DATE : 24/11/2019

PAPER CODE : 24

Aakash
Medical | IIT-JEE | Foundations
(Divisions of Aakash Educational Services Limited)

Regd. Office : Aakash Tower, 8, Pusa Road, New Delhi-110005 | Ph.: 011-47623456

Time : 120 Minutes

Questions & Answers

Max. Marks : 240

for

INDIAN ASSOCIATION OF PHYSICS TEACHERS NATIONAL STANDARD EXAMINATION IN BIOLOGY 2019-20

INSTRUCTIONS TO CANDIDATES :

(i) Question paper has 80 multiple choice questions. Each question has four alternatives, out of which **only one** is correct. Choose the correct alternative and fill the appropriate bubble, as shown.

Q. No. 22 (a) ● (c) (d)

(ii) A correct answer carries 3 marks whereas 1 mark will be deducted for each wrong answer.

(ONLY ONE OUT OF FOUR OPTIONS IS CORRECT)

Choose the correct answer :

1. Mutations in the genome of *E. coli* are introduced at a rate of $1/10^9$ bp per generation. If a scientist starts with a colony of 10^6 cells having 1000 bp DNA, the number of mutant cells observed after two doubling times will be

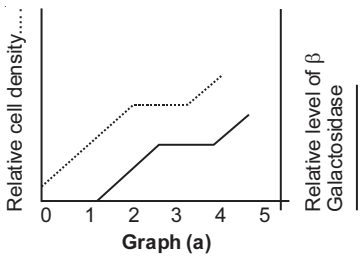
(a) At least 2 (b) Not more than 4

(c) At least 4 (d) 0

Answer (a)

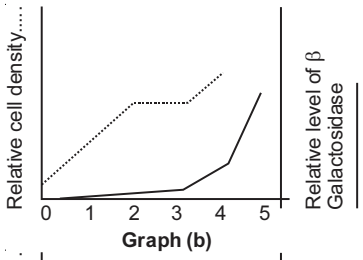
2. *E. coli* can utilize glucose as well as lactose as carbon source for growth and multiplication. Which of the following graphs (a – d) correctly reflect the levels of β-galactosidase, if these organisms is grown in a media containing glucose as well as lcatose?

(a)



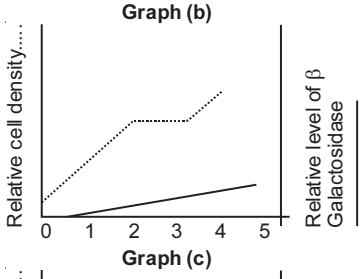
Graph (a)

(b)



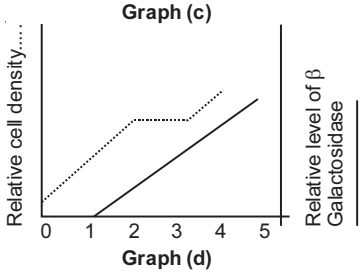
Graph (b)

(c)



Graph (c)

(d)



Graph (d)

Answer (b)

3. If a budding yeast cell is compared to a mitotically dividing cell, the most likely difference observed will be in:

(a) Conventional prophase

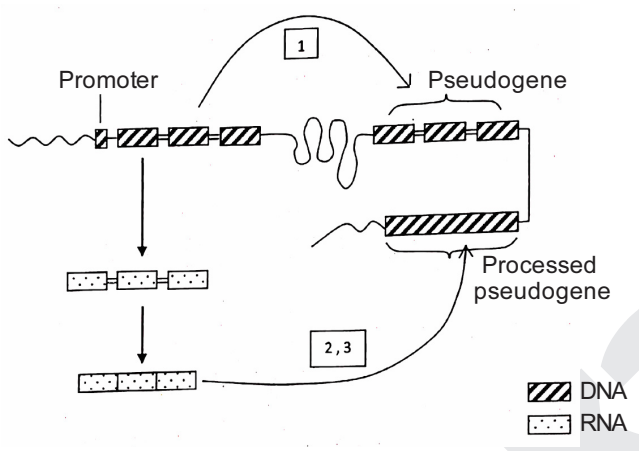
(b) Conventional metaphase

(c) Conventional anaphase

(d) Conventional telophase

Answer (a)

4. There are various ways which can give rise to pseudogenes. A small portion of genomic DNA is shown along with formation of pseudogenes.



The processes 1, 2 & 3 responsible for the formation of pseudogenes respectively could be:

(a) 1 : mutation 2 : duplication 3 : reverse transcription

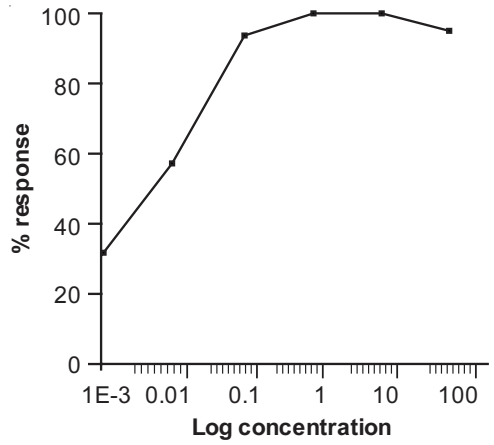
(b) 1 : duplication 2 : mutation 3 : reverse transcription

(c) 1 : reverse transcription 2 : mutation 3 : duplication

(d) 1 : deletion 2 : duplication 3 : mutation

Answer (b)

5. A student wanted to study the effect of caffeine on heart beats of *Daphnia*. Ideally, the experiment should span the entire range of concentrations that produce a response. To determine this, she performed a pilot experiment and the results obtained are shown in the graph.



Based on these results, which of the following would be the most appropriate concentration range for the actual experiment?

(a) Log concentration 0.001 - 0.1

(b) Log concentration 0.001 - 10

(c) Log concentration 0.001 - 1

(d) Log concentration 0.01 - 100

Answer (c)

6. Which of the following strategy will be the most appropriate to grow seedless watermelon?

(a) Growing triploid plant in isolation

(b) Growing diploid plant with polypoid plant in the vicinity

(c) Growing diploid and tetraploid plant in the vicinity

(d) Growing triploid plant with diploid plant in the vicinity

Answer (a)

7. The decreasing order of net primary productivity per unit area per year is:

(a) Estuaries > Savannah > Open ocean

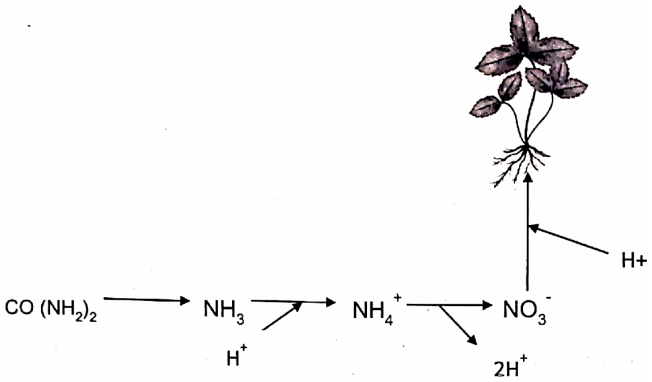
(b) Temperate grassland > Swamp and marshes > Desert shrub

(c) Tropical rain forest > Open ocean > Temperate forest

(d) Savannah > Tundra > Estuaries

Answer (a)

8. Relationship between soil acidity and nitrogen fertilizers is shown in the diagram.



Mark the correct interpretation:

(a) Urea fertlizers will make soil more acidic

(b) Ammonium fertilizers will have no effect on soil acidity

(c) Nitrate fertilizer, if not run off, will make soil alkaline

(d) Applying excess urea to soil will make soil alkaline

Answer (c)

9. Which of the following is/are principal mode/s of information transfer in a cell?

i. Transcription

ii. Translation

iii. Replication

(a) i only (b) i & ii only

(c) ii only (d) i, ii & iiii

Answer (b)

10. Which of the following vitamin protects cell against damage by reactive oxygen species?

(a) Riboflavin (b) Ascorbic acid

(c) Cobalamin (d) Thiamine

Answer (b)

11. Which of the following contains amphipathic molecules that act as detergents dispersing lipids into droplets?

(a) Saliva (b) Lymph

(c) Pancreatic juice (d) Bile

Answer (d)

12. Which part of the cell is in continuity with the nucleus?

(a) Golgi

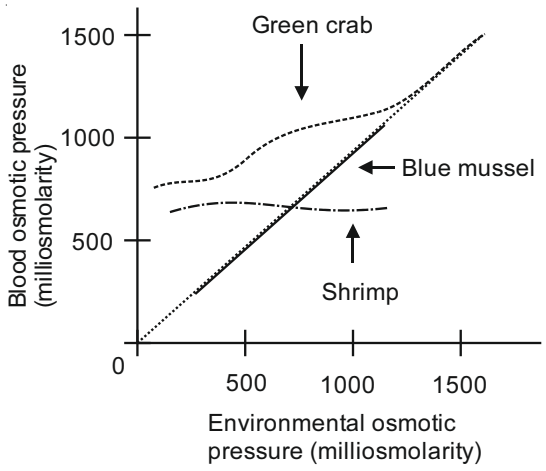
(b) Mitochondria

(c) Endoplasmic reticulum

(d) Cell membrane

Answer (c)

13. Animals exhibit responses that are mixed or intermediate between idealized regulation and idealized conformity. The osmotic pressure of the blood plasma as a function of the environmental osmotic pressure is shown for three species of marine invertebrates, the blue mussel, the green crab and grass shrimp.



(1000 milliosmolarity is the approximate osmotic pressure of full strength sea water) Which of the following statement/s is/are correct?

(i) Mussel is a strict osmotic conformer.

(ii) The crab regulates in water more concentrated than sea water.

(iii) The shrimp regulates over a wide range of environmental pressure.

(iv) Crab is a osmotic conformer at high environmental osmotic pressure.

(a) (ii) and (iii) only

(b) (i), (iii) and (iv) only

(c) (i) and (ii) only

(d) Only (i)

Answer (b)

14. Nisha was observing a pond sample using 15X eyepiece. She measured one of the protist using a micrometer and found it to be approximately 0.2 cm in size under the microscope. Her friend told her that the actual size of this protist is known to be 3μ. Thus Nisha was observing the organism using an objective lens of _____ magnification.

(a) 4X

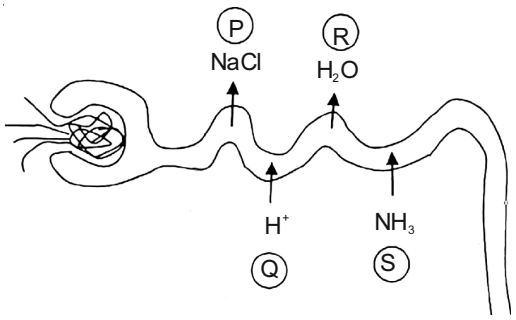
(b) 10X

(c) 45X

(d) 100X

Answer (c)

15. The movement of some solutes across the membrane of the proximal tubule of the kidney is shown below.



The modes of transport of P, Q, R and S respectively would be:

(a) Active, Passive, Active, Passive

(b) Active, Active, Passive, Passive

(c) Active, Passive, Passive, Active

(d) Passive, Passive, Active, Active

Answer (b)

16. Blood Ca^{2+} is maintained at a level of about 10mg/100ml in a normal healthy individual. Which of the following occur when there is a drop in the blood Ca^{2+} level?

i. Stimulation of Ca^{2+} uptake in kidneys

ii. Stimulation of Ca^{2+} uptake in bones

iii. Suppression of parathyroid hormone (PTH) release.

iv. Increase in Ca^{2+} uptake in intestine

v. Vitamin D activation in liver.

(a) (i), (ii) and (iii)

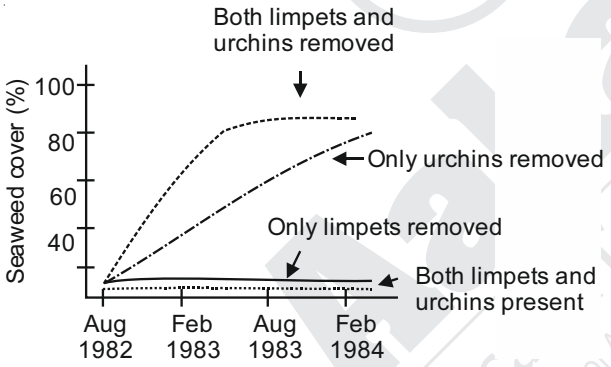
(b) (iii) and (v)

(c) (i), (iv) and (v)

(d) (ii), (iii), (iv) and (v)

Answer (c)

17. In order to study the effect of limpets and sea urchins on the seaweed survival in a particular event, the ecologist Fletcher carried out certain experiment and the effects are shown in the graph:



(i) Urchins had a greater effect on seaweed cover than limpets.

(ii) Removing limpets had a dramatic positive effect on seaweed growth.

(iii) Removing urchins led to increased growth of the seaweed as compared to its natural growth rate.

(iv) Both species have some influence on the seaweed distribution.

(a) (i) only (b) (ii) and (iv)

(c) (iii) only (d) (i) and (iv)

Answer (d)

18. A few characteristic features of blood vessels of the human circulatory system are tabulated below:-

	P	Q	R
Blood flow	Even	Pulsatile	Even
Presence of valves	Absent	Absent	Present
Blood pressure	Low	High	Very low
Elastic tissue in walls	-	+++	+

P, Q and R respectively represent:

(a) Artery, vein, capillary

(b) Capillary, artery, vein

(c) Vein, artery, capillary

(d) Vein, capillary, artery

Answer (b)

19. Following is the data obtained for two fishes (1 and 2) of similar body mass:

	1	2
Heart mass (mg)	4.7 ± 0.6	2.2 ± 1.1
Spleen mass (mg)	14.2 ± 6	5.7 ± 4
Pectoral muscle LDH u/g	38 ± 16	110 ± 42

Which of the following is the most appropriate conclusion from the data?

(a) Fish 1 is benthic (bottom dwelling) while 2 is limnetic.

(b) Fish 1 performs endurance like activities while 2 is likely to perform short quick bursts of activities.

(c) Fish 2 has to supply blood to smaller biomass than fish 1

(d) Fish 1 lives in well oxygenated stream while 2 lives in less aerobic environment

Answer (b)*

20. In marine mammals, which of the following is NOT observed during deep sea diving?

(a) Decrease in heart rate

(b) Peripheral vasoconstriction

(c) Hypometabolism

(d) Myoglobin saturation

Answer (d)

21. Sulfolobus bacteria that fix CO_2 using energy from inorganic chemicals are classified to be:

(a) Photoautotrophs

(b) Photoheterotrophs

(c) Chemoautotrophs

(d) Chemoheterotrophs

Answer (c)

22. A cell of seta of a moss and a cell of endosperm of a cycad, both having n = 18, will respectively have the chromosome numbers:

(a) 36 and 54 (b) 36 and 18

(c) 36 and 36 (d) 18 and 54

Answer (b)

23. Lata came across a slide without label. On microscopic examination when realised that it was a cross section of some plant organ. She noticed metaxylem vessels in the centre and protoxylem vessels towards the periphery in 4 groups alternating with phloem patches, surrounded by pericycle, endodermis, cortex and epidermis with long narrow outgrowths. It should be labelled as a cross-section of:

(a) Young root of a gymnosperm

(b) Young root of a dicot

(c) Young root of a monocot

(d) Old root of a dicot

Answer (b)

24. Which of the following is the largest animals without any endoskeleton or exoskeleton?

(a) Jellyfish

(b) Sea cucumber

(c) Hag fish

(d) Sword fish

Answer (a)

25. Open circulatory system is encountered in which of the following?

i. Starfish ii. Hydra

iii. Spider iv. Planaria

v. Crab

(a) i, iii and iv (b) ii, iii and v

(c) iii and v (d) i and v

Answer (c)

26. Cabbage, cauliflower, broccoli, kohlrabi, kale, brussels sprouts have all sprung from the wild mustard plant through:

(a) Variations and natural selection

(b) Induced mutations and their propagation

(c) Induced transgenesis

(d) Artificial selection of variations

Answer (d)

27. Air dried seeds and dry wood were soaked in water. After a day both of them were found to be swollen. Which of the following inference is correct?

(a) Dry wood absorbed water by imbibition for few hours and thereafter by osmosis

(b) Dried seeds absorbed water only by osmosis

(c) Dried seeds absorbed water imbibition for few hours and thereafter by osmosis

(d) Both of them absorbed water by osmosis and imbibition simultaneously

Answer (c)

28. Which one of the following are the effects of growth hormones in humans?

i. Enhanced uptake of amino acids from blood by the body cells.

ii. Decreased uptake of sulphur from blood.

iii. Enhanced storage of lipids in fat depots.

iv. Enhanced glycogenolysis increasing sugar level in blood.

(a) i, ii and iii

(b) i and iv

(c) ii and iv

(d) i and iii

Answer (b)

29. Catecholamines-hormones secreted by adrenal glands cause all the following **except**:

(a) Increased heart rate

(b) Increased metabolic rate

(c) Increased blood pressure

(d) Constriction of bronchioles

Answer (d)

30. An endoparasite present at which one of the following sites can tolerate lowest oxygen tension in the medium?

(a) Blood stream

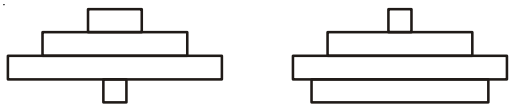
(b) Bile duct

(c) Lungs

(d) Oropharynx

Answer (b)

31. Two ecological pyramids are represented in the diagrams A and B:



A B

Choose the correct statement/s from the following:

i. A is based on biomass and B is based on energy at every level.

ii. In B, the producers are very small in size and produce enough food for first order consumers and the turnover of producers is much more rapid than that of herbivore.

iii. In A, the size of the producer is huge and supports large number of herbivores.

iv. In B, the producers have longer life span and in A the producers have shorter life span.

(a) i and iv (b) Only ii

(c) ii and iii (d) Only iv

Answer (c)

32. What is the probability that , in an organism with a diploid number 20, a sperm will be formed which contains all 10 chromosomes that come from the mother?

(a) $\left(\frac{1}{2}\right)^{20}$ (b) $\left(\frac{1}{2}\right)^{10}$

(c) $\left(\frac{1}{4}\right)^{20}$ (d) $\left(\frac{1}{4}\right)^{10}$

Answer (b)

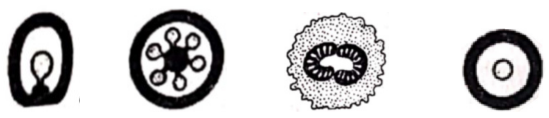
33. The nuclei in the tender coconut water and the hard white pulp of coconut are respectively

(a) Triploid, Diploid (b) Diploid, Diploid

(c) Triploid, Triploid (d) Triploid, Haploid

Answer (c)

34. The following are the T.S. of different types of ovaries. The types of placentation in I, II, III and IV are respectively-



I II III IV

(a) Axile, free central, axile, basal

(b) Marginal, free central, axile, basal

(c) Marginal, free central, axile, free central

(d) Basal, axile, free central, axile

Answer (b)

35. The following characters are found in many trees that belong to temperate forests.

i. Pollen shed occurs at the beginning of growing season before the leaves develop.

ii. Pollen shed is also timed to avoid high humidity and rain.

Identify the type of pollination.

(a) Entomophily (b) Anemophily

(c) Ornithophily (d) Chiropterophily

Answer (b)

36. A son with Klinefelter syndrome is born to a mother who is phenotypically normal. The father has X linked skin defect (Anhidrotic ectodermal dysplacia). But the son has patches of normal as well de defective skin. This can be explained as:

i. Non- disjunction of X chromosome took place during oogenesis and the son inherited two X chromosomes.

ii. Non- disjunction of X and Y chromosomes took place during spermatogenesis.

iii. Mosaic phenotype caused by random inactivation of X chromosome resulted in different patches on skin.

iv. X linked gene might have crossed over to Y and the son inherited the skin disorder.

(a) i and ii (b) ii and iii

(c) i and iv (d) ii and iv

Answer (d)

37. An aphid is fed on a herbaceous plant and its stylet is removed by anesthetizing the insect. The fluid in the stylet is analysed for its chemical content. Which of the following will be the correct observation/s?

i. The main component will be starch if it is a potato plant. Sugars like sucrose and fructose also will be found.

ii. The main component will be fructose when the plant bears sweet fruits.

iii. The contents will be minerals from xylem as well as sucrose from phloem.

iv. The contents will be mostly sucrose.

(a) i, ii and iv

(b) iii only

(c) iv only

(d) i, ii and iii

Answer (c)

38. The floral characters that cannot be identified by floral diagram and floral formula are respectively:
    (a) Position of ovary and monadelphous stamens
    (b) Epipetalous stamens and position of ovary
    (c) Position of ovary and aestivation in calyx and corolla
    (d) Gamopetalous condition and number of locules in ovary

Answer (c)

39. If for convenience, the biochemical pathway of photosynthesis is represented briefly by the following equation;

$$CO_2 + 2H_2A \xrightarrow{\text{Light}} [CH_2O] + H_2O + 2A$$

Then, A can represent:
    i. Oxygen utilised by land plants and in blue-green algae.
    ii. Oxygen utilized by phototrophic bacteria and sulphur by cyanobacteria.
    iii. Oxygen utilised by angiosperm and sulphur in phototrophic bacteria.
    iv. Oxygen utilized by all eukaryotes and sulphur by all prokaryotes.
    (a) i and ii (b) ii and iv
    (c) i and iii (d) i, iii and iv

Answer (c)

40. Which of the following sets of tissues represents the ground tissue of plants?
    (a) Epidermis, sclerenchyma fibres, xylem vessels, phloem sieve tube members
    (b) Parenchyma of cortex of stem, mesophyll cells of leaf, collenchyma of young stem, sclereids in the pulp of guava
    (c) Parenchyma of pith of stem, epidermis of leaf, epidermis of young stem, root hair
    (d) Collenchyma of hypodermis of young stem, cork cells of the bark, parenchyma of pith, cortex of young root

Answer (b)

41. The function of contractile vacuole is to pump out excess water from the cell. In Paramecium, the activity of contractile vacuole was found to increase when transferred from one medium to another. Hence it can be concluded that the transfer was from:
    (a) Isotonic to hypotonic solution
    (b) Hypotonic to isotonic solution
    (c) Hypotonic to hypertonic solution
    (d) Isotonic to hypertonic solution

Answer (a)

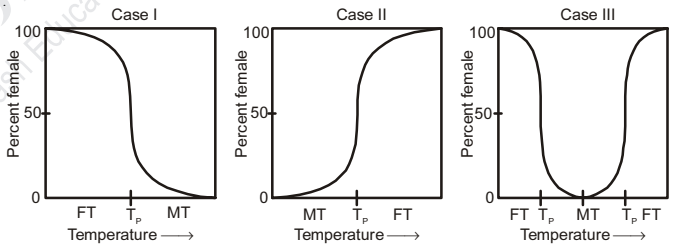
42. Enzyme A has higher km value than enzyme B, although both can achieve the same Vmax. Hence it can be concluded that,
    (a) Enzyme A requires higher substrate concentration and has lower affinity to substrate than enzyme B
    (b) Enzyme A requires lower substrate concentration and has lower affinity to substrate than enzyme B
    (c) Enzyme A requires higher substrate concentration and has higher affinity to substrate than enzyme B.
    (d) Enzyme A requires lower substrate concentration and has higher affinity to substrate than enzyme B

Answer (a)

43. Average molecular weight of amino acid is considered to be 110 Da.
    A homodimeric membrane protein is found to have a molecular weight of 44,000 Da. How many amino acids are present in each monomer of the protein?
    (a) 400 (b) 300
    (c) 200 (d) 100

Answer (c)

44. The graphs show the data on sex determination of the progeny which is dependent on temperature.



MT = Male favouring Temperature; FT = Female favouring Temperature; Tp = Temperature obtaining ratios at equilibrium

A few statements regarding the data are made.
    i. Case I: At a mid range temperature, 3:1 is a predicted the male: female ratio.
    ii. Case II: The number of males will be much higher at lower temperatures.
    iii. Case III: The number of females: males will always be higher at temperature extremes.
    iv. Case I and II are likely to face ratio imbalance at mid ranges of temperatures.

The correct statement/s is/are:
    (a) ii only (b) i and ii
    (c) ii and iii (d) iii and iv

Answer (c)

45. The given table showing the recombination frequencies between different gene loci on the same chromosome. Recombination frequencies are directly related to the distance between the two genes. Higher the recombination frequency, greater the distance between the two loci. However, even if the actual distance exceeds 50 units, the recombination frequency does not exceed 50%. Select the most probable arrangement of genes based on the data below:

Gene pairs	Recombination frequency
ab	50
ac	7
ad	22
bc	50
bd	50
cd	15

(a) d-c-a-b / b-a-c-d (b) b-d-a-c / c-a-d-b

(c) c-d-a-b / b-a-d-c (d) d-a-c-b / b-c-a-d

Answer (a)

46. The compartmentalization of the cytoplasm by the membranes of the endoplasmic reticulum (ER) results in:

(a) Increasing the surface area available for biochemical synthesis

(b) Providing a structural framework

(c) Facilitating cell mobility

(d) Maintaining cell fluidity and cell dynamics

Answer (a)

47. Cross pollination will take place when:

i. The flowers are Cleistogamous (flowers never open).

ii. The flowers show Herkogamy (physical barrier between anther and style).

iii. The flowers show Dichogamy (stamens and carpels of bisexual flowers mature at different times).

iv. The plants are Dioecious (plants having unisexual flower).

Choose the correct option:

(a) ii only (b) i and iii

(c) ii and iii (d) ii, iii and iv

Answer (d)

48. Predict the phenotype of a promoter mutant (lacP) for the lac operon.

(a) The lac genes would be expressed efficiently only in the absence of lactose

(b) The lac genes would be expressed efficiently only in the presence of lactose

(c) The lac genes would be expressed continuously.

(d) The lac genes would never be expressed efficiently

Answer (d)

49. A tall plant with red flowers is crossed with a dwarf plant that produces white flowers. In F_1 all plants are tall with pink flowers. The F_1 plant is crossed with dwarf parent that bears white flower. Four types of progenies were produced in a ratio of 102 : 98 : 103 : 99. The progenies expressed:

(a) All the five characters of parents and F_1

(b) All the characters except pink colour of the flower

(c) All characters except white colour of the flower

(d) All characters except red

Answer (d)

50. Thyroid gland produces hormones which control the rate of metabolism in animals. Which of the following would occur if the thyroid of cattle is fed to a man deficient in thyroid secretion?

i. It will speed up his metabolism

ii. It will lower the rate of his metabolism

iii. It will regulate the hormone secretion

iv. It will not have any effect on hormone secretion

Which of the following are correct option?

(a) i and iv (b) ii and iii

(c) i and iii (d) ii and iv

Answer (c)

51. Removal of which of the components from the given food chain will not result in complete collapse of the food chain?

Producers → Primary consumers → Secondary consumers → Decomposers

(a) Producers and primary consumers

(b) Primary consumers and secondary consumers

(c) Secondary consumers and decomposers

(d) Producers and decomposers

Answer (b)

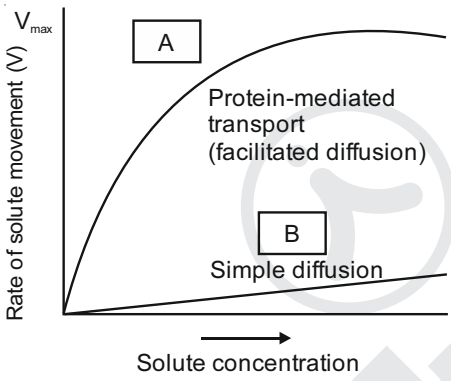
52. Suppose a leaf containing chlorophyll 'a' molecule is irradiated at its absorption maxima i.e. 450 nm and 662 nm. The fluorescence emission of this leaf would be at 668 and 723 nm. If now the leaf is irradiated with either 400 nm or 550 nm wavelength of light then, the fluorescence emission of this leaf would probably be at:

(a) 668 and 723 nm (b) 610 and 700

(c) 610 nm only (d) 610 and 668 nm

Answer (c)

53. Patterns of diffusion for two molecules A and B for a living cell are shown in the graph.



A and B most likely could be respectively :

(a) Na^+ and Glucose (b) O_2 and CO_2

(c) Glucose and O_2 (d) O_2 and glycerol

Answer (c)

54. During transmission of impulses across the nerve membrane; a simple impulse dies out just before the synapse, whereas several impulses reaching the synapse within a short period "Fire" the impulse into the next neuron. The reason for simple neuron to die out maybe that the:

(a) Synapse gets fatigued by continuous work

(b) Impulse is unable to produce the adequate quantity of neurotransmitters

(c) Speed at which impulse travels is less

(d) Dendrites of nerve fibres take time to accept signal for nerve impulse

Answer (b)

55. Double fertilization is not found in

(a) Cucumber

(b) Rice

(c) *Pinus*

(d) Mango

Answer (c)

56. Which of the following diploids produce β-galactosidase, in the absence of lactose?

(a) $p^+ lacZ^- lacI^+ / p^+ lacZ^+ lacI^-$

(b) $p^- lacZ^- lacI^- / p^- lacZ^+ lacI^-$

(c) $p^+ lacZ^+ lacI^- / p^+ lacZ^+ lacI^-$

(d) $p^+ o^c lacZ^- lacI^+ / p^+ o^+ lacZ^+ lacI^+$

Answer (c)

57. How many meiotic divisions will be required for the formation of 80 zygotes in an angiospermic plant?

(a) 40

(b) 100

(c) 80

(d) 160

Answer (b)

58. A food chain in a terrestrial ecosystem is shown

Sun → Grass → Rabbit → Snake

The food chain is incomplete due to:

(a) Absence of tertiary consumer

(b) Absence of decomposers

(c) Absence of quaternary consumer

(d) Absence of parasitic component

Answer (b)

59. Eutrophication is considered bad for a water body because it leads to:

(a) Increase in demand for carbon dioxide

(b) Increase in demand for oxygen

(c) Increase in demand for nitrogen

(d) Change in pH of the water body

Answer (b)

60. Cells of *E. coli* are placed in a solution with 12% NaCl. Which effect would be visible after 24 h of incubation?

(a) Plasmolysis

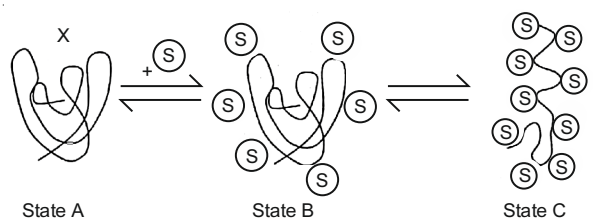
(b) Plasmoptysis

(c) Osmotic lysis

(d) Swelling of cells

Answer (a)

61. Enzyme 'x' is a polypeptide in nature. When added to solvent 's' it acquires following conformation



Which of the following is correct?

(a) Enzyme will be most active in state C

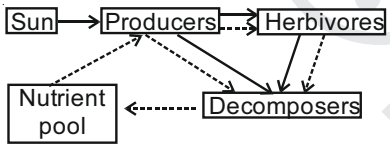
(b) The solvent acts as a denaturant for the protein molecule

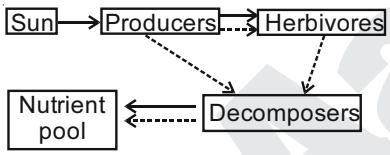
(c) Further addition of solvent will lead to precipitation of the protein

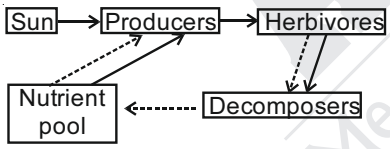
(d) Further addition of solvent will lead to breaking of polypeptide bonds of the protein

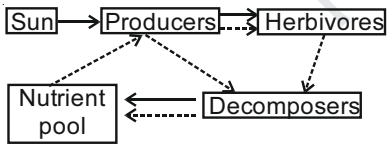
Answer (b)

62. Which of the following correctly represents simplified model of energy and mineral movement in an ecosystem?

(a)


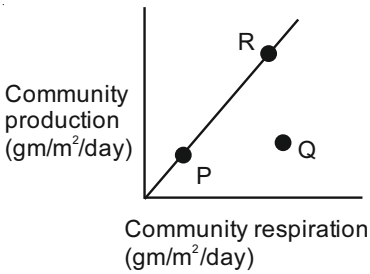
(b)


(c)


(d)


Answer (a)

63. Various communities can be classified based on their metabolic characteristics such as productivity and respiration. Communities P, Q and R in the graph respectively represent:



(a) Oceans, deserts and ponds

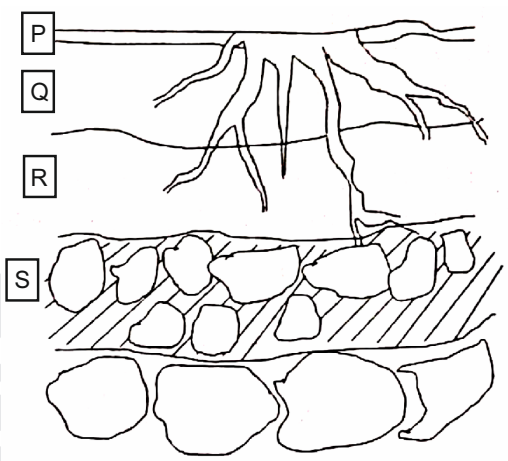
(b) Coral reefs, deserts and fertile agricultural area

(c) Estuaries, oceans and grassland

(d) Oceans, swamp waters and coral reefs

Answer (d)

64. Generalized profile of a soil in which a plant is growing is shown. The region/s rich humus will be:



(a) P only

(b) P and Q

(c) R only

(d) S only

Answer (b)

65. The following represents a tri-peptide (3 amino acids) stretch of a protein sequence:

Arginine-Methionine-Lysine

Given below are four DNA sequence. Only one strand of the double stranded DNA has been represented. Which one of the following can possibly code for the above tri-peptide?

(a) 5' AAA GTA CGC 3'

(b) 5' TTT CAT GCG 3'

(c) 5' GCG TAC TTT 3'

(d) 5' CGC AUG AAA 3'

Answer (b)

66. In a diploid organism the total DNA content of a sperm was found to be 'C'. What will be the DNA content of its cell that is at Metaphase I of meiosis?

(a) C

(b) 0.5C

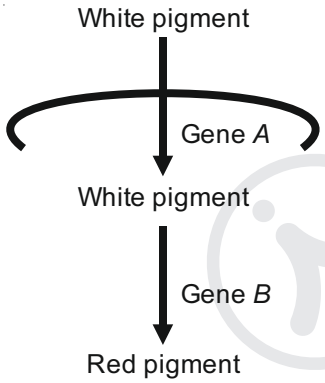
(c) 2C

(d) 4C

Answer (d)

67. In a plant, the color of a flower is determined by the conversion of a white pigment into a red pigment that is controlled by the product of gene '*B*'. Product of the gene '*A*' is responsible for bringing the white pigment into the cell for conversion. The process is schematically represented in the figure.

Alleles 'a' and 'b' are non-functional mutant alleles of genes 'A' and 'B', respectively. Two parental plants with white flowers are crossed. F_1 progeny have red flowers only. When the F_1 progeny is self-pollinated, the F_2 progeny has plants that have either red or white flowers.

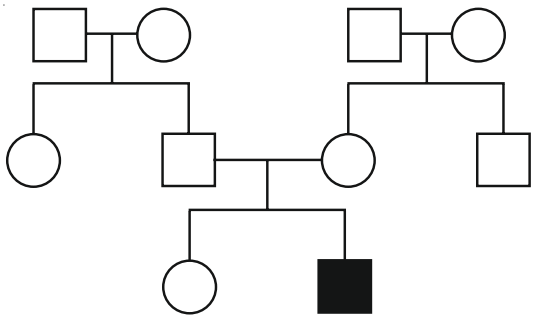


Considering that the two genes are on two independent chromosomes, what is the expected ratio of the two phenotypes in the F_2 progeny?

(a) 3 Red : 1 white
(b) 9 Red : 7 white
(c) 1 Red : 1 white
(d) 15 Red : 1 white

Answer (b)

68. The following pedigree represents the inheritance of a rare disorder caused due to an autosomal recessive allele. Filled square indicates affected male.



What is the probability that the daughter in the third generation carries the allele responsible for the disorder?

(a) 1/2 (b) 2/3
(c) 3/4 (d) 1/4

Answer (c)

69. Bacteriophages are viruses that infect bacterial cells. In a given experiment bacteriophages were grown in the presence of radioisotopes ^{14}C and ^{32}P. These bacteriophages were used to infect bacterial cells. Following infection, radioisotopes present in the bacterial cells were analyzed. The radioactivity in the bacterial cell will be observed due to the presence of:

(a) Only ^{32}P (b) Only ^{14}C
(c) Both ^{32}P and ^{14}C (d) Either ^{32}P or ^{14}C

Answer (c)

70. A water strider can walk on the surface of water without even getting its claws wet. The insect can do it due to which property of water?

(a) Specific gravity (b) Surface tension
(c) Specific heat (d) Anomalous behaviour

Answer (b)

71. The spider silk has a predominant component called 'spiderwin', with five times the strength of steel, weight for weight. The elasticity of the web strands is due to the presence of :

(a) Beta sheets (b) Alpha helices
(c) Disordered loops (d) Sugar residues

Answer (b)

72. The hepatocytes of an elephant, in comparison to the hepatocytes of a mouse are :

(a) Twice as big (b) Five times bigger
(c) Twenty times bigger (d) Of the same size

Answer (d)

73. Plant scientists are worried that C_4 crops such as corn and sugarcane may suffer stiffer competition from C_3 weeds since there is a global

(a) Increase in temperature
(b) Increase in CO_2 content of atmosphere
(c) Decrease in rainfall
(d) Increase in genome contamination of C_4 crops

Answer (b)

74. During menstrual cycle there are two surges in estrogen concentration of blood. The first and major surge is just prior to the ovulation phase and the next one is in :

(a) Menstruation phase (b) Early follicular phase
(c) Mid-luteal phase (d) Late-luteal phase

Answer (c)

75. Match the following examples with the evolutionary phenomena, namely, convergent evolution (p), divergent evolution (q) and adaptive radiation (r).

i. Sugar gliders of Australia and European flying squirrel.

ii. Squirrel species on opposite rims of Grand Canyon.

iii. Sharks and dolphins.

iv. Darwin's finches.

(a) i-p, ii-q, iii-p, iv-r (b) i-r, ii-r, iii-p, iv-r

(c) i-r, ii-q, iii-p, iv-q (d) i-q, ii-r, iii-p, iv-p

Answer (a)

76. Most of the drugs are eliminated by nephrons through:

(a) Filtration at loop of Henle

(b) Tubular reabsorption at proximal convoluted tubules

(c) Tubular secretion at distal convoluted tubules

(d) Tubular secretion at collecting duct

Answer (c)

77. Consumption of salty food results in increased thirst and a cascade of events. Select and arrange the sequence of events:

(i) Increased reabsorption of water.

(ii) High Na^+ in blood.

(iii) Increased release of aldosterone.

(iv) Increased ADH in blood.

(v) Passing out more concentrated urine.

Choose the correct sequence.

(a) (ii), (iv), (i), (v) (b) (i), (iii), (iv), (ii), (v)

(c) (iii), (i), (iv), (v), (ii) (d) (ii), (iii), (vi), (i)

Answer (a)

78. Acid precipitation refers to rain, snow or fog with a pH lower or more acidic than pH 5.6. It results primarily by the presence of which of the following components in the atmosphere?

(a) CO and CO_2

(b) Sulphur and nitrogen oxides

(c) Lend and phosphorous oxides

(d) Ozone and hydrocarbons

Answer (b)

79. Peroxisomes are often noticed in proximity of mitochondria. This is due to the fact that the products can be transported to mitochondria. Which of the following functions is most relevant to this explanation?

(a) Peroxisomes use oxygen to break fatty acids down into smaller molecules that are then used as fuel for cellular respiration.

(b) Peroxisomes oxidise alcohol to detoxify it in liver.

(c) Peroxisomes transfer hydrogen from toxins to oxygen rendering them harmless.

(d) Peroxisomes produce H_2O_2 and also convert it to water.

Answer (a)

80. Homology suggests a common ancestry, while analogy suggests:

(a) Monophyletic origin

(b) Character displacement

(c) Polyphyletic origin

(d) Adaptation to common environment

Answer (d)

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