

**INDIAN ASSOCIATION OF PHYSICS TEACHERS
NATIONAL STANDARD EXAMINATION IN BIOLOGY 2014 -15**

Date of Examination: 23rd November, 2014

Time: 1500 to 1700 Hrs

Q. Paper Code: B344

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. 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 ☒ b ☐ c ☐ d

6. A correct answer carries 3 marks whereas 1 mark will be deducted for each wrong answer.
7. Any rough work should be done only in the space provided.
8. Use of **non-programmable** calculator is allowed.
9. No candidate should leave the examination hall before the completion of the examination.
10. 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.

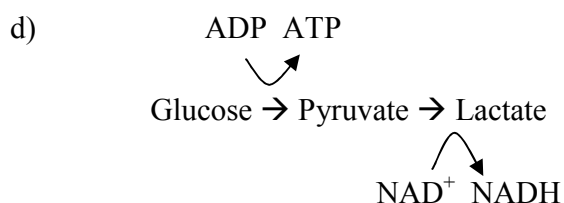
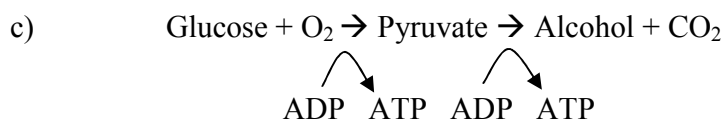
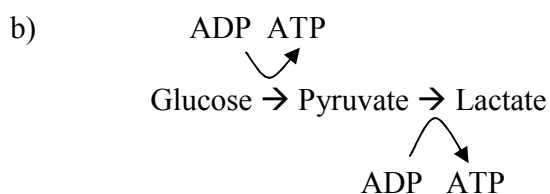
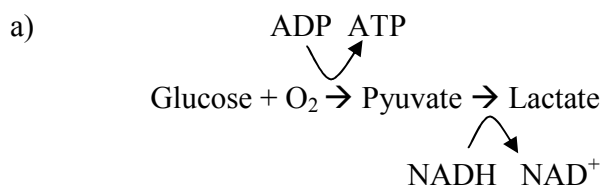
DO NOT WRITE ON THE BACK SIDE OF THE ANSWER SHEET.

Instructions to Candidates (continued)–

Read the following instructions after submitting the answer sheet.

11. Comments regarding this question paper, if any, may be sent by email only to iaptpune@gmail.com till 25th November, 2014.
12. The answers/solutions to this question paper will be available on our website – www.iapt.org.in by 3rd December, 2014.
13. **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
14. Result sheets and the “Centre Top 10%” certificates will be dispatched to the Prof-in-charge of the centre by January, 2015.
15. 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, 2014. See the **Eligibility Clause** in the Student’s brochure on our website.
16. Students eligible for the INO Examination on the basis of selection criteria mentioned in Student’s brochure will be informed accordingly.
17. Gold medals will be awarded to TOP 35 students in the entire process.

1. Ribosomes are found in and/or attached to:
 - a) cytoplasm, mitochondria, nucleus, rough endoplasmic reticulum, smooth endoplasmic reticulum
 - b) cytoplasm, mitochondria, rough endoplasmic reticulum, smooth endoplasmic reticulum
 - c) cytoplasm, mitochondria, rough endoplasmic reticulum
 - d) cytoplasm, nucleus, rough endoplasmic reticulum
2. A living, colorless, unstained organism can be best viewed using:
 - a) bright-field light microscope.
 - b) dark-field light microscope.
 - c) fluorescent microscope.
 - d) scanning electron microscope.
3. Which of the following reactions correctly depicts steps involved in respiration?

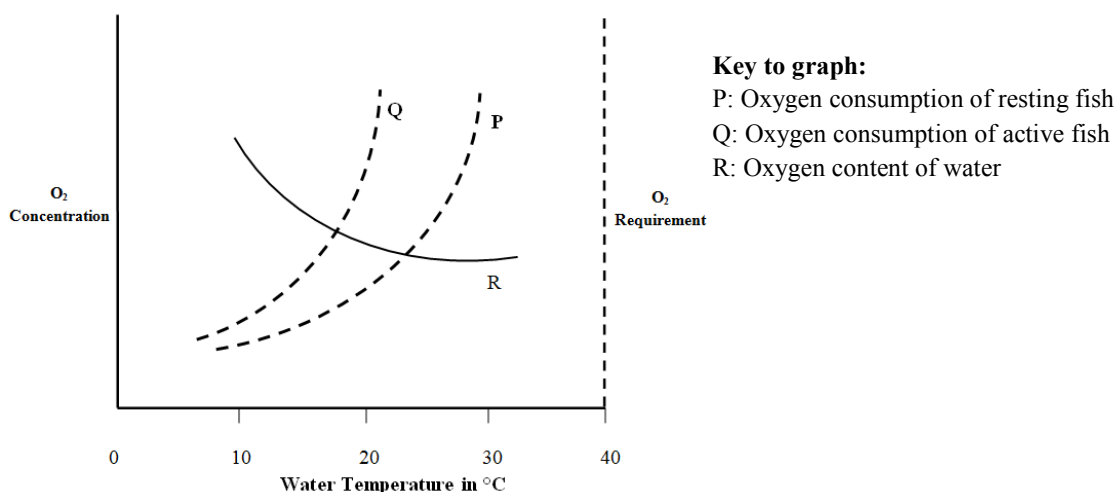


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4. A germinal cell has 10 chromosomes when it enters the gamete formation phase. What will be the number of chromosomes and chromatids in it during Metaphase-II of meiosis?
 - a) 20 & 20
 - b) 10 & 20
 - c) 10 & 10
 - d) 5 & 10
5. Gibberellins are known to break seed dormancy in cereal seeds. This dormancy break is due to the activity of:
 - a) protease
 - b) lipase
 - c) α -amylase
 - d) cellulase
6. Following are the lengths of processed m-RNA molecules. Which of them can produce a polypeptide composed of 15 amino acids?
 - a) 45 bases
 - b) 48 bases
 - c) 57 bases
 - d) 167 bases
7. Which of the following is not a hormone but acts like one in enhancing the uptake of calcium from food and preventing loss of calcium in urine?
 - a) Vitamin D
 - b) Prostaglandins
 - c) Reduced glutathione
 - d) Cytochrome P450
8. In an experiment, when an amoeba was transferred from container A to container B, the activity of contractile vacuole increased. However, the vacuole activity decreased when the amoeba was transferred back to container A. The containers A and B respectively contain:
 - a) fresh and marine water.
 - b) marine and fresh water.
 - c) dilute HCl and distilled water.
 - d) distilled water and dilute HCl.

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9. If a double stranded DNA has 20% of cytosine, the percent of adenine in the DNA would be:
- 20%
 - 30%
 - 40%
 - 50%
10. Damage to the right parietal lobe of human brain causes a condition called Contralateral Neglect Syndrome. In this syndrome the person:
- tends to ignore stimuli from the left side of the body.
 - tends to ignore stimuli from the right side of the body.
 - is not able to co-ordinate between the stimuli from the right and left sides of the body.
 - shows more sensitivity towards the stimuli from the left side of the body.
11. In an ecosystem, keystone species are:
- species that are predatory in nature.
 - species that exert influence out-of-proportion to its abundance.
 - species that decrease the flow of energy through ecosystems.
 - species that create an abundance in species-richness of that ecosystem.
12. Which of the following statements can be deduced from the graph?
- Fish need more O_2 when water is warmer.
 - Warm water carries less O_2 than cold water.
 - An active fish uses more O_2 than an inactive fish.
 - Fish prefers cooler water for feeding.

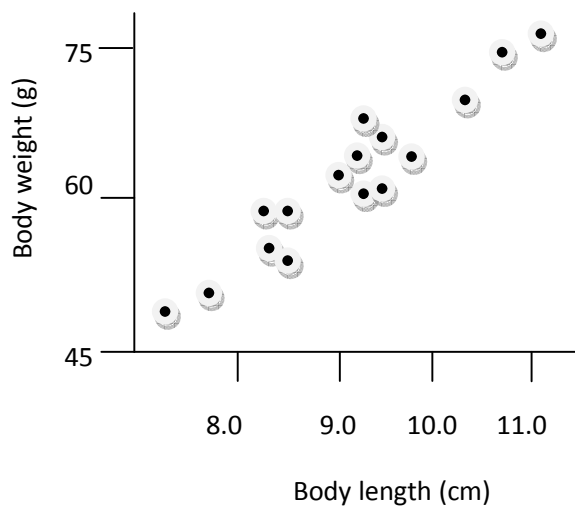


- a) i, ii, iii and iv
- b) i and ii only
- c) i, ii and iii only
- d) Only i

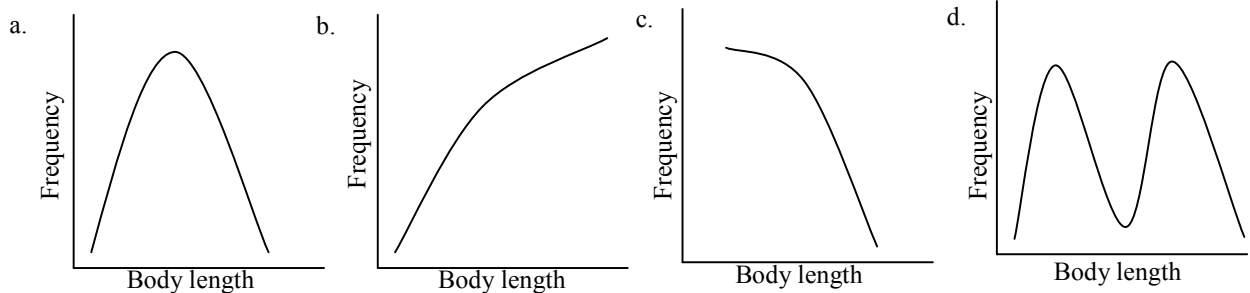
13. The distances between genes W, X, Y and Z on a chromosome are as follows: W-Y is 18 units, W-X is 26 units, W-Z is 40 units, X-Y is 8 units and X-Z is 14 units. The sequence of these genes would be:

- a) W, X, Y, Z
- b) W, Y, X, Z
- c) X, Y, W, Z
- d) Y, W, X, Z

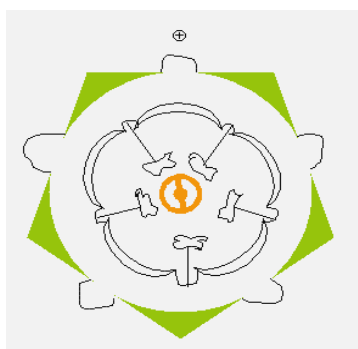
14. A sample of sunfish population was studied for two parameters namely body length and weight. The following graph was obtained.



If the data is converted into a frequency polygon to study the distribution of body lengths, the pattern obtained would be:



15. Under which of the following circumstances, will there be a temporary shift from non-cyclic to cyclic electron flow during light reaction of photosynthesis?
- Rise in level of NADPH_2
 - Absence of PS II
 - $[\text{Chlorophyll-a}] < [\text{Chlorophyll-b}]$
 - Rise in level of ATP
16. A researcher treats cells with a chemical that blocks DNA synthesis. This treatment would arrest the cells in which phase of the cell cycle?
- G1 phase
 - S phase
 - Metaphase
 - Anaphase
17. There are 10 flowers in one individual plant of *Solanum*. Each microsporangium of every stamen contains 25 microspore mother cells. How many microspores would be formed from this plant?
- 4,000
 - 5,000
 - 10,000
 - 20,000
18. Which of the following statements is correct with reference to the accompanying floral diagram?

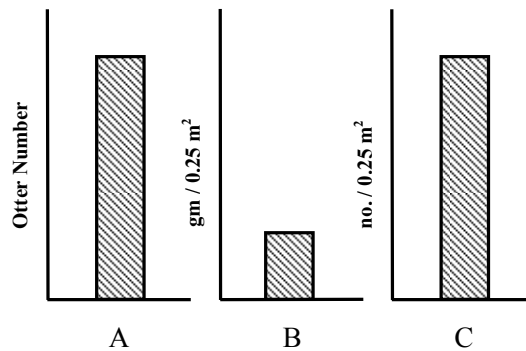


- There is adhesion between corolla and androecium.
- Calyx as well as corolla have imbricate aestivation.
- The flower is bracteate.
- Placentation is parietal.

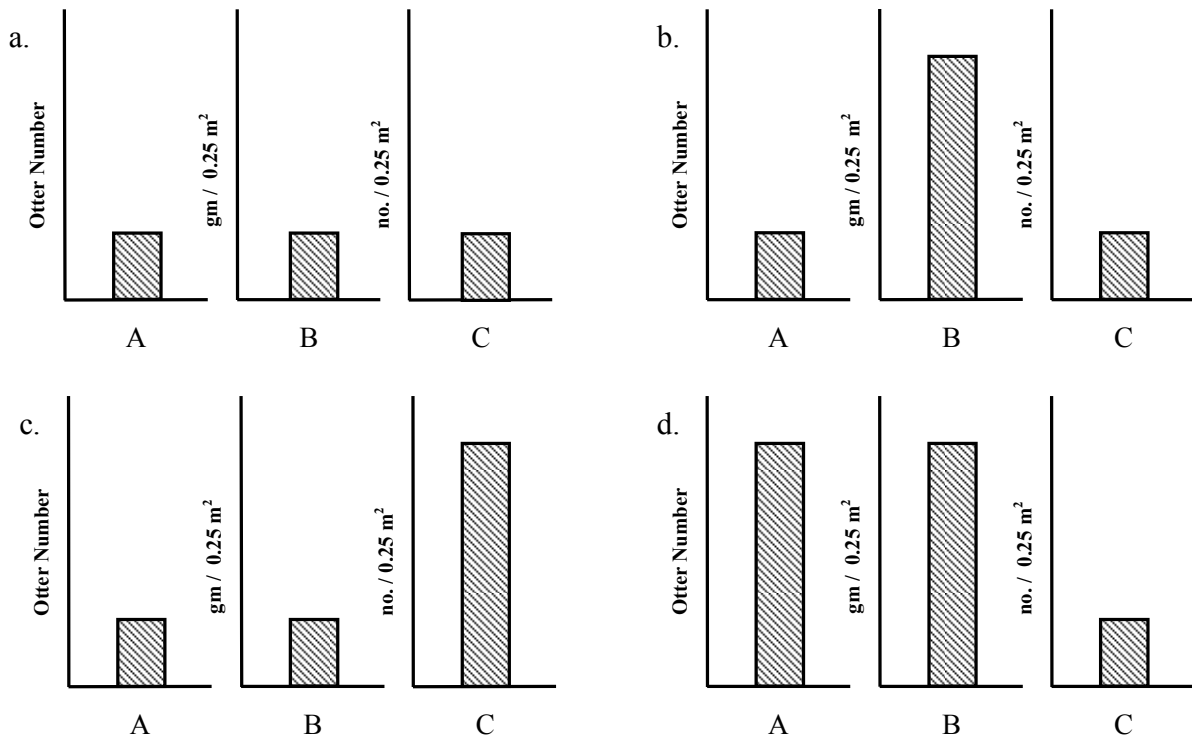
19. A variety of pea plant with round yellow seeds and violet flowers ($RRYYCC$) was crossed with a plant having wrinkled green seeds and white flowers ($rryycc$). The frequency of plants with genotype $RrYyCc$ in the F_2 generation would be:
- $1/2$
 - $1/8$
 - $27/64$
 - $9/64$
20. In *Drosophila*, the yellow gene (y) and white gene (w) showed 1.3% recombination while white (w) and miniature wing gene (m) showed 37.2% recombinations. This indicates that:
- w and m are on different chromosomes.
 - w and m are closer than w and y .
 - w and y are on the same chromosome while m is on a different chromosome.
 - w and y are closer than w and m .
21. A few statements regarding viruses are made.
- They are the simplest unicellular organisms.
 - They contain ribose or deoxyribose nucleic acid enclosed in a protein coat.
 - They are the most primitive organisms.
 - They exhibit inheritance of characters and can undergo mutations.
- Which of the statements are correct?
- i, iii and iv
 - i and iii only
 - ii and iv only
 - i, ii and iii only
22. Exobiologists analyzed samples of certain microorganisms collected from space. They noticed 34 types of amino acids in their proteins. However, their nucleic acids were composed of the same four nitrogenous bases as that found on the Earth. Each codon of these organisms is expected to have:
- 2 nucleotides
 - 3 nucleotides
 - 4 nucleotides
 - 6 nucleotides
23. A food chain consisting of kelps → sea urchin → sea otters in the large areas off the coast of Western Alaska was being studied. The graph depicting the sea otter

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abundance (A), sea urchin biomass (B) and kelp density (C) for the habitat in the year 1985 is depicted below.



An increase in the number of killer whale species in the area by the year 1997 would result in which of the following?



24. Reproductive barriers are mechanisms which help maintain species over time. Three examples of reproductive barriers in certain species are given below:

A: Two species of garter snakes occur in the same area but one lives in water while the other is terrestrial.

B: Some Salamander subspecies of genus *Ensatina* live in the same region and occasionally hybridize resulting in frail individuals in the next generation.

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C: Blue-footed boobies (a type of bird) mate only after a courtship display wherein the male draws the female's attention to its bright blue feet.

Indicate whether these are examples of pre-zygotic or post-zygotic reproductive barriers.

- | | | |
|--------------------|-----------------|-----------------|
| a) A: Pre-zygotic | B: Pre-zygotic | C: Pre-zygotic |
| b) A: Post-zygotic | B: Post-zygotic | C: Pre-zygotic |
| c) A: Pre-zygotic | B: Pre-zygotic | C: Post-zygotic |
| d) A: Pre-zygotic | B: Post-zygotic | C: Pre-zygotic |

25. Melting of DNA is the process of separation of the complementary strands by heating. Which of the following DNA molecules would melt at the lowest temperature?

- a) GGACGGCTACCGG
CCTGCCGATGGCC
- b) CTACCGCGCTTCGG
GATGGCGCGAAGCC
- c) ATGGAATTCTTACT
TACCTTAAGAATGA
- d) GGGTCGGAACCCGT
CCCAGCCTTGGGCA

26. In a frog leaping frantically to escape a predator, which of the following modes of respiration is likely to occur?

- i. Cutaneous
 - ii. Buccal
 - iii. Pulmonary
- a) i, ii & iii
 - b) ii & iii only
 - c) i & ii only
 - d) i & iii only

27. Many varieties of ants are engaged in fungus gardening. This helps them in:

- a) devouring fungal biomass.
- b) cultivating fruiting bodies of fungi as food.
- c) fermenting leaves into products they can devour.
- d) developing toxins to fight enemies.

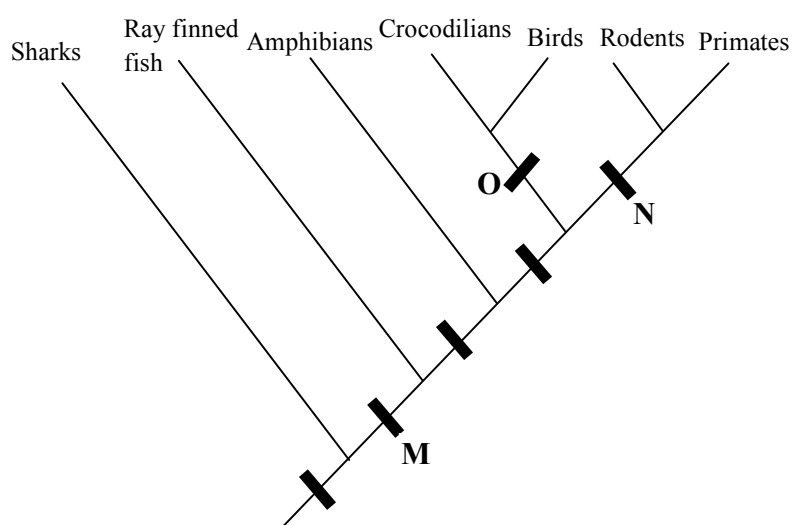
28. Which of the following have a positive influence on the rate of speciation?

- i. Species richness of habitat
- ii. Heterogeneity of habitats

iii. Long generation time

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

29. Classification of a few animals is shown in the cladogram. The characters M, N and O respectively represent:



- a) vertebrae, sweat glands, amniotic egg.
- b) bony skeleton, hair, eggs with shell.
- c) vertebrae, amniotic egg, feathers.
- d) notochord, four legs, amniotic eggs.

30. Babita made squash preparation of body portion of a specimen. When observed under microscope, the preparation showed cnidocytes. The specimen must be:

- a) sponge
- b) mollusc
- c) coelenterate
- d) annelid

31. A cross between *AabbCCDd* and *aaBBccdd* would yield offspring in the ratio of:

- a) 27:9:9:9:3:3:3:1
- b) 9:3:3:1
- c) 1:1:1:1:1:1:1:1
- d) 1:1:1:1

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32. If a bacteriophage with a lytic life cycle infects bacteria in a culture medium containing radioisotope of sulphur, the subsequent generation of the phage will have:
- a) radioactive core
 - b) radioactive coat
 - c) radioactive core and coat
 - d) no radioactivity
33. Which of the following could be generally attributed to *k*-selected species?
- i. Strong territorial behaviour
 - ii. Mass spawning behaviour
 - iii. Significant parental care
 - iv. Distinctive developmental stages after hatching
- a) i & iii
 - b) i & iv
 - c) ii & iii
 - d) ii & iv
34. Two nearby seashores A and B were compared using dominance and diversity indices. It was found that the diversity index of A was better than that of B while the dominance index of B was better than that of A. Which of the following can be true?
- a) Eutrophication has occurred at A.
 - b) Eutrophication has occurred at B.
 - c) Habitat loss could be a problem at A.
 - d) Indicator species are present at B.
35. A bare rock is exposed for colonization of life forms. The correct sequence of seres will be:
- a) Lichen, fern, moss, grass, herb
 - b) Fern, moss, grass, herb, lichen
 - c) Moss, fern, grass, lichen, herb
 - d) Lichen, moss, fern, grass, herb
36. The amount of DNA present per cell during a nuclear division is represented as a bar diagram below.

DNA content →	4C				
	2C				
	C				
		W	X	Y	Z

What phases are represented by X and Y?

- a) X- Prophase I , Y- S phase
- b) X- Prophase I , Y- Prophase II
- c) X- Metaphase II , Y- Prophase II
- d) X- Anaphase I , Y- Telophase I

37. Human red blood cells when suspended in solutions of varying osmolarities, change shape either by shrinking or swelling or do not change shape. Which of the following statements are true?

- i. They will shrink in plasma while swell in tap water.
- ii. They will shrink in sea water but swell in tap water.
- iii. They will remain unchanged in plasma but shrink in tap water
- iv. They will remain unchanged in plasma but shrink in sea water

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

38. Three clear glass bottles (A, B, C) were filled with clean, fresh, natural pond water and capped tightly. Bottle A was kept in sunlight for two hours. Bottle B was completely covered with a black paper and was incubated in dark for two hours. The oxygen content in water from bottle A and B were measured at the end of two hours (O_a and O_b respectively), while that of bottle C was measured immediately after collection (O_c). Which of the following statements is true?

- a) O_a and O_c will give an estimate of oxygen content due to gross primary production.
- b) [O_a – (O_c – O_b)] will give an estimate of oxygen content due to net primary production.
- c) [O_a – (O_b + O_c)] will give an estimate of oxygen content due to net primary production.
- d) [(O_a + O_b) - O_c] will give an estimate of oxygen content due to net primary production.

39. Sportsmen who require sustained muscular efforts for long periods of time normally undergo training to control their heart functions. The changes that occur as a result of this training would be:

- a) decreased stroke volume.
- b) increased heart rate and increased stroke volume.
- c) decreased heart rate and increased stroke volume.
- d) decreased stroke volume and increased rate of breathing.

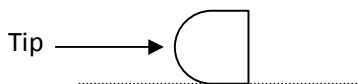
40. During DNA replication, the synthesis of the lagging strand involves the activity of following enzymes:

- i. DNA polymerase I (exonuclease)
- ii. DNA polymerase III
- iii. DNA ligase
- iv. RNA primase

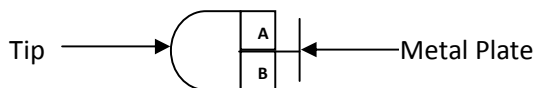
The correct order in which they act is:

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

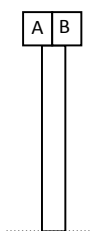
41. During the study on auxins, the coleoptile tip was cut and placed horizontally for some time.



A piece of agar block, separated into two halves by a thin metal plate, was placed in contact with it as shown in the figure below:

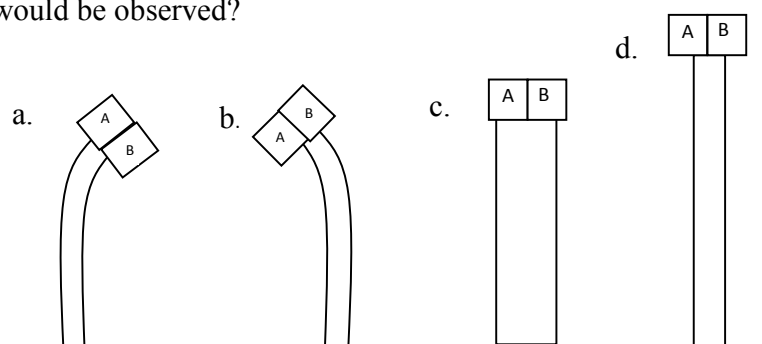


The entire block was placed on a cut shoot tip as shown below.



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What effect would be observed?



42. The path of light as it passes through the human eye would be:

- a) conjunctiva → cornea → aqueous humor → lens → vitreous humor → retina
- b) cornea → conjunctiva → vitreous chamber → lens → aqueous chamber → retina
- c) cornea → lens → conjunctiva → aqueous chamber → vitreous chamber → retina
- d) conjunctiva → lens → cornea → aqueous chamber → vitreous chamber → retina

43. A bird was found to have a long narrow curved beak, long tongue and lacked a gizzard. It could most probably be:

- a) a frugivore
- b) a scavenger
- c) a graminivore
- d) a nectarivore

44. Blue eye colour in humans is an autosomal recessive trait. Black-eyed son of a blue-eyed mother marries a blue-eyed girl. If the first child is blue-eyed; what is the probability of the second child also being blue-eyed?

- a) 0%
- b) 25%
- c) 50%
- d) 100%

45. In a graft, the stock has 40 chromosomes and the scion has 20 chromosomes. How many chromosomes would be present in the root and egg cells respectively?

- a) 20 and 10
- b) 40 and 20
- c) 10 and 40
- d) 40 and 10

46. A few statements regarding sugarcane and pineapple are given below:

- i. Sugarcane is adapted to avoid photorespiration while pineapple is not.
- ii. In both the plants, 4-carbon acid is the first stable product of photosynthesis.
- iii. Both the plants exhibit Kranz anatomy.
- iv. In sugarcane, there is spatial separation of initial CO_2 fixation and Calvin cycle, while in pineapple there is temporal separation of the two.

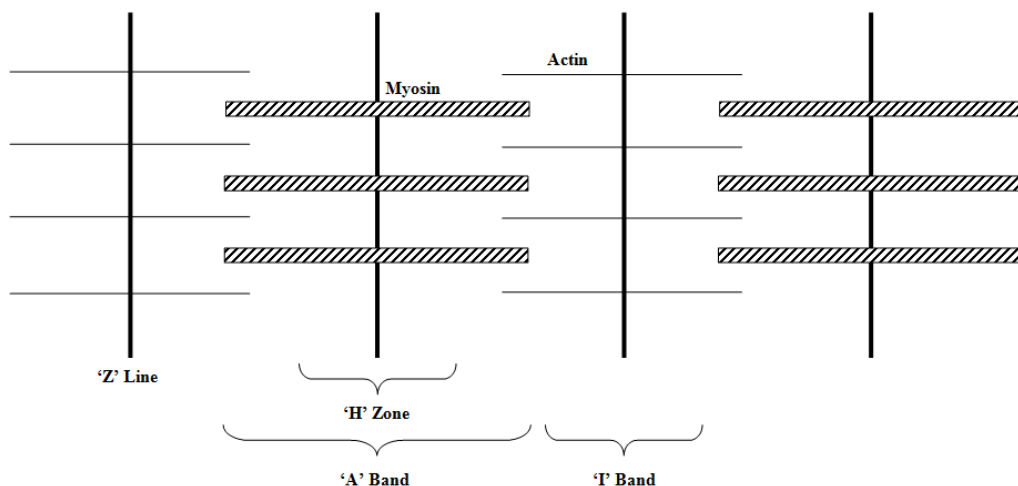
The correct statements are:

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

47. How much assimilatory power is required for the formation of 5 glucose molecules in photosynthesis?

- a) 18 ATP & 12 NADPH
- b) 12 ATP & 18 NADPH
- c) 90 ATP & 60 NADPH
- d) 60 ATP & 90 NADPH

48. A sarcomere shows characteristic striations due to particular arrangement of actin and myosin filaments. A schematic representation of sarcomere is shown below.



During muscle contraction, which of the following would disappear?

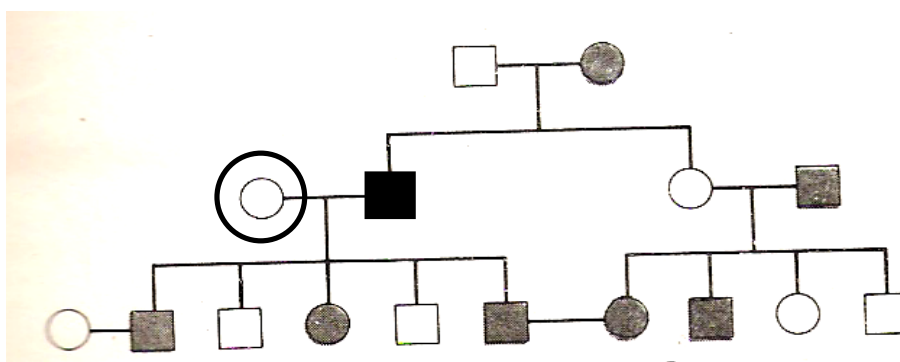
- a) I band
- b) Z line
- c) A band
- d) Actin

49. Which of the following measures can directly increase the carrying capacity of a habitat?

- i. Animals are encouraged to reduce their home ranges.
- ii. Older animals are protected from diseases by regular immunization.
- iii. Water holes are provided during summer to tackle scarcity.
- iv. Dams are built across perennial streams to store water.

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

50. The pedigree given below is for a dominant trait, caused by a gene A .



The possible genotype/s for the circled individual in the pedigree would be:

- a) AA only
- b) Aa only
- c) AA or Aa
- d) aa only

51. A patient received his medical report showing that he has higher percentage of high density lipoproteins (HDLs) and lower levels of low density lipoproteins (LDLs). This kind of lipid profile indicates that:

- a) he may be at high risk of developing atherosclerotic heart disease.
- b) there could be higher probability of blockages occurring in his arteries.
- c) he may stay fit and healthy.
- d) there could be deposition of abdominal fats.

52. A normal woman has a haemophilic son besides three normal daughters. The genotypes of the woman and her husband with respect to haemophilia would respectively be:

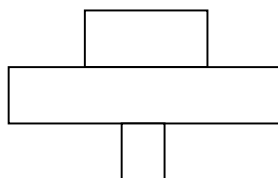
- a) XX and X^hY
- b) X^hX and X^hY
- c) X^hX^h and XY
- d) X^hX and XY

53. Data collected after survey in an evergreen forest patch was:

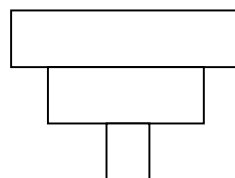
- 425 Trees
- 2,80,000 Primary consumers
- 2,05,000 Secondary consumers

Which of the following pyramid of biomass correctly represents the data?

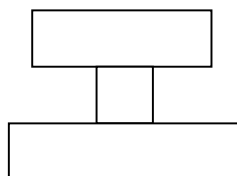
a.



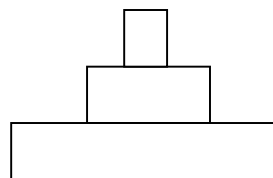
b.



c.



d.



54. Facilitated diffusion of a solute across the plasma membrane:

- a) is also known as active transport.
- b) does not require concentration gradient across the membrane.
- c) requires energy in the form of ATP.
- d) occurs through solute specific channel proteins.

55. Four couples having blood groups as shown below (i to iv) registered a claim on a baby having blood group AB surviving the fire in maternity hospital.

- i. A and B
- ii. A and O
- iii. O and O
- iv. AB and O

The couple with which blood groups must have sired the baby?

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

56. β -thalassaemia is an autosomal recessive disorder. A couple, both being carriers for this trait, decides to have children. What will be the probability that their children will also be carriers?

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

57. When a culture medium is supplemented with radio-labeled cysteine, the label appears in succession in the following cell organelles:

- a) Golgi body \rightarrow RER \rightarrow Nuclear Envelope
- b) RER \rightarrow Nuclear Envelope \rightarrow Vesicle
- c) RER \rightarrow Golgi Body \rightarrow Vesicle
- d) SER \rightarrow RER \rightarrow Golgi Body

58. What is true about the hepatic portal system?

- i. It regulates nitrogen metabolism in the body.
- ii. It drains blood from all parts of the body into the liver.
- iii. It helps in removing the toxins from the food.
- iv. It helps in regulating composition of blood.

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

59. Members of a population residing in a valley migrated to higher altitudes of a nearby mountain and over generations, adapted to the colder habitats of the mountain tops. The migrant population adaptively radiated from the parent population of the valley. This is an example of;

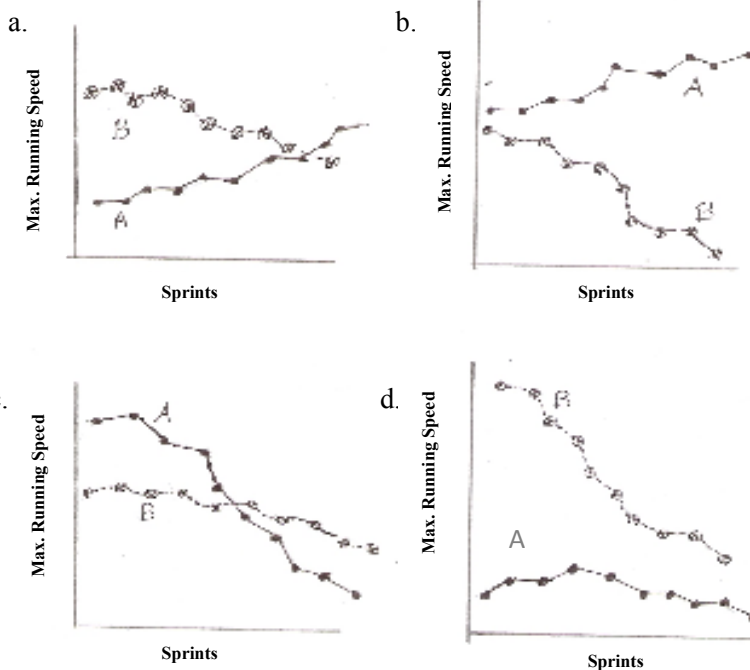
- a) Genetic drift
- b) Disruptive selection
- c) Directional selection
- d) Temporal selection

60. Which of the following plant pigments can appear in the urine of a consumer?

- i. Phycoerythrins
- ii. Carotenoids
- iii. Chlorophylls
- iv. Betalains

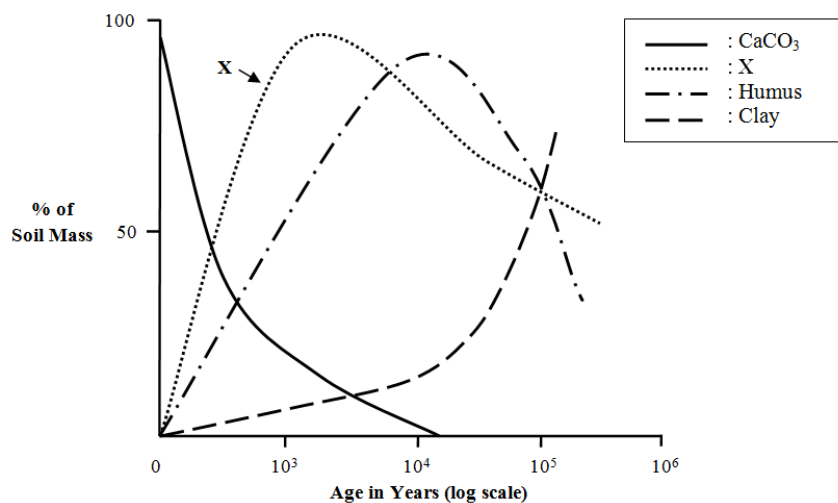
- a) i, ii, iii, & iv
- b) Only i & iv
- c) Only ii & iii
- d) Only iv

61. In an experiment, two groups of trained athletes ran 10 short sprints as fast as possible. Group A has been trained as sprinters and group B as long distance runners. Between each sprint they rested for half a minute. Which of the following graphs describes maximum running speed of both the groups correctly?



62. The accompanying diagram depicts change in certain constituents of soil expressed as percent of soil mass. The factor "X" can be:

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- a) Phosphates
- b) Nitrates
- c) Biomass
- d) Moisture

63. Carbonic anhydrase is an enzyme that accelerates the formation of carbon dioxide from carbonic acid (H_2CO_3) and is found in high concentrations inside the red blood cells. Indicate which of the following would be true for the activity levels of this enzyme in the following animals.

- a) Elephant > Man > Rat
- b) Rat > Man < Elephant
- c) Man > Elephant > Rabbit
- d) Rat > Man > Elephant

64. A few statements regarding blood circulation are made. Which of the statements is/are true?

- i. Blood flow velocity increases markedly as blood flows from arteries to arterioles.
- ii. In large land animals such as giraffe, additional pressure is required to push blood above the level of the heart.
- iii. The blood flow velocity is the highest in the capillaries.
- iv. The total cross-sectional area of the blood capillaries is the highest.

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

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65. It is observed that many stream fish such as trout exhibit positive rheotaxis i.e. they orient themselves to face an oncoming current. Which of the following statements regarding this behavior is/are correct?

- i. This is an example of learned behavior.
- ii. This behavior helps in keeping the fish from being swept away.
- iii. The behavior is under strong genetic control.
- iv. The behavior keeps the fish facing the direction from which food will come.

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

66. The table given below lists a few interactions between species and the effects that each type of interaction has on the two species involved.

Interaction	Species 1	Species 2
Commensalism	Benefits	P
Q	Benefits	Harmed
Competition	R	Harmed

A, B and C indicate:

- a) P: Harmed Q: Mutualism R: Unaffected
- b) P: Unaffected Q: Amensalism R: Harmed
- c) P: Unaffected Q: Herbivory R: Harmed
- d) P: Benefits Q: Symbiosis R: Benefits

67. A student inoculated a drop of pond water into a liquid culture medium which mainly contained extract of dry leaves. She incubated the culture bottle and microscopically observed a drop from the culture on the 2nd, 3rd and 4th day after the commencement of the experiment. The organisms that she observed on each of these days were:

- On 2nd day → mainly bacteria
- On 3rd day → mainly *Paramecia*
- On 4th day → mainly Rotifers

The domains that these organisms belong to respectively are:

- a) Eubacteria, Eubacteria, Eukaryota
- b) Archaeobacteria, Eubacteria, Eukaryota

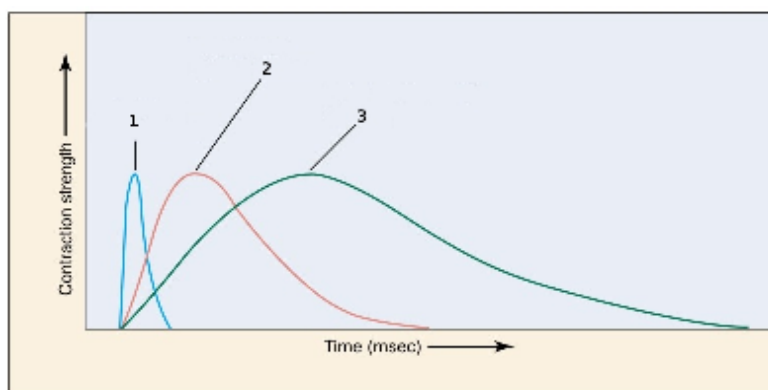
- c) Eubacteria, Eukaryota, Eubacteria
- d) Eubacteria, Eukaryota, Eukaryota

68. Production efficiency is a term used in ecology to denote the fraction of energy stored in food that is not used for respiration. The equation for production efficiency is as follows:

$$\text{Production efficiency} = \text{Net production} / \text{Total assimilation}$$

If a grasshopper which consumes leaf tissue containing 120J of energy, uses 30J for respiration and excretes out 50J in its faeces, then what would be the production efficiency?

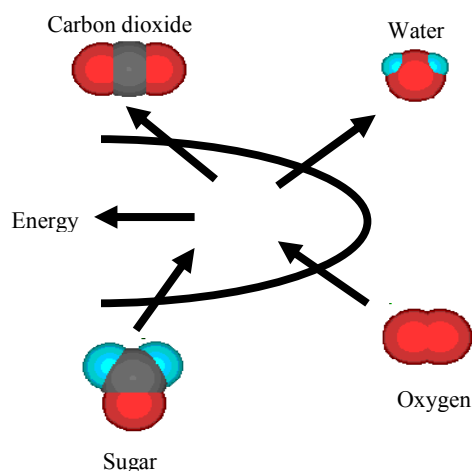
- a) 28.6%
 - b) 57.14%
 - c) 58.3%
 - d) 75%
69. If a muscle is stimulated with a single electric shock, it will quickly contract and relax in a response called a twitch. Given graph represents twitch pattern from three different muscles.



The muscle type correctly matching with the twitch type will be:

- | | | |
|--------------------------|-----------------------|-----------------------|
| a) 1: Eye muscle | 2: Calf muscle | 3: Deep muscle of leg |
| b) 1: Eye muscle | 2: Deep muscle of leg | 3: Calf muscle |
| c) 1: Deep muscle of leg | 2: Calf muscle | 3: Eye muscle |
| d) 1: Deep muscle of leg | 2: Eye muscle | 3: Calf muscle |

70. The following schematic diagram depicts the energy acquiring process in:



- a) bacterium
- b) mitochondrion
- c) chloroplast
- d) (a) and (b)

71. Which is the correct sequence of air passage in man?

- a) nasal cavity → larynx → pharynx → trachea → bronchi → bronchioles → alveoli
- b) nasal cavity → pharynx → trachea → larynx → bronchi → bronchioles → alveoli
- c) nasal cavity → larynx → bronchi → pharynx → trachea → bronchioles → alveoli
- d) nasal cavity → pharynx → larynx → trachea → bronchi → bronchioles → alveoli

72. A hydrophyte showed the presence of lance shaped (narrow with pointed ends) leaves and broader heart shaped leaves in the same plant. This plant is most likely to be:

- a) emergent hydrophyte.
- b) submerged hydrophyte.
- c) free floating hydrophyte.
- d) rooted hydrophyte with floating leaves.

73. The data for the following parameters were collected for two plants.

No.	Parameter	Plant 1	Plant 2
i.	Total leaf area (cm ²)	18.65	12.45
ii.	Total plant weight (g)	0.245	0.133
iii.	Total area of leaves per unit plant weight (cm ² /g)	76	93.7
iv.	Total area of leaves per unit weight of leaves (cm ² /g)	334	392

Which parameter/s indicate/s that plant 2 is most likely a shade plant?

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

74. The cells of the leaf tip of a plant contain sixteen chromosomes. Each cell of the pollen tetrad of such a plant would contain:

- a) 4 chromosomes
- b) 8 chromosomes
- c) 16 chromosomes
- d) 24 chromosomes

75. Counter current mechanism has **no** role to play in:

- a) Fish gills
- b) Whale fin
- c) Human lungs
- d) Penguin legs

76. A few statements regarding natural selection are made. Mark the correct one.

- a) Directional selection is represented by a bell shaped curve where majority of the individuals have values close to the average value for a trait.
- b) Disruptive selection is represented by a positively skewed curve where majority of the individuals acquire values higher than the average value for a trait.
- c) Disruptive selection is represented by bell shaped curve where very few individuals acquire values for a trait peripheral to the average value.
- d) Stabilizing selection is represented by bell shaped curve where majority of individuals acquire values close to the average value for a trait.

77. When the nucleus of a white blood cell (WBC) from blood is highly magnified under the microscope:

- a) all 46 chromosomes can be counted as WBC is a diploid cell.
- b) chromosomes cannot be counted as some blood cells are enucleated.
- c) chromosomes cannot be counted as they are in the form of reticulum.
- d) only 45 chromosomes can be counted as one of the sex chromosomes is highly condensed.

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78. Events that take place in eutrophication are listed below:

- i. Excessive growth of aquatic vegetation.
- ii. Depletion of dissolved O_2 .
- iii. Bacteria feed on dead vegetation.
- iv. Aquatic ecosystem becomes rich in phosphates.

The correct order in which these events occur is:

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

79. Which of the following can be termed as 'temporary endocrine gland'?

- a) Pineal gland
- b) Thymus
- c) Placenta
- d) Kidney

80. Identify the example/s of plants in which chloroplasts transform into chromoplasts.

- a) Tomato
- b) Beet root
- c) Lady finger
- d) Cotton

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