

INDIAN ASSOCIATION OF PHYSICS TEACHERS
NATIONAL STANDARD EXAMINATION IN BIOLOGY 2017 -18

Date of Examination: 26TH November, 2016

Time: 1400 to 1600 Hrs

Q. Paper Code: B221

Write the question paper code mentioned above on YOUR answer sheet (in the space provided), otherwise your answer sheet will NOT be assessed. Note that the same Q. P. Code appears on each page of the question paper.

Instructions to Candidates –

1. Use of mobile phones, smartphones, ipads during examination is **STRICTLY PROHIBITED**.
2. In addition to this question paper, you are given answer sheet along with Candidate's copy.
3. On the answer sheet, make all the entries carefully in the space provided **ONLY** in **BLOCK CAPITALS** as well as by properly darkening the appropriate bubbles.
Incomplete/incorrect/carelessly filled information may disqualify your candidature.
4. On the answer sheet, use only **BLUE or BLACK BALL POINT PEN** for making entries and filling the bubbles.
5. The email ID and date of birth entered in the answer sheet will be your login credentials for accessing performance report. Please take care while entering.
6. 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

7. A correct answer carries 3 marks whereas 1 mark will be deducted for each wrong answer.
8. Any rough work should be done only in the space provided.
9. Use of **non-programmable** calculator is allowed.
10. No candidate should leave the examination hall before the completion of the examination.
11. After submitting your answer paper, take away the Candidate's copy for your reference.

Please DO NOT make any mark other than filling the appropriate bubbles properly in the space provided on the answer sheet.

Answer sheets are evaluated using machine, hence CHANGE OF ENTRY IS NOT ALLOWED.

Scratching or overwriting may result in a wrong score.

DO NOT WRITE ON THE BACK SIDE OF THE ANSWER SHEET.

Instructions to Candidates (continued) –

Read the following instructions after submitting the answer sheet.

1. Comments regarding this question paper, if any, may be sent by email only to iapt.nse@gmail.com till 28th November, 2017.
2. The answers/solutions to this question paper will be available on our website – www.iapt.org.in by 2nd December, 2017.
3. **CERTIFICATES and AWARDS –**
Following certificates are awarded by the IAPT to students successful in NSEs

(i) Certificates to “Centre Top 10%” students

(ii) Merit Certificates to “Statewise Top 1%” students

(iii) Merit Certificates and a book prize to “National Top 1%” students

4. Result sheets can be downloaded from our website in the month of February. The “Centre Top 10%” certificates will be dispatched to the Prof-in-charge of the centre by February, 2018.
5. List of students (with centre number and roll number only) having score above MAS will be displayed on our website (www.iapt.org.in) by 22nd December, 2017. See the **Eligibility Clause** in the Student’s brochure on our website.
6. Students eligible for the INO Examination on the basis of selection criteria mentioned in Student’s brochure will be informed accordingly.

NATIONAL STANDARD EXAMINATION IN BIOLOGY

(NSEB) 2017-18

Q.1. A veterinarian wanted to determine the pedigree of a puppy born at his hospital. Four male adult dogs had to be considered as possible fathers of the puppy. Following is the result of partial DNA fingerprinting. Which male is most likely to be the father of the puppy?

MOTHER	PUPPY	POSSIBLE FATHERS			
Lily	Sweety	Jim	Jam	Jack	Jill

- a) Jim
- b) Jam
- c) Jack
- d) Jill

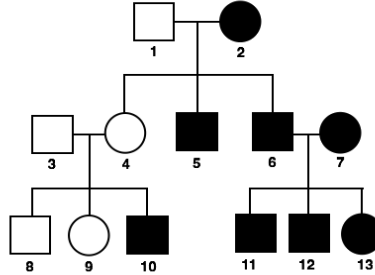
Q.2. Eastern and Western Meadow Larks look almost the same and inhabit the same areas of Prairie. They recognize mates of their own species by distinctive courtship songs. This is an example of _____ type of pre-zygotic isolation.

- a) ecological
- b) gametic

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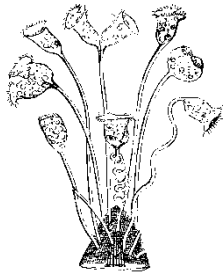
- c) mechanical
- d) behavioural

Q.3. Study the pedigree chart of a family showing the inheritance of a disorder and trace the trait.

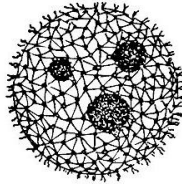


- a) Dominant X-linked
- b) Recessive X-linked
- c) Autosomal dominant
- d) Autosomal recessive

Q.4. Which of the following is a large single-celled organism?



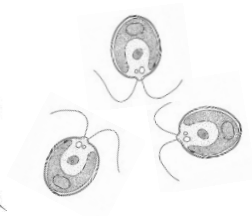
a



b



c



d

- a) *Vorticella*
- b) *Volvox*
- c) *Acetabularia*
- d) *Chlamydomonas*

Q.5. Find out the **incorrect** statement about action of hormones:

- a) Steroid hormones are lipid soluble and pass across the cell membrane easily.
- b) Synthesis of secondary messengers in the cell is activated by the binding of peptide hormones.

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- c) Receptor-steroid hormone complex binds to DNA causing transcription of genes.
- d) Production of cAMP in the cell is activated by binding of steroid hormone to receptor.

Q.6. Which of the following processes requires energy?

- a) Movement of calcium into a cell.
- b) Secretion of mucus by a cell.
- c) Entry of oxygen into a cell.
- d) Water absorption by a cell.

Q.7. The passage of minerals, absorbed at the surface of root hair, to xylem of the root as per the mass flow hypothesis would be guided by the cells of:

- a) root hair
- b) cortex
- c) endodermis
- d) pericycle

Q.8. An easy way to ensure elimination of a toxin from the body is to add :

- a) amine group so as to make it alkaline.
- b) aromatic ring to enhance precipitation.
- c) hydrocarbon chain to make it non-polar.
- d) hydroxyl group to enhance solubility.

Q.9. Deep sea sponges have silicate spicules because:

- a) precipitation of calcium carbonate is hindered by the depth.
- b) at greater depth sequestration of silica is easier.
- c) only silicious spicules make circulation of water through body efficient.
- d) availability of calcium is relatively less at depth.

Q.10. Which of the following cytoskeletal structures have maximum diversity of the component proteins?

- a) Microtubules
- b) Microfilaments
- c) Intermediate filaments
- d) Microfibrils

- Q.11. Though triploblastic, platyhelminths are classified as acoelomate because :
- the mesoderm is acellular.
 - their body is flat.
 - the alimentary canal is incomplete.
 - the mesoderm is not distinguished into somatic and splanchnic layers.
- Q.12. Though both starch and cellulose are composed of repeating glucose units, the main difference between them is that :
- they are bonded by 1-6 and 1-4 glycosidic linkages respectively.
 - they differ in the α and β configuration.
 - most of the fruits and grains are rich in starch and poor in cellulose or fiber.
 - starch is made of simple sugars while cellulose is made of amino sugars.
- Q. 13. The photosynthetic pigment that provides effective photoprotection is :
- chlorophyll b
 - chlorophyll e
 - phycobilins
 - carotenoids
- Q.14. The allosteric enzyme that is most sensitive to activators as well as inhibitors and thus responsible for regulating cellular respiration is:
- hexokinase
 - phosphofructokinase
 - aldolase
 - phosphoglycerokinase
- Q.15. A biologist was given two animal cell populations, X and Y. When he subjected them to culturing under similar conditions of availability of nutrients, growth factors and substratum he found the growth of sample X stopped after the available substratum was covered while the growth of sample Y continued so that multilayered mass was formed. The cells in sample X and Y respectively, are most likely to be:
- epithelial cells and leucocytes
 - germinal cells and muscle cells
 - normal cells and cancer cells
 - diploid cells and polyploid cells

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Q.16. If a quantitative character is influenced by an additive effect of four genes, how many phenotypic categories are expected in the progeny of a tetrahybrid cross?

- a) 5
- b) 7
- c) 9
- d) 11

Q.17. Following is the sequence of nucleotides of a fragment of DNA molecule.

5'GCCATTG...ACTAAGCATA3'

3'CGGTAAC...TGATTCGTAT5'

The most appropriate primer for replication of the above fragment shall be:

- a) 5'UAUG3' and 5'GCCA3'
- b) 5'TATG3' and 5'ACCG3'
- c) 5'GCCU3' and 5'TATG3'
- d) 5'UGGA3' and 5'GTAT3'

Q.18. A pure tall pea plant (*Pisum sativum*) with axillary pods is crossed with dwarf pea plant with terminal pods. Out of 48 F₂ generation plants, how many will have phenotype like parents?

- a) 18
- b) 27
- c) 30
- d) 20

Q.19. Which of the following statement is **NOT** true about waxes?

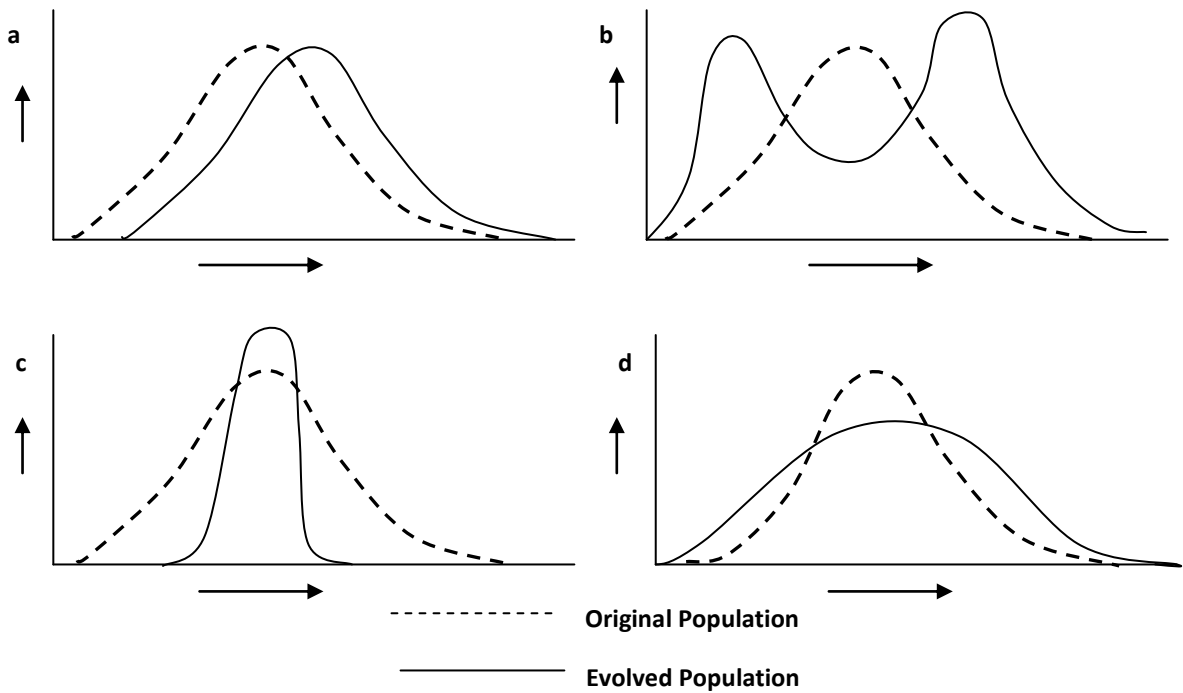
- a) They form waterproof coating on leaves.
- b) They have PUFA linked to glycerol.
- c) They protect the ear canal.
- d) They protect pine needles from acid rain.

Q.20. If a gene needs to be introduced in a plant, the expression vector has to be:

- a) pBR322
- b) Ti plasmid
- c) λ phage

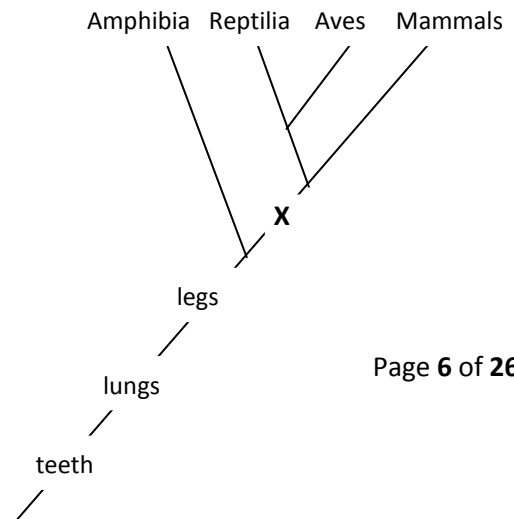
d) YAC

Q.21. Which of the diagrams given below will best represent stabilising selection in a population with continuous variations? X axis represents phenotype with quantitative variation while Y axis represents frequency of individuals.



Q.22. The X in the accompanying cladogram is:

a) amniotic egg



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- b) bipedal locomotion
- c) diapsid skull
- d) four chambered heart

Q.23. If a dihybrid test cross produces offsprings in 1 : 1 ratio, then it can be concluded that

- a) the two genes are present on the same chromosome and very close to each other.
- b) the two genes are present on the same chromosome but apart from each other.
- c) the two genes are present on two different chromosomes.
- d) there is an independent assortment of genes.

Q.24. In a polycarpellary and syncarpous pistil, ovary can be unilocular or multilocular, and placentation can be:

- a) free – central or parietal.
- b) parietal or marginal.
- c) marginal or free central.
- d) parietal or axile.

Q.25. Three genes A, B and C are involved in determination of skin colour. If a couple with fair skin colour, produced a child with dark skin colour, then the genotype of the parents most probably can be:

- a) Aabbcc x aaBbcc
- b) AAbbcc x aabbcc
- c) Aabbcc x aaBBcc
- d) AaBbcc x aaBbCc

Q.26. Which of the following is a **mismatched** pair?

- a) Lady's finger – Capsule
- b) Banana – Berry
- c) Date – Drupe
- d) Maize – Caryopsis.

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Q.27. A biochemist prepared a mixture of all reactants and enzymes he thought were needed for DNA replication. When DNA was added, replication occurred. The product, however, consisted of the parent DNA strand paired with several DNA segments, each segment, a few hundred nucleotides long. Which of the following could possibly be missing in the reaction mixture ?

- a) DNA polymerase.
- b) RNA primers.
- c) DNA ligase.
- d) Single strand binding proteins.

Q.28. The number of classes of phenotypes in the F_2 generation of a cross between dihybrids involving both the genes with incomplete dominance would be:

- a) six
- b) nine
- c) sixteen
- d) eight

Q.29. Some R-plasmids carry genes for resistance to many antibiotics. This occurs naturally due to:

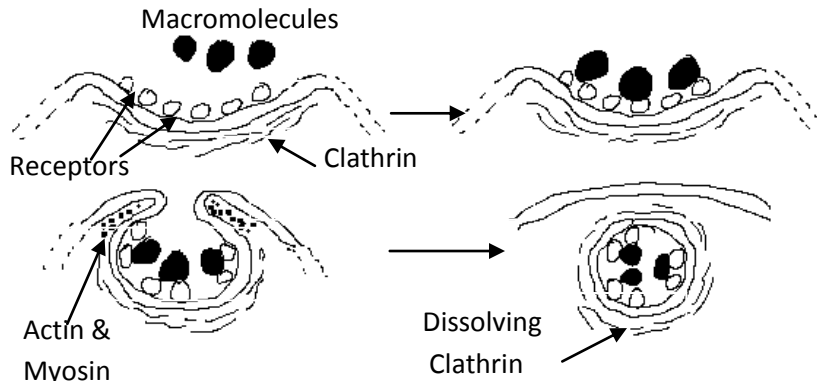
- a) transposons
- b) transduction
- c) transformation
- d) transgenesis

Q.30. The extracellular fluid in human body contains large amounts of sodium, chloride, bicarbonate ions and other nutrients for the cells. Which of the following can be categorized as extracellular fluid?

- i. Lymph
 - ii. Renal interstitial fluid
 - iii. Axoplasm
 - iv. Cerebrospinal fluid
- a) I, ii, iii and iv
 - b) i, & iii only

- c) i, ii and iv only
- d) i & ii only

Q.31. Which process of cell ingestion is shown in diagram below?



- a) Exocytosis
- b) Pinocytosis
- c) Phagocytosis
- d) Macrophage engulfing an infectious agent

Q.32. The sugar glider and flying squirrel belong to two different groups of mammals, but they have both evolved bushy tails and flaps of skin that help them exploit their forest environments more efficiently. This pattern of evolution is an example of:

- a) character displacement
- b) adaptive radiation
- c) convergent evolution
- d) divergent evolution

Q.33. A woman heterozygous for colorblindness marries a colour blind man. What will be the chances of the birth of a colorblind daughter?

- a) 0.5
- b) 0.25
- c) 0.0625
- d) 1

Q.34. Tyloses are outgrowths of parenchyma cells growing into the adjoining xylem vessels clogging them progressively so that the sap wood gets transformed into heart wood. The most common reason for their formation is:

- a) drought or lack of sap flowing through xylem.
- b) accumulation of excessive storage material in cells of rays.
- c) synthesis of alkaloid that modulate growth of parenchymal cells.
- d) deprivation of nutrition to cells of rays.

Q.35. One effective way of ascertaining population size of an animal species in wild is to capture a certain number, mark them and release in the habitat. After a duration, catch another batch of animals and find out how many among them are marked. From the ratio of marked to unmarked individuals, total number of animals can be computed. In a workout, 10 marked individuals were released in wild and after a week, a batch of 12 was captured among which 2 were found to be marked. The size of the population would be:

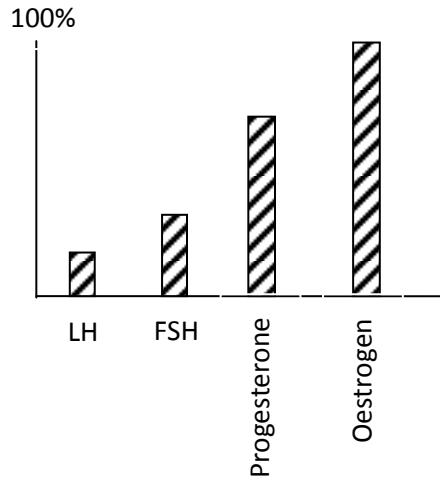
- a) 40
- b) 60
- c) 80
- d) 100

Q.36. Which of following characters are found in prokaryotes?

i) presence of DNA ii) presence of flagella iii) presence of cytoskeleton
iv) presence of cell wall v) presence of pili.

- a) i, ii, iii, iv and v
- b) only i, iii, and v
- c) only ii, iii and iv
- d) only i, ii, iv and v

Q.37. The diagram below shows the concentration of hormones in circulating blood as percentage of their maximum possible concentration. Which phase of ovarian cycle of a mammal does it represent?



- a) Menstruation
- b) Follicular phase
- c) Ovulation phase
- d) Secretory phase

Q.38. A farmer sprayed a commercial plant growth promoter and found that his cabbage plant grew into a herb with long internodes. What must be the growth promoter?

- a) Auxin.
- b) Cytokinin
- c) Gibberellic acid
- d) Abscisic acid

Q.39. Select the appropriate combination of responses caused by the parasympathetic activation in man.

- i. Accentuated secretion of digestive enzymes
- ii. Slowing of heart beats
- iii. Increased sweating
- iv. Dilation of pupil
- v. Constriction of tracheoles

- a) i, iii, iv & v
- b) i, ii, & v

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- c) ii, iii & iv
- d) iii, iv & v

Q.40. If a tissue is consuming 50 molecules of O_2 and releasing 70 molecules of CO_2 , then the substrate being utilized in cellular respiration is;

- a) glucose
- b) fatty acid
- c) amino acid
- d) organic acid

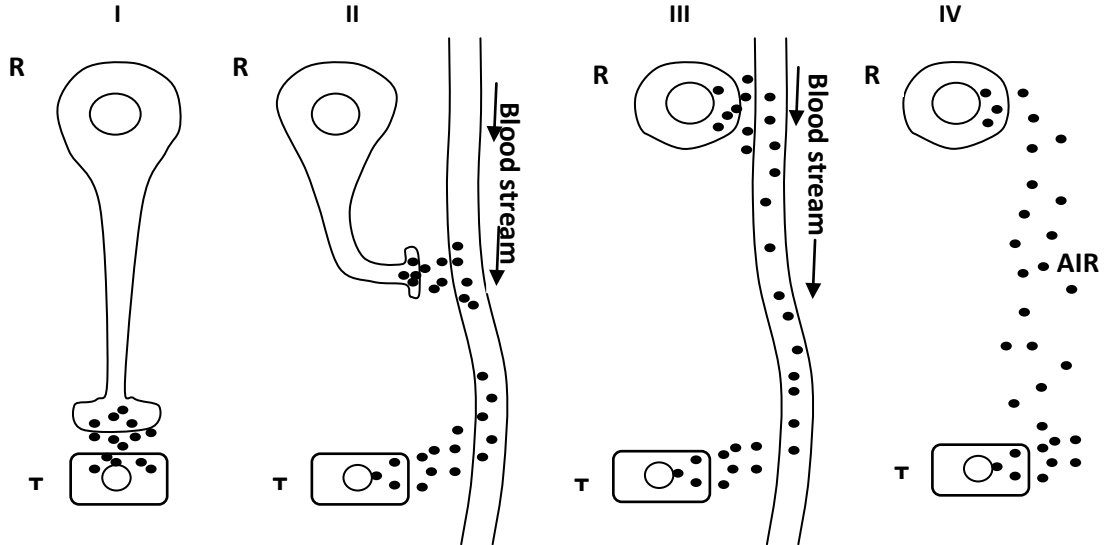
Q.41. Sclerides are the sclerenchyma cells with very thick secondary wall deposits and provide mechanical support. In which of the following plant organs one would expect to find abundant sclerides?

- a) Underground tuberous roots.
- b) Leaves of floating hydrophyte.
- c) Flower petals of mesophytes.
- d) Petioles of xerophytic plant.

Q.42. Which of the following animals has blood as circulating medium?

- a) Cockroach
- b) Mussel
- c) Leech
- d) Planaria

Q.43. Four types of chemical messengers (Black Dots) released from the regulator cell (R) to the target cell (T) are depicted in I, II, III and IV.



Match I, II, III and IV sequentially with i) Steroid Hormone, ii) Pheromones, iii) Neurohormone iv) Neurotransmitter and choose the correct option.

- a) iv, iii, ii, i
- b) iv, iii, i, ii
- c) i, ii, iii, iv
- d) iii, iv, i, ii

Q.44. Which of the following assist in the locomotion of earthworm?

- i. Muscles in the body wall
- ii. Coelomic fluid
- iii. Septa
- iv. Setae

- a) i, ii, iii and iv
- b) Only i, ii and iv
- c) Only ii, iii and iv
- d) Only i and iv

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- Q.45. The carbon atom (C) is one of the most important atoms in biological molecules. Several properties of this atom make it suitable for life on earth. Which of the following statements are true?
- Carbon-carbon bond energy is higher than the energy of visible spectrum of light.
 - Carbon-nitrogen bonds can be broken by UV light spontaneously.
 - Each hydrogen bond in water is stronger than the carbon-carbon covalent bond.
 - Carbon-hydrogen bond can be broken by infra red light spontaneously.
- i & ii
 - i & iii
 - ii & iv
 - i, ii & iv
- Q.46. Despite the lack of pressure, blood moves towards the heart in veins due to the :
- wider bore.
 - suction created due to pumping by heart.
 - narrow bores of efferent capillaries.
 - presence of valves preventing back flow.
- Q.47. In principle, longest Henle's loop should be found in the nephrons of desert dwelling mammal feeding mainly on :
- succulent cactus
 - fleshy fruits
 - leathery leaves
 - seeds
- Q.48. A littoral gastropod will have thickest shell when it is located at the :
- high tide marks on a rock beach.
 - greatest depth in a sand beach.
 - low tide marks on a mud beach.
 - bottom of a rock pool.
- Q.49. Correct arrangement of the following in increasing size is :
- Width of biological membrane.
 - Diameter of *E. coli* DNA.
 - Human ribosome.

- iv. Length of *E. coli* DNA.
- v. Diameter of human liver cell.

- a) i, iii, ii, iv, v
- b) ii, i, iii, v, iv
- c) i, iii, v, ii, iv
- d) ii, iii, i, iv, v

Q.50. Mark the correct option that shows highest to lowest % resorption of substances from nephron:

- a) Water > Sodium > Urea
- b) Glucose > Water > Urea
- c) Water > Urea > Glucose
- d) Urea > Glucose > Sodium

Q.51. Which of the following statements about human disorders caused by different organelles is true?

- a) Peroxisomal disorders are due to mutations in nuclear genes.
- b) Mitochondrial disorders are always due to mutations in maternally inherited mitochondrial genes.
- c) Person can suffer from lysosomal storage diseases even if lysosomal hydrolases are synthesized in sufficient quantities.
- d) Inefficient recycling of long chain fatty acids is likely to be a result of mitochondrial disorder.

Q.52. Three types of mutations are listed below:

- i. Chromosomal mutation
- ii. Gene mutation
- iii. Somatic mutation

Which of the following statements describe them correctly?

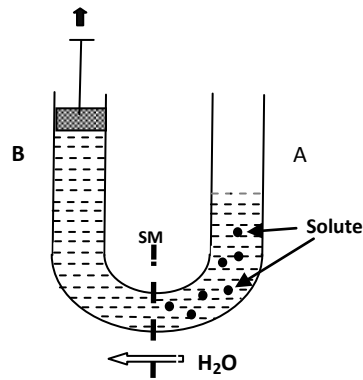
- a) i & ii both describe the same phenomenon.
- b) iii will always result in abnormal cell growth leading to cancer.
- c) Only gene mutation can alter the DNA sequence.
- d) Gene duplication is a type of chromosomal mutation.

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- Q.53. Which of the following statements about plasmids is true?
- a) Plasmids are genetically indispensable for host cells in the absence of a selection pressure.
 - b) Some plasmids have the ability to transfer themselves physically from one cell to another.
 - c) Plasmids are naked DNA molecules capable of survival outside a living cell.
 - d) Plasmids do not depend on host enzymatic machinery for their replication.
- Q.54. Filtration rate through kidneys is dependent on the filtration pressure. This in turn depends on the following three factors:
- I. Glomerular blood hydrostatic pressure
 - II. Capsular hydrostatic pressure
 - III. Blood colloid osmotic pressure
- The net filtration pressure will be:
- a) $I + II + III$
 - b) $I - (II + III)$
 - c) $(I + III) - II$
 - d) $II - (I + III)$
- Q.55. Which one of the following is **incorrect** statement about 'Cell surface to volume ratio concept'?
- a) Greater the cell volume, more will be the cytoplasmic content.
 - b) Greater the surface area, rapid will be the exchange of substances
 - c) Greater the cell volume, lesser will be the amount of wastes produced
 - d) As the cell increases in size, volume increases more rapidly than its surface area.
- Q.56. In a population of a species with 500 gene loci, half the loci are fixed. In the remaining, there are two alleles at each locus. How many alleles are there in the gene pool?
- a) 500
 - b) 750
 - c) 250
 - d) 550

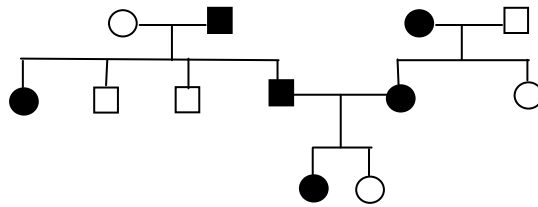
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Q.57. Observe the given diagram and select the possible reason for the movement of water through the Semipermeable membrane (SM) separating sides A and B:



- Addition of solute reduces the water potential in side A hence water moves from A to B.
- Withdrawal of piston in side B increases water potential hence water move from A to B.
- Due to atmospheric pressure in side A, water potential becomes 0 and hence water moves from A to B.
- Withdrawal of piston in side B decreases the water potential and hence water moves from A to B.

Q.58. The following pedigree traces the trait called achondroplasia, a form of dwarfism. Which of the following hypothesis can be supported by given pedigree?



- The trait is due to dominant allele.
- The trait is due to recessive allele.
- The trait is sex linked.
- Given information is not sufficient to hypothesize the situation.

Q.59. For various cellular processes, following molecules need to be transported from the site of synthesis to the site of activity.

- Nucleotides
- tRNA

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iii. Histones

iv. Deoxyribose sugar

Which molecules from the above are transported from cytoplasm to nucleus?

- a) i and ii
- b) i and iii
- c) ii and iv
- d) i and iv

Q.60. Some honey bee strains make a practice of removing the carcasses of dead larvae from their nests. This hygienic behaviour seems to be under the control of two recessive genes - uncapping the larval cells (U or u) and removing the carcass (R or r). Which of the following bees are non hygienic, but will remove dead pupae if cells are uncapped?

- a) UuRr
- b) uuRr
- c) Uurr
- d) uurr

Q.61. Which of the following is the main criteria for distinguishing ectotherms from endotherms?

- a) The source of heat used to maintain body temperature.
- b) Body temperature being constant or variable.
- c) Amount of heat used to maintain body temperature.
- d) Amount of calories produced in body.

Q.62. The extend of tilt in the earth's rotation has **no influence** on:

- a) patterns of global climate.
- b) different seasons.
- c) periods of glacial expansion/retreat.
- d) atmospheric concentrations of gases.

Q.63. Five leaf discs of a hydrophyte were submerged in 0.2% sodium bicarbonate solution (containing a small quantity of soap) and another five discs were submerged in plain water. Which of the following will happen?

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- a) Discs in bicarbonate solution rise while those in plain water remain submerged.
- b) Discs in bicarbonate solution and in plain water, both remain submerged.
- c) Discs in plain water rise earlier than those in bicarbonate solution.
- d) Discs in bicarbonate solution and in plain water, both rise at the same time.

Q.64. A test cross of F_1 flies $+a/+b$ produces the following number of offsprings:

$++/ab$	9
ab/ab	9
$+b/ab$	41
$a+/ab$	41

What will be the distance between two genes?

- a) 82 cM (cis)
- b) 18 cM (cis)
- c) 18 cM (trans)
- d) 20 cM (cis)

Q.65. If blood of healthy human is tested after high protein meal, which of the following will **not** be observed?

- a) Considerable increase in plasma glucose level.
- b) Raised insulin level.
- c) High plasma glucagon level.
- d) Increased amino acids level.

Q.66. If the osmotic pressure of a plant system is -45 atmospheres and its turgor pressure is 9 atmospheres, find out the water potential of this osmotic system.

- a) -54 units
- b) -36 units
- c) 36 units
- d) 54 units

Q.67. Which of these statements are correct with reference to deep benthic communities in oceans?

- i. They are adapted to continuous cold.
- ii. They have accessory air-sacs to store oxygen.
- iii. The producers in benthic zone are chemoautotrophs.

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- iv. Most of the organisms in benthic zone are anaerobes.
- v. Most of the organisms in benthic zone form detritus food chain.

- a) i, ii and iii only
- b) i, iii and v only
- c) i, ii, iii, iv and v
- d) ii, iii and iv only

Q.68. Following sequence of RNA, when translated will form a protein molecule of _____ amino acids.

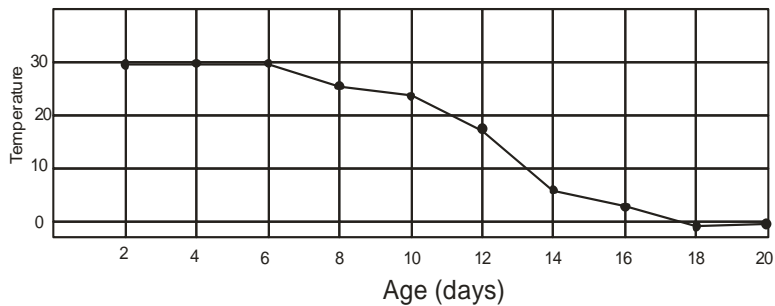
5' GCUCGCAUGCCAGAUGUCUUCGUCCUUUAGUUUAUUAGA 3'

- a) 3
- b) 7
- c) 6
- d) 9

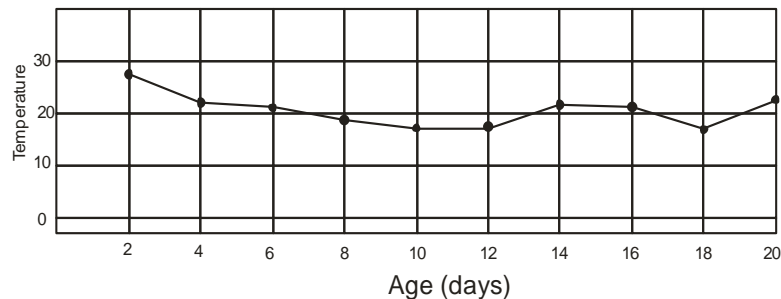
Q.69. A white footed mouse '*Peromyscus leucopus*', a common rodent of South America can maintain core body temperature near 37°C even if the air temperature is below 0°C. This capacity gradually increases from birth to adulthood. Which graph correctly depicts ability of isolated individual animals to thermoregulate during their developmental stages?

Note: Y axis depicts the temperature at which the animal can thermoregulate.

a.

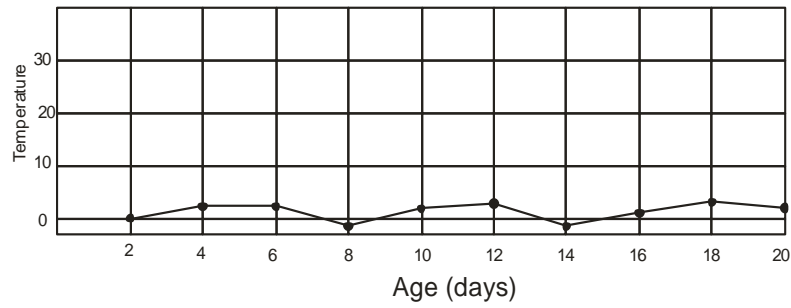


b.

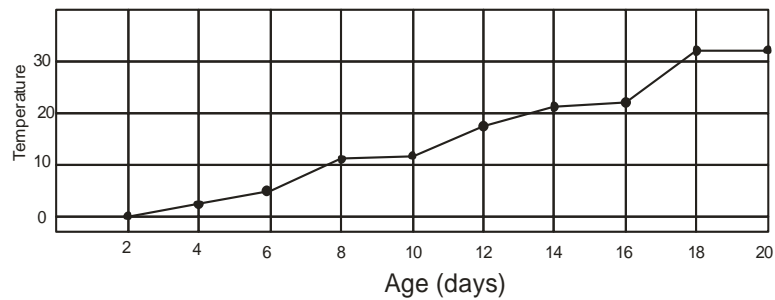


B221

c.

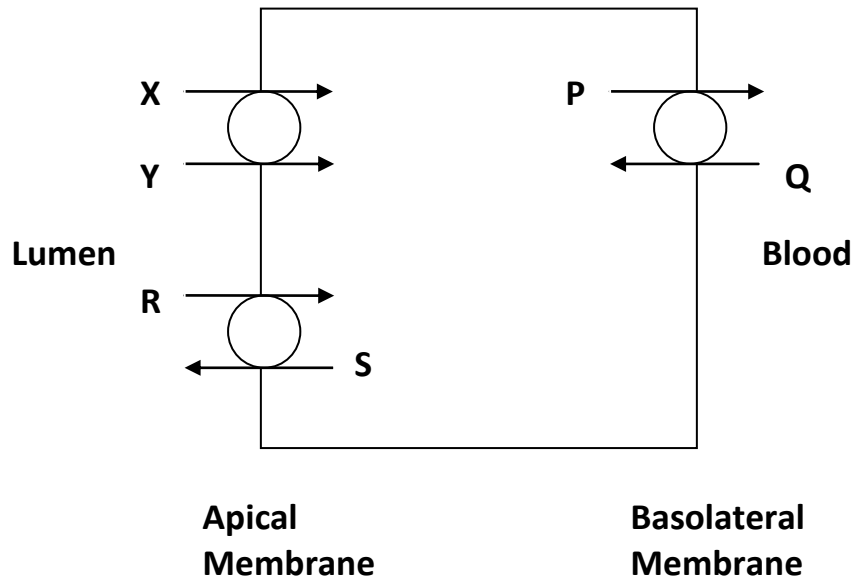


d.



- Q.70. In the famous example showing change in the gene frequencies through Industrial melanism, the increase in the number of black peppered moth in soot covered area is due to:
- a) pre-existing mutation
 - b) genetic drift
 - c) genetic bottleneck effect
 - d) migration

Q.71. A few transporters present in cell's proximal convoluted tubules of nephron are shown. Mark the option that correctly depicts the substances transported.



- a) X: glucose, Y: H^+
- b) R: Na^+ , S: H^+
- c) P: Na^+ , Q: HCO_3^-
- d) P: K^+ , Q: H_2O

Q.72. In male sex organs, primary spermatocyte cells undergo meiotic division to form spermatids. Consider a hypothetical situation where non-disjunction of sex chromosomes occurs in all primary spermatocytes during sperm formation. In such case, what all types of sperms will be formed?

- a) X, Y, O, XY
- b) O, XY only
- c) X, Y, XX, YY
- d) O, XY, XX, YY

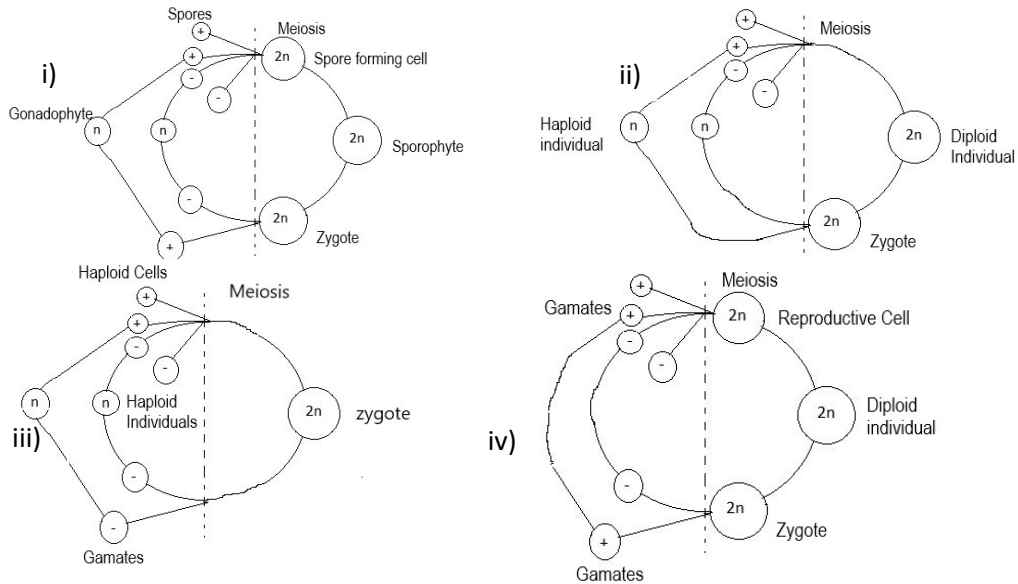
Q.73. Esha found a small dead organism on sea shore. She brought it in lab and observed it carefully with magnifying lens. She could identify it as some kind of annelid. Which of the following character(s) must have led her to this conclusion?

- i. Segmented body.
- ii. Absence of clitellum.

- iii. Presence of parapodia.
- iv. Absence of suckers at mouth region.
- v. Bilateral symmetry.

- a) ii and iv
- b) i, iii and v
- c) only iii
- d) i, ii and iv

Q.74. Which of the following diagrams represent eukaryotic life cycle?



- a) i and ii only
- b) ii, iii and iv only
- c) i, iii and iv only
- d) i, ii, iii and iv

Q.75. Consider four different striated muscles M1, M2, M3 and M4 of varying lengths L1, L2, L3 and L4. All these muscles have fibers running parallel to their longitudinal axis. Muscles M1, M2 and M4 have similar area of cross section while M3 has double than others. If $L2 = L3$, $2 \cdot L3 = L4$ and $L1 = \frac{3}{4} L2$, the maximum force produced by a muscle will be greater in:

- a) M1
- b) M2
- c) M3
- d) M4

Q.76. A student designs an experiment to check whether rats have UV vision.

Design I: Food is kept in a closed room with only UV light and rat is let in. The rat goes towards the food.

Design II: A wooden model of a predator is kept in a closed room with only UV light and rat is let in. The rat tries to run away.

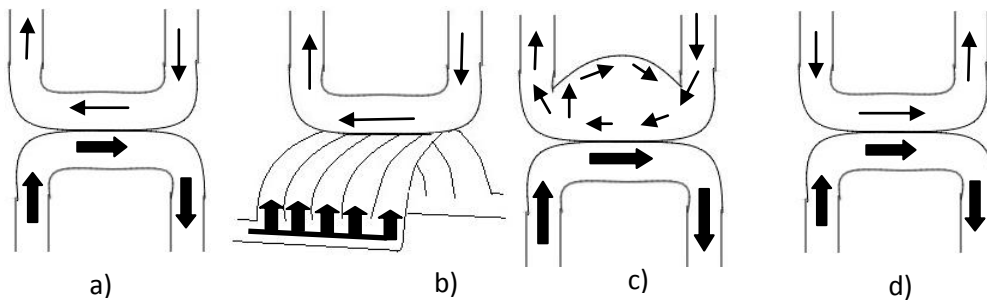
Design III: A female rat is kept in a closed room with only UV light and a male rat is let in. The male rat chases the female.

Which of the above experiments can conclusively give information about the rat's vision in UV spectrum?

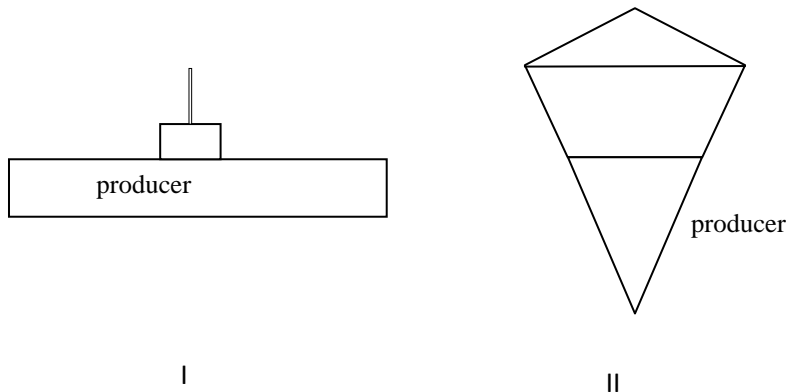
- a) Design I only
- b) Design II only
- c) Design I and II only
- d) Design I, II and III.

Q.77. The gas transfer system found in Aves is represented in following figures:

(Bold arrows represent blood flow while thin arrows represent air flow through respiratory system.) The correct representation is in the figure:

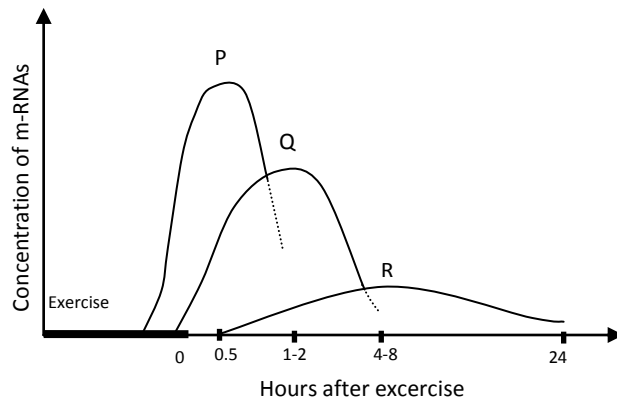


Q.78. Two ecological pyramids (I and II) are shown. Mark the correct statement that describes them.



- a) I is a biomass pyramid while II is a number pyramid.
- b) I is likely to represent rain forest while II represents desert ecosystem.
- c) I is biomass pyramid of a grassland and II is number pyramid of oceanic ecosystem.
- d) I is an energy pyramid of rain forest and II is biomass pyramid of host and parasite.

Q.79. In an experiment, a person was subjected to perform 90 minutes leg extension exercise once a day for five days. Every day only the left leg was exercised while other was kept at rest. On the fifth day, concentrations of different mRNAs were measured from muscles of both legs, towards the end of the exercise session. Three major types of mRNAs, P, Q and R were found to show distinct variations in levels:



The following are the possible genes from which these mRNAs are synthesised;

- I : Gene responsible to initiate cell division
- II: Stress response gene
- III: Mitochondrial protein synthesis gene
- IV: Metabolic priority gene

P, Q and R respectively must be for mRNAs of :

- a) II, IV and III
- b) I, II, and IV
- c) II, IV and I
- d) IV, II and I

Q.80. In the following diagram distribution of 4 species of plants (P, Q, R and S) along length of a geographical unit has been depicted. Which among them would best represent vegetation across a cliff?

