

Association of Teachers in Biological Sciences

NATIONAL STANDARD EXAMINATION IN BIOLOGY 2011-2012

Date of Examination 27th November 2011

Time 15.00 to 17.00 Hrs

INSTRUCTIONS TO CANDIDATES

01. On the answer sheet, fill up all the entries carefully in the space provided, **ONLY IN BLOCK CAPITALS**. Use only **BLUE** or **BLACK BALL PEN** for making entries and marking answers. Incomplete / incorrect / carelessly filled information may disqualify your candidature.
02. The question paper has 80 multiple choice questions. Each question has 4 options, out of which only one is correct. Choose the correct answer and mark a cross in the corresponding box on the answer sheet as shown below:

Q.	a	b	c	d
22			X	

03. A correct answer carries 3 marks and 1 mark will be deducted for each wrong answer.
04. All rough work may be done on the blank sheet provided at the end of the question paper.
05. **PLEASE DO NOT MAKE ANY MARKS OTHER THAN (X) IN THE SPACE PROVIDED ON THE ANSWER SHEET.** Answer sheets are evaluated with the help of a machine. Due to this, **CHANGE OF ENTRY IS NOT ALLOWED.**
06. Scratching or overwriting may result in wrong score. **DO NOT WRITE ANYTHING ON THE BACK OF ANSWER SHEET.**
07. Use of a nonprogrammable calculator is allowed.
08. The answers / solutions to this question paper will be available on our website - www.iapt.org.in by 3 rd December 2011.

CERTIFICATES & AWARDS

- i) Certificates to top 10% students of each centre.
- ii) Merit certificates to statewide Top 1% students.
- iii) Merit certificate to Nationwide Top 1% students.
09. **Result sheets** and the “**centre top 10%**” certificates of NSEB are dispatched to the Professor in charge of the centre. Thus you will get your marks from the Professor in charge of your centre by January 2012 end.
10. TOP 300 (or so) students are called for the next examination - Indian National Biology Olympiads (INBO). Individual letters are sent to these students ONLY.
11. Gold medals may be awarded to TOP 35 students in this entire process.
12. No queries will be entertained in this regard.

1. The cellular component directly related to the working of pseudopodia is :
 - a. mitochondria
 - b. endoplasmic reticulum
 - c. microtubules
 - d. contractile vacuole

2. Respiration in silkworm is accomplished by :
 - a. external gills
 - b. pulmonary sacs
 - c. body wall
 - d. spiracles & trachea

3. Biochemical analysis of pyrenoids in algae would reveal the presence of :
 - a. RNA & starch
 - b. Proteins & starch
 - c. Proteins & phosphates
 - d. sugars & phospholipids

4. In a resting nucleus, centromeres appear as:
 - a. euchromatin
 - b. constitutive heterochromatin
 - c. facultative heterochromatin
 - d. nucleolus

5. Which of the four couples claiming the baby with O+ blood type are possibly the biological parents of it?
 - a. AB- and A+
 - b. A+ and O-
 - c. O+ and AB+
 - d. B- and O-

6. Even if it is bred under protection to increase the number considerably a species threatened with extinction can rarely come out of this category. This is due to the:
 - a. loss of genetic diversity
 - b. physical weakness induced by human care
 - c. loss of skill in gathering food
 - d. pathologies developed in them.

7. Nitrobacter that oxidises nitrites to nitrates can be considered to have this type of nutrition:
 - a. photo organotrophic
 - b. chemo organotrophic
 - c. photo lithotrophic
 - d. chemo lithotrophic

8. Angular fluttering or flapping wings near the throat skin in birds serves the purpose of:
 - a. Thermoregulation
 - b. osmoregulation
 - c. warning enemies
 - d. attracting opposite sex

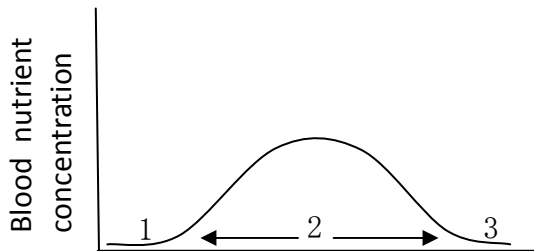
9. Temperature has direct effect on which of the following?
- body size
 - size of the extremities of the body
 - mutation
 - life span
 - metabolism in poikilotherm
- i,iii and iv
 - ii, iii and iv
 - ii,iii and v
 - i,ii and v
10. The main difference between an enzyme catalyzed and uncatalyzed reaction is that the former has
- lower energy of activation
 - lower free energy
 - ability to use all available substrate
 - little influence of external conditions
11. A researcher isolated a bacterial strain that could degrade a hazardous aromatic pollutant. He cultured the isolate in appropriate fluid medium for 24 hrs. and plated the culture. He found only 60% cells are capable of degrading the same pollutant. What can be deduced from this observation?
- conjugal recombinants must have caused loss of the ability.
 - plasmids bearing concerned genes might have been lost.
 - culture medium might be deficient in certain nutrient.
 - the gene for the concerned ability might have mutated in 40% organisms.
12. G-proteins are usually associated with
- plasma membrane
 - Gogi bodies
 - kinetic spindle
 - G1 and G2 phase of the cell cycle
13. Adaptive radiation in a taxon is mainly due to
- allopatric distribution
 - sympatric distribution
 - parapatric distribution
 - orthopatric distribution
14. The suppression of fusion of gametes is a general trend among fungi. However, sexual reproduction has not been noticed at all in:
- phycomycetes
 - basidiomycetes
 - deuteromycetes
 - ascomycetes

15. Among various ions encountered in living cells the ions most commonly used as signals are:
- Fe⁺⁺
 - K⁺
 - Na⁺
 - Ca⁺⁺
16. The weight of fruit in a plant is determined by the number of dominant alleles of a certain number of genes. If seven weight categories are noticed, how many gene sites would be involved?
- two
 - three
 - four
 - five
17. Metastasis is a term which refers to:
- uncontrolled mitosis
 - spreading of cancer cells from the primary tumour to other parts
 - metabolic irregularities
 - none of these.
18. Liver secretes bile which has:
- heparin
 - amylase
 - lipase
 - no enzymes
19. The cell that is concerned with excretion and osmoregulation is:
- flame cell
 - chromatophore
 - nematoblast
 - osteocyte
20. Disorders caused by hypersecretion of concerned hormones are:
- gigantism and exophthalmic goiter
 - mongolism and cretinism
 - cretinism, diabetes and goiter
 - rickets, diabetes mellitus.
21. The microinjection of desired genes from other organism into fertilized eggs of animals results in?
- monstrosities
 - free Martins
 - transgenic animals
 - twins
22. There are minimum chances of a body rejecting a transplanted organ if the donor is a:
- sibling
 - spouse
 - offspring
 - twin

23. During which period of cell cycle do the paired centrioles become centrosomes?
- prophase
 - metaphase
 - anaphase
 - telophase

24. Which of the following adaptations is likely to be observed in arid condition?
- vertically hanging leaves
 - presence of salt glands.
 - green fleshy stem.
 - absence of vascular tissue, scarcely developed vascular tissue
- i and ii
 - ii and iv
 - i and iii
 - ii and iii

25. The accompanying graph indicates digestion of food. 1, 2 and 3 indicate:

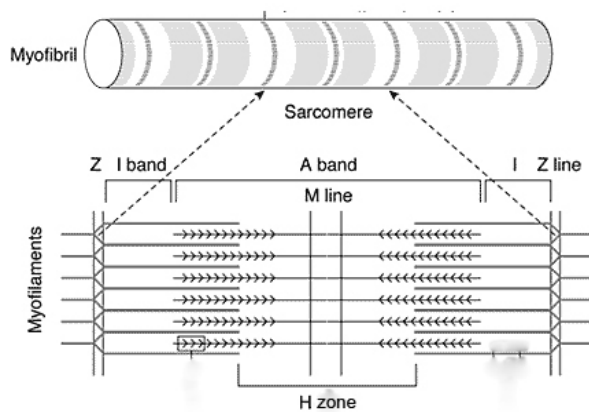


- 1 and 2- mouth, 3- stomach
 - 1- mouth, 2- stomach, 3- small intestine
 - 1- mouth, 2- oesophagus, 3- stomach
 - 1- stomach, 2- small intestine, 3- large intestine
26. A cell suspension was incubated in a culture medium containing radio labelled Uracil , a few cells were removed every 10 seconds and autoradiography was performed. What would be the correct sequence of appearance of the label?
- rough ER--> nucleus-->nucleolus
 - nucleolus--> ribosomes-->nucleus
 - nucleolus--> rough ER-->golgi
 - nucleolus-->nucleus-->ribosome
27. Which of the following tissues will not test positive for lipids?
- bone marrow
 - liver
 - salivary gland
 - spinal cord

28. There are various ways of controlling pests. Killing majority of pest insects only accelerates their breeding to restore the population size. Predators may not be very specific towards their prey and may eliminate pollinating insects. The effective way of pest control is therefore:
- tracking and eliminating
 - male sterilisation
 - use of repellents
 - use of moulting or juvenile hormones
29. Of the following pigments found in plants which one are not concerned with photosynthesis?
- chlorophylls
 - anthocyanins
 - phycobilins
 - carotenoids
30. Which of the following represents specialised carnivore animals?
- cnidarians
 - sponges
 - ciliates
 - snails
31. Phylogenetic position of which group of arthropods is still debated by the systematists?
- crustaceans
 - insects
 - arachnids
 - myriapods
32. The groups of extant animals that are closest to the extinct dinosaurs are:
- crocodiles and birds
 - chelonians and mammals
 - snakes and turtles
 - marsupials and running birds
33. Pigments absorb complementary coloured rays most effectively. Which of the following types of algae would be found at greater depths?
- green
 - brown
 - red
 - blue green
34. Of the following statements which ones apply for a climax ecosystem?
- More organic matter occurs as dead than live organisms
 - Production to community respiration ratio is 1
 - There is maximum niche specialization and minimum niche separation
 - There are many large and long lived individuals
- i, ii and iv
 - ii, iii and iv
 - i, iii and iv
 - only i and iv

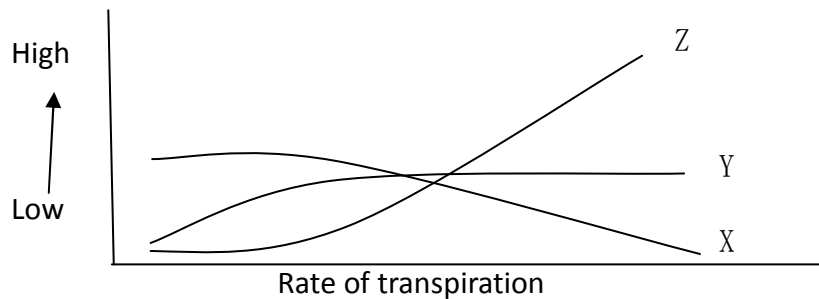
35. Although in bee hive all individuals are closely related to one another, inbreeding is rare since:
- drones rarely engage in copulation with queen of their own hive
 - queen evades drones of her own colony
 - queen has a very large spermatheca and copulates with drones from many hives
 - drones exhibit excessively high rate of mutation
36. Like sickle cell anaemia, which is the other genetic disorder related to blood pigment?
- Phenylketoneuria
 - Leukemia
 - Thalassemia
 - Xeroderma pigmentosa
37. The release of chemical messenger at nerve muscle end plate is under the influence of these ion/s
- Cl^-
 - Fe^{++} and S^{++}
 - Ca^{++}
 - Mg^{++} and Sr^{++}
38. The biochemical analysis to confirm CAM in a green plant is
- Titrateable Acid Number
 - Iodine number
 - activity of transaminases
 - total reducing power
39. Cattle ranches are known to cause acute green house effect. This is due to:
- mechanized milking practices
 - methanogenic bacteria in rumen
 - decomposition of leftover fodder
 - decomposition of organic remains in faeces
40. Addition of chemical fertilizers claims increased irrigation to avoid development of :
- excessive solute potential in soil
 - air spaces that may cause oxidation of fertilizers
 - bacteria that may decompose useful salts
 - larger root caps on the tender tips of branches of roots
41. Platyhelminths have highly branched intestine due to the lack of which of the following structures?
- anus
 - circulatory system
 - coelom
 - accessory digestive glands
- i, ii & iii
 - ii, iii & iv
 - i, ii & iv
 - only i & ii

42. Plants with inferior ovary always bear:
- Pseudocarps
 - berries
 - aggregete fruits
 - seedless fruits
43. Advantage of animal aggregation consisting of several overlapping generations is that:
- gene frequencies do not fluctuate
 - genes for altruism is found in all
 - fecundity and fertility is high
 - competition is at its minimum
44. The set of annelid characters that are share by leeches is:
- setae for locomotion
 - metameric segmentation
 - indeterminate number of segments
 - presence of clitellum
 - hermaphroditism
- i,ii,and iii
 - ii, iii and iv
 - only i and iv
 - only ii and v
45. Critically observe the accompanying diagram of myofibril. During the contraction which of the following events occurs?



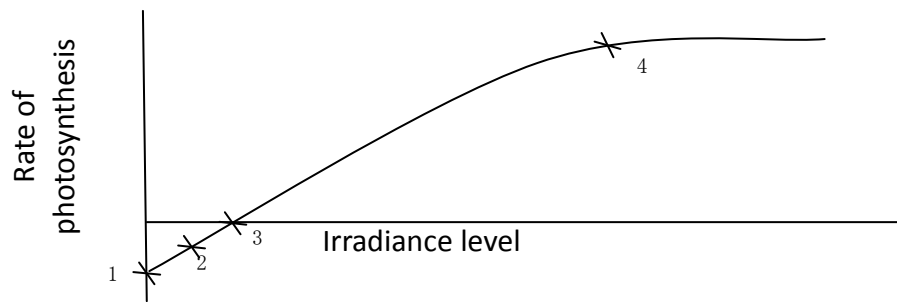
- H-zone is eliminated
 - A band widens
 - I band reduces in width
 - Width of A band is unaffected
 - M line and Z line come closer
- i,iii,iv and v
 - only i,ii and v
 - only ii iv and v
 - only i,ii and iii

46. Biochemical analysis of a cell fraction revealed no carbohydrates, 1% RNA, 0.2 % DNA, 40% lipids and 60% proteins. It may possibly be a pure
- Plasma membrane fraction
 - nuclear fraction
 - microsomal fraction
 - mitochondrial fraction
47. Lateral meristem in plants is responsible for increase in which of the following?
- Height
 - Girth
 - Number of vascular bundles
 - Breadth of medullary rays
48. Factors that affect transpiration in plants are indicated in the graph. X, Y and Z respectively indicate:



- Relative humidity, wind speed, temperature
 - Stomatal density, temperature, wind speed
 - Temperature, relative humidity, wind speed
 - Relative humidity, stomatal opening, stomatal frequency
49. If cross-linking of the immunoglobulin monomer is blocked, which one of the following types of antibodies would lose its function?
- IgM
 - IgE
 - IgG
 - IgD
50. Which of the following is the correct combination of merits of an inflorescence?
- Flowers can be unisexual
 - Increased efficiency of pollination
 - ensuring self pollination and fertility
 - Attract pollinators easily
- i,ii and iv
 - ii,iii and iv
 - ii and iii
 - ii and iv

51. The point on the graph where rate of photosynthesis equals the rate of respiration is:



- a. 2
- b. 3
- c. 4
- d. 1

52. Digestion of carbohydrate in this form **cannot** be digested by humans:

- a. Disaccharides
- b. Starch
- c. Glycogen
- d. Cellulose

53. When a red flowered plant was cross pollinated by white flowered one and the offspring were self pollinated to obtain a phenotypic ratio of 1:2:1, it has to be a case of:

- a. Incomplete dominance
- b. Co-dominance
- c. Recessive epistasis
- d. Pleurotropic effect of genes

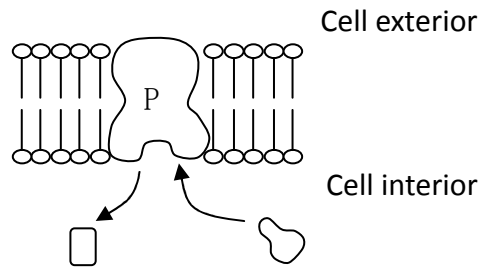
54. Identify the correct statement:

- a. Hypogynous flowers have inferior ovary
- b. Perigynous flowers have inferior ovary
- c. Hypogynous flowers have superior ovary
- d. Epigynous flowers have superior ovary

55. Arrange the following taxa to form the correct sequence of classification of man:

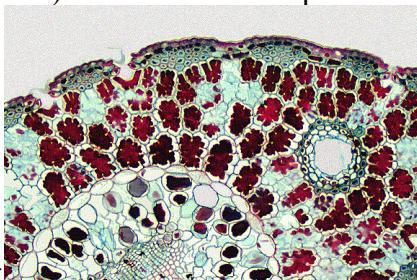
- i. Primata
 - ii. Chordata
 - iii. Mammalia
 - iv. Hominidae
- a. i, iii, iv, ii
 - b. ii, iii, i, iv
 - c. iv, ii, I, iii
 - d. iii, ii, iv, i

56. Molecule indicated as 'P' in the diagram can be described as:



- i. transmembrane protein
 - ii. channel protein
 - iii. enzyme
 - iv. cell receptor
 - v. transport protein
 - a. ii and iv
 - b. i and iv
 - c. only iii
 - d. i and iii
57. To a few drops of chicken blood in a test tube, water is added and the mixture is centrifuged. What would be the result?
- a. RBCs will settle at the bottom while WBCs will remain in suspension
 - b. Pellet of RBCs will be obtained with plasma in supernatant
 - c. Pellet of RBCs and WBCs will be formed with serum in suspension
 - d. Nuclei will form a pellet while haemoglobin will remain in supernatant
58. For a DNA to function as a cloning vector the most essential requirement is:
- a. multiple restriction sites
 - b. several selectable markers
 - c. circular nature
 - d. 'ori' sequence
59. Which of the following the correct description of human saliva?
- a. Acidic, slightly salty, hydrophilic body secretion
 - b. Neutral, hydrophobic body fluid without any salts
 - c. Slightly alkaline, polar, enzymatic secretion
 - d. Acidic, hydrophobic secretion with high osmolarity
60. Cell organelles that perform the function of food storage as well as energy harvesting are:
- a. Mitochondria
 - b. Plastids
 - c. Vacuoles
 - d. Nucleus

61. Meristematic tissues have all these except:
- Tubulin
 - Aspartine
 - Adenine
 - Lignin
62. Natural system of classification of flowering plants is based on similarities and differences in-
- Flower morphology
 - Sequence of nucleotides in mitochondrial DNA
 - Nature and arrangement of vascular strands
 - Fruit and seed morphology
- i, iii and iv
 - i and iv only
 - only ii
 - only i
63. Which of the following cells can divide?
- Scleride
 - Sieve cell
 - Phellogen cell
 - Xylem trachied
64. Which of the following births must have preceded by release of maximum number of eggs during ovulation phase?
- identical twins
 - fraternal twins
 - identical triplet
 - Siamese twins
65. A rooster with gray feathers was mated with a hen of same phenotype. Among their offspring 15 were gray, 6 black and 8 white. What phenotypes would you expect among the offspring resulting from mating of gray rooster and black hen?
- All black
 - All gray
 - Equal proportion of black and gray
 - $\frac{1}{4}$ gray and $\frac{3}{4}$ black
66. Study the diagram of cross section of leaf carefully. The armed palisade tissue (seen dark) seems to have adapted to



- a. Diffused light from ground
 - b. Diffused light from all around
 - c. Intense sunlight from above
 - d. Intense sunlight from all around
67. Which of the following statements is true for photosynthesis?
- a. Dark reactions occur only in dark
 - b. Dark and light reactions always occur simultaneously
 - c. Dark reactions occur only when light reactions stop
 - d. Dark reactions may also occur in dark
68. To initiate transcription, RNA polymerase binds to the:
- a. Operator sequence
 - b. Promoter sequence
 - c. Repressor sequence
 - d. Structural gene
69. Most of the sedentary marine animals have:
- a. suppressed locomotors
 - b. isogamy
 - c. motile larvae
 - d. calcareous exoskeleton
70. The passage of water taken in for respiration and food is same, a fish rarely swallows lot of water with food. This is due to the:
- a. presence of gill rakers on the gills
 - b. presence of cilia along the roof of pharynx
 - c. closure of gill slits while swallowing
 - d. presence of esophageal sphincter
71. If a frog is gradually exposed to increasing concentration of salt in surrounding water, it will:
- a. get acclimated to saline conditions
 - b. release gametes faster
 - c. not reproduce
 - d. die of dehydration due to exosmosis
72. The evolutionary forerunner of vasculature in land plants is:
- a. Rhizoids in bryophytes
 - b. Hypodermal parenchyma in moss stem
 - c. Columella of hornworts
 - d. Seta of sporogonium of moss
73. Conjugated lipids among the following are:
- a. Storage lipids
 - b. Peritoneal fat
 - c. Cuticle
 - d. Membrane lipids

74. Statistical analysis is significant at this stage of scientific research:
- Noting the observations
 - Proposing a hypothesis
 - Testing the hypothesis
 - Designing the experiments
75. During the opening of stomata, the organic malate ions are produced in the guard cells for maintaining the:
- negative voltage to take in potassium ions
 - photosynthetic products in active osmotic form
 - calcium ions in lesser concentration
 - respiratory pathway in aerobic mode
76. In liverworts the plant body is in the form of a rosette. This is mainly due to:
- prostrate nature
 - dichotomous branching
 - lack of vascular tissue
 - lack of mechanical tissue
77. The primary consumers sustain on:
- gross primary production
 - net primary production
 - secondary production
 - net community production
78. If the hypophyseal stalk is damaged which of the following hormones will not be released by pituitary gland?
- Somatotropin
 - Oxytocin
 - Prolactin
 - ACTH
79. The bacteria in ruminant stomach convert the fibers of cellulose and hemicellulose into:
- Glucose and fructose
 - Organic acids and amino acids
 - Volatile fatty acids
 - Ethanol and butanol
80. Which of the following joints are found only in children, till puberty?
- Symphysis
 - Synchondrosis
 - Synarthrosis
 - Synovial
-

Rough Sheet
