

**Indian Association of Teachers in Biological Sciences**  
**NATIONAL STANDARD EXAMINATION IN BIOLOGY 2009-2010**  
**Date of Examination 22 November 2009**  
**Time 15.00 to 17.00**

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- Q.1** The key feature of gymnosperms that is absent in present day pteridophytes is -  
(A) heterospory (B) seed  
(C) triploid endosperm (D) tracheids  
**Ans. (B)**
- Q.2** The subunits of ribosomes of mouse hepatocytes are -  
(A) 50S and 30S (B) 40S and 23S  
(C) 70S and 16S (D) 60S and 40S  
**Ans. (D)**
- Q.3** In meiosis, separation of homologous chromosomes occurs during -  
(A) Anaphase I (B) Metaphase I  
(C) Anaphase II (D) Metaphase II  
**Ans. (A)**
- Q.4** Hydrogen cyanide causes irreversible inhibition of cytochrome oxidase. If this compound is added to a preparation of intact mitochondria, which of the following would be expected ?  
(A) Fall in hydrogenation of molecular oxygen  
(B) Rise in electrochemical gradient  
(C) No change in ATP synthesis  
(D) Inactivation of ATP synthetase  
**Ans. (A)**
- Q.5** Select the correct statement from the following  
(A) Yellow fever is transmitted by tse-tse fly  
(B) Night blindness is a result of deficiency to vitamin B<sub>6</sub>  
(C) Filariasis is transmitted by culax mosquito  
(D) Excessive consumption of mercury causes itai-itai  
**Ans. (C)**
- Q.6** In the thylakoid membrane, the photosynthetic pigments are held in place by -  
(A) ionic linkages (B) hydrophobic interaction  
(C) covalent bonds (D) coordination bonds  
**Ans. (B)**
- Q.7** The odd group from the following is -  
(A) cary fish, pipe fish, puffer fish (B) monitor lizard, cobra, tortoise  
(C) scorpion, crab, tick (D) jelly fish, sea anemone, coral  
**Ans. (A)**

- Q.8** The correct description of sporophyte of *Marchantia* and gametophyte of a fern is -  
(A) former is haploid while latter is diploid  
(B) both show poorly developed vascular tissue  
(C) both are free living structures  
(D) both represent the dominant generation in their respective life cycle

**Ans. (B)**

- Q.9** Which of the following is not a function of calcitonin ?  
(A) promoting deposition of  $\text{Ca}^{2+}$  in bones  
(B) suppressing  $\text{Ca}^{2+}$  absorption in GI tract  
(C) countering the action of parathormone  
(D) increasing reabsorption of  $\text{Ca}^{2+}$  in nephrons

**Ans. (D)**

- Q.10** A long day plant with critical day length of 14 hrs will flower under which of the following treatments ?  
(A) 7 hrs light-2 hrs darkness-3 hrs light-5 hrs darkness-7 hrs light  
(B) 5 hrs light-9 hrs darkness-8 hrs light-2 hrs darkness  
(C) 11 hrs darkness-13 hrs light  
(D) 6 hrs light-6 hrs darkness-7.5 hrs light-4.5 hrs darkness

**Ans. (A)**

- Q.11** Application of auxin in a concentration far more than cytokinin causes callus to undergo -  
(A) caulogenesis  
(B) histogenesis  
(C) rhizogenesis  
(D) morphogenesis

**Ans. (C)**

- Q.12** The correct order in terms of molecular weight is -  
(A) DNA < tRNA < mRNA < insulin  
(B) tRNA < mRNA < rRNA < DNA  
(C) rRNA < insulin < cDNA < Z-DNA  
(D) insulin < B-DNA < cDNA < Z-DNA

**Ans. (B)**

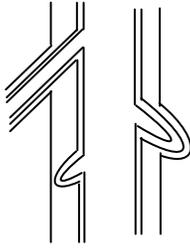
- Q.13** Algal scum floats on the surface of water because -  
(A) The density of cells is lesser than that of water  
(B) Oxygen accumulates in it  
(C) Carbon dioxide accumulates in it  
(D) It generates methane gas

**Ans. (B)**

- Q.14** In maize the colour of grains is controlled by 3 pairs of genes. Gene 'C' and 'R' independently do not form any colour but when together, they impart greenish-brown colour to the stem, while the grains remain colourless. In presence of an additional allele 'A' the stem as well as grains become violet. In a trihybrid cross what phenotypic ratio is expected in grains ?  
(A) 48 coloured : 16 colourless  
(B) 36 coloured : 28 colourless  
(C) 27 coloured : 37 colourless  
(D) 40 coloured : 24 colourless

**Ans. (C)**

**Q.15** Accompanying diagram is a longitudinal section of a tender plant part. This plant part must be -



- (A) root
- (C) inflorescence

- (B) stem
- (D) midrib of a leaf

**Ans. (A)**

**Q.16** In recombinant DNA technology, a promoter sequence helps in -

- (A) modifying the transgene
- (C) recognising and cutting the specific gene

- (B) integration of foreign gene in host DNA
- (D) expressing the transgene at right time and place

**Ans. (D)**

**Q.17** Involuntary muscles are not found in

- (A) iris
- (C) tongue

- (B) bronchi of the lungs
- (D) heart

**Ans. (C)**

**Q.18** In typical angiosperm anther, 1000 pollen grains were found in each pollen sac. How many meiotic divisions would have occurred in the microspore mother cells before these pollen were formed ?

- (A) 2500
- (C) 250

- (B) 1000
- (D) 100

**Ans. (B)**

**Q.19** If a cytotoxin blocks the activity of an enzyme permanently, it is a -

- (A) competitive inhibitor
- (C) non-competitive inhibitor

- (B) non-competitive promoter
- (D) competitive promoter

**Ans. (C)**

**Q.20** Based on the morphological features the plant in the accompanying diagram has to be a -

- (A) Hydrophyte
- (C) Emergent hydrophyte

- (B) Submergent hydrophyte
- (D) Halophyte

**Ans. (C)**

**Q.21** Which of the following is a set of traits with continuous variation ?

- (A) Blood group, sex
- (C) Eye colour, Hair texture

- (B) Red Green colour blindness, Haemophilia
- (D) Skin colour, Height

**Ans. (D)**

- Q.22** Which of the following statements are the functions of a medullary ray in plants ?  
(i) storage of food (ii) secondary growth  
(iii) transmission of water and food (iv) seat of origin of inter-fascicular cambium  
(A) i, ii and iii (B) i, iii and iv  
(C) ii, iii and iv (D) only i and iii

**Ans. (B)**

- Q.23** Different microorganisms taking part in nitrogen cycle are -  
(i) Rhizobia in root nodules (ii) Ammonifying bacteria  
(iii) Nitrifying bacteria (iv) Denitrifying bacteria  
Which of them work strictly under anaerobic conditions ?  
(A) only iv (B) i and iv  
(C) i, ii and iv (D) none of these

**Ans. (B)**

- Q.24** The linear protein that has catalytic function is -  
(A) actin (B) collagen  
(C) myosin (D) trypsin

**Ans. (C)**

- Q.25** The genome of onion has 8 chromosomes ( $n = 8$ ). In a root tip cell undergoing anaphase the number of chromosomes will be -  
(A) 8 (B) 16  
(C) 32 (D) Indeterminate

**Ans. (C)**

- Q.26** Biological clock is influenced by this part of brain -  
(A) hypothalamus (B) corpus callosum  
(C) crura cerebri (D) neocortex

**Ans. (A)**

- Q.27** Among the following an exclusively marine form is -  
(A) prawn (B) slug  
(C) salamander (D) brittle star

**Ans. (D)**

- Q.28** Which of the following events, essential for cell division, is accomplished in  $G_2$  phase of cell cycle ?  
(A) Duplication of centrioles (B) DNA replication  
(C) Disorganization of nucleolus (D) Accumulation of Mrna

**Ans. (A)**

- Q.29** Considering size, which of the following series is the most appropriate ?  
(A) bacteria > viruses > yeast  
(B) hornworts > mosses > liverworts  
(C) smooth muscle cell < striated muscle cell < cardiac muscle cell  
(D) platelets < human erythrocytes < human eosinophils

**Ans. (D)**

- Q.30** Light has no influence on this molecule -  
(A) Phytochrome (B) Florigen  
(C) Vernalin (D) Auxin  
**Ans. (C)**
- Q.31** What would be the molecular weight of a homotriglyceride if the molecular weight glycerol is 92 and that of fatty acid is 596 ?  
(A) 653 (B) 688  
(C) 1880 (D) 1844  
**Ans. (D)**
- Q.32** The nucleus owes its shape mainly to -  
(A) hydrostatic pressure of nucleoplasm (B) abundance of chromatin  
(C) nuclear lamina (D) nuclear envelope  
**Ans. (C)**
- Q.33** Which of the following treatments will not cause denaturation of most proteins ?  
(A) Transfer from aqueous to organic solvent (B) Addition of electrolyte  
(C) Agitation of the solution (D) Addition of strong acid  
**Ans. (B)**
- Q.34** Dilation and increased permeability of blood vessels is a response to -  
(A) pyrogen (B) antibodies  
(C) histamine (D) interferons  
**Ans. (C)**
- Q.35** What is not true about the sympathetic nervous system ?  
(A) It has functions antagonistic to those of parasympathetic system  
(B) It has bilateral ganglionated cords  
(C) It has longer post ganglionic fibres  
(D) It has stimulatory influence on involuntary organs  
**Ans. (D)**
- Q.36** If t-RNA isolated from E.coil and m-RNA as well as ribosomes isolated from mouse liver cell are incubated with ATP and free amino acids, what may happen ?  
(A) Protein specific to mouse will be synthesised (B) Protein specific to E.coil will be synthesised  
(C) Protein synthesis will not occur (D) A hybrid protein will be synthesised  
**Ans. (A)**
- Q.37** Purple cabbage leaves do not lose their colour in cold water but do so in boiling water because.  
(A) The pigment is not soluble in water at low temperature.  
(B) The cell wall becomes porous in hot water  
(C) The cell membrane is disorganised at high temperature  
(D) The pigment breaks down at higher temperature  
**Ans. (C)**

**Q.38** Match the fruits with the appropriate edible part –

**I.** date palm

**II.** pear

**III.** coconut

**IV.** cashew nut

(A) I - P, II - O, III - M, IV - N

(C) I - M, II - P, III - O, IV - N

**Ans. (A)**

**M.** endosperm

**N.** peduncle and cotyledons

**O.** thalamus

**P.** pericarp

(B) I - O, II - N, III - P, IV - M

(D) I - N, II - M, III - O, IV - P

**Q.39** The incorrect pair is :

(A) pseudocoel : tapeworm

(C) metameric : segmentation : millipede

**Ans. (A)**

(B) retrogressive metamorphosis : tunicate

(D) trichocysts : paramoecium

**Q.40** The indirect development in insects is because of :

(A) abundance of food in water

(C) spiral cleavage of zygote

**Ans. (D)**

(B) lack of stored food in eggs

(D) short life span of adults

**Q.41** A cell when viewed under the microscope clearly revealed nucleus, glycogen granules and cell wall. The cell most likely belongs to :

(A) a bacterium

(C) fungal cell

**Ans. (C)**

(B) a plant cell

(D) a protist

**Q.42** The community that always has an inverted pyramid of numbers is :

(A) grassland

(C) freshwater

**Ans. (D)**

(B) desert

(D) tropical forests

**Q.43** Which of the following communities has maximum net primary production ?

(A) Mangroove

(C) Tropical forest

**Ans. (A)**

(B) Coral reef

(D) Marine benthos

**Q.44** Species that have evolved in earlier era and undergone minimum evolutionary changes are called living fossils. Which of the following species is a living fossil ?

(A) Amoeba

(C) Squid

**Ans. (B)**

(B) King crab

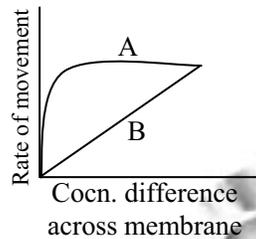
(D) Monitor lizard

**Q.45** Q and R are the flowering plants belonging to the same species. Plant Q is defoliated and both Q and R are then exposed to appropriate photo inductive cycles. A branch of R is then grafted on Q, which of the following response can be obtained ?

- (A) Only R will flower (B) Only Q will flower  
(C) Both Q and R will flower (D) Therefore will be no flowering in both

**Ans. (C)**

**Q.46** The accompanying figure depicts movement of a solute across a membrane without consumption of energy 'A' and 'B' would be -



- (A) facilitated diffusion and passive diffusion (B) passive diffusion and active transport  
(C) passive diffusion and facilitated diffusion (D) facilitated diffusion and active transport

**Ans. (A)**

**Q.47** Considering a fertility of 80% how many meiotic divisions will be involved in development of brood of 160 fish ?

- (A) 160 (B) 200 (C) 250 (D) 320

**Ans. (C)**

**Q.48** Leber's optic neuropathy is a disease caused by a mutation in mitochondrial DNA. As a genetic counsellor, what will you advise a couple with healthy husband and wife with this disease ?

- (A) Their children would suffer from the disease irrespective to gender  
(B) If daughter is born, she would not be suffering from the disease  
(C) If they have a son, he would be suffering from the disease  
(D) Their children are not likely to suffer from the disease irrespective of gender

**Ans. (A)**

**Q.49** In pigs, a gene of length of 2160 base pairs, codes for an enzyme with 218 amino acids. The length of initial and processed mRNA transcript would respectively be -

- (A) 2160 & 600 bp (B) 720 & 564 bp  
(C) 720 & 218 bp (D) 2160 & 564 bp

**Ans. (A)**

**Q.50** During the assembly of progeny of lysogenic bacteriophage sometimes the segment of bacterial DNA gets incorporated in the phage capsid. Such a phage can infect a new bacterial host. This host cell will -

- (A) lyse (B) becomes lysogenic  
(C) remains healthy (D) gets transformed

**Ans. (C)**

- Q.51** Water striders are the insects that walk on the water surface without sinking. This owes to -  
 (A) high specific gravity of water (B) high surface tension of water  
 (C) greater bond length between H and O (D) anomalous property of water

**Ans. (B)**

- Q.52** The movement of dissolved materials from the lumen through the space between adjacent epithelial cell is prevented by -  
 (A) tight junction (B) desmosomes  
 (C) gap junction (D) basal lamina

**Ans. (A)**

- Q.53** Animals habituated to hot climate are generally -  
 (A) small and long lived (B) large and long lived  
 (C) small and short lived (D) large and short lived

**Ans. (C)**

- Q.54** As part of a student project, Sheela surgically made a full cut in the hypothalamo-hypophyseal tract in pregnant rabbits and studied the physiological effects on different tissues/organs. Which of the following should be expected ?

- (i) Formation of large volume of dilute urine  
 (ii) Reduced synthesis of milk by the mammary gland  
 (iii) Increased heart rate  
 (iv) Difficulty in parturition

- (A) i and ii (B) ii and iii  
 (C) iii and iv (D) i and iv

**Ans. (D)**

- Q.55** If the cell shown below stops respiring, the resultant cell milieu will be -

Plasma Erythrocyte

Na<sup>+</sup> : 100 15

K<sup>+</sup> : 14 90

Plasma Erythrocyte

(A) Na<sup>+</sup> : 0 115

K<sup>+</sup> : 0 104

Plasma Erythrocyte

(C) Na<sup>+</sup> : 57 57

K<sup>+</sup> : 52 52

Plasma Erythrocyte

(B) Na<sup>+</sup> : 115 0

K<sup>+</sup> : 104 0

Plasma Erythrocyte

(D) Na<sup>+</sup> : 100 15

K<sup>+</sup> : 14 90

**Ans. (C)**

- Q.56** A few statements about algae and bryophytes are given below. The correct statement,s is/are -  
(i) Bryophytes are found in terrestrial habitats while algae are not  
(ii) Bryophytes are better adapted to conserve water than algae  
(iii) Bryophytes and algae need aquatic media for reproduction  
(iv) Bryophytes and algae have short-lived gametophytic generation  
(A) i and ii (B) i, ii and iii  
(C) i, iii and iv (D) only iii  
**Ans. (B)**
- Q.57** While taking a stroll in the garden, you happen to see a tall fern plant. The correct description of this plant will be -  
(A) It is a gametophyte that will produce gametes by mitosis  
(B) It is a sporophyte with haploid number of chromosomes in each cell  
(C) It is a gametophyte with haploid in number of chromosomes in each cell  
(D) It is a sporophyte that will produce spores by meiosis  
**Ans. (D)**
- Q.58** Which of the following animals are likely to have more esters of unsaturated fatty acids in the cell membranes ?  
(i) Cold blooded animals  
(ii) Warm blooded animals living in cold climate  
(iii) Warm blooded animals living in hot climate  
(A) i and ii (B) ii and iii  
(C) only i (D) only ii  
**Ans. (A)**
- Q.59** The correct statements about respiration are -  
(i) In cockroach gaseous exchange occurs mainly between tracheoles and haemolymph  
(ii) Increase in inspiratory capacity does not involve an increase in tidal volume  
(iii) Partial pressure of oxygen in blood is less than that in alveoli  
(iv) Chloride shift in erythrocytes maintain the ionic balance  
(A) i and ii (B) i, iii and iv  
(C) i, ii and iv (D) ii and iii  
**Ans. (B)**
- Q.60** Which of the following statement,s about fungi is/are true ?  
(i) Some fungi are parasitic (ii) Some fungi are saprotrophs  
(iii) Some fungi are mutualistic (iv) Some fungi are autotrophic  
(A) i and ii only (B) ii and iii only  
(C) only i (D) i, ii and iii  
**Ans. (D)**
- Q.61** An animal cannot be classified as coelomate or acoelomate if it shows  
(A) radial symmetry (B) haemocoel  
(C) diploblasty (D) metameric segmentation  
**Ans. (C)**

**Q.62** An inexperienced mouse may readily attack a brightly coloured, slow-moving caterpillar only to find its mouth full of distasteful fluid. Following this experience, the mouse may avoid attacking insect larvae with similar colouration and behaviour. This is an example of -

- (A) habituation (B) sensitization  
(C) spatial learning (D) associative learning

**Ans. (D)**

**Q.63** Kiran was born with 6 toes on each foot, a dominant trait called polydactyly, due to the allele D. Two of her five siblings and her mother have extra digits but not her father. The genotypes of Kiran and her mother respectively are -

- (A) DD and DD (B) Dd and Dd  
(C) Dd and DD (D) DD and Dd

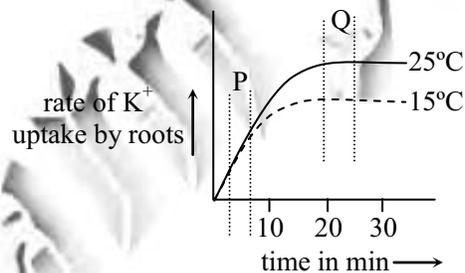
**Ans. (B)**

**Q.64** A lake was found to harbour alarming level of a pesticide-DDT. The people most affected by accumulation of DDT in the body would be those that -

- (A) consumed products of plants growing in the lake  
(B) ate fish from the lake  
(C) ate birds dwelling in the same area  
(D) used same water for bathing

**Ans. (C)**

**Q.65** Following graph was obtained when rate of  $K^+$  uptake by roots of growing seedlings was measured at different temperatures. The limiting factor/s at region P and Q is/are -



- (A) time and rate of metabolism respectively (B) temperature and time respectively  
(C) rate of metabolism (D) temperature

**Ans. (A)**

**Q.66** Consider a hypothetical situation where a cell Q with pressure potential of 0.05 units filled solely with water is surrounded by four cells A, B, C and D. The pressure and solute potentials ( $\Psi_P$  and  $\Psi_S$ ) of the respective cells are tabulated below

	A	B	C	D
$\Psi_P$	0	0.3	0.23	-0.23
$\Psi_S$	-0.23	-0.23	-0.23	-0.23

Water from which of the cells is likely to enter the cell Q ?

- (A) A (B) B (C) C (D) D

**Ans. (B)**

**Q.67** A student carrying out cell fractionation of plant tissue forgot to label her tubes. The contents of one tube when studied showed organelles bounded by single membrane with acid acidic internal components. These organelles could be -

- (A) nucleus (B) chloroplast  
(C) lysosome (D) peroxisome

**Ans. (C)**

**Q.68** Which of the following animals has exoskeleton but no endoskeleton ?

- (A) Lizard (B) Frog  
(C) Sponge (D) Cockroach

**Ans. (C)**

**Q.69** If the blood groups of parents are O Rh<sup>+</sup> and AB Rh<sup>+</sup>, the blood group of child will be -

- (A) A Rh<sup>+</sup> (B) O Rh<sup>+</sup>  
(C) AB Rh<sup>+</sup> (D) A Rh

**Ans. (A)**

**Q.70** In a biology laboratory an unknown protozoan culture is given for observation. When observed under high power of microscope, then protozoan showed ciliary movements and rotated on the long axis while moving. The organism must be -

- (A) Paramecium (B) Amoeba  
(C) Vorticella (D) Chlamydomonas

**Ans. (A)**

**Q.71** A piece of skull showing a thecodont and diphyodont dentition was discovered in a cave. It must be of which of the following animals ?

- (A) Salamander (B) Monitor lizard  
(C) Man (D) Platypus

**Ans. (C)**

**Q.72** Which group of organelles is involved in anabolic processes in a cell ?

- (A) lysosome, vacuole, ribosome  
(B) ribosome, rough ER, smooth ER  
(C) vacuole, rough ER, smooth ER  
(D) smooth ER, ribosome, vacuole

**Ans. (B)**

**Q.73** Which of the following structures, absent in algae, is very important for complete and permanent invasion of land by plants ?

- (A) chloroplasts (B) tracheids  
(C) sporangia (D) free living gametophyte

**Ans. (B)**

**Q.74** What would be the molecular weight of a polypeptide with 20 amino acids, assuming an average molecular weight of amino acids to be 128 ?

- (A) 2200 (B) 2560  
(C) 2578 (D) 2218

**Ans. (D)**

