

**INDIAN ASSOCIATION OF PHYSICS TEACHERS**  
**NATIONAL STANDARD EXAMINATION IN BIOLOGY 2016 -17**

Date of Examination: 27<sup>TH</sup> November, 2016

Time: 1330 to 1530 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.*

12. Comments regarding this question paper, if any, may be sent by email only to [iapt.nse@gmail.com](mailto:iapt.nse@gmail.com) till 29<sup>th</sup> November, 2016.
13. The answers/solutions to this question paper will be available on our website – [www.iapt.org.in](http://www.iapt.org.in) by 2<sup>nd</sup> December, 2016.
14. **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

15. 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, 2017.
16. List of students (with centre number and roll number only) having score above MAS will be displayed on our website ([www.iapt.org.in](http://www.iapt.org.in)) by 22<sup>nd</sup> December, 2016. See the **Eligibility Clause** in the Student’s brochure on our website.
17. Students eligible for the INO Examination on the basis of selection criteria mentioned in Student’s brochure will be informed accordingly.

## ***Indian Association of Physics Teachers***

### **NATIONAL STANDARD EXAMINATION IN BIOLOGY 2016-2017**

**Total time: 120 minutes**

**Marks: 240**

***Only one out of four options is correct***

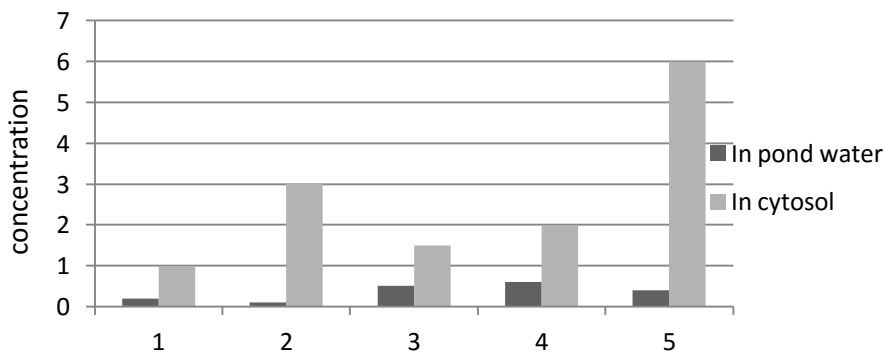
- 1) Though the earliest evolved life forms were anaerobic, there was an eventual predominance of aerobes on earth. Which of the following is the most likely reason for it?
  - a) Evolution of mitochondria and eukaryotic organization.
  - b) Evolution of photosynthetic organisms.
  - c) Evolution of heterotrophic organisms.
  - d) Evolution of terrestrial organisms.
  
- 2) Colonization of land by plants was associated with the evolution of structures to obtain water and to minimize water loss. Which of the following adaptations are associated with the latter?
  - i. Development of epidermis with waxy cuticle.
  - ii. Development of stomata with elaborate opening and closing mechanism.
  - iii. Development of bark on old stem and roots.

a) i and ii only    b) i only    c) ii and iii only    d) i, ii and iii
  
- 3) Fats and oils are the most preferred reserved foods. Choose the correct combination of statements given below to support this:
  - i. They have density lower than most other molecules in a cell.
  - ii. Their complete oxidation release energy greater than other organic polymers.
  - iii. Being hydrophobic they get clustered and use lesser space for storage.
  - iv. Being heteropolymeric they are the most convenient storage foods.

a) ii & iii                  b) i & ii                  c) i & iv                  d) iii & iv
  
- 4) The secondary structure of proteins mainly owes to the amino acids that have:
  - a) sulfhydryl group                  b) aromatic group
  - c) alkaline side chain                  d) acidic side chain
  
- 5) Which combination of statements correctly relates to the stress exerted by excess of sodium chloride in the soil on the plants?
  - i. Salt lowers the water potential of soil.
  - ii. Salt lowers the pH of soil.
  - iii. Excess sodium ions exert a toxic influence.
  - iv. Root hair cells impede the uptake of harmful ions, in turn reducing the uptake of water.
  - v. Organic contents of root hair cells make the water potential less negative than that of soil.

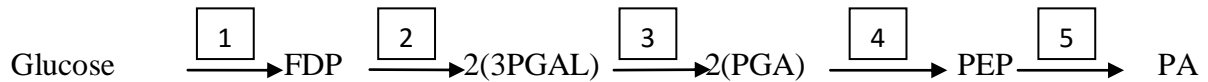
a) i, iii and v    b) ii, iv and v    c) i, iii, and iv    d) ii, iii, and iv

- 6) A male English Robin attacks a bundle of red feathers placed in its territory but ignores a stuffed non-red juvenile. This is an example of:
- i) Fixed action pattern    ii) Learned behaviour    iii) Learned behaviour  
 iv) Reflex action pattern    v) Cognitive behavior
- a) i only    b) i & ii only    c) i & iv only    d) only iii
- 7) A few examples of transport across cell membranes are listed below. Which of them occurs by direct passive diffusion?
- a) Movement of oxygen molecules into cells.  
 b) Movement of sodium ions against its concentration gradient.  
 c) Uptake of cholesterol by cells.  
 d) Secretion of mucus by cells.
- 8) The interaction between actin and myosin generates the force for all of the following **except**:
- a) Cytoplasmic streaming in a cell of *Chara*.  
 b) Wriggling movement of an earthworm.  
 c) Closure of leaflets of “touch-me-not” plant.  
 d) Swallowing of food in man.
- 9) Which of the cellular organelles mentioned below have to import all the proteins they contain?
- a) Nucleus    b) Lysosomes    c) Chloroplast    d) Mitochondria
- 10) A few cells and associated entities are listed. Which of them represents the correct ascending order of the sizes relative to each other?
- a) Mitochondrion < Paramecium < Human erythrocyte < E. coli  
 b) Protein < Virus < Mitochondrion < Paramecium  
 c) Chloroplast < protein < human sperm < frog egg  
 d) Nucleus < protein < Paramecium < Chloroplast
- 11) In the accompanying figure, relative concentrations of certain ions in water and in cytosol of the green alga *Nitella* has been shown. If 5 represents  $\text{Cl}^-$ , which of the numbered bars in the figure represent  $\text{Ca}^{+2}$ ,  $\text{Mg}^{+2}$ ,  $\text{Na}^+$  and  $\text{K}^+$  respectively?



- a) 2, 3, 4 & 1    b) 1, 2, 3 & 4    c) 3, 2, 1 & 4    d) 3, 4, 1 & 2

12) The chemical transformations occurring in glycolysis can be summarized as follows:



If  $\text{NAD}^+$  is not available, the pathway will be blocked at the reaction represented by:

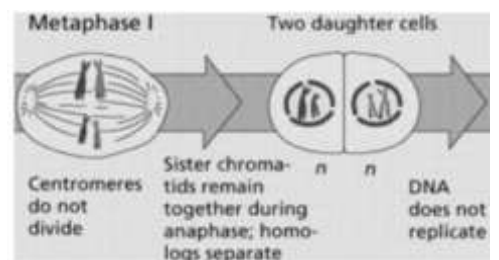
- a) 2                      b) 3                      c) 4                      d) 5
- 13) In the accompanying diagram a single set of chromosomes is found in:
- i. Germinal cell    ii. Spermatogonium            iii. Primary Spermatocyte  
iv. Secondary Spermatocyte    v. Spermatid
- a) ii, iii, iv and v      b) i, iii, iv and v      c) Only iv and v      d) Only v
- 14) Which of the following structures is not found in a prokaryotic cell
- i) Plasma membrane    ii) Ribosomes    iii) Endoplasmic reticulum    iv) Golgi bodies
- a) i and ii              b) ii only              c) iii only              d) iii and iv
- 15) Which of the following is the key compound in the intermediary metabolism of carbohydrates, lipids and proteins?
- a) PEP                      b) PGA                      c) Acetyl CoA                      d)  $\alpha$ -ketoglutarate
- 16) Denudation of habitats by which of the following events leads to the fastest secondary succession?
- a) Flood                      b) Fire                      c) Earthquake                      d) Volcanic eruption
- 17) Absence of oxygen will arrest which of the following?
- i. EMP Pathway    ii. TCA cycle    iii. Chemiosmosis coupling    iv. Lactate fermentation
- a) i, ii & iii              b) ii, iii & iv              c) Only i & iii              d) Only ii & iii
- 18) A researcher working with nucleic acids found out that the cytosine content in a mRNA molecule was 30%. What will be the content of Adenine?
- a) 20%                      b) 30%                      c) 40%                      d) Can't be deduced
- 19) A retrovirus with a Reverse transcriptase enzyme infects a eukaryotic cell and forms a protein whose RNA reads as **5' AUCGACGAUACGAAAGCCGUACGCUAU 3'**.
- What will be the corresponding sequence in its original genome?
- a) **5' TAGCTGCTATGCTTTCGGCATGCGATA 3'**  
b) **5' AUCGACGAUACGAAAGCCGUACGCUAU 3'**  
c) **5' UAGCUGCUAUGCUUUGCCGAUGCGAUA 3'**  
d) **5' ATCGACGATACGAAAGCCGTACGCTAT 3'**

- 20) In temperate ponds many short-lived zooplanktonic species show morphological variations in successive generations. These are referred to as the ecotypes of the respective species. They are the reflections of:
- a) Directional mutations                      b) Adaptations to physical environment  
c) Population fluctuations                  d) Gene flow
- 21) Which of the following processes are involved in sympatric speciation?
- i. Reduced interactions between populations.  
ii. Niche separation  
iii. Divergent evolution  
iv. Convergent evolution
- a) ii & iii only                      b) i & iv only                      c) ii & iv only                      d) i, ii & iii only
- 22) The fresh extract of leaves of *Bryophyllum* dissolves calcium carbonate. What is the ideal time to collect the leaves to be most effective?
- a) Before daybreak                      b) Early hours of day                      c) At sunset                      d) Late evening
- 23) When the fruits of a specific plant species were collected they exhibited a variation in weight. The weight categories were 20, 25, 30, 35 & 40 grams. If it is a polygene inheritance, how many gene loci are involved?
- a) 2                      b) 3                      c) 4                      d) 5
- 24) The excessive CO<sub>2</sub> being released in the atmosphere through the combustion of fuels is largely absorbed by seas and oceans thus restricting the green house effect and global warming. Choose the appropriate combination of the biological processes that help in minimizing global warming.
- i. Photosynthesis by phytoplanktonic species  
ii. Deposition of marl and compaction into limestone  
iii. Diagenesis of organic sediment into mineral oils  
iv. Formation of exoskeleton by marine organisms
- a) i, ii & iv                      b) i, ii & iii                      c) Only i & ii                      d) Only i & iv
- 25) An alga with cells lacking centrioles, flagella and having Floridian starch as reserved food has to be a
- a) Green alga                      b) Blue green alga                      c) Red alga                      d) Brown alga
- 26) Reclamation of which of the following habitats by dumping debris is sure to increase global warming?
- a) Seas                      b) Peat lands                      c) Temporary ponds                      d) Streams

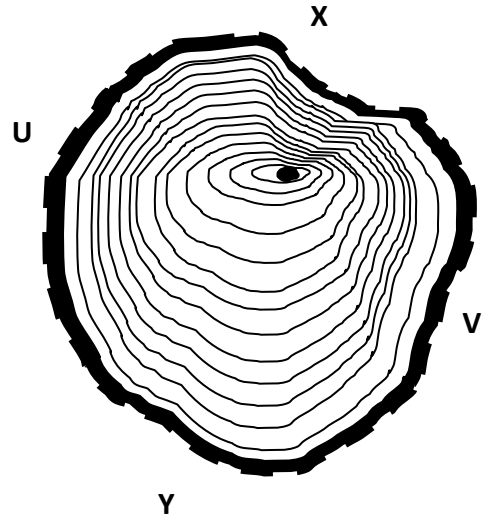
- 27) Study the given illustration of a cell division

In which organ of the human body would this process take place?

- a) Liver                      b) Spleen  
c) Bone marrow                      d) Gonad



- 28) From the T.S of trunk shown in the diagram it can be predicted that the corresponding branch must be
- Bent in the direction of 'X'
  - Bent in the direction of 'Y'
  - Twisted through U→V axis
  - Bearing the beating of wind and rain in Y→X direction



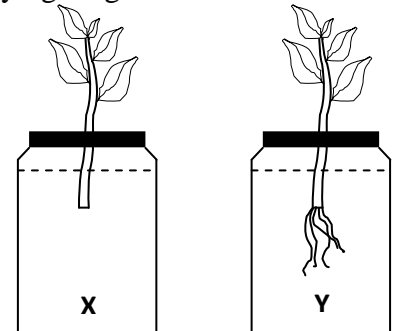
- 29) The role of luteinizing hormone (LH) in human male is:

- blocking the release of GnRH from pituitary.
- stimulating Sertoli cells to promote spermatogenesis.
- stimulating Leydig's cells to produce testosterone.
- modifying the signal produced by FSH in seminiferous tubule

- 30) The cut stem of two identical branches of the same mother plant were inserted in bottles containing liquids X and Y for a week to show the result as seen in the accompanying diagram.

The liquid 'X' and 'Y' may be:

- Water and physiologically balanced solution.
- Water and weak solution of abscisic acid.
- Water and weak solution of auxin.
- Weak salt solution and weak solution of ethylene.

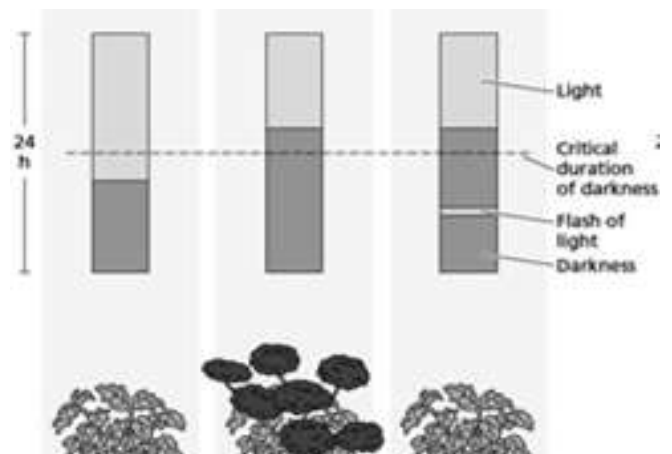


- 31) Which of the extra-embryonic membranes is/are involved in the gaseous exchange of the embryo?

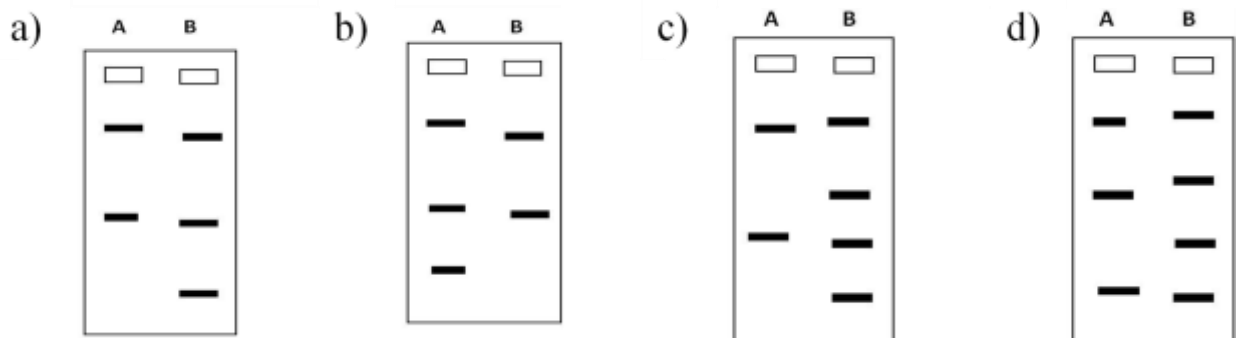
- |                  |                  |                   |                    |
|------------------|------------------|-------------------|--------------------|
| i) Amnion        | ii) Chorion      | iii) Allantois    | iv) Yolk sac       |
| a) i, ii and iii | b) i, iii and iv | c) Only i and iii | d) Only ii and iii |

- 32) In the accompanying figure the exposure of plant to cycles of light and darkness along with the following responses has been shown. The plant must be a-

- Long day plant
- Short day plant
- Day neutral plant
- Gibberellins treated plant



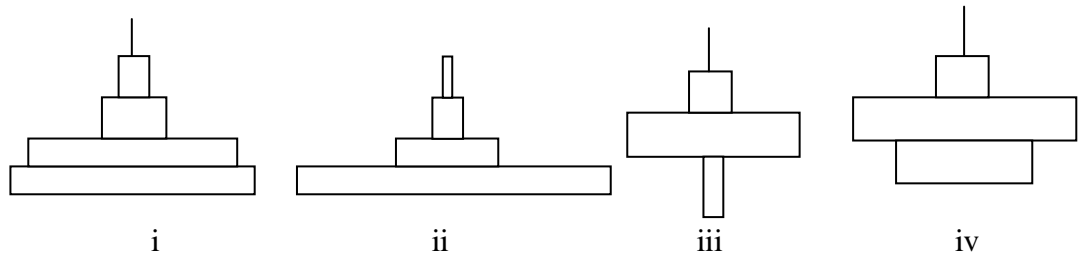
33) PBR<sub>322</sub> (A) is a plasmid having two restriction sites for EcoRI while T4 phage DNA (B) has three restriction sites for it. These two DNA were treated with EcoRI and allowed to run on agarose gel. Which of the following correctly depicts the EcoRI digested gel pattern?



34) Starvation proteins are synthesized by the bacteria at the onset of carbon starvation. These are produced by a bacteria during which of the following stages of growth curve ?

- a) Lag phase      b) Exponential phase      c) Stationary phase      d) Death phase

35)



The pyramid of numbers for marine ecosystems, tropical deciduous forest, grassland and temperate forest are depicted above. Arrange the pyramids in the order of ecosystems mentioned above.

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

36) Stratified squamous epithelium is found in the lining of:

- a) nasal passage      b) urethra      c) oesophagus      d) blood vessels

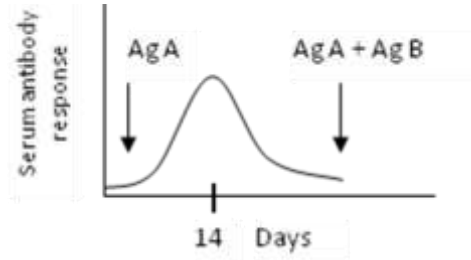
37) Fires play critical roles in development of grasslands. Fire selects against plants with

- a) Basal meristems not easily destroyed by fire / grazers
- b) Permanent above ground parts
- c) Structures for vegetative propagation
- d) Underground storage organs

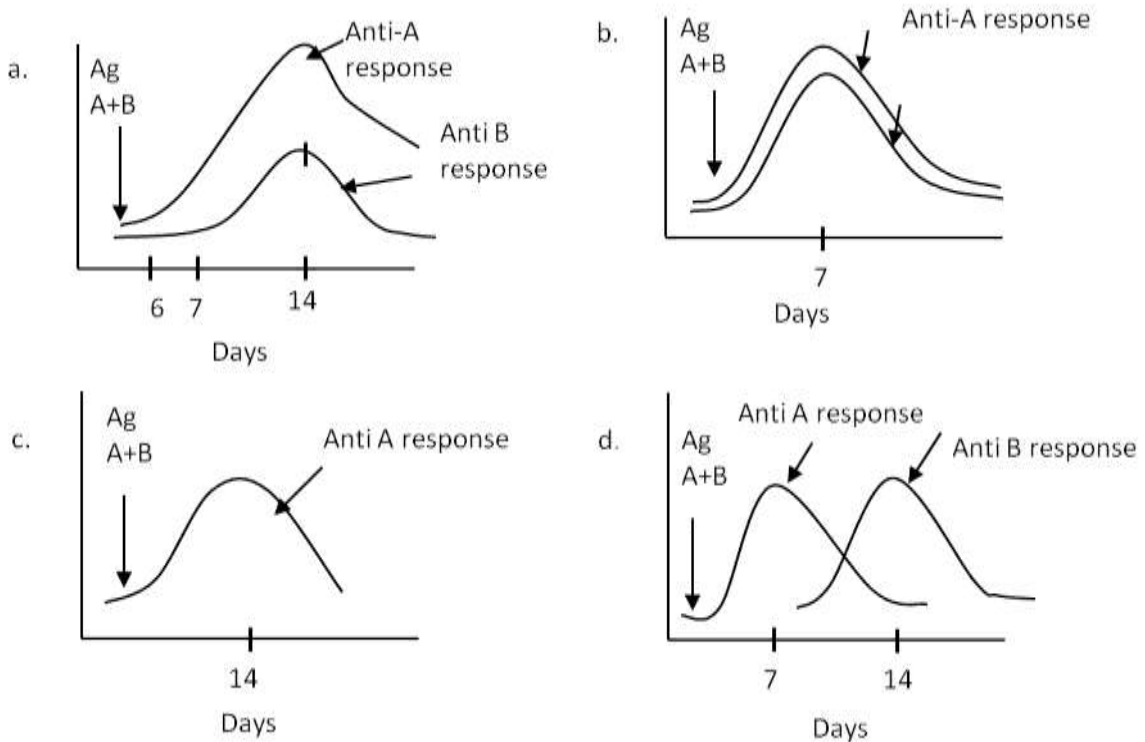
38) In which of the following, hydrogen bonding is involved?

- i. Water molecule and other polar molecule
  - ii. DNA and RNA (during transcription)
  - iii. Metal ion and chelating agent
  - iv. Amino acid residues in  $\alpha$  helix of a polypeptide
  - v. Electron deficient and electron surplus atoms
- a) i, ii, iii & iv      b) i, iii, iv & v      c) only i, iv & v      d) only i, ii & iv

39) When an animal is injected with an antigen A, it produces antibody response as shown:



If the same animal is now injected with a mixture of antigen A and B (shown by arrow) the expected response following the injection would be:



40) Transcriptional activity of genes is regulated by promoter & enhancer sequences. Which of the following descriptions is correct?

- i. Promoter sequences are always *cis* acting while enhancer sequences can be *trans* acting
  - ii. Both are located upstream from the structural gene that they regulate
  - iii. TATA box is one type of promoter sequence
  - iv. of promoter sequence is controlled by transcription factors which are small RNA sequences
- a) i & ii only      b) Only iii & iv      c) i & iv only      d) iii only

41) Consider an ecosystem where diatoms, copepods and small fish coexist. Which of the following statements is/are correct?

- i. The biomass pyramid of this ecosystem is likely to be inverted.
  - ii. The number pyramid of this ecosystem is likely to be upright.
  - iii. The energy pyramid of this ecosystem can be inverted depending on the season of the year.
- a) i only      b) i & iii only      c) ii only      d) iii only

42) Which of the following defenses of the body against foreign particles constitute innate immunity?

- i. Antimicrobial proteins
- ii. Mucous membrane
- iii. Antibodies
- iv. Phagocytic cells
- v. Inflammatory response
- vi. Cytotoxic lymphocytes

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

43) Arrange the following biomolecules in an increasing order of rate of passing through plasma membrane:

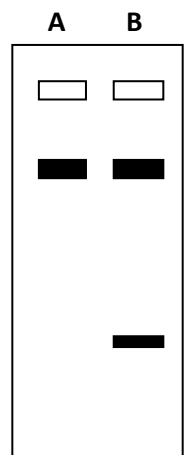
- i) Triglycerides    ii) Fructose    iii) Na<sup>+</sup>    iv) Urea

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

44) Gel electrophoresis of DNA of two bacterial strains A & B is done. It showed band pattern as follows. What could be the probable reason/s for two DNA bands in strain B:

- i. DNA in strain B is fragmented while extraction.
- ii. DNA in strain B is duplicated.
- iii. Strain B is harboring plasmid DNA.

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



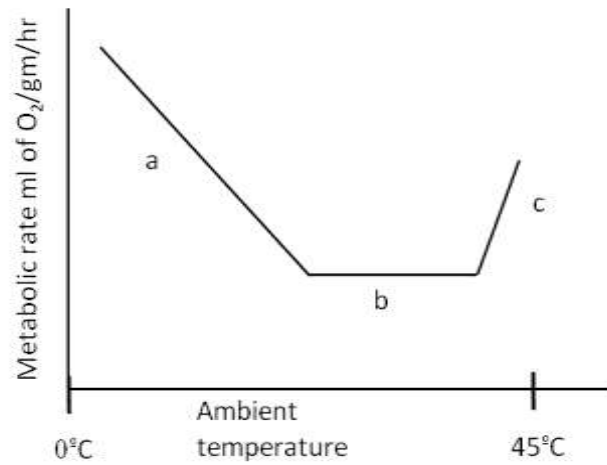
45) A botanist collected leaf specimen from two different plants (I and II). He then took transverse sections of both the specimens, stained and observed them under the microscope. The observations are tabulated below.

Leaf from plant	Stomata on		Cuticle		Air spaces
	Upper epidermis	Lower epidermis	Upper epidermis	Lower epidermis	
I	Present	Absent	Present	Absent	Present
II	Absent	Present	Present	Present	Absent

The plants I and II could respectively represent:

- a) Xerophyte and Mesophyte    b) Xerophyte and Floating hydrophyte  
 c) Mesophyte and Submerged hydrophyte    d) Floating hydrophyte and Xerophyte

- 46) Temperature related metabolic response of an animal is shown in the accompanying graph. Which of the following is the correct description of regions a, b or c :



- a) Energy expended to lose excess heat: b+c
  - b) Energy required to maintain body temperature: a
  - c) Endothermy : b & ectothermy: a
  - d) Heterothermy : a,b, & c
- 47) For an unclothed man, following are the skin & rectal temperature when ambient temperature is 30° C.

$$t_a: 30^\circ\text{C} \quad t_{\text{skin}}: 34^\circ\text{C} \quad t_{\text{rectal}}: 37.1^\circ\text{C}$$

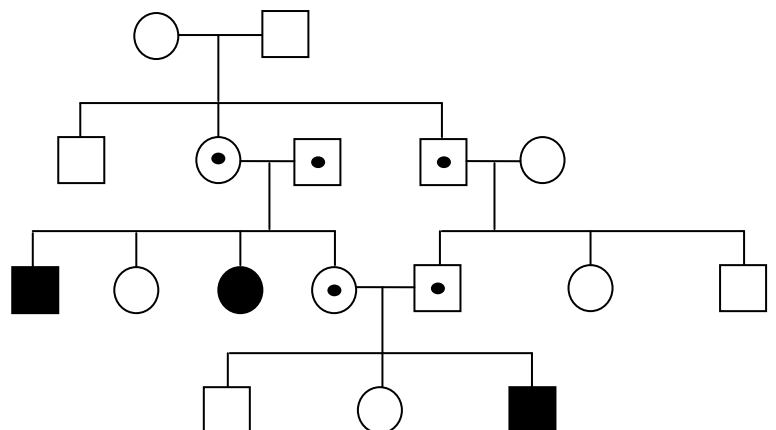
What will be the temperatures when ambient temperature is 20°C & 40°C respectively?

- a)  $t_{\text{skin}} : 32^\circ\text{C}$   $t_{\text{rectal}} : 37.1^\circ\text{C}$  and  $t_{\text{skin}} : 36^\circ\text{C}$   $t_{\text{rectal}} : 37.2^\circ\text{C}$
- b)  $t_{\text{skin}} : 32^\circ\text{C}$   $t_{\text{rectal}} : 35.1^\circ\text{C}$  and  $t_{\text{skin}} : 36^\circ\text{C}$   $t_{\text{rectal}} : 39.1^\circ\text{C}$
- c)  $t_{\text{skin}} : 20^\circ\text{C}$   $t_{\text{rectal}} : 35^\circ\text{C}$  and  $t_{\text{skin}} : 40^\circ\text{C}$   $t_{\text{rectal}} : 39^\circ\text{C}$
- d)  $t_{\text{skin}} : 34^\circ\text{C}$   $t_{\text{rectal}} : 37.1^\circ\text{C}$  and  $t_{\text{skin}} : 34^\circ\text{C}$   $t_{\text{rectal}} : 37.1^\circ\text{C}$

- 48) A pedigree depicting the inheritance of a trait in a family is shown.

The trait represented is:

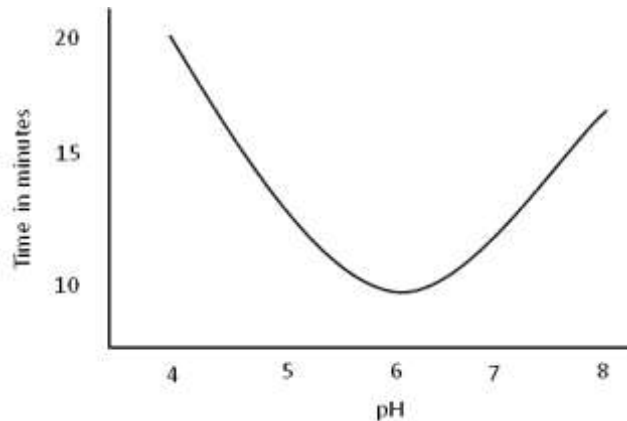
- a) Autosomal dominant
- b) Autosomal recessive
- c) X-linked recessive
- d) Y-linked



49) Separation of DNA fragments using agarose gel electrophoresis occurs due to:

- a) Difference in the sequence of the fragments.
- b) Presence of different charges on the fragments.
- c) Difference in the staining properties of the fragments.
- d) Difference in the sizes of the fragments.

50) While studying enzyme activity, Neeta added  $1\text{cm}^3$  of catalase enzyme to fixed volume of hydrogen peroxide solution at different pH values. The time taken to collect  $10\text{cm}^3$  of oxygen was measured. The results are plotted on the graph as shown below.



From the graph it can be concluded that:

- a) pH of the solution and time taken for collection of gas are inversely proportional.
- b) The rate of reaction is highest at pH 4 and 8.
- c) If the rate of reaction is plotted against pH, the graph will look similar.
- d) The pattern of graph will remain same if quantity of catalase is doubled.

51) Curling or straightening hair using various physical and chemical processes is common for reshaping the hair. Which of the following is true?

- a) Curling the straight hair requires to form new SH bonds in hair keratin.
- b) Straightened hair has fewer SH bonds than their natural counterpart.
- c) Both curling & straightening requires breaking and making of SH bonds.
- d) Hydrogen peroxide treatment on hair helps in breaking and making of SH bonds

52) Which of the following may result in allopatric speciation?

- a) Rising sea levels submerging islands
- b) Polluted waters destroying coral reefs
- c) Torrential rains changing course of wide rivers
- d) Uncontrolled logging destroying forests.

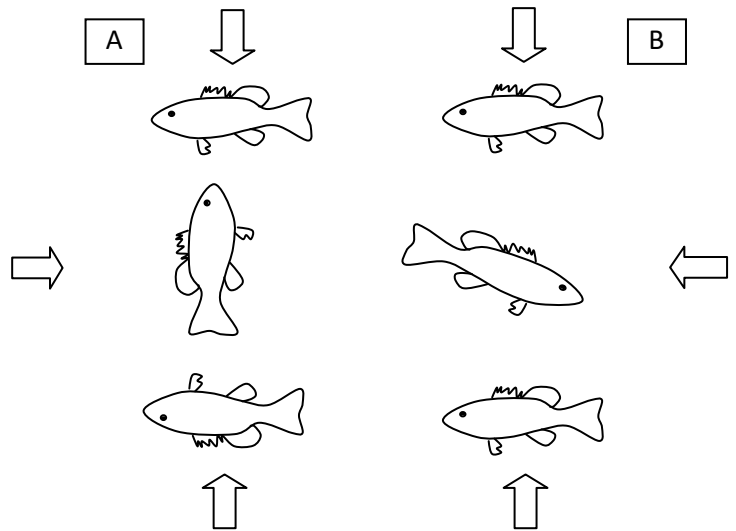
53) Hydrophobic interaction influence protein structure at which of the following level/s?

- (i) Primary structure
- (ii) Secondary structure
- (iii) Tertiary structure
- (iv) Quaternary structure

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

54) Fish normally swim with dorsal surface towards light. Two fish A and B showed following response to light. Mark correct interpretation. (Arrow indicates light source.)

- a) B is normal fish & A with gravity sensor removed.  
 b) B is normal fish & A with one eye removed.  
 c) B is normal fish & A with photoreceptor dysfunction (unequal stimulation).  
 d) A has gravity sensor dominant over light sensor & B light sensor dominant over gravity sensor.



55) In a cloning experiment, DNA ligase used shows optimum activity at  $37^{\circ}\text{C}$  and a segment of DNA that needs to be ligated shows  $18^{\circ}\text{C}$  as its  $T_m$  (melting temperature). Which of the following conditions will give best results of the ligation experiment?

- a) Experiment performed between  $18^{\circ}\text{C}$  and  $37^{\circ}\text{C}$ .  
 b) Experiment quickly performed at  $18^{\circ}\text{C}$ .  
 c) Experiment performed at temp above  $18^{\circ}\text{C}$  but less than  $37^{\circ}\text{C}$ .  
 d) Experiment performed at  $8-10^{\circ}\text{C}$  temp over a prolonged period.

56) The difference between excitatory and inhibitory response across a synapse is mainly due to:

- i. Intensity of voltage through synaptic space  
 ii. Type of neurotransmitter  
 iii. Type of gated channel opened in response to neurotransmitter

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

57) If a fluorescing protein is attached to many free ribosomes in a cell and the cell is photographed after a time interval, the colour will appear:

- a) in cytoplasm only  
 b) in cytoplasm and along rough endoplasmic reticulum.  
 c) in cytoplasm, along rough endoplasmic reticulum and along wall of nucleus  
 d) in cytoplasm, along rough endoplasmic reticulum, along wall of nucleus and in the matrix of mitochondria.

58) Choose the statements that represent the effect of adrenal activation through sympathetic stimulation due to stress.

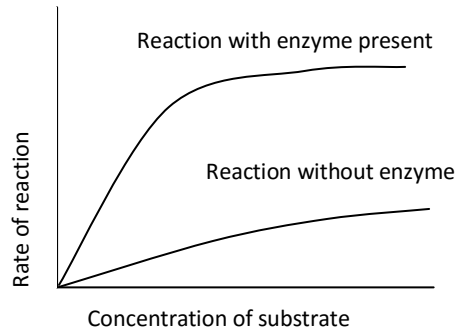
- (i) Glycogenolysis is resulting in increased blood glucose  
 (ii) Breakdown of proteins and lipids leading to gluconeogenesis  
 (iii) Increased breathing rate  
 (iv) Retention of sodium and water by kidneys  
 (v) Increased metabolic rate

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

59) When a plant cell undergoes expansive growth, the increase in volume is caused mostly by:

- a) uptake of minerals   b) uptake of water   c) synthesis of cellulose   d) synthesis of proteins.

60) The graph below explains the correlation between the rate of reaction and concentration of substrate during any enzymatic reaction. It can be seen that enzyme catalyses the reaction to significant extent but after certain increase in substrate concentration, rate of reaction remains constant. This must be because:



- a) At high substrate concentration, enzyme activity gets suppressed.  
 b) Enzymes activity is directly proportionate to the concentration of substrate.  
 c) There are no enough enzyme molecules to bind to substrate for catalyzing the reaction at higher concentration.  
 d) Higher concentration of substrate can degrade the enzyme.

61) A student could make out that a specimen he found in a lake was an arthropod but could not assign it to a class. The organism had two pairs of antennae and compound eyes on stalk. It must belong to the class:

- a) Crustacea      b) Arachnida      c) Insecta      d) Myriapoda

62) Following are the biotic components of an ecosystem:

- (i) Primary producers      (ii) Primary consumers      (iii) Secondary consumers  
 (iv) Tertiary consumers      (v) Decomposers

The component/s without which an ecosystem cannot exist is/are:

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

63) Assuming same body size, which of the following animals will have largest stomach?

- a) Dolphin      b) Llama      c) Leopard      d) Vulture

64) 64. Choose the correct combination of the animals 1 and 2 with the feature that differentiates them:

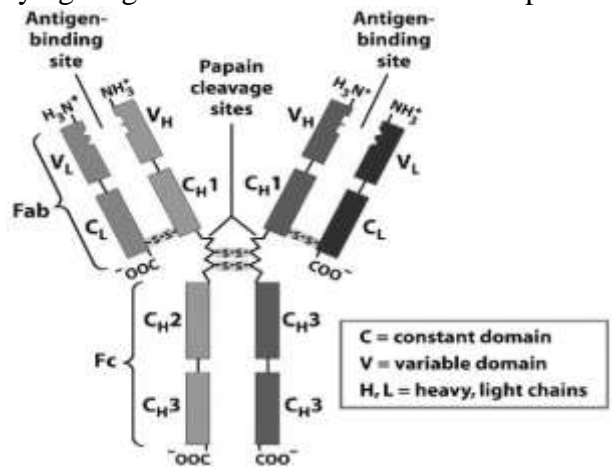
	<b>Animal 1</b>	<b>Animal 2</b>	<b>Feature</b>
a)	Lizard	Tiger	Amniotic egg
b)	Shark	Frog	Lungs
c)	Tiger	Gorilla	Hair
d)	Gorilla	Human	Loss of tail

- 65) If the frequency of a dominant phenotype in a stable population is 75%, the frequency of recessive allele in that population would be,  
 a) 0.375                      b) 0.25                      c) 0.75                      d) 0.50
- 66) During a field trip, a zoology students collected some specimens. They tried identifying one of the specimens. To do this they observed and listed the following characteristics: Absence of special sense organs such as eyes, ability to withstand low oxygen levels and poorly developed nervous system. The specimen could most likely be:  
 a) A free-living flatworm such as Planaria.  
 b) An ectoparasite like flea.  
 c) A filter feeder like mollusk  
 d) An endoparasite like liver fluke.
- 67) Which one of the following genetic disorders can be detected by karyotyping ?  
 a) Down syndrome      b) Phenylketonuria      c) Hemophilia      d) Huntington's disease
- 68) In a test cross of F1 generation having a genotype AaBb, following progeny were obtained;  
 AaBb (450), aabb (450), Aabb (50), aaBb (50)  
 How far in centimorgans (cM) are the a and b genes?  
 a)100                      b)90                      c)10                      d)1

- 69) Immunoglobulin G molecule is shown in the accompanying diagram. If it is treated with mercapto-ethanol (reducing agent),

Result will be the production of:

- a) Single peptide molecule without affinity for antigen  
 b) Total of four polypeptide chains  
 c) Two polypeptide chains one with Fab portion & another with Fc  
 d) Six fragments with each with either Fc or Fab region



- 70) Nitrogen bend” is avoided by diving mammals like whales because  
 a) their blood has low partial pressure of Nitrogen at all times  
 b) their lungs are filled with nitrogenous air before diving  
 c) Peripheral circulation is minimal while diving  
 d) they have very low metabolic rate while diving

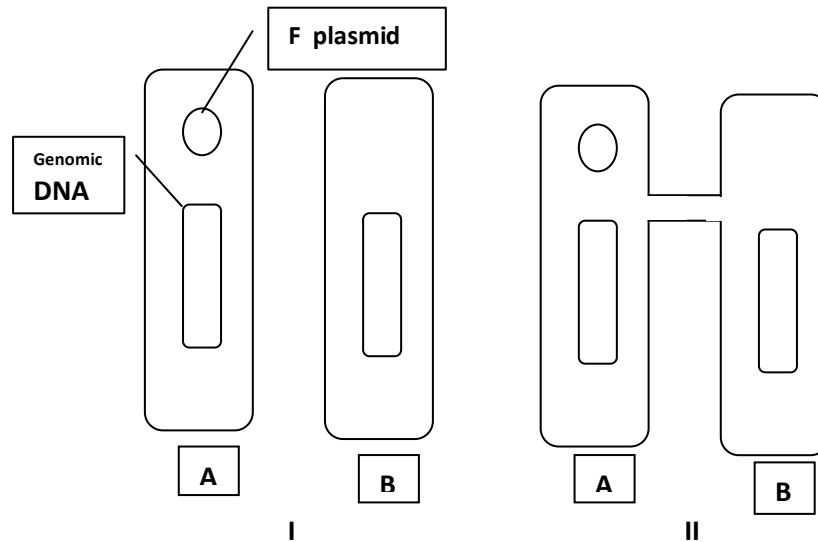
- 71) A frog's egg is centrifuged to disturb its contents. Which of the following is correct?
- abnormal development may occur since the animal pole and vegetal pole are reversed
  - abnormal development may occur since the gradient of egg contents is disturbed.
  - abnormal development may occur since the grey crescent is shifted horizontally.
  - abnormal development may occur since the heavier proteins are shifted to the vegetal pole.
- 72) The predator population in a habitat is an indicator of its health because:
- predators keep a check on the population of tertiary consumers
  - predators control the consumption of primary consumers
  - predators selectively hunt the weaker members of consumers
  - predation enhances population of decomposers
- 73) The key events in embryo development are given below. Which is the correct order of sequences?
- (i) Organogenesis      (ii) Fertilization      (iii) Gastrulation      (iv) Neurulation      (v) Cleavage
- v → ii → iv → i → iii
  - ii → iii → v → i → iv
  - iii → iv → ii → i → v
  - ii → v → iii → iv → i
- 74) The molecules absorbed and secreted in the lumen by the cells of Malpighian bodies of cockroach are respectively:
- sodium urate and urea
  - purines and ammonia
  - urea and uric acid
  - ammonia and uric acid
- 75) The least percentage of water is encountered in the:
- fluid in convoluted tubule
  - filtrate in Bowman's capsule
  - blood plasma in glomerulus
  - filtrate in renal capsule
- 76) Some animals have adapted to specific niche. In this specialization, some organs become well developed at the expense of others that become vestigial.

No.	Specialized organ	Vestigial organ
I	Wings	Leg muscles
II	Well developed nose	Eyes
III	Elongated muscular body	Legs
IV	Legs	Wings

Select the correct match of the animals.

- I – Bat,      II – python,      III – mole,      IV – ostrich.
  - I – Bat,      II – mole,      III – python,      IV – ostrich
  - I – Ostrich,      II – python,      III – mole,      IV – bat
  - I – Ostrich,      II – mole,      III – python,      IV – bat
- 77) Which of the following statements is **incorrect**?
- cDNA is synthesized from mRNA.
  - cDNA lacks introns.
  - cDNA cannot be expressed outside a eukaryotic cell.
  - Size of cDNA is shorter than the original DNA in a eukaryotic cell.

- 78) The  $K_m$  value of an enzyme-substrate reaction is a measure of affinity of the enzyme for its substrate. In presence of a competitive inhibitor, which of the following is true?
- the  $K_m$  and  $V_{max}$  will increase
  - the  $K_m$  will increase but  $V_{max}$  will remain unaltered
  - the  $K_m$  will remain same but  $V_{max}$  will increase
  - the  $K_m$  will remain same but  $V_{max}$  will decrease
- 79) Two initial stages (I and II) of conjugation between bacteria 'A' and 'B' are depicted below.



Which of the events will follow?

- Both strands of F plasmid will be transferred from A to B with A becoming F-negative and B becoming F-positive.
  - Only one strand of F plasmid will be transferred from A to B and complementary strands will be synthesized making both cells F-positive.
  - Genomic DNA will be transferred from A to B and A remains F-positive while B remains F-negative.
  - Both genomic DNA and F plasmid will be transferred from A to B. Consequently, cell A dies.
- 80) If one arginine has molecular weight of 174 Daltons, then what would be the molecular weight (Daltons) of a linear polymer of 30 arginines ?
- 5760
  - 5220
  - 4698
  - 4680

Rough Sheet