

PAPER – III
LIFE SCIENCES

Note : Attempt all the questions. Each question carries *two* (2) marks.

1. What products are obtained when 1-palmityl-2-oleyl-3-phosphatidyl serine is hydrolyzed by a phospholipase A1

- 1) palmitic acid and 2-oleoyl-3-phosphatidyl serine
- 2) oleic acid and 1-palmitoyl – 3- phosphatidyl serine
- 3) phosphoserine and 1-palmitoyl – 2 – oleoyl – glycerol
- 4) serine and 1-palmitoyl – 2 – oleoyl – phosphatic acid

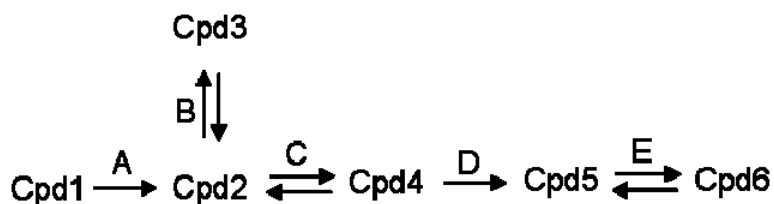
2. The empirical formula of thiamine is

- | | |
|--|--|
| 1) C ₁₂ H ₄ N ₁₇ OS | 2) C ₁₂ H ₁₇ N ₄ OS |
| 3) C ₁₇ H ₁₂ N ₄ OS | 4) C ₄ H ₁₇ N ₁₂ OS |

3. Estimate the volume of a solution of 5 M NaOH that must be added to adjust the pH from 4 to 9 in 100 mL of a 100 mM solution of phosphoric acid

- | | |
|---------|-----------|
| 1) 4 mL | 2) 2 mL |
| 3) 1 mL | 4) 0.5 mL |

4. In the reaction sequence below the best point for controlling production of compound 6 is



- | | |
|------|------|
| 1) A | 2) B |
| 3) C | 4) D |

5. Which of the following polypeptide is most likely to form an α helix?
- | | |
|------------------|------------------|
| 1) CRAGNRKIVLETY | 2) SEDNFGAPKSILW |
| 3) QKASVEMAVRNSG | 4) CREDNFGKIVLET |
6. If a cell require more NADPH than ribose – 5 – phosphate
- 1) only the first phase of the pentose phosphate pathway would occur
 - 2) glycolytic intermediates would flow into the reversible phase of the pentose phosphate pathway
 - 3) there would be sugar conversions but no net release of carbons from glucose – 6 – phosphate
 - 4) the equivalent of the carbon atoms of glucose -6 – phosphate would be released as 6 CO₂
7. In the *de-novo* synthesis of pyrimidine nucleotides
- 1) a reaction take place exclusively in the cytosol
 - 2) a free base is formed as an intermediate
 - 3) PRPP is required in the rate limiting step
 - 4) UMP and CMP are formed from a common intermediate
8. Which of the following statements regarding Na⁺–K⁺– ATPase is correct?
- 1) It exchanges extracellular Na⁺ for intracellular K⁺.
 - 2) It is an ion channel.
 - 3) It is important for maintaining a constant cell volume.
 - 4) It is not energy regulated.
9. Which of the following statements on Endoplasmic Reticulum is incorrect?
- 1) The ER is the main component of the endomembrane system
 - 2) When misfolded or unfolded proteins accumulate in the lumen of the RER, a signalling mechanism known as Unfolded Protein Response is activated
 - 3) The sarcoplasmic reticulum is a specialized type of SER that regulates the potassium ion concentration of striated muscle cells
 - 4) The SER is involved in the synthesis of lipids

10. C-value paradox is
- 1) the order of the genes on the chromosome
 - 2) similarity in the organization of genes within the genome
 - 3) the lack of a direct relationship between genome size and organism complexity
 - 4) single-copy DNA
11. The G₂/M checkpoint is where
- 1) the cell ensures that it has enough cytoplasm and phospholipids for two daughter cells
 - 2) the cell checks whether it has enough raw materials to fully replicate its DNA
 - 3) the cell ensures that the spindle has formed
 - 4) the cell checks if all the chromosomes are aligned at the spindle equator
12. What properties are not expected to be significantly different between hot-spring bacteria that live at 120°C and regular intestinal *E.coli*?
- A. Number of cysteines in the proteins
 - B. Number of methionine in the proteins
 - C. Molecular weight of the proteins
 - D. Richness of saturated fatty acids in plasma membrane
- 1) A and B
 - 2) B and C
 - 3) C and D
 - 4) A and D
13. Will a ¹⁵N – labelled circle replicating in ¹⁴N medium using the rolling circle mode ever achieve the density of ¹⁴N¹⁴N DNA?
- 1) yes
 - 2) no
 - 3) partially
 - 4) very lightly
14. Write down the two RNA sequences which could conceivably result from complete transcription of a DNA molecule that has the following sequence in one of the strands 5'-AGCTGCAATG-3'. Indicate the 5' and 3' end of each transcript.
- 1) 5' – AGCUGCAAUG – 3' and 5' – CAUUGCAGU – 3'
 - 2) 5' – AGACCGAGUC – 3' and 5' – CAUUGCAGU – 3'
 - 3) 5' – AGCUGCAAUG – 3' and 5' – ACGGUUAGU – 3'
 - 4) 5' – AGACCGAGUC – 3' and 5' – ACGGUUAGU – 3'

15. Match the allowed pairing according to the Wobble hypothesis

| | Codon Base | Anticodon Base |
|------|------------|----------------|
| I. | A | U, I |
| II. | G | C, U |
| III. | U | G, I |
| IV. | C | C, I |

Which one of the following is true?

- 1) I, II, III are correct IV is incorrect
 - 2) II, III, IV are correct I is incorrect
 - 3) III, IV, I are correct II is incorrect
 - 4) IV, I, II are correct III is incorrect
16. By performing F' X F' - matings, partial diploids having the genotypes F' lac⁻/lac⁺ or F' lac⁺/lac⁻ were constructed. When these partial diploids were tested for the Lac⁺ Phenotype, it was found that all of the mutants initially isolated could be placed into two groups. What are the two groups;
- 1) lacZ mutants and lac γ mutants
 - 2) lacA mutants and lac B mutants
 - 3) lacE mutants and lac B mutants
 - 4) lacA mutants and lac Z mutants

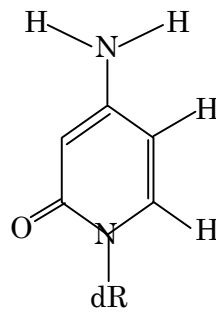
17. Match the concentrations of cyclic AMP in cells growing in media having the indicated carbon sources

| | Carbon source | Concentrations |
|------|--------------------|----------------|
| I. | Glucose | Low |
| II. | Glycerol | High |
| III. | Lactose | High |
| IV. | Lactose + Glucose | High |
| V. | Lactose + Glycerol | Low |

Which concentration is true?

- 1) I, II, III are correct IV, V are incorrect
- 2) I, IV, V are correct II, III are incorrect
- 3) II, III, IV are correct I, V are incorrect
- 4) III, IV, V correct I, II are incorrect

18. Name the following structure



- | | |
|--------------------|-----------------------------|
| 1) Deoxycytidine | 2) 5-methyl – Deoxycytidine |
| 3) heterochromatin | 4) Deoxy uridine |
19. In the exon cassette mode, some exons can be included or excluded independently of other exons, and usually the same reading frame is maintained whether the exon is spliced out or not. This mode was found in the genes for _____.
- | | |
|-------------|-------------|
| 1) N – CAMs | 2) P – CAMs |
| 3) N – CMPs | 4) P – CMPs |
20. *In-situ* DNA nick labeling technique is used to quantitate the fraction of cells in
- | | |
|-----------------------|-------------|
| 1) apoptotic pathways | 2) S phase |
| 3) M phase | 4) G1 phase |
21. HAT medium for hybridoma selection contains
- 1) Hypoxanthine –amylopectin –thymine
 - 2) Hypochloride –aminopterin –thymidine
 - 3) Hypoxanthine-amylopectin –thymidine
 - 4) Hypoxanthine-aminopetrin –thymine
22. The alpha-fetoprotein, the most abundant fetal protein, drops from milligram levels in fetal serum to
- 1) between 5ng/ml and 50 ng/ml after birth
 - 2) between 50 ng/ml and 500 ng/ml after birth
 - 3) between 500 ng/ml and 1000ng/ml after birth
 - 4) none

26. Studying the following events, prescribe the correct sequence of events for fertilization in plants
- anthesis of flower
 - pollen-pistil interactions
 - dehiscence of anther
 - degeneration of synergids
- $A \rightarrow B \rightarrow C \rightarrow D \rightarrow E$
 - $A \rightarrow B \rightarrow D \rightarrow C \rightarrow E$
 - $A \rightarrow D \rightarrow B \rightarrow C \rightarrow E$
 - $A \rightarrow C \rightarrow B \rightarrow D \rightarrow E$
27. Polyspermy, the process where two sperms are likely to fertilize the egg, shall be blocked by
- Electrical impulse mediated by sodium ions
 - Depolarization of the egg membrane
 - Calcium ion mediation
 - Released content of the cortical granule
- A and B correct
 - B and C correct and D is incorrect
 - C is correct while A and D are incorrect
 - D is correct whereas B and C are incorrect
28. Match the types of egg with animal group and find the odd man out
- Microlecithal – Mammal
 - Centrolecithal – Insects
 - Mesolecithal – Birds
 - Teloecithal Amphibians
- A, B and C are correct
 - B is correct and C and D are incorrect
 - C is correct while A and D are incorrect
 - D is correct whereas B and C are incorrect
29. Examine the correct match for the cause and effect pertaining to senescence and aging in plants
- | | | |
|-----------------------------|-------|------------------------------------|
| I. Mineral Deficiency | (i) | Stunted growth and yield reduction |
| II. Persistent Drought | (ii) | Premature fruit drop |
| III. Ultra Violet radiation | (iii) | Chlorosis |
| IV. Fungal infection | (iv) | Wilting of leaves |
- I – ii; II – ii ; III – iii ; IV – iv
 - I – iii; II – iv ; III – i ; IV – ii
 - I – iv; II – iii ; III – i ; IV – ii
 - I – iii; II – i ; III – ii ; IV – iv

30. If a loss of function mutation occurs in B-type genes of Arabidopsis, what will be the composition of the floral whorl

- | | |
|--------------------------------|---------------------------------|
| 1) Sepal-Petal-Stamens- Carpel | 2) Sepal-Sepal- Stamen-Carpel |
| 3) Sepal-Sepal-Carpel-Carpel | 4) Petal –Petal- Stamen- Stamen |

31. Which of the following is the correct pair if you relate Cleavage to the Animal Group

- A. Radial cleavage – Echinoderms
B. Spiral - Annelids
C. Bilateral - Tunicate
D. Rotational cleavage - Mammal
- | | |
|--------------------|--------------------|
| 1) A and B correct | 2) C and D correct |
| 3) B and C correct | 4) All are correct |

32. Study the statements on plant reproduction and match terms in List I with those in List II :

- | List I | List II |
|-----------------------|--|
| I. Filiform apparatus | (i) Transfer of pollen nucleus to the stigma |
| II. Triple fusion | (ii) Seedless fruit formation |
| III. Pollination | (iii) Transfer of pollen nucleus into egg |
| IV. Parthenocarpy | (iv) Fusion of polars with male gamete |
- 1) I –ii; II – ii ; III – iii ; IV – iv
2) I – iii; II – iv ; III – i ; IV – ii
3) I – iv; II – iii ; III – i ; IV – ii
4) I – iii; II – i ; III – ii ; IV – iv

33. What is the correct sequence of formation of the following intermediate compounds in C₄ pathway?

- A. Phosphoenol pyruvate
B. Malic acid
C. Pyruvic acid
D. Oxaloacetic acid
- | | |
|------------------|------------------|
| 1) A → B → C → D | 2) B → D → C → A |
| 3) D → A → B → C | 4) D → B → C → A |

- 34.** Choose the correct pairs from the following :
- | | |
|-----------------------------------|--|
| A. Isocitrate lyase | 1. conversion of amino acid into glucose |
| B. PEP carboxykinase | 2. biotin |
| C. Pyruvate dehydrogenase complex | 3. synthesis of glucose from acetate |
| D. Phosphofructokinase | 4. lipoic acid |
| E. Pyruvate carboxylase | 5. an allosteric enzyme |
- 1) A – 1, B – 2, C – 4, D – 5, E – 3
 2) A – 3, B – 1, C – 4, D – 5, E – 2
 3) A – 3, B – 1, C – 4, D – 2, E – 5
 4) A – 2, B – 5, C – 1, D – 4, E – 3
- 35.** Nitrate reductase is an important enzyme for nitrate assimilation. From the following statements on nitrate reductase choose the correct combination :
- A. Nitrate reductase of higher plants is composed of two identical subunits
 B. One subunit of nitrate reductase contains three prosthetic groups
 C. One of the prosthetic groups attached to both subunits is heme
 D. One of the prosthetic groups complexed with pterin is magnesium
- 1) A, B and C 2) A, C and D
 3) B, C and D 4) A, B and D
- 36.** Consider the following statements on plant growth substances :
- A. Cytokinins make dormant buds active
 B. The richest concentrations of cytokinins generally occur in endosperm
 C. Ethylene is involved in the formation of aerenchyma in submerged roots and stems
 D. Gibberellins are involved in the breaking of seed dormancy
- Which of these statements are correct?
- 1) A, B, C and D 2) B, C and D
 3) A and D 4) A, B and D
- 37.** Consider the following statements on phototropism :
- A. Phototropism is a photomorphogenetic response
 B. PHOT1 and PHOT2 genes mediate phototropism
 C. CRY1 and CRY2 which help to perceive blue light are not involved in phototropism
 D. Perception of blue light by phyA photoreceptor initiates phototropism
- Which one of the following combination of the above statements is correct?
- 1) A, C and D 2) B, C and D
 3) A, B and C 4) A, B and D

38. Phototropism is a photomorphogenetic response about the directional growth toward/away the light. A seedling subjected to directional light stimulus, bends towards the light source because
- flavoproteins namely phototropins are the photoreceptors for the blue-light signalling pathway that trigger the curvature
 - the auxin produced at the tip in response to a directional light stimulus are transported basipetally in a differential amounts more on the shaded side
 - the auxin produced at the tip In response to a directional light stimulus are transported basipetally in a differential amounts more on the illuminated surface
 - the gradient in phototropin phosphorylation induces the degradation of auxin on the illuminated
- A and D
 - Only D
 - Only C
 - B and C
39. The muscles of a professional sprinter are most likely to have _____.
- 80 percent fast-twitch muscle fibers and 20 percent slow-twitch muscle fibers
 - 20 percent fast-twitch muscle fibers and 80 percent slow-twitch muscle fibers
 - 50 percent fast-twitch muscle fibers and 50 percent slow-twitch muscle fibers
 - 40 percent fast-twitch muscle fibers and 60 percent slow-twitch muscle fibers
40. A 45- year-old female with renal failure, missed her dialysis and was feeling sick, what could be the reason?
- Metabolic Acidosis
 - Metabolic Alkalosis
 - Respiratory Acidosis
 - Respiratory Alkalosis
41. Müllerian-Inhibiting hormone serves which of the following functions?
- It inhibits the growth of male genitalia, allowing the development of the Wolffian system in female
 - It inhibits testosterone and estrogen
 - It inhibits the growth of female genitalia, allowing the development of the Wolffian system in males
 - It inhibits the growth of female and male genitalia
42. Father is of blood group O and mother of blood group O. The percentage of children with blood group O would be
- 12.5%
 - 25.0%
 - 50.0%
 - 100%

43. The pairwise map distances for four linked genes are as follows: A-B = 28 m.u., B-C = 15 m.u., C-D = 25 m.u., B-D = 10 m.u., A-D = 38 m.u., A-C = 13 m.u. What is the order of these four genes?
- 1) ABCD
 - 2) ACBD
 - 3) ABDC
 - 4) ADCB
44. In man which of the following genotypes and phenotypes may be correct result of aneuploidy in the sex chromosomes?
- 1) 22 pairs + Y females
 - 2) 22 pairs +XX females
 - 3) 22 pairs +XXY males
 - 4) 22 pairs +XXXY females
45. Systematics is the science of dealing with organism diversity aimed at
- A. discovery, description and interrelation of biological variations
 - B. synthesis of information in the form of predictive classification system
 - C. professional way of grouping and affixing a taxonomic rank to the taxon under study
 - D. naming and classification of life forms
- 1) A, B and C are correct
 - 2) B is correct C and D are incorrect
 - 3) C is correct while A and D are incorrect
 - 4) D is correct whereas B and C are incorrect
46. What is the probable sequences in which the following clades of animals originated, from earliest to most recent?
- A. Tetrapods
 - B. Vertebrates
 - C. Deuterostomes
 - D. Amniotes
 - E. Bilaterians
- 1) E-C-B-D-A
 - 2) E-C-B-A-D
 - 3) E-C-D-B-A
 - 4) C-E-D-B-A

47. Which of the following is the characteristic of allopatric speciation?
- large populations
 - asexually reproducing population
 - geographic isolation
 - small populations
- A, B and C are correct
 - A is correct and C and D are incorrect
 - C is correct while A and D are incorrect
 - D is correct whereas B and C are incorrect
48. Given that a population contains genetic variation, what is could be the correct sequence to influence of natural selection
- Well-adapted individuals leave more offspring than do poorly adapted individuals.
 - The trigger for change is from the environment.
 - Genetic frequencies within the population change.
 - Poorly adapted individuals evince low survivorship.
- B→D→A→C
 - D→B→A→C
 - D→A→B→C
 - D→B→C→A
49. The reason Blue green and Red algae are kept together in algal classification and the red line of evolution is because
- have phycoyanin and phycoerthyrin in common as photosynthetic pigments
 - cyanobacertia lack sexual reproduction and Rhodophyceae shows most complex reproductive patterns
 - BGA exhibit only parasexuality whereas red algae show complex triphasic life cycles
 - both exhibit ability to tolerate the extremes of environment and therefore have relatively less competition in their own given habitats from other taxa
- A, B and C are correct
 - A is incorrect C and D are correct
 - C is correct while A and D are incorrect
 - D is incorrect whereas B and C are correct

50. In the ferns and Pteridophytes the
- A. gametophyte is prominent, and the sporophyte is dependent upon the gametophyte.
 - B. sporophyte is prominent, but the sporophyte and gametophyte live free of each other
 - C. stele and seed have come to stay
 - D. sporophyte is prominent, and the gametophyte is dependent upon the sporophyte
- 1) A, B and C are correct
 - 2) A is incorrect C and D are correct
 - 3) C is correct while A and D are incorrect
 - 4) D is incorrect whereas B and C are correct

51. Hydra is an example for a
- A. single celled animal
 - B. parasitic marine dweller
 - C. organism at tissue level differentiation
 - D. autotrophic organism
- 1) A and B are correct
 - 2) C is correct A and D are incorrect
 - 3) D is correct A and B are incorrect
 - 4) B, C and D are correct

52. Fit the crops to the respective Harlan's center

| LIST 1 | | LIST 2 |
|---|-------|----------------|
| I. Maize, Tomato, Cotton, Avocado, Sweet Potato | (i) | Central Asia |
| II. Common Millet, Buckweed, Alfafa, Grapes, Hemp | (ii) | India |
| III. Oriental Rice, Banana, Sugarcane, Citrus, Tea | (iii) | Southeast Asia |
| IV. Sorghum, Watermelon, Yam, Coffee, Cowpea | (iv) | Mesoamerica |
| V. Pigeon Pea, Egg Plant, Cucumber, Cotton, Sesame | (v) | Africa |

- 1) III – i; II – ii; I – iv; IV – iii; V – v
- 2) V – v; IV – iii; I – ii; III – i; II – iv
- 3) IV – iii; II – ii; III – i; I – iv; V – v
- 4) I – v; II – ii; III – i; IV – iii; V – iv

53. India is known to be land of heritage where public, especially Indian women have shown themselves to be the change agents and custodian of ecological traditions and customs is known from

- A. Chipko Andolan
 - B. Save Silent Valley
 - C. Narmada Bachao Andolan
 - D. Earth summit
- 1) A, B and C are correct
 - 2) A is incorrect C and D are correct
 - 3) C is incorrect while A and D are correct
 - 4) D is incorrect whereas B and C are correct

54. Find out the correct match/es of lakes with their properties

- | | |
|---|----------------------|
| (i) Deep lakes with low supply of nutrients, organic matter and high water transparency | A. Dystrophic lake |
| (ii) Shallow lakes, rich plant and animals, low water transparency | B. Tectonic lake |
| (iii) Bog like, very high BOD, coloured water, abundant blue green algae | C. Oligotrophic lake |
| (iv) Formed by the movement of earth crust | D. Eutrophic lake |
- 1) (i) C, (ii) A, (iii) D, (iv) B
 - 2) (i) C, (ii) D, (iii) A, (iv) B
 - 3) (i) B, (ii) D, (iii) A, (iv) C
 - 4) (i) A, (ii) C, (iii) B, (iv) D

55. Find the correct match of biotic interaction

- | | |
|-----------------------|-------------------------|
| (i) Mutualism | a. Epiphytes |
| (ii) Commensalism | b. Rhizosphere microbes |
| (iii) Amensalism | c. Antibiosis |
| (iv) Protocooperation | d. Mycorrhiza |
- 1) (i) – d; (ii) – a; (iii) – c ; (iv) – b
 - 2) (i) – d; (ii) – c ; (iii) – b ; (iv) – a
 - 3) (i) – b; (ii) – d; (iii) – c ; (iv) – a
 - 4) (i) – b; (ii) – a; (iii) – c ; (iv) – d

56. Choose the correct sequence of process involved in plant succession

- 1) Migration – competition – ecesis – reaction – climax
- 2) Competition – reaction- migration – ecesis – climax
- 3) Ecesis – competition – migration – reaction – climax
- 4) Migration – ecesis – competition – reaction – climax

57. Find the correct match/es of pond flora

- | | |
|----------------|---|
| (i) Planktons | A. Plants or animals attached to surfaces and projecting above the bottom |
| (ii) Neustons | B. Organisms attached to or resting and living in the bottom sediments |
| (iii) Nektons | C. Free floating microorganisms |
| (iv) Benthos | D. Unattached organism on the surface at air water interface |
| (v) Periphyton | E. Large active swimming organisms |

- 1) (i) D, (ii) C, (iii) A, (iv) E, (v) B
- 2) (i) C, (ii) D, (iii) E, (iv) B, (v) A
- 3) (i) B, (ii)D, (iii) E, (iv) A, (v) C
- 4) (i) D, (ii) B, (iii) A, (iv) E, (v) C

58. If a wetland of international importance is brought under the 'Montreux Record', what does it imply?

- 1) Changes in ecological character have occurred, are occurring or are likely to occur in the wetland as a result of human interference
- 2) The country in which the wetland is located should enact a law to prohibit any human activity within five kilometers from the edge of the wetland
- 3) The survival of the wetland depends on the cultural practices and traditions of certain communities living in its vicinity and therefore the cultural diversity therein should not be destroyed
- 4) It is given the status of 'World Heritage Site'

59. The "Red Data Books" published by the International Union for Conservation of Nature and Natural Resources (IUCN) contain lists of
- A. Endemic plant and animal species present in the biodiversity hotspots.
 - B. Threatened plant and animal species.
 - C. Protected sites for conservation of nature and natural resources in various countries.

Select the correct answer :

- 1) A and C
- 2) B only
- 3) B and C
- 4) C only

60. Find the correct match of pair/s

- A. Dampa Tiger Reserve : Mizoram
- B. Gumti Wildlife Sanctuary : Sikkim
- C. Saramati Peak : Nagaland
- D. Kanha Tiger reserve : Assam

- 1) A and D only
- 2) B and C only
- 3) A and C only
- 4) All

61. Find the correct set of matches :

- (i) Convergence
- (ii) Parallelism
- (iii) Homology
- (iv) Analogy
- A. Similarity based on shared genes or developmental pathways
- B. Similarity resulting from shared ancestry
- C. Similarity resulting from evolution in independent lineages
- D. Similarity in function but having different structure

- 1) (i) C, (ii) A, (iii) B, (iv) D
- 2) (i) B, (ii)A , (iii) D, (iv) C
- 3) (i) B, (ii) C, (iii) D, (iv) A
- 4) (i) C,(ii) A, (iii) B, (iv) D

- 62.** Find the correct answer to consider hydrothermal vents as site of origin of biomolecules
- A. Iron pyrite abundant in rocks
- B. Present at the bottom of the ocean and emit superheated fumes with NH_3 , N_2 , etc.
- C. They produce molecules with enzymatic activity
- D. Inorganic and mineral catalysts are present
- 1) A, B and C only 2) A, B and D only
- 3) B, C and D only 4) A, B, C and D
-
- 63.** Choose the correct statement/s on Neo Darwinism
- A. It is a reconciliation of Mendelism and Darwinism
- B. Modern synthesis of evolutionary theory defy Neo Darwinism
- C. Changes in gene frequency within a population under the influence of selection, mutation, genetic drift and gene flow
- D. It is otherwise called Synthetic theory
- 1) A, C and D only 2) B, C and D only
- 3) C and D only 4) A, B, C and D
-
- 64.** Choose the correct set of species concept
- | | |
|---|----------------------------|
| (i) Unites individuals that share more characters with one another | A. Phylo species |
| (ii) Relationship define lineages of organisms | B. Evolutionary species |
| (iii) Inability of individuals in population to inbred with individuals of other population | C. Biological species |
| (iv) Evolutionary isolation from each other using features from all possible means | D. Paleontological species |
| | E. Morphospecies |
- 1) (i) C, (ii) E, (iii) D, (iv) A
- 2) (i) E, (ii) A, (iii) C, (iv) B
- 3) (i) D, (ii) B, (iii) A, (iv) E
- 4) (i) C, (ii) D, (iii) A, (iv) B

65. Find the correct match set of five eukaryote super groups with its illustration

- | | |
|----------------------|--------------------------------|
| (i) Archaeplastida | A. algae, ciliates |
| (ii) Excavata | B. fungi, parasitic protists |
| (iii) Chromalveolata | C. Plantae |
| (iv) Rhizaria | D. Protista |
| (v) Unikonta | E. Heterotrophs, Foraminiferns |

- 1) (i) B, (ii) C, (iii) D, (iv) E, (v) A
- 2) (i) C, (ii) E, (iii) B, (iv) A, (v) D
- 3) (i) C, (ii) D, (iii) A, (iv) E, (v) B
- 4) (i) E, (ii) D, (iii) A, (iv) B, (v) C

66. Find the correct match/es

- | | |
|------------------------|--|
| (i) Paralogues | A. Several tandem duplication of genes with in a species |
| (ii) Orthologues | B. Duplicated gene which is functionless and retained |
| (iii) Multigene family | C. Genes in duplication within a species |
| (iv) Pseudogene | D. Genes shared between species resulting from shared species ancestry |

- 1) (i) C, (ii) A, (iii) D, (iv) B
- 2) (i) D, (ii) C, (iii) B, (iv) A
- 3) (i) C, (ii) D, (iii) A, (iv) B
- 4) (i) D, (ii) A, (iii) C, (iv) B

67. Find the correct set of matches :

- | | |
|--------------------|--|
| (i) Gene pool | A. Population receive alleles from nearby population gene migration |
| (ii) Genetic drift | B. The extent which a population departs from a perfect genetic constitution |
| (iii) Gene flow | C. All members of species and total variation |
| (iv) Genetic load | D. Changes in gene frequencies through mutation and gene flow gives a Directionality |

- 1) (i) C, (ii) A, (iii) B, (iv) D
- 2) (i) C, (ii) B, (iii) A, (iv) D
- 3) (i) B, (ii) C, (iii) D, (iv) A
- 4) (i) D, (ii) A, (iii) B, (iv) C

68. Identify the natural plant growth regulators from the following list
- zeatin
 - Benzylaminopurine (BAP)
 - Indole-3-acetic acid (IAA)
 - 2,4 – Dichlorophenoxy acetic acid
- 1) a and b
 - 2) a and d
 - 3) a and c
 - 4) c and d
69. In phage display, what are the two main reasons for testing fusion of the protein library to different phage coat proteins (pIII and pVIII being the predominant choices)?
- The coat proteins are expressed in different numbers on the surface of phage which allows for some variation in stringency of binding assays
 - The library protein may be secreted to the surface more or less efficiently, depending on the coat protein chosen
 - The different coat proteins are themselves of different size and will have a tolerance level regarding the size of library protein
 - The degree of difficulty in cloning and obtaining fusion constructs varies depending on the chosen coat protein
- 1) Reasons A and B
 - 2) Reasons A and C
 - 3) Reasons B and C
 - 4) Reasons A and D
70. In the creation of a knockout mouse using homologous recombination, a viral thymidine kinase gene is often included in the vector outside of the region of homology between the vector and targeted chromosome. What is the purpose of this?
- 1) To allow negative selection of cells in which integration of the targeting sequence has occurred by homologous recombination.
 - 2) To allow negative selection of cells in which integration of the targeting sequence has occurred by random insertion into the genome.
 - 3) To allow positive selection of cells in which integration of the targeting sequence has occurred by homologous recombination.
 - 4) To allow positive selection of cells in which integration of the targeting sequence has occurred by random insertion into the genome.
71. Yeast Tri-hybrid analysis is used for
- 1) Studying DNA-protein interactions
 - 2) Studying protein-protein interactions
 - 3) Studying RNA-protein interactions
 - 4) Studying post-translational modifications

72. *Agrobacterium tumefaciens* mediated infection of plant cells leads to
- crown gall disease
 - hairy root disease
 - transfer of T-DNA into the plant chromosome
 - transfer of Ri-plasmid into the plant cell
- D only
 - A and C only
 - B and D only
 - A, B and C only
73. A patient presents with symptoms suggestive of autoimmune hemolytic anemia. A direct Coombs test is positive. Which of the following is a correct interpretation of the test?
- The patient has autoantibodies in her serum that are directed against her own red blood cells
 - The patient has anti-Ig antibodies in her serum
 - The patient's red blood cells have autoantibodies bound to the surfaces
 - The patient has complement-fixing autoantibodies bound to her red blood cells
74. A group of investigators has set up a cohort study to investigate whether women who consume a higher amount of red meat in their diet have an increased risk of developing breast cancer. Participating women are asked to complete a food diary for a specific week each year for five years to record their eating habits during that week. At the time of recruitment, women are asked to complete a questionnaire that collects information on several demographic and socioeconomic factors (including age, socioeconomic status and geographic location) as well as known risk factors for cancer (including family history of breast cancer, contraceptive use, parity, and smoking status). Select the true statement
- The investigators chose to perform a cohort study as women's dietary habits are unlikely to change over time
 - The investigators chose to perform a cohort study as this would ensure that a woman's consumption of red meat occurred prior to the development of breast cancer
 - The main exposure of interest in this study is the incidence of breast cancer
 - The main exposure of interest in this study is smoking status
75. Suppose that 100 cattle were allowed to graze in either one of two pastures. If the grass was three times as productive in pasture A as in pasture B, how many cows would you expect in pasture A according to the ideal free distribution?
- 25
 - 33
 - 66
 - 75

ROUGH WORK

ROUGH WORK