
4. Yeast reporter construct D

3-B-1
89. In a genetic assay, randomly generated fragments of yeast DNA were cloned into a bacterial plasmid containing gene 'X' essential for yeast viability on minimal media. The recombinant plasmid was used to transform a yeast strain deficient in recombination and lacking 'X' gene. Transformants, which survive on minimal media and form colonies should essentially have:

1. Yeast centromeric sequence which ensures integrity of the plasmid after transformation.
2. Enhancers for the essential gene missing in the transformed strain.
3. A sequence similar to bacterial origin of replication.
4. Yeast autonomous replicating sequence.

90. A budding yeast strain with a marker were crossed with another strain without the marker.

A. A marker in the mating mixture of the two differing strains because of recombination.
B. Marker is present with 0.5 of the diploid offspring, but it is missing from the other 0.5 offspring.
C. Marker is present with 0.5 of the diploid offspring, but it is missing from the other 0.5 offspring.
D. Marker is present with 0.5 of the diploid offspring, but it is missing from the other 0.5 offspring.

91. Following statements have been made about recombination in a diploid organism:

A. Recombination could be identified by genotyping parents and offspring pairs for a pair of loci.
B. Recombination frequency does not exceed 0.5, and therefore, 50% would be the maximum distance between two loci.
C. Recombination is a reciprocal process. However, a non-reciprocal exchange may cause gene conversion.

92. Occasionally non-homologous recombination happens and this functions as a source of chromosomal rearrangements.

Select the combination with all correct statements:

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

93. In a diploid organism, two homologous chromosomes are present.

VI. In a diploid organism, two homologous chromosomes are present.

94. The diagram below illustrates the process of meiosis in a diploid organism.

95. Occasionally non-homologous recombination happens and this functions as a source of chromosomal rearrangements.

Select the combination with all correct statements:

1. A, B, C
2. A, B, D
3. B, C, D
4. A, C, D
91. Bacteria adopt different strategies to evade host defense mechanisms. From the lists of various different mechanisms and bacterial strategies against host defense given below, select the option representing all correct pairings:

<table>
<thead>
<tr>
<th>Host defense mechanism</th>
<th>Bacterial strategies against host defense</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. Phagocytosis</td>
<td>W. Change of bacterial surface charge, making it more positive</td>
</tr>
<tr>
<td>b. Release antibodies, like IgG</td>
<td>X. Capsular poly saccharides, such as that of Klebsiella pneumoniae</td>
</tr>
<tr>
<td>c. Antibody-mediated agglutination</td>
<td>Y. Release of soluble proteins like protein A of Streptococcus pyogenes</td>
</tr>
<tr>
<td>d. Anti-microbial peptides</td>
<td>Z. Secretion of elastase to inactivate C3a and C5a</td>
</tr>
</tbody>
</table>

7. a - W; b - X; c - Y; d - Z  
8. a - X; b - Y; c - Z; d - W  
9. a - Z; b - Y; c - X; d - W  
10. a - Y; b - W; c - Z; d - X

92. Bacterial chemotaxis response is mediated by histidine-kinase-associated receptors that activate a two-component signalling pathway which enables chemotaxis receptors to control the flagellar motors. When bacteria move towards attractants, they produce smooth swimming by rotating flagella counter-clockwise, whereas when bacteria move away from repellents, they produce increased tumbling by rotating flagella clockwise. Which of the following characteristics regarding chemotaxis receptor is NOT true?

1. The receptor is a dimeric transmembrane protein that binds specific attractants and repellents on the outside of the plasma membrane.
2. The cytoplasmic tail of the receptor is closely associated with a histidine-kinase CheA via an adapter protein CheW.
3. The receptor and its associated proteins are all clustered at one end of the cell.
4. The binding of an attractant increases the activity of the receptor whereas binding of a repellent decreases the activity.

93. Some of the key differences between the two are:

- **Chemotaxis A** and **Chemotaxis B** differ in their interaction with the flagellar motor.
- **Chemotaxis A** is activated by repellents, whereas **Chemotaxis B** is activated by attractants.
- The **Chemotaxis A** pathway leads to smooth swimming, whereas **Chemotaxis B** leads to tumbling movements.
- The **Chemotaxis A** pathway involves the kinases CheY and CheA, whereas **Chemotaxis B** involves different kinases and effectors. 

---

-Diff
### Column A | Column B
---|---
A. | Connexin (i) | The chief endothelial cell proteins that are recognized by the white blood cell integrins and member of Immunoglobulin (Ig) superfamily
B. | Plasmodesma (ii) | Cell surface carbohydrate binding proteins that mediate a variety of transient cell-cell adhesion interactions in the bloodstream
C. | ICAM (iii) | Four-pass transmembrane protein which is the major component of gap junctions in forming a continuous aqueous channel.
D. | Selectin (iv) | It is the only class of intercellular junctions in plants that directly connect the cytoplasm of adjacent cells.

Which one of the following is the correct match?
1. A—i; B—iv; C—iii; D—ii
2. A—ii; B—iii; C—iv; D—i
3. A—iii; B—iv; C—i; D—ii
4. A—iv; B—i; C—ii; D—iii

93. Following are a list of extracellular matrix proteins (Column A) along with their functional characteristics (Column B).

94. Which of the following statements is correct?
A. The protein components of the ECM exhibit G₂ growth arrest
B. The activation of JAK-STAT pathway is an important mechanism.
94. A western blot analysis after treating cancer cells with a prospective anti-cancer drug is shown below:

<table>
<thead>
<tr>
<th>Drug</th>
<th>(PI)Drug</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td></td>
</tr>
<tr>
<td>II</td>
<td></td>
</tr>
<tr>
<td>II</td>
<td></td>
</tr>
<tr>
<td>III</td>
<td>STAT3</td>
</tr>
<tr>
<td>IV</td>
<td>Bcl-2</td>
</tr>
<tr>
<td>V</td>
<td>Cleaved PARP</td>
</tr>
<tr>
<td>VI</td>
<td>B-Tubulin</td>
</tr>
</tbody>
</table>

The following assumptions were made:

A. The drug may have arrested the growth of cells at the G1 phase.
B. The drug targeted the JAK-STAT signalling pathway.
C. The drug led to apoptosis of the cells.
D. Drug-induced apoptosis was through the extrinsic or mitochondrial-independent pathway.

Which one of the following combination is correct?
1. Only B and D
2. A, B and C
3. Only A and B
4. B, C and D

95. निम्नलिखित सिद्धांत का एक केसर अनुमान या स्पष्टता आधारित के रूप से कहा जा सकता है?
1. प्रतिक्रिया A निर्देशित कोलेस्टरल तूफान पर Ig वातावरण धरण करती है एवं कार्बन B कोलेस्टरल पर नवीनता कहाँ में प्रतिक्रिया के लिए परिवर्तनशील विश्वास होती है।
2. प्रतिक्रिया B निर्देशित कोलेस्टरल तूफान पर Ig वातावरण धरण करती है एवं कार्बन B कोलेस्टरल पर नवीनता कहाँ में प्रतिक्रिया के लिए परिवर्तनशील विश्वास होती है।
3. प्रतिक्रिया A निर्देशित कोलेस्टरल तूफान पर Ig वातावरण धरण करती है एवं कार्बन B कोलेस्टरल पर नवीनता कहाँ में प्रतिक्रिया के लिए परिवर्तनशील विश्वास होती है।
4. प्रतिक्रिया B निर्देशित कोलेस्टरल तूफान पर Ig वातावरण धरण करती है एवं कार्बन B कोलेस्टरल पर नवीनता कहाँ में प्रतिक्रिया के लिए परिवर्तनशील विश्वास होती है।

96. तांत्रिक द्रव्य के संग जिथों (खरीरूप) के सहजीवों के संबंध के रूप में सूचित करते जाना गया था:
A. जैसे 1 (modul) ऐसे जितने हैं।
B. जैसे (modul) अन्य के जितने जड़ों अन्यहीं हैं।
C. जैसे (modul) आज़ाद के प्रभाव पर 1-10 वाले N-एफिलिम-2-प्रकाशक अंतर ही रहता है।
96. Following statements were made with respect to symbiotic association of Rhizobium with legumes:
A. nodD is a regulatory gene.
B. Nod factors are lipopolysaccharides.
C. Nod factors predominantly have α-1→4-linked N-acetylglucosamine backbone.
D. Receptors for Nod factors are protein kinases with extracellular sugar-binding.
LysM domain.
Which one of the following combinations represents all correct statements?
1. A, B and C
d. 2. A, C and D
2. B, C and D
3. A, B and D

97. C. polychromatophilic cytoplasmic granules are seen:

Which one of the following combinations is true?
1. A and C
d. 2. B and C
2. B and D
3. A and D

98. The cycle of O. elegans exhibits rotational clamping. When the first two blastomeres formed (P1 and AB) are experimentally separated, the following outcomes may be possible:
A. The P1 cell in isolation generates all the cells it would normally make, showing autonomous specification.
B. The P1 cell in isolation generates all the cells it would normally make, showing conditional specification.
C. The AB cell in isolation generates a small fraction of cell types it would normally make, showing autonomous specification.
D. The AB cell in isolation generates a small fraction of cell types it would normally make, showing conditional specification.

Which one of the above combination of statements is true?
1. A and C
d. 2. B and C
2. B and D
3. A and D

99. Which of the following statements are true?

Which one of the following combinations is true?
1. A and C
d. 2. B and C
2. B and D
3. A and D

100. The cycle of O. elegans exhibits rotational clamping. When the first two blastomeres formed (P1 and AB) are experimentally separated, the following outcomes may be possible:
A. The P1 cell in isolation generates all the cells it would normally make, showing autonomous specification.
B. The P1 cell in isolation generates all the cells it would normally make, showing conditional specification.
C. The AB cell in isolation generates a small fraction of cell types it would normally make, showing autonomous specification.
D. The AB cell in isolation generates a small fraction of cell types it would normally make, showing conditional specification.

Which one of the above combination of statements is true?
1. A and C
d. 2. B and C
2. B and D
3. A and D
98. नीचे के सभी समानुपात प्रयुक्त करें।
1. D और D
2. C और D
3. A, B और C
4. A, B, C और D

99. नीचे दिए गए कुछ बाली श्रेणियों में स्वतंत्रता के बारे में हैं:
A. अम्लमता का सार्वजनिक श्रेणी में लेन-देन अथवा नये वृक्षों के पौधों में नहीं किया जा सकता।
B. जीवाणु उपरोक्त असंतता में समान नहीं।
C. गुण्योजकता असंतता के दौरान अपरिवर्तनीय।
D. दीर्घायु जीवाणु में, मूलधारण मात्र जीवाणु की अपरिवर्तनीय निर्देश हो सकता है, जिसमें से एक ही मूलधारण मात्र का निर्माण करता है।

100. नीचे दिए गए कुछ बाली श्रेणियों में स्वतंत्रता के बारे में हैं:
A. संख्या A में 6DG तथा PDGF निर्धारित है।
B. संख्या B में पैटर्निक असामान्यता है।
C. संख्या D में संकीर्ण कोडिफिकेशन महत्वपूर्ण के बाद में से एक ही क्लासिफ़ाटिव कोडिफिकेशन निर्देश निर्धारित है।

1. A, B और C
2. A, B और D
3. A, B और C
4. अन्य
The following assumptions were derived from the above experiment:
A. Medium A contained IPGF and PDGF.
B. Medium B is contained retinoic acid.
C. Cells cultured in Medium B were determined to become functional neurons prior to addition of the medium.

Which one of the following combinations represents correct statements?

1. A and B only
2. A, B and C
3. B and C only
4. A and C only

101. The conduction velocity of action potential in a myelinated nerve fibre was much greater than that of an unmyelinated fibre of the same diameter. The following statements were proposed to explain this observation:
A. The speed of conduction in a nerve fibre is determined by the plasma membrane resistance and axial resistance of the cytoplasm.
B. The electrical properties of myelinated and unmyelinated nerve fibres are not similar.
C. The myelin sheath decreases the effective membrane resistance.
D. The magnitude of an electrotonic potential decreases more with distance along the axon in myelinated nerve fibres than that of unmyelinated fibres.
E. The voltage-gated Na⁺ channels are highly concentrated at the nodes of Ranvier.

Choose one of the following combinations with both INCORRECT statements:
1. A and B
2. B and C
3. C and D
4. D and E

102. एक सीधी-रेखांकृत तथा एक त्रिसंख्यक संबंधीत प्रमाण का एक दृष्टिकोण होता है। तथा के लिए जीत सिधांत लागता है, तीन संयुक्त रूप हैः
102. A quadratic check of gene combinations and disease reaction types in a host-pathogen system where the gene-for-gene concept operates is represented below:

<table>
<thead>
<tr>
<th>Resistance or susceptibility</th>
<th>Genes in the pathogen</th>
<th>Resistance or susceptibility genes in the plant</th>
</tr>
</thead>
<tbody>
<tr>
<td>R (resistant) dominant</td>
<td>A</td>
<td>A</td>
</tr>
<tr>
<td>r (susceptible) recessive</td>
<td>a</td>
<td>ar</td>
</tr>
</tbody>
</table>

The following statements were made about the above genotypes:
A. All genotypes had incompatible (resistant) reactions.
B. All genotypes had compatible (susceptible) reactions.
C. A1 genotype had compatible (susceptible) reactions.
D. All genotypes had incompatible (resistant) reactions.

Choose the combination with all correct statements:
1. A, B, and D
2. A, B, and C
3. B, C, and D
4. A, C, and D

103. In a study of the effect of photosynthesis on yield, the following conditions were observed:
A. Sorghum Rubisco exhibits higher affinity for CO₂ compared to wheat.
B. Light saturation of net photosynthetic flux is lower for sorghum compared to wheat.
C. Warburg effect is difficult to record for sorghum and could be said as “not measurable” whereas it could be easily recorded for wheat.
D. Temperature optimum for net photosynthesis is lower for sorghum compared to wheat.
E. CO₂/P₂ ratio of assimilate is relatively higher for sorghum compared to wheat.

Which one of the following combinations of the above observations is correct?
1. Only A and B
2. Only B and C
3. Only A, B, and D
4. Only A, C, and E

S/27 C/S8/19—(BH—3B)
104. Following are certain statements regarding respiratory metabolism in plants:
A. Respiratory quotient during aerobic breakdown of carbohydrate (alcoholic fermentation) will be infinity.
B. Respiratory quotient indirectly provides information about (i) nature of the substance used for respiration and (ii) the relative rate of competing respiratory processes.
C. Breakdown of organic acids in mature fruit will exhibit a respiratory quotient value of more than one since organic acids are relatively oxygen-rich compared to other common substrates.
D. Anabolic metabolism can influence respiratory quotient by removing reduction equivalents for respiration leading to decrease in oxygen uptake.

Which one of the following combination of the above statement is correct?
1. Only A
2. Only B and C
3. Only D
4. A, B, C and D

105. Which one of the following statement is correct?
A. Photosynthesis occurs during the day.
B. Respiration occurs only at night.
C. Both photosynthesis and respiration occur throughout the day.
D. Both photosynthesis and respiration occur throughout the night.

106. Which statement is correct?
A. Photosynthesis is the process by which plants convert light energy into chemical energy.
B. Respiration is the process by which plants release carbon dioxide into the atmosphere.
C. Transpiration is the process by which plants absorb water from the soil.
D. Photosynthesis is the process by which plants release oxygen into the atmosphere.
197. Angelman syndrome (AS) and Prader-Willi Syndrome (PWS) have very distinct symptoms. Factors responsible for the occurrence of these syndromes are given below.

A. Deletion of 15q11-13 in paternal chromosome.
B. Uniparental disomy of maternal chromosome 15.
C. Lack of functional maternal copy of ubiquitin ligase E3A.
D. Lack of SNURF-SNRPN transcript, which is produced only from paternal chromosome.

107. The plant hormones, auxin and cytokinins, and their interactions play an important role in regulating apical dominance. The following figure represents an experiment related to the study of gene interactions that influence auxillary bud outgrowth or dominance. Q, Z and M represent genes involved in phytohormone pathway.

Based on the above figure, the following statements were made:

A. ‘X’ is an auxin that maintains expression of ‘Q’ and ‘Z’ and represses ‘M’.
B. ‘Y’ is a cytokinin that promotes auxillary bud growth and is induced by ‘M’.
C. Decapitation (removal of apex) activates ‘X’.
D. ‘X’ is a cytokinin that represses ‘M’.

Which one of the following options represents a correct statement(s)?
1. A and C only
2. B and D only
3. A and B only
4. C only
6. Deficiencies of small nuclear RNAs, which are encoded from the lenti of SNURF-SNRPN transcrip from parental chromosom.

Which of the following combination of answers is correct for Angelman and Prader-Willi Syndromes?

1. PWS – A, C, D; AS – B, E
2. PWS – B, AS – A, C, D, E
3. PWS – A, B, D, E; AS – C only
4. PWS – A, B, AS – C, D, E

108. विशिष्टता (अशुल्कता) संबंध विवेचन का उपयोग करके हुए, यह Hfr मार्ग से प्रवर्तन ना अपनाने को जानकर के लिए दिया गया क्योंकि विभिन्न प्रजनन जीनों की संरचना को F- मार्ग में शीर्षित करते हैं। प्रमुख Hfr मार्ग अपने जीनों के रूपांतरणबंधि ग्रहण में करते हुए जा गया जो रजसी में संशोधित किया गया है। उनके प्रवर्तन पदार्थ निवेश की गई कोई है।

<table>
<thead>
<tr>
<th>प्रेषण का क्रम</th>
<th>Hfr निवेश</th>
</tr>
</thead>
<tbody>
<tr>
<td>प्रथम</td>
<td>A</td>
</tr>
<tr>
<td></td>
<td>B</td>
</tr>
<tr>
<td></td>
<td>C</td>
</tr>
<tr>
<td></td>
<td>D</td>
</tr>
<tr>
<td></td>
<td>E</td>
</tr>
<tr>
<td></td>
<td>F</td>
</tr>
<tr>
<td></td>
<td>G</td>
</tr>
<tr>
<td></td>
<td>H</td>
</tr>
</tbody>
</table>

विशिष्टता (अशुल्कता) संबंध विवेचन का उपयोग करके हुए, यह Hfr मार्ग से प्रवर्तन ना अपनाने को जानकर के लिए दिया गया क्योंकि विभिन्न प्रजनन जीनों की संरचना को F- मार्ग में शीर्षित करते हैं। प्रमुख Hfr मार्ग अपने जीनों के रूपांतरणबंधि ग्रहण में करते हुए जा गया जो रजसी में संशोधित किया गया है। उनके प्रवर्तन पदार्थ निवेश की गई कोई है।

<table>
<thead>
<tr>
<th>प्राप्ति</th>
<th>प्रवर्तन</th>
</tr>
</thead>
<tbody>
<tr>
<td>प्रथम</td>
<td>A</td>
</tr>
<tr>
<td>मध्यम</td>
<td>B</td>
</tr>
<tr>
<td>अंतिम</td>
<td>C</td>
</tr>
<tr>
<td>शीर्षित</td>
<td>D</td>
</tr>
<tr>
<td>होक्त</td>
<td>E</td>
</tr>
</tbody>
</table>

109. नीचे दिए गए परिलक्षणों की साथियों या ती के संबंध हेतु प्राप्त मार्ग या प्रवर्तन जैसे हैं कितने?

A. विषमोक्ति चीज़ीयर्कित यौजिक
B. विषमोक्ति चीज़ीयर्कित यौजिक
C. विषमोक्ति चीज़ीयर्कित यौजिक
D. विषमोक्ति चीज़ीयर्कित यौजिक

विवरण के लिए नीचे दिए गए परिलक्षणों की साथियों या ती के संबंध हेतु प्राप्त मार्ग या प्रवर्तन जैसे हैं कितने?

1. विषमोक्ति – A; विषमोक्ति – B, C, D
2. विषमोक्ति – A, B, C, विषमोक्ति – D
3. विषमोक्ति – A, B; विषमोक्ति – C, D
4. विषमोक्ति – A, D; विषमोक्ति – B, C

<table>
<thead>
<tr>
<th>प्रवर्तन</th>
<th>Hfr निवेश</th>
</tr>
</thead>
<tbody>
<tr>
<td>प्रथम</td>
<td>A</td>
</tr>
<tr>
<td>मध्यम</td>
<td>B</td>
</tr>
<tr>
<td>अंतिम</td>
<td>C</td>
</tr>
<tr>
<td>होक्त</td>
<td>D</td>
</tr>
</tbody>
</table>

108. Using interrupted mating, four Hfr strains were analysed for their genetic similarity in which they transmitted a number of different genes to a F- strain. Each Hfr strain was found to transmit its genes in a unique order as summarised in the table. (Only the first five genes were scored).

<table>
<thead>
<tr>
<th>Order of</th>
<th>Hfr strain</th>
</tr>
</thead>
<tbody>
<tr>
<td>transmission</td>
<td></td>
</tr>
<tr>
<td>First</td>
<td>A, B, M, F</td>
</tr>
<tr>
<td></td>
<td>B, A, K, H</td>
</tr>
<tr>
<td></td>
<td>C, L, J, G</td>
</tr>
<tr>
<td></td>
<td>D, E, K, H</td>
</tr>
</tbody>
</table>

Which one of the following correctly represents the gene sequence in the original strain from which the Hfr strains were derived as well as the place of integration and polarity of the F plasmid?
110. Given below is a list of bacteria either functioning as methanogens or methanotrophs:
A. Methanosphaera sp
B. Methanobrevibacter sp
C. Methylophilus sp
D. Methylophilus sp
Which of the following options classifies the above list correctly?
1. Methanogens – A; Methanotrophs – B, C, D
2. Methanogens – A, B, C; Methanotrophs – D
3. Methanogens – A, B; Methanotrophs – C, D
4. Methanogens – A, D; Methanotrophs – B, C

111. The oxygen-haemoglobin dissociation curve illustrates the relationship between pO₂ in blood and the number of O₂ molecules bound to haemoglobin. The "S" shape of the curve has been explained in the following proposed statements:
A. The quaternary structure of haemoglobin determines its affinity to O₂.
B. In deoxygenated haemoglobin, the globin units are highly bound in a T-configuration.
C. The interactions between globin subunits are altered when O₂ binds with deoxyhaemoglobin.
D. The affinity to O₂ in T-configuration of haemoglobin is increased.
E. In the relaxed configuration of haemoglobin, the affinity to O₂ is reduced.
Choose one of the following combinations which both INCORRECT statements:
1. A and B
2. B and C
3. A and D
4. B and E

112. Which one of the following combinations represents a combination of probable malfunctioning organ?
A. Liver and Pancreas
B. Lung and Kidney
C. Pancreas and Spleen
D. Liver and Kidney

113. Methanotrophs, like methanogens, are anaerobic bacteria that thrive in environments with low oxygen availability. They play a crucial role in the sulfur cycle, converting sulfur compounds into usable forms for plants. The role of methanotrophs in this cycle is essential for maintaining the balance of elements in ecosystems.

C. Staphylococcus aureus and E. coli are both gram-positive bacteria. S. aureus is known to cause a wide range of infections, including skin infections, pneumonia, and bloodstream infections. E. coli is a common gut bacteria that can cause diarrhea and other infections when it enters the bloodstream. The role of these bacteria in the sulfur cycle is not typically significant.

D. E. coli is not a sulfur cycle bacterium. It is a common gut bacteria that can cause diarrhea and other infections when it enters the bloodstream. The role of these bacteria in the sulfur cycle is not typically significant.

E. Staphylococcus aureus is a gram-positive bacterium that is not involved in the sulfur cycle. It is known for its virulence and ability to cause a wide range of infections.

114. A four-year-old boy was brought to hospital for weak bones in spite of sufficient intake of calcium in his diet. The attending doctor examined the functioning of the following organs:
A. Liver
B. Kidney
C. Pancreas
D. Pancreas
Which one of the following options represents a combination of probable malfunctioning organ?
1. A and B
2. B and C
3. C and D
4. A and D

115. The oxygen-haemoglobin dissociation curve illustrates the relationship between pO₂ in blood and the number of O₂ molecules bound to haemoglobin. The "S" shape of the curve has been explained in the following proposed statements:
A. The quaternary structure of haemoglobin determines its affinity to O₂.
B. In deoxygenated haemoglobin, the globin units are highly bound in a T-configuration.
C. The interactions between globin subunits are altered when O₂ binds with deoxyhaemoglobin.
D. The affinity to O₂ in T-configuration of haemoglobin is increased.
E. In the relaxed configuration of haemoglobin, the affinity to O₂ is reduced.
Choose one of the following combinations which both INCORRECT statements:
1. A and B
2. B and C
3. A and D
4. B and E

116. Which one of the following statements is INCORRECT?
A. Methanotrophs, like methanogens, are anaerobic bacteria that thrive in environments with low oxygen availability. They play a crucial role in the sulfur cycle, converting sulfur compounds into usable forms for plants. The role of methanotrophs in this cycle is essential for maintaining the balance of elements in ecosystems.
B. Methanotrophs, like methanogens, are anaerobic bacteria that thrive in environments with low oxygen availability. They play a crucial role in the sulfur cycle, converting sulfur compounds into usable forms for plants. The role of methanotrophs in this cycle is essential for maintaining the balance of elements in ecosystems.
C. Staphylococcus aureus and E. coli are both gram-positive bacteria. S. aureus is known to cause a wide range of infections, including skin infections, pneumonia, and bloodstream infections. E. coli is a common gut bacteria that can cause diarrhea and other infections when it enters the bloodstream. The role of these bacteria in the sulfur cycle is not typically significant.
D. E. coli is not a sulfur cycle bacterium. It is a common gut bacteria that can cause diarrhea and other infections when it enters the bloodstream. The role of these bacteria in the sulfur cycle is not typically significant.
E. Staphylococcus aureus is a gram-positive bacterium that is not involved in the sulfur cycle. It is known for its virulence and ability to cause a wide range of infections.

3-B-H
112. The changes in left atrial, left ventricular and aortic pressure in a cardiac cycle are shown below in the figure:

Given below are the events of cardiac cycle (column A) associated with marked points (A, B, C, D) in the figure (column B).

<table>
<thead>
<tr>
<th>Column A</th>
<th>Column B</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. Aortic valve open</td>
<td>i (I)</td>
</tr>
<tr>
<td>b. Mitral valve closed</td>
<td>ii (II)</td>
</tr>
<tr>
<td>c. Aortic valve closed</td>
<td>iii (III)</td>
</tr>
<tr>
<td>d. Mitral valve open</td>
<td>iv (IV)</td>
</tr>
</tbody>
</table>

Choose the option that matches the events with marked points in the figure:
1. a (i), b (ii), c (iii), d (iv)
2. a (i), b (ii), c (iii), d (iv)
3. a (i), b (ii), c (iii), d (iv)
4. a (i), b (ii), c (iii), d (iv)

113. A person recovered from a moderate degree of hemorrhagic shock. The participating physiological mechanisms in this recovery process are proposed in the following statements:

A. The decrease in arterial pressure after hemorrhage causes inhibition of sympathetic-vasoconstrictor system.
B. After hemorrhage, the angiotensin II level in blood is increased which causes increased re-absorption of Na+ in renal tubules.
C. The increased secretion of vasopressin after hemorrhage causes water retention by the kidneys.
D. After hemorrhage, the reduced secretion of epinephrine and nor-epinephrine from adrenal medulla induces decreased peripheral resistance.
B. In hemorrhage, the central nervous system ischemic response elicits sympathetic inhibition.
Choose one of the following combinations with both the correct statements:

114. A healthy individual was immersed in water up to neck in an upright posture for 3 h. The plasma concentration of atrial natriuretic peptide (ANP), renin, and aldosterone were measured for 5 h at 1 h intervals including the immersion period. The results are graphically presented below.

The results of this experimental condition (EC) are explained in the following proposed statements which may be correct or incorrect.
A. ANP secretion is proportional to the degree of stretch of atria.
B. The decreased plasma renin concentration in EC is due to increased sympathetic activity.
C. The decreased aldosterone level in EC is the effect of plasma renin level.
D. The effect of gravity on the circulation is counteracted in EC.
E. The central venous pressure is decreased in EC.
Choose one of the following combinations with all correct statements:

115. कई उल्लेखित (1-4) केदार तौर पर गले ही स्थिति के लिए भाषिकीय उदाहरण होती है। उदाहरण के लिए उदाहरण ई में उदाहरण होती है। उदाहरण के लिए उदाहरण ई में उदाहरण होती है। उदाहरण के लिए उदाहरण ई में उदाहरण होती है। उदाहरण के लिए उदाहरण ई में उदाहरण होती है। उदाहरण के लिए उदाहरण ई में उदाहरण होती है।
Several mutants (1-4) are listed, all of which require compound E for growth. The compounds A to D in the biotransformation pathway to E are known, but their order in the pathway is not known. Each compound is tested for its ability to support the growth of each mutant (1-4). In the following table, a plus sign indicates growth and a minus sign indicates no growth.

<table>
<thead>
<tr>
<th>Mutant</th>
<th>Medium supplemented with compound</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>A</td>
</tr>
<tr>
<td>1</td>
<td>-</td>
</tr>
<tr>
<td>2</td>
<td>-</td>
</tr>
<tr>
<td>3</td>
<td>-</td>
</tr>
<tr>
<td>4</td>
<td>-</td>
</tr>
</tbody>
</table>

What is the order of the compounds (A to E) in the pathway?
1. E → D → C → B → A
2. A → C → D → B → E
3. E → B → D → C → A
4. A → B → C → D → E

116. Following is the picture of an inversion hetero-zigote undergoing a single crossing-over event.
The following statements are given towards explaining the consequences at the end of meiosis:

A. The resultant two chromosomes will have deletions and duplications.
B. A dicentric and anacentric chromosome will be formed.
C. The inversion does not allow crossing over to occur, so even if a crossing over is initiated, it will fail to occur.
D. The crossing over is considered suppressed by inversion as the acentric chromosome will survive.

Which combination of statements is correct?
1. B and E
2. A and C
3. B, D and F
4. A, E and F

1.17. Polymorphic DNA sequences are used for molecular identification. Short tandem repeats (STRs) and Single Nucleotide Polymorphisms (SNPs) are used as polymorphic markers. The Table below summarizes the status of autosomal SNP, autosomal STR, mitochondrial SNP, Y-linked STR for four individuals related to each other, representing parents and their two children.

<table>
<thead>
<tr>
<th>Individual</th>
<th>SNP</th>
<th>STR</th>
<th>SNP1</th>
<th>SNP2</th>
<th>STR</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>C/C</td>
<td>13/13</td>
<td>C</td>
<td>G</td>
<td>13</td>
</tr>
<tr>
<td>B</td>
<td>C/G</td>
<td>13/13</td>
<td>C</td>
<td>A</td>
<td>13</td>
</tr>
<tr>
<td>C</td>
<td>C/G</td>
<td>14/14</td>
<td>C</td>
<td>A</td>
<td>-</td>
</tr>
<tr>
<td>D</td>
<td>C/C</td>
<td>15/14</td>
<td>C</td>
<td>A</td>
<td>-</td>
</tr>
</tbody>
</table>

Based on the above data, identify the individuals representing the two parents.
1. Individuals A and D
2. Individuals A and C
3. Individuals B and C
4. Individuals C and D

1.18. Among the autosomal recessive conditions, a probable cause of death is known to be the perinatal death. This condition has been found to be associated with a specific chromosome abnormality. Which of the following statements is correct?

- C
- D
- E
- F

1.19. A newborn is affected with a condition affecting 1 in 10,000 newborns in a random mating population without any disruptive acting force. What is the approximate expected frequency of carriers in this population?
1. 1 in 1000 newborns
2. 1 in 500 newborns
3. 1 in 100 newborns
4. 1 in 50 newborns

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1. 1 in 1000 newborns
2. 1 in 500 newborns
3. 1 in 100 newborns
4. 1 in 50 newborns
119. An alphabetical list of tropical rainforest mammals from South America and Africa is given below:

South America  Africa

A. Agouti  A. Brazilian Potoo
B. Giant Armadillo  B. Chipmunk
C. Pangolin  C. Chevrotain
D. Three toed sloth  D. Royal Antelope

1. I-A; II-G; III-C; iv-B
2. I-A; ii-G; iii-D; iv-B
3. I-A; II-B; III-D; iv-C
4. I-D; ii-G; III-B; iv-A

Pale the species in the list to demonstrate the concept of convergent evolution between the two continents.

120. A study tested the importance of learning mechanisms in the development of anti-predator escape responses in tadpoles of a frog species. Tadpoles hatched from eggs in the lab were kept individually either with predator chemical cues (PRIOR EXPOSURE) or without predator chemical cues (NAIVE) for 1 week. These individuals were tested for their
escape response when exposed to a live predator. They were tested either alone or together with 3 older experienced tadpoles. The graph below shows the escape response of the test individuals in the four different treatments.

Some of the inferences drawn are given below:
A. Prior exposure to predator cues is necessary for the development of escape response.
B. Prior exposure to predator cues positively influences the development of escape response.
C. The presence of older experienced individuals is necessary for the development of escape response.
D. The presence of older experienced individuals positively influences the development of escape response.
E. An individual with prior exposure and with older experienced individuals showed the strongest escape response.

Which one of the following combinations of statements represents the correct inference from the experiment?
1. A and C
2. B and D
3. A, C, and E
4. A, B, C, and E

12.1. Beak shape in birds has evolved in response to their diet. The table listing bird species and food type is given below:

<table>
<thead>
<tr>
<th>BIRD SPECIES</th>
<th>FOOD TYPE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Barn swallow</td>
<td>A: Fruits</td>
</tr>
<tr>
<td>Great hornbill</td>
<td>B: Insects</td>
</tr>
<tr>
<td>House sparrow</td>
<td>C: Nectar</td>
</tr>
<tr>
<td>Purple sunbird</td>
<td>D: Seeds</td>
</tr>
</tbody>
</table>

Match the bird species shown above to their main food resources.
1. i-B; ii-D; iii-C; iv-B
2. i-B; ii-D; iii-A; iv-C
3. i-C; ii-D; iii-A; iv-B
4. i-B; ii-A; iii-D; iv-C

12.2. Vincristine and vinblastine are two potent antitumour agents. They are synthesized from T-DNA of Streptomyces griseus. The sequence of steps in their synthesis is:
A. VDE
B. VIG
C. VIB
D. VDI

Which is the correct sequence of events (from first to last)?
1. A-B-D-C
2. B-C-A-D
3. C-A-D-B
4. D-A-C-B

12.3. The Assad experiment on Agrobacterium-mediated transfer of T-DNA into plant cells revealed:
A. Production of single-stranded T-DNA by VirD1 and VirD2 proteins.
B. Interaction of VirE2 with VirE1 and VirE3.
C. Use of VirB/VirD4 type IV secretion system.
D. Activation of VirA-VirG complex.

The correct sequence of events (from earliest to latest) is:
1. A-B-C-D
2. B-C-A-D
3. C-A-B-D
4. D-A-C-B
123. The table given below provides a list of groups of Arthropods (A-D) and some features (I-v).

| A. Onychophorans | (I) | includes insects |
| B. Trilobites | (II) | have cephalothorax and often pleon-like appendages |

124. The correct match between the arthropod groups with these features?

- A - (iv); B - (ii); C - (i); D - (v)
- A - (i); B - (ii); C - (iv); D - (iii)
- A - (iii); B - (iv); C - (ii); D - (i)
- A - (iv); B - (iii); C - (v); D - (ii)

Which one of the following options represents the correct match between the arthropod groups with those features?

- 1. A - (iv); B - (ii); C - (i); D - (v)
- 2. A - (i); B - (ii); C - (iv); D - (iii)
- 3. A - (iii); B - (iv); C - (ii); D - (i)
- 4. A - (iv); B - (iii); C - (v); D - (ii)
124. In the following table, a list of threat categories and animals of India is given in an alphabetical order:

<table>
<thead>
<tr>
<th>Animals</th>
<th>Threat category</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bengal Floridan</td>
<td>Critically endangered</td>
</tr>
<tr>
<td>Ganges River Dolphin</td>
<td>Endangered</td>
</tr>
<tr>
<td>Indian Rhinoceros</td>
<td>Vulnerable</td>
</tr>
<tr>
<td>Indian Vulture</td>
<td></td>
</tr>
</tbody>
</table>

Which of the following sections show correct combinations of animals and their threat category as per Red Data List of IUCN?

1. i – A; ii – B; iii – C
2. i – A; ii – C; iii – B; iv – A
3. i – B; ii – C; iii – B; iv – A
4. i – C; ii – A; iii – B; iv – B

125. Following table shows presence (+) and absence (−) of selected distinguishing characters of different plant taxa:

<table>
<thead>
<tr>
<th>Taxon</th>
<th>Xylem and Palisade</th>
<th>Wood</th>
<th>Flowers</th>
<th>Seeds</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>+</td>
<td>−</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>B</td>
<td>+</td>
<td>−</td>
<td>+</td>
<td>−</td>
</tr>
<tr>
<td>C</td>
<td>+</td>
<td>+</td>
<td>−</td>
<td>−</td>
</tr>
<tr>
<td>D</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>−</td>
</tr>
</tbody>
</table>

Based on the above, which of the following shows correct hierarchy of taxa A, B, C and D?

1. A – Hornworts; B – Oaks; C – Ferns; D – Pines
2. A – Ferns; B – Oaks; C – Hornworts; D – Pines
3. A – Hornworts; B – Pines; C – Ferns; D – Oaks
4. A – Ferns; B – Pines; C – Hornworts; D – Oaks

126. Following table shows an alphabetical list of certain domesticated crops and places of origin:

<table>
<thead>
<tr>
<th>State</th>
<th>Crop</th>
<th>Origin</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Wheat</td>
<td>India</td>
</tr>
<tr>
<td>B</td>
<td>Rice</td>
<td>India</td>
</tr>
<tr>
<td>C</td>
<td>Potato</td>
<td>South Asia</td>
</tr>
<tr>
<td>D</td>
<td>Tomato</td>
<td>South Asia</td>
</tr>
<tr>
<td>E</td>
<td>Jute</td>
<td>India</td>
</tr>
</tbody>
</table>

Based on the above, which of the following shows correct state of crop origin?

1. i – C; ii – D; iii – A; iv – B; v – B
2. i – B; ii – D; iii – A; iv – C; v – B
3. i – C; ii – D; iii – B; iv – A; v – B
4. i – B; ii – D; iii – C; iv – A; v – B

3-B-H
127. A list of floral formulae and plant families are given in the following table:

<table>
<thead>
<tr>
<th>Floral Formula</th>
<th>Family</th>
</tr>
</thead>
<tbody>
<tr>
<td>D</td>
<td>Bromeliaceae</td>
</tr>
<tr>
<td>G</td>
<td>Papilionaceae</td>
</tr>
<tr>
<td>C</td>
<td>Cactaceae</td>
</tr>
<tr>
<td>A</td>
<td>Solanaceae</td>
</tr>
<tr>
<td>B</td>
<td>Leguminosae</td>
</tr>
</tbody>
</table>

Which of the following options most appropriately matches given plant families with their representative floral formulae?

1. D; B; A; C; iv; C; iv; A
2. D; C; A; B; iv; C; iv; D
3. D; C; B; A; iv; B; iv; A
4. D; C; C; iii; B; iv; D

3-B-H

128. The seed of a cucumber plant contains 10 seeds. If one seed contains 10 parts, which of the following options correctly represents the parts of a cucumber seed?

A. Outer coat,里面的子叶,胚芽,胚根,胚柄
B. Outer coat,里面的子叶,胚芽,胚根,胚柄
C. Outer coat,里面的子叶,胚芽,胚根,胚柄
D. Outer coat,里面的子叶,胚芽,胚根,胚柄

Based on the above, which one of the following options represent the correct match between crops and their place of origin?

<table>
<thead>
<tr>
<th>Crop</th>
<th>Place of origin</th>
</tr>
</thead>
<tbody>
<tr>
<td>Durley</td>
<td>China</td>
</tr>
<tr>
<td>Maize</td>
<td>Peru/Crescent</td>
</tr>
<tr>
<td>Mung Bean</td>
<td>India</td>
</tr>
<tr>
<td>Rice</td>
<td>Southern Mexico</td>
</tr>
<tr>
<td>Wheat</td>
<td></td>
</tr>
</tbody>
</table>

127. A list of floral formulae and plant families are given in the following table:

<table>
<thead>
<tr>
<th>Floral Formula</th>
<th>Family</th>
</tr>
</thead>
<tbody>
<tr>
<td>D</td>
<td>Bromeliaceae</td>
</tr>
<tr>
<td>G</td>
<td>Papilionaceae</td>
</tr>
<tr>
<td>C</td>
<td>Cactaceae</td>
</tr>
<tr>
<td>A</td>
<td>Solanaceae</td>
</tr>
<tr>
<td>B</td>
<td>Leguminosae</td>
</tr>
</tbody>
</table>

Which of the following options most appropriately matches given plant families with their representative floral formulae?

1. D; B; A; C; iv; C; iv; A
2. D; C; A; B; iv; C; iv; D
3. D; C; B; A; iv; B; iv; A
4. D; C; C; iii; B; iv; D

3-B-H
128. Grasland plots with varying number of grass species were cultivated for 10 years. At the end of the experiment, total plant cover was measured. Soil nitrogen was also measured to assess its utilization by plants. The relationships are shown in the following plots.

Which one of the following inferences can be drawn from the above experiment?
1. Grasses in plots with lower species richness enriched soil nitrogen, thereby increasing the plant cover.
2. Plots with greater species richness showed greater stability and more efficient soil nitrogen utilization.
3. Plots with greater species richness utilized nitrogen more efficiently, but would not show increased net primary production.
4. No correlation can be drawn between species richness, community productivity, and nitrogen utilization.

129. Complete the following sentence with the most appropriate option.
Global analysis of a large number of plant species traits showed that with increase in leaf lifespan
1. specific leaf area increases whereas leaf nitrogen and net photosynthesis rate decrease.
2. specific leaf area, leaf nitrogen and net photosynthesis rate increase.
3. specific leaf area, leaf nitrogen and net photosynthesis rate decrease.
4. specific leaf area decreases whereas leaf nitrogen and net photosynthesis rate increase.

130. एक कृषि भूमि में अन्दरूनी चेतावनी के अनुसार उद्योगों के साथ अभिलेखित रिपोर्ट का रूपांतरण के रूप में व्यवस्थित किया जा सकता है। अन्दरूनी एवं व्यवस्थित के दृश्य के रूप में उपयोगणित उपयोगी यथास्थिति के साथ व्यवस्थित के रूप में व्यवस्थित के रूप में व्यवस्थित के रूप में व्यवस्थित के रूप में व्यवस्थित के रूप में व्यवस्थित के रूप में व्यवस्थित के रूप में व्यवस्थित के रूप में व्यवस्थित के रूप में व्यवस्थित के रूप में व्यवस्थित के रूप में व्यवस्थित के रूप में व्यवस्थित के रूप में व्यवस्थित के रूप में व्यवस्थित के रूप में व्यवस्थित के रूप में व्यवस्थित के रूप में व्यवस्थित के रूप में
130. Forest fragments in an agricultural landscape can be viewed as islands of habitat in an ocean of non-habitat. MacArthur and Wilson’s island biogeography model can be used to predict patterns of species richness in these forest fragments which are represented in the graphs below.

Which one of the following combinations of the graphs correctly represents predictions from the model?
1. A and C
2. A and D
3. B and C
4. B and D

131. In order to estimate population size of a fish species in a lake, a researcher captures 100 fish from the lake and marks them with coloured tags. A week later, the researcher returns to the lake and catches 150 fish of the same species and finds that 25 of them are previously tagged ones. Assuming no immigration or emigration occurred, the total population size of the fish species in the lake will be:
1. 17
2. 38
3. 600
4. 860

132. The following diagram represents the interdependencies among various species in an ecosystem. Which of the following statements is true?
1. A, B and C are all predators.
2. B and C are herbivores.
3. A is a detritivore.
4. B is a primary consumer.

3-3H
627 CISN/18-3BH-4A
132. Given below is a graphical representation of plant life histories based on Grime’s model in which stress, disturbance and competition are the important factors.

Which of the following options correctly represents A, B and C, respectively in the figure above?
1. perennial herbs, trees and shrubs, annual plants.
2. annual plants, perennial herbs, trees and shrubs.
3. annual plants, trees and shrubs, perennial herbs.
4. trees and shrubs, perennial herbs, annual plants.

133. निम्नलिखित प्राविष्टाने रेखांकित A, B, C तथा D के विवेचनात्मक रूप में होते हैं:

134. एकसमय असुरक्षित A, B, C, D का उपयोग तीव्रि आकड़ा का टेक्ट करने के लिए किया गया। अनुपातिक तुलना में जीविक आकड़ा के स्तर में परिवर्तन की गई आकड़ा गया। एक ऐसा अनुपातिक के तीव्रि आकड़ा को प्रदर्शित करता है एवं इसने वह उपयोगित असुरक्षित असुरक्षित के जीविक आकड़ा को।

135. निम्नलिखित तालिका आकड़ा अर्थक रूप से नीतिविद्या है?

1. A तथा D प्राविष्टिक
2. तथा A प्राविष्टिक
3. तथा D प्राविष्टिक
4. तथा C प्राविष्टिक
134. Four drugs (A,B,C,D) were used to disrupt a biological rhythm in experimental animals. The changes in the pattern of the biological rhythm as compared to untreated are shown below. The solid line represents the biological rhythm of the untreated and broken line represents that of the treated animal.

Which of the following interpretations from the above experiment is INCORRECT?
1. Drug A can be used to reduce the period length of the rhythm.
2. Drug B can be used for sustained lowering of amplitude of the rhythm without changing its period.
3. Drug C can be used for sustained lowering of amplitude and period of the rhythm.
4. Drug D can be used to reduce the robustness and dampen out the rhythm.

135. The phylogenetic tree below shows evolutionary relationships among 8 species. Males of these species are either blue (b) or red (r) in colour, the colour being indicated next to each species name.

Based on the principle of parsimony, which of the following statements best represents the evolution of male body colour in this set of species?
1. The most recent common ancestor of all 8 species was blue; red evolved independently 4 times.
2. The most recent common ancestor of all 8 species was blue; red evolved independently 4 times.
3. The most recent common ancestor of all 8 species was red; blue evolved independently 3 times.
4. The most recent common ancestor of all 8 species was red; blue evolved independently 2 times.
Three proteins, Blm 1, Blm 2, and Blm 3 were shown to be involved in repair of DNA double strand breaks. A chromatin immunoprecipitation experiment was performed for the three proteins. The pattern of results obtained is shown below:

Based on the above figure, choose the option that correctly interprets the data.

1. Blm 1, Blm 2, Blm 3 bind to DNA break sites
2. Blm 1 binds to the break site; Blm 3 binds to the break site and beyond
3. Blm 2 remains bound to DNA after the break is induced
4. Blm 3 binds to DNA irrespective of the break

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Based on the above figure, choose the option that correctly interprets the data.

1. Blm 1, Blm 2, Blm 3 bind to DNA break sites
2. Blm 1 binds to the break site; Blm 3 binds to the break site and beyond
3. Blm 2 remains bound to DNA after the break is induced
4. Blm 3 binds to DNA irrespective of the break

The most important property of any microscope is its resolution (D). Which one of the following wavelengths (nm) would be used to achieve the best resolution using a light microscope with lenses having numerical aperture (NA) of 1.4?

1. 450
2. 480
3. 560
4. 700

A 800 MHz FT-BNC was used to acquire a 20-residue peptide by variable-temperature NMR spectroscopy. Which of the following combinations is correct?

1. 1H NMR, 15N-NOE, 1H, 15N-NOE
2. 1H NMR, 15N-NOE, 1H, 15N-NOE
3. 1H NMR, 15N-NOE, 1H, 15N-NOE
4. 1H NMR, 15N-NOE, 1H, 15N-NOE

Detailed NMR spectra of a 20-residue peptide were recorded using a 600 MHz instrument. If the peptide adopts an α-helical conformation, which one of the following statements is correct?
139. Given below are names of statistical distribution (Column I) and their characteristic features (Column II).

<table>
<thead>
<tr>
<th>Column I</th>
<th>Column II</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. Binomial distribution</td>
<td>(i) Each observation represents one of two outcomes (success or failure)</td>
</tr>
<tr>
<td>B. Poisson distribution</td>
<td>(ii) Probability distribution that is symmetric about the mean</td>
</tr>
</tbody>
</table>

140. Highly purified peptides P1, P2 and P3 were subjected to MALDI mass spectral analysis. The following observations were made:

P1: Showed a m/z of 16 more than the expected value.
142. Consider the following sequence of events in a bacterial cell: 

1. The bacteria are exposed to a toxic antibiotic, killing a large number of cells. 
2. A few resistant mutants survive. 
3. The resistant mutants are isolated and analyzed. 
4. It is observed that the resistant mutants have a mutation in the gene encoding the target of the antibiotic. 
5. The gene is cloned and expressed in a yeast system. 
6. The yeast cells are exposed to the antibiotic. 
7. The yeast cells produce a protein that has resistance to the antibiotic. 
8. The protein is purified and its structure is determined. 
9. It is found that the protein has a modified target site that is not sensitive to the antibiotic. 

Which statement is true about the resistant mutants? 

A) The resistant mutants were exposed to a different antibiotic. 
B) The resistant mutants had a frameshift mutation in the target gene. 
C) The resistant mutants had a point mutation that altered the target site. 
D) The resistant mutants had a deletion in the target gene. 

3-6-11
Which one of the following options represents a correct combination of terms in Column A and Column B?

1. A; C; D; B
2. A; B; C; D
3. A; C; D; B
4. A; B; C; D

144. In an attempt to increase the yield of a commercially important enzyme from natural isolate, several strategies were adopted as follows:
A. Genome was selectively modified to increase yield.
B. Recombined of culture requirement of the modified organism in increasing yield.
C. Induced mutants were screened and selected for mutation synthesizing improved levels of the enzyme.
D. Organism was genetically modified, so that a product is a factor that enhances stability of the enzyme.

Which one of the following options represents strategies that are appropriate for the purpose?

1. A, B, C and D
2. B and C only
3. A, C and D only
4. A and B only
145. Given below are names of techniques (Column A) and their characteristic features/applications (Column B):

<table>
<thead>
<tr>
<th>Column A</th>
<th>Column B</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. Hybridoma technology</td>
<td>(ii) Separation of proteins according to charge</td>
</tr>
<tr>
<td>B. MALDI-TOF</td>
<td>(iii) Identification of protein complexes in cells</td>
</tr>
<tr>
<td>C. Non-exchange chromatography</td>
<td>(iv) Production of identical antibodies</td>
</tr>
<tr>
<td>D. Co-immunoprecipitation</td>
<td>(v) Determination of molecular weight of proteins and/or peptides</td>
</tr>
</tbody>
</table>

Which one of the following represents a correct match between Column A and Column B:
1. A—(ii); B—(iii); C—(iv); D—(v)
2. A—(iii); B—(iv); C—(i); D—(ii)
3. A—(iv); B—(i); C—(ii); D—(iii)
4. A—(i); B—(iv); C—(i); D—(iii)

4-B-H