

**Association of Teachers in Biological Sciences**  
**NATIONAL STANDARD EXAMINATION IN BIOLOGY 2012-2013**

Date of Examination : 24th November 2012

Time 15.00 to 17.00 Hrs

**[Ques. Paper Code : 3-0-2]**

1. To a culture medium containing cells in the phase of differentiation, a marker molecule capable of binding to the newly synthesising cellulose molecules was added. The marker will appear in -  
 (a) middle lamella (b) primary wall layer  
 (c) secondary wall layer (d) both b and c

**Ans.** [c]

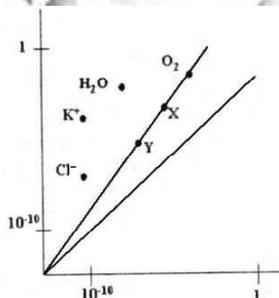
**Sol.** During cell differentiation mainly secondary wall formation occur thus cellulose molecule will be deposited only in secondary cell wall. Marker will binds only on newly synthesized cellulose. Thus only secondary cell wall show the marker.

2. While the light reaction of photosynthesis is going on, the pH of the matrix of thylakoids in comparison with the pH of the fluid in stroma would be -  
 (a) variable (b) higher (c) identical (d) lower

**Ans.** [d]

**Sol.** During light reaction, the concentration of  $H^+$  is high in matrix of thylakoids i.e. acidic pH while of stroma low  $H^+$  conc. i.e. high pH.

3. Comparison between permeability of certain molecules across a lipid bilayer and a biological membrane is depicted in the diagram. What could X and Y respectively be ?



- (a)  $CO_2$  and Glycerol (b) Glycerol and  $CO_2$  (c) Sucrose and  $PO_4^{3-}$  (d)  $PO_4^{3-}$  and Sucrose

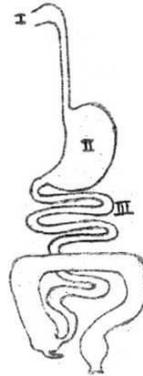
**Ans.** [c]

**Sol.** Rate of transport across membrane

$O_2 > H_2O > Sucrose > K^+ > PO_4^{3-}$

Thus  $X = sucrose$   $Y = PO_4^{3-}$

4. During the process of digestion, food is exposed to a range of pH. The relative pH of fluids in I, II and III regions of the alimentary canal shown in this diagram is -



- (a)  $I < II > III$                       (b)  $I > II > III$                       (c)  $I < II < III$                       (d)  $I > II < III$

**Ans.** [d]

**Sol.** pH of buccal cavity is  $\approx 6.8$ , stomach  $\approx 2.5$  and Intestine  $\approx 7.8$

5. An egg was placed in diluted HCl till the shell was completely dissolved. It was then transferred to another fluid and was found to swell within 10 minutes. What can this solution be ?

- (a) Sugar syrup    (b) Soap solution  
(c) Concentrated salt solution                      (d) Tap water

**Ans.** [d]

6. A scion from a short day plant was grafted on the stalk of long day plant. The flowering response of the grown plant will be like a -

- (a) non-flowering plant    (b) long day plant                      (c) day neutral plant                      (d) short day plant

**Ans.** [d]

**Sol.** Flowering will be determined by scion, as it will percet the stinoli and respond to photoperiodism.

7. The most significant factor limiting primary production at a depth of 20 meters in sea is the -

- (a) availability of  $CO_2$     (b) availability of nutrients  
(c) quality of light    (d) temperature

**Ans.** [c]

**Sol.** Lack of light in deep oceans.

8. Half the pups in the litter of a dog were given meat and remaining half were given only pancreas of freshly slaughtered goats. After maintaining this diet for 6 weeks, clinical examination was done. "In comparison to the pups raised on meat, the ones fed on pancreas would show -

- (a) hypoglycaemia    (b) hyperglycaemia  
(c) protein deficiency    (d) no detectable difference

**Ans.** [d]

**Sol.** Both are feed on animal cell (Non-veg.)

9. Select the hormones that influence the process of digestion -

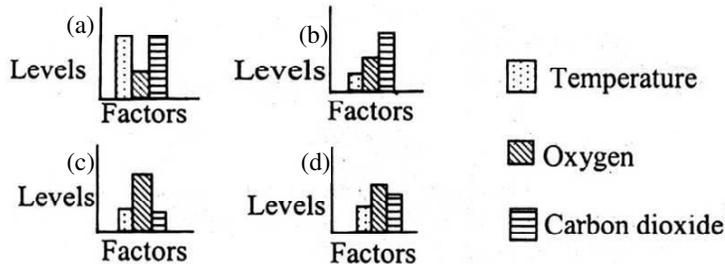
- i. Secretin    ii. Cytokinin    iii. Chloecytokinin  
iv. Enterogastrone    iv. Somatostatin

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

**Ans.** [d]

- Sol.** Except cytokinin hormone, secretin, cholecystokinin, enterogasterone and somatostatin influences The secretion of digestive juices.
- Secretin stimulates the secretion of pancreatic juice and bilejuice
  - Cholecystokinin stimulates the gall bladder for secretion of store bile juice.
  - Enterogasterone inhibites the secretion of gastric juice.
  - Somatostatin inhibites the secretion of intestinal & juice.

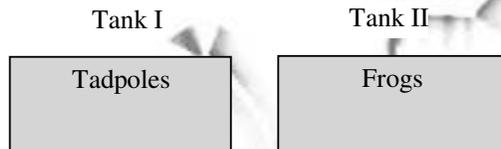
- 10.** Choose the combination of conditions in a tissue that would influence the most rapid dissociation of oxyhemoglobin.



**Ans.** [a]

**Sol.** High Temperature and high  $PO_2$  will decrease the  $O_2$ -Hb affinity causing more dissociation of oxyhaemoglobin.

- 11.** Water from the two tanks shown in the diagram was tested 3 hours after they were stocked with indicated animals. The predominant nitrogenous waste detected in Tank-I and Tank-II respectively would be –



- (a) urea in both      (b) ammonia and urea      (c) ammonia in both      (d) urea and uric acid

**Ans.** [b]

- 12.** A radioisotope having half life of 1000 years occurs in a proportion of 1 : 100 with the non-radioactive isotope. If a fossil had this proportion of about 0.02 : 100 of this element it must have been fossilised -

- (a) 800 to 2000 years ago      (b) 1600 to 3200 years ago  
 (c) 5000 to 6000 years ago      (d) 4000 to 5000 years ago

**Ans.** [c]

- 13.** Grass seeds trapped in the crevices of rock causes its fragmentation in monsoon. This is owing to the phenomenon of -

- (a) imbibition by seed coat      (b) hydrolysis of minerals by enzymes from seeds  
 (c) pressure of  $CO_2$  in respiration      (d) pressure of germinating radicals

**Ans.** [a]

**Sol.** Phenomenon of inhibition creates inhibition pressure results in fragmentation of rocks.

- 14.** Though triploblastic platyhelminthes are considered acoelmates since the mesoderm is -

- (a) underdeveloped  
 (b) non-cellular jelly-like  
 (c) organized into discontinuous patches  
 (d) spongy, filling the space between ectoderm and endoderm

**Ans.** [d]

15. Both, absorption and translocation of water are associated by this property of cell wall -  
 (a) porosity (b) hydrophilic nature (c) mechanical strength (d) elasticity

**Ans. [b]**

**Sol.** Cell wall have hydrophilic nature, plays most important role in absorption and translocation of water by a cell.

16. Arrange the following animals in the order of increasing rate of heart beats.

- i. Sheep                      ii. Mouse                      iii. Rabbit  
 iv. Horse                      v. Elephant  
 (a) ii, i, iii, iv, v              (b) v, iv, i, iii, ii              (c) v, iv, ii, iii, i              (d) i, iii, iv, v, ii

**Ans. [b]**

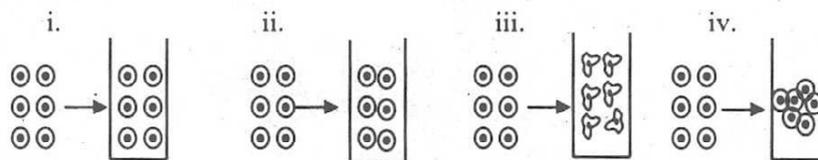
**Sol.** In arm blooded animals the heart rate is inversely proportional to body size.

17. Raj encountered a plant with thick, leathery, dark green leaves with prominent petioles; elongated, branched, prostrate stem and very long adventitious roots. From these adaptations, the plant seems to be -  
 (a) a submerged plant (b) a marsh dweller (c) a shade loving plant (d) a sand binder

**Ans. [d]**

**Sol.** All the given features are characters of succulent xerophytes.

18. Consider the following hypothetical experiment. A definite number of eukaryotic cells were placed for 30 minutes in some solutions and the result is depicted below -



The solutions (i), (ii), (iii) and (iv) respectively most likely are -

- (a) nutrient medium, hypotonic medium, isotonic medium, hypertonic medium  
 (b) hypotonic medium, hypertonic medium, isotonic medium, nutrient medium  
 (c) isotonic medium, hypertonic medium, hypotonic medium, nutrient medium  
 (d) hypertonic medium, hypotonic medium, nutrient medium, isotonic medium

**Ans. \***

**Sol.** All the 4 options are incorrect, the correct answer should be

- i. Isotonic solution                      ii. Isotonic solution  
 iii. Hypertonic solution                      iv. Hypotonic solution

19. Which of the following is expected to have a lining of stratified epithelium ?

- i. alveoli in lungs                      ii. oesophagus                      iii. duodenum  
 iv. urinary bladder                      v. major arteries  
 (a) ii, iv, and v                      (b) i, ii, iii and v                      (c) only ii                      (d) only ii and v

**Ans. [a]**

**Sol.** Oesophagus lined by stratified squamous epithelium, urinary bladder lined by stratified transitional epithelium and major arteries are also lined by stratified squamous epithelium.

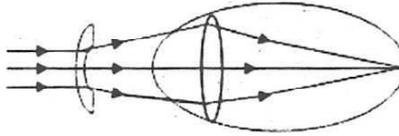
20. Forest fires are natural means of -

- i. secondary succession                      ii. elimination of predators  
 iii. mineralization of nutrients                      iv. discouraging primary consumption  
 (a) i and iii                      (b) ii and iii                      (c) i, ii and iii                      (d) i, ii and v

**Ans. [a]**

**Sol.** Forest fire will naturally responsible for secondary succession and mineralization of nutrients.

21. The figure depicts an eye defect and its correction. Select the most appropriate alternative from the following that best explains this.



- (a) Hypermetropia, convex lens of suitable focal length  
 (b) Hypermetropia, concave lens of suitable focal length  
 (c) Myopia, convex lens of suitable focal length  
 (d) Myopia, concave lens of suitable focal length

**Ans.** [d]

**Sol.** According to diagram of question, concave lens is used which is used myopia eye defect.

22. Which of the following sequences of mRNA will not translate completely ?

- (a) 5'AUG AAC UAA CCA CUC 3'                      (b) 5'AUG UUC AGC UCG UGA 3'  
 (c) 5'AUG UUA CUC GCG UAA 3'                      (d) 5'AUG CCA UAC GAC UAG 3'

**Ans.** [a]

**Sol.** UAA stop codon is present in it.

23. In living organisms, mucilage prevents damage to the underlying cells from either acidic or alkaline fluids in contact. This is due to which of the following properties of mucilage ?

- (a) Hydrophilic nature                                      (b) Viscosity  
 (c) Reducing properties of sugar residues              (d) Amphoteric nature of protein component

**Ans.** [d]

24. In Galapagos Islands mountain peaks sustain populations of related species of snails. This is an example of -

- (a) genetic drift                      (b) gene flow                      (c) reproductive isolation      (d) migration

**Ans.** [c]

25. Which of the following can be a reliable indication that the body fats are being consumed ?

- (a) Respiratory Quotient dipping below 1              (b) Rapid loss of body weight  
 (c) Increased thirst    (d) Hypoglycemia

**Ans.** [b]

**Sol.** Body fat loss have maximum contribution in weight loss process.

26. Antidiuretic hormone has the most abundant receptors in the kidneys of -

- (a) frogs in tropical pond                                      (b) rabbits in a grass land  
 (c) spotted deer in moist evergreen forest              (d) kangaroo rats in deserts

**Ans.** [d]

27. A bacterium-like cell was retrieved from space and on its analysis revealed the presence of biochemical constituents identical to those of eubacteria except for the presence of 33 types of amino acids. The codons to code for them would be made of a minimum -

- (a) 3 deoxyribonucleotides                                      (b) 2 deoxyribonucleotides  
 (c) 4 deoxyribonucleotides                                      (d) 5 deoxyribonucleotides

**Ans.** [a]

**Sol.** Total codon =  $(X)^n$                       X = Nitrogen base                      n = number  
 =  $(4)^3 = 64$  codon  
 64 codon are sufficient for 33 amino acid.

28. Which of the following will be immediately affected if sodium potassium pumps start malfunctioning in the body ?
- (a) Impulse transmission (b) Secretion of gastric juice  
(c) Ultrafiltration (d) Oogenesis

Ans. [a]

Sol. Impulse transmission in nerve is dependent on Na-K pump.

29. Protein molecules giving individuality to cells have to be membrane proteins of this category -
- (a) Peripheral or Extrinsic (b) Integral proteins on cytoplasmic lamina  
(c) Integral proteins on extracytoplasmic lamina (d) Lipoproteins

Ans. [c]

Sol. Membrane individuality is given by glycoprotein mainly and integral protein present on extra cytoplasmic surface.

30. The dominant alleles A and B each add 2 g weight to a basal weight (in homozygous recessive condition) of 6g of fruits of a certain plant. If two plants, each with fruits weighing 8g and having heterozygous condition for one gene each are crossed. What phenotypic ratio is expected among the offspring ?
- (a) 24% with 10g; 50% with 8g; 25% 6g fruit  
(b) 50% with 10g; 50% with 6g fruit  
(c) 24% with 12g; 25% with 10g; 25% with 8g; 25% with 6g fruit  
(d) 12.5% with 14g; 25% with 12g; 25% with 10g; 25% with 8g; 12.5% with 6g fruit

Ans. [a]

Sol.  $Aabb \times aaBb$   
(8g) (8g)

	Ab	ab
aB	AaBb 10g	aaBb 8g
ab	Aabb 8g	aabb 6g

31. Of the following sequences, which one shows trend from mutually beneficial to mutually deleterious interactions ?
- (a) Protocooperation → Obligatory symbiosis → Competition → Parasitism  
(b) Commensalism → Amensalism → Facultative Symbiosis → Predation  
(c) Obligatory symbiosis → Commensalism → Amensalism → Competition  
(d) Facultative Symbiosis → Amensalism → Parasitism → Predation

Ans. [c]

Sol.  $+/+ \rightarrow +/0 \rightarrow -/0 \rightarrow -/-$

32. Which of the following is NOT a function of mitochondria ?
- (a) Storage of reserved food materials, particularly in ova  
(b) Storage of divalent cations like  $Ca^{++}$  and  $Mg^{++}$   
(c) Influencing extranuclear hereditary characters  
(d) Synthesis of high energy compounds like creatine

Ans. [b]

33. Cells were cultured in a medium containing heavy isotope of phosphorous till the entire DNA complement had only this isotope. Subsequently some cells were transferred to a medium with the normal isotope of phosphorous. After a certain period some cells were harvested and analyzed for heavy phosphorous. It was found that only 6.25% of phosphorous in DNA was heavy. How many times the cells must have divided ?  
(a) 4 times (b) Twice (c) 8 times (d) 10 times

Ans. [a]

34. A female plant with spadix inflorescence for three successive generations was cross pollinated with male plant having simple spike for three successive generations and all plants in the first generation were with spadix inflorescence. When the male plants among them were crossed with the female plants bearing simple spike, all the descended were with simple spike inflorescence. What can you conclude from this ?  
(a) Gene for spadix inflorescence is dominant one that for simple spike  
(b) Gene for spadix inflorescence is incompletely dominant  
(c) Gene for spadix and simple spike inflorescence are co-dominant  
(d) This is an example of oocyte inheritance

Ans. [d]

35. In the forest ecosystem the biomass of primary producers might not have been consumed completely if the following consumers were not there -  
(a) rodents (b) elephants (c) aphids (d) ants

Ans. [c]

Sol. Aphids are the primary consumers whose population size is very high. So can able to consume the whole biomass produced by primary producers.

36. A botany student encountered a palm like, short tree with pinnately compound leaves with sessile leaflets bearing midrib but no lateral veins. The stem has persistent, woody, leaf bases. Branched, blunt finger-like structures could be noticed on ground around the base of trunk. The plant has to be -  
(a) Cycas (b) Araca nut (c) The fern (d) Coconut palm

Ans. [a]

37. Plant of genotype AaBBCc was cross pollinated with another having the genotype aaBbcc. If all genes involved have complete dominance, the phenotypic ratio in the first generation plants will be -  
(a) 1 : 2 : 1 (b) 1 : 1 : 1 : 1 (c) 1 : 3 : 3 : 9 (d) 1 : 1 : 1 : 1 : 1 : 1

Ans. [b]

Sol. Cycas leaflet bears the midrib but does not have lateral veins.

38. A skull excavated from a place had large zygomatic arches, 2 pairs of large incisors, 2 pairs of premolars following a gap and 3 pairs of large molars. The formaen magnum was directed posteriorly. This skull belongs to a -  
(a) predatory mammal with bipedal locomotion  
(b) predaceous dinosaur with bipedal locomotion  
(c) herbivorous mammal with quadrapedal locomotion  
(d) herbivorous dinosaur with quadrapedal locomotion

Ans. [c]

39. A field scientist counted the number of individuals of the following -  
i. Grass ii. Hawks iii. Sparrows iv. Plant bugs from a place and has jumbled up the titles of the datasheet. Can you identify the numbers with the organisms in the sequence mentioned above ?

- (a) 13254, 5, 8376, 279 (b) 8379, 279, 5, 13254  
(c) 13254, 279, 8376, 5 (d) 13254, 5, 279, 8379

**Ans.** [d]

**Sol.** Population size is in order of

Primary producer → Primary consumer → Secondary consumer → Tertiary consumer

(P.P.)

(P.C.)

(S.C.)

(T.C.)

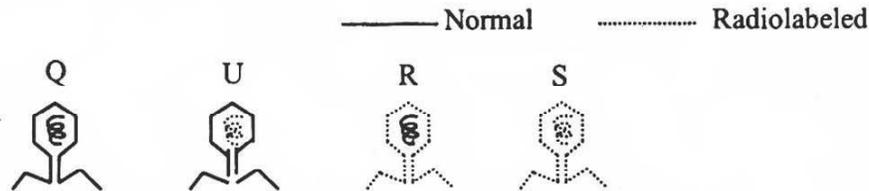
Grass – P.P.

Hawks – T.C.

Sparrow – S.C.

Plant bugs – P.C.

40. Bacterial cultures on separate culture plates were infected by phages as shown below



Post infection, the bacterial cells in each plate were lysed and centrifuged. The supernatant from bacteria infected by which phage/s will show radioactivity ?

(a) Q and R

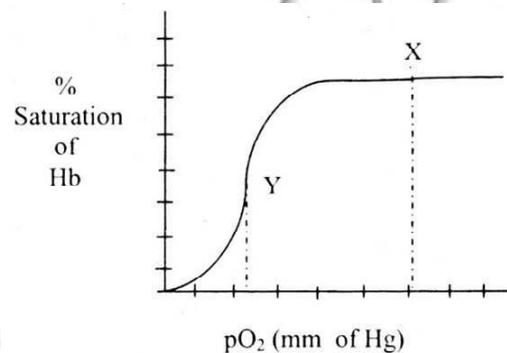
(b) Q and S

(c) U and S

(d) U and R

**Ans.** [c]

41. The accompanying graph depicts the % saturation of vertebrate haemoglobin with oxygen. What does X and Y indicate ?



(a) X- oxygenated blood, Y- deoxygenated blood

(b) X- deoxygenated blood, Y- oxygenated blood

(c) X- blood of haemophilic person, Y- blood of normal person

(d) X- blood of foetus, Y- blood of adult

**Ans.** [a]

**Sol.** X-shows 97% saturation of O<sub>2</sub> with haemoglobin which occurs in oxygenated blood.

Y shows less percentage saturation of O<sub>2</sub> with haemoglobin which occurs in deoxygenated blood.

42. Rohit complained of stomach ache and heart burn. Deepak advised him to take lime juice (i) while Jyoti advised him to take milk of magnesia (ii) which of these do you feel will work and how ?

(a) i – because it will neutralize acidity in stomach

(b) ii – because it will neutralize excess acidity in stomach

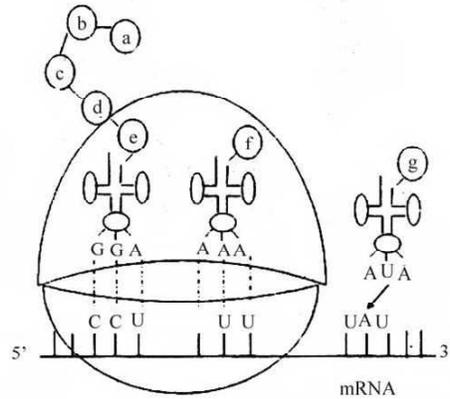
(c) i – because it will suppress the secretion of acid in stomach

(d) ii – because it will suppress the secretion of acid in stomach

**Ans.** [b]

**Sol.** According to asking question hyperacidity develop in stomach which can be neutralize by milk of magnesia

43. The figure illustrates the process of translation in protein synthesis. if the triplet UAU is modified to UAG what will be the consequence ?



- (a) amino acid 'f' will be omitted from resultant polypeptide chain  
 (b) the amino acid 'g' will be replaced by some other amino acid in the resultant polypeptide  
 (c) the polypeptide with a, b, c, d, e and f will be released  
 (d) the polypeptide will not be produced at all

Ans. [c]

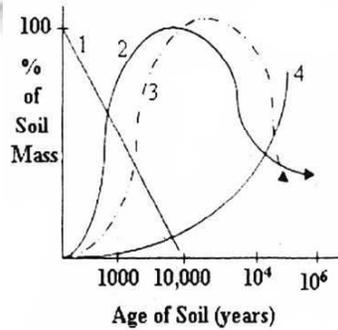
Sol. UAG is stop codon

44. Leaves of eucalyptus hang vertically on weak branches that themselves hang down. The advantages of it are -  
 i. Availability of light is assured to all leaves  
 ii. Leaf lamina is not presented directly to mid-day sun  
 iii. Heating as well as water loss is kept under control  
 iv. Trunk and major branches get shielded from intense light

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

Ans. [d]

45. The accompanying diagram shows the changing amounts of clay, calcium carbonate, humus and biomass. Match these with the numbers representing lives in the diagram -



- (a) 1- Biomass, 2- CaCO<sub>3</sub>, 3- Clay, 4- Humus      (b) 1-Clay, 2- Humus, 3- Biomass, 4- CaCO<sub>3</sub>  
 (c) 1- Humus, 2- Clay, 3- Biomass, 4- CaCO<sub>3</sub>      (d) 1- CaCO<sub>3</sub>, 2- Biomass, 3- Humus, 4- Clay

Ans. [b]

46. Select the statement related to the effect of ethylene -
- Promotes lateral swelling of stem
  - Inhibits elongation of cells
  - Causes loss of sensitivity of stem to gravitropic stimuli
  - Loosens cell wall
  - Delayed leaf senescence

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

Ans. [c]

47. The lateral line sense organ in fish is a -

(a) Chemoceptor                      (b) Mechanoceptor                      (c) Photoceptor                      (d) Gustatoceptor

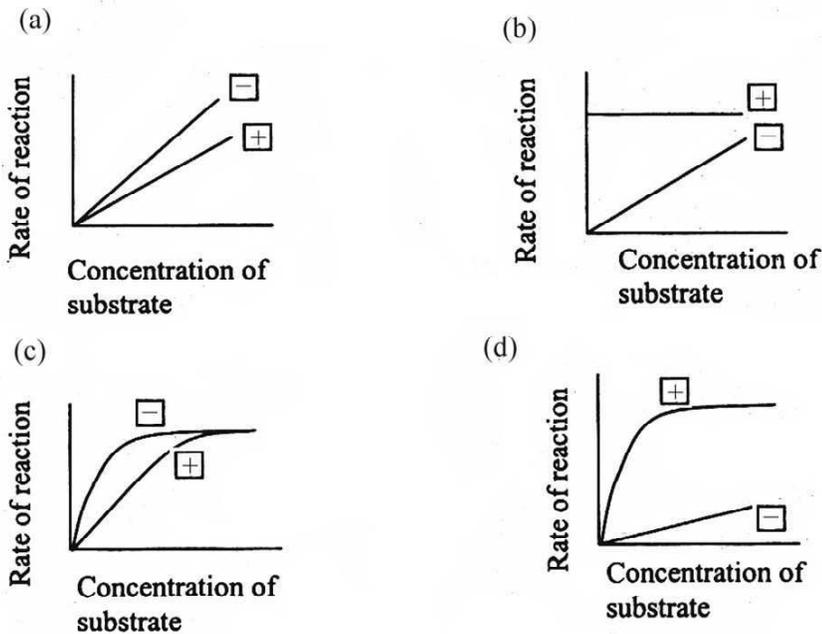
Ans. [b]

48. Which of the following elements is NOT involved in the information transfer from DNA to finished protein ?

(a) Ribosome                      (b) tRNA                      (c) DNA polymerase                      (d) RNA polymerase

Ans. [c]

49. Which of the following graphs correctly indicates the reaction in presence (indicated by +) and absence (indicated as -) of an enzyme ?



Ans. [d]

Sol. Enzyme increase the rate of reaction with increase in substrate concentration reach to maximum than become constant as follows Michaelis Menten reaction kinetics.

50. P, Q and R are the three ploidy levels.

P:  $4n$ ,

Q:  $2n$

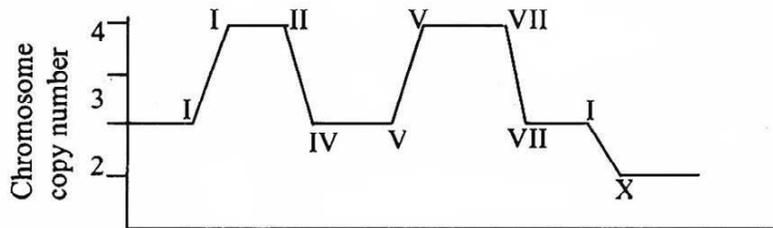
R:  $n$ .

Which of these ploidy levels can be found in the cells of a multicellular eukaryotic organism ?

(a) Q and R                      (b) Only Q                      (c) P and Q                      (d) All P, Q and R [www.examrace.com](http://www.examrace.com)

Ans. [d]

51. Chromosome copy numbers in different cell division cycles are shown in the graph.



Mark the option that correctly depicts the numbers and the process.

- (a) V - X: Meiosis I  
 (b) III - IV: Mitosis  
 (c) VII - X: meiotic division  
 (d) I - IV: Mitotic division

Ans. [c]

Sol. VII to X show the changes of chromosome during meiosis.

52. A few events that occur in the lytic cycle of a virus (bacteriophage) are listed.

- i. Host cell transcribes and translates phage proteins
- ii. Host DNA is digested
- iii. New phage DNA is formed
- iv. Phage enzyme causes the cell to lyse
- v. Phage particles are released

The correct order in which these events occur is -

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

Ans. [d]

53. Macrophages are white blood cells that phagocytose any foreign body while plasma cells are effector B cells that produce antibodies. When these two cell types are activated, the predominant organelle at work will be respectively -

- (a) Rough Endoplasmic Reticulum and Smooth Endoplasmic Reticulum  
 (b) Golgi bodies and lysosomes  
 (c) Lysosomes and Rough Endoplasmic Reticulum  
 (d) Peroxisomes and lysosomes

Ans. [c]

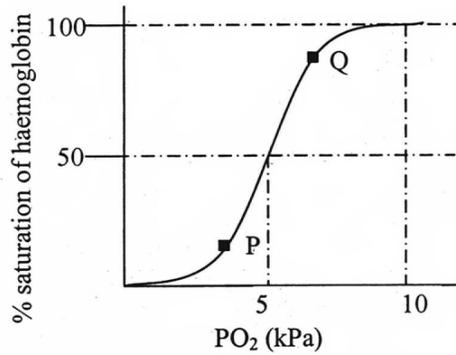
54. Various life forms appeared on earth at certain time periods in the history of several million years. Arrange the following in the order of their appearance on earth (starting with the earliest) -

1. Multicellular organisms
2. Eukaryotes
3. Organisms with exoskeleton
4. Angiosperms

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

Ans. [d]

55. Oxygen saturation curve of hemoglobin molecule is shown in the graph -



The correct representation of haemoglobin molecule at points P and Q is respectively -

- (a)  $\text{HbO}_2$  and  $\text{HbO}_4$     (b)  $\text{HbO}_2$  and  $\text{HbO}_8$     (c)  $\text{HbCO}$  and  $\text{HbCO}_2$     (d)  $\text{HbO}_4$  and  $\text{HbO}_6$

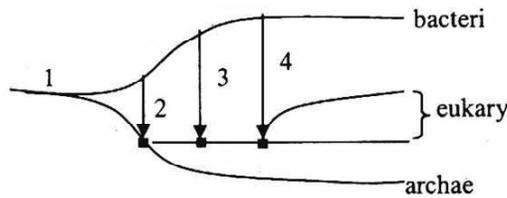
Ans. [b]

56. Which of the following is the correct representation of primary RNA (pre m-RNA) transcript ?

- (a) exon-intron-exon-intron-poly A sequence    (b) exon-intron-exon-intron-poly A signal  
 (c) promoter-enhance-exon-intron-exon-intron    (d) Start codon-exon-exon-stop codon-poly A tail

Ans. \*

57. Study the tree of life given.



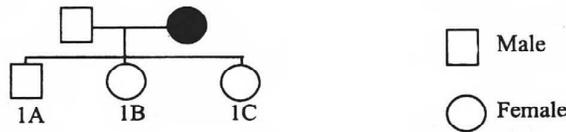
The numbers indicating symbiosis of chloroplast and mitochondrial ancestors respectively are -

- (a) 3 and 1    (b) 3 and 4    (c) 2 and 3    (d) 4 and 3

Ans. [b]

Sol. Mitochondria is originated from rickettsia like bacteria while chloroplast is evolved from Blue green Algae.

58. The following pedigree depicts the inheritance of an X-linked recessive trait.



If the mother shows the affected phenotype and the father is phenotypically normal but having an unknown genotype then -

- (a) Offspring 1A, 1B and 1C would be normal    (b) Only offspring 1A would be affected  
 (c) Offspring 1B and 1C would be affected    (d) Offspring 1A, 1B and 1C would be affected

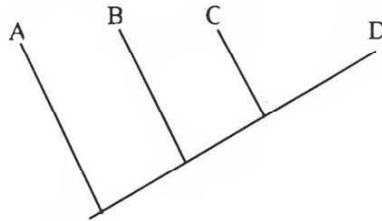
Ans. [b]

Sol.

	X	Y
$X^c$	$X^cX$	$X^cY$
$X^C$	$X^CX$	$X^CY$

Only male offspring will be affected

59. A cladogram depicting the evolution of various plant forms with respect to the evolutionary time scale is shown below.



If 'D' indicates 'flowering plants', then C would represent -

- (a) Mosses                      (b) Liverworts                      (c) Conifers                      (d) Ferns

Ans. [c]

Sol. Before angiosperm conifer were evolved on earth .

60. The following list indicates certain molecules/ions and their mechanism of transport across the cell membrane. Determine the correct pair/s from the list.

- I. Diffusion –  $\text{Na}^+$   
 II. Active transport – Amino acids  
 III. Osmosis – Water  
 IV. Facilitated diffusion – Glucose

Options -

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

Ans. [a]

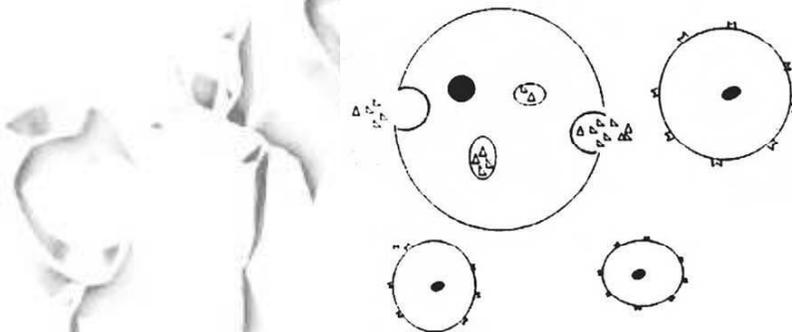
61. If a person is suffering from hypocalcaemia, which one of the following could be the possible reason ?

- (a) Absence of parathyroid hormone                      (b) Malfunction of pancreas  
 (c) Pineal gland dysfunction                      (d) Decreased level of corticosteroids

Ans. [a]

Sol. Concentration of calcium is increased or controlled by parathormone which is secreted by parathyroid gland.

62. Which type of cell communication/signaling is described in the following figure ?

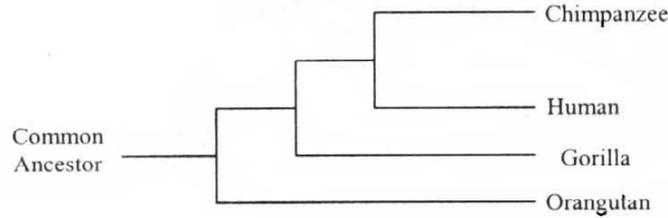


- (a) Synaptic                      (b) Exocrine                      (c) Paracrine                      (d) Endocrine

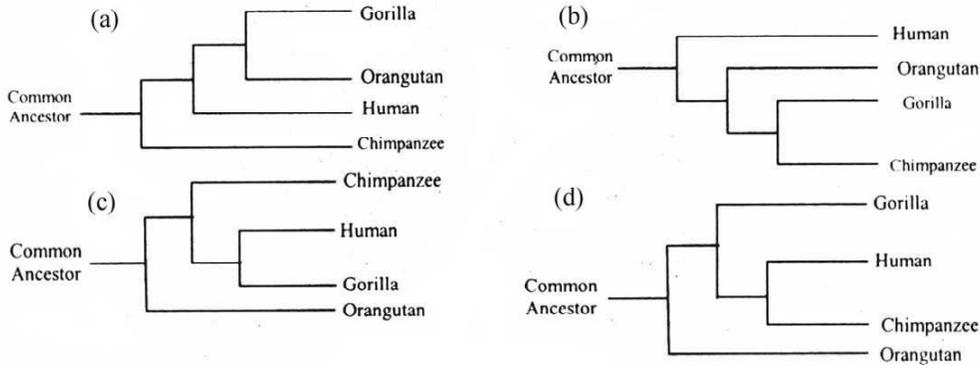
Ans. [c]

Sol. According to diagram of asking question this diagram represent only paracrine gland.

63. A cladogram depicting the evolutionary relationship between some primates is shown below.

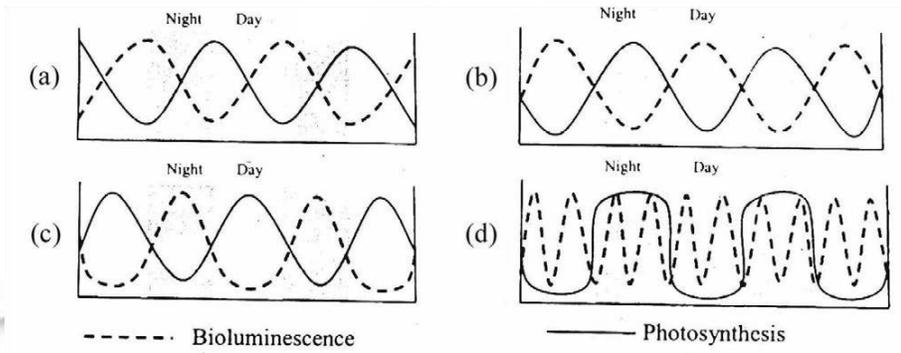


Which one of the following would describe the relationship in exactly same manner ?



Ans. [d]

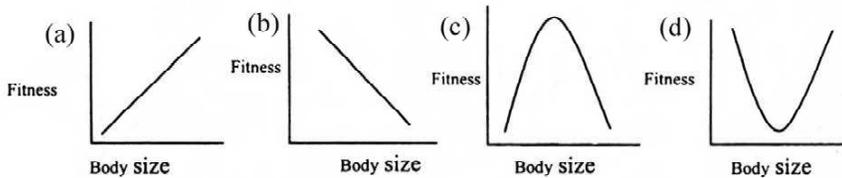
64. Red algae *Gonyaulax polyhedra* follow circadian rhythm for two different activities; i.e. Photosynthesis and Bioluminescence. Which of the following graphs correctly explains this phenomena ?



Ans. [c]

Sol. Photosynthesis maximum occurs during day time while bioluminescence occurs maximum during night time.

65. Which one of the following graphs correctly describes disruptive selection ?



Ans. [d]

66. If two people who are both carriers for a genetically inherited fatal recessive disease decide to marry, what will be the odds that their children will also be carriers ?

- (a) 1 out of 2                      (b) 1 out of 4                      (c) 3 out of 4                      (d) 4 out of 4

Ans. [a]

Sol.

	P <sub>1</sub>	P <sub>2</sub>
	Aa	Aa
	Carrier	Carrier
	A	a
A	AA Normal	Aa Carrier
a	Aa Carrier	aa Disease

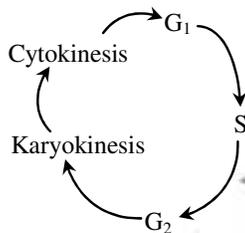
2 out of 4 / 1 out of 2

67. Sequences that correctly describes the cell cycle is -

- (a) → S → G<sub>2</sub> → mitosis → cytokinesis → G<sub>1</sub> →  
 (b) → G<sub>1</sub> → G<sub>2</sub> → S → mitosis → cytokinesis →  
 (c) → G<sub>1</sub> → S → G<sub>2</sub> → cytokinesis → mitosis →  
 (d) → cytokinesis → mitosis → G<sub>1</sub> → S → G<sub>2</sub> →

Ans. [a]

Sol.



68. Which of the following is NOT a part of human chromosomes ?

- (a) Centromere                      (b) Histone                      (c) Nucleosome                      (d) Centriole

Ans. [d]

Sol. Centriole is not present in chromosome it is cell organelle.

69. Which of the following requires energy ?

- (a) Diffusion                      (b) Osmosis                      (c) Facilitated diffusion                      (d) None of these

Ans. [d]

70. Transmission across a synapse is dependent on the release of -

- (a) neurotransmitters                      (b) synaptic vesicle                      (c) Neurons                      (d) receptor proteins

Ans. [a]

Sol. Transmission across the synapse of two or more than two neuron are depend on neurotransmitters. eg. Acetylcholine, GABA etc.

71. Persons suffering from albinism have problems of vision in bright light because they lack -  
(a) Cones (b) Melanin (c) Rods (d) Keratin

**Ans.** [b]

**Sol.** Albin person have lack of melanin pigment in body.

72. If bacterial genome and plasmid are allowed to replicate in the same manner then -  
(a) bacterial genome replicates faster  
(b) plasmid genome replicates faster  
(c) both will take equal time for replication  
(d) speed of replication is dependent on AT/GC ratio

**Ans.** [b]

**Sol.** Plasmid contain slam DNA than bacterial genome so it require less time & energy or replicates faster

73. Two animal cell lines were cultured separately and only one cell type among them expressed a protein with green fluorescence. When these two cell types were mixed together and allowed to grow for some time, all cells showed green fluorescence. Which of the following must be having a key role in this ?  
(a) Desmosomes (b) Gap junctions (c) Plasmodesmata (d) Tight junctions

**Ans.** [b]

**Sol.** According to experimental question these animal cell (epithelial) show Gap junction relation.

74. A novel protein changes its conformation below pH 6 and above pH 8. This protein was made to pass through a column in which beads are coated with its receptor molecules at pH 7. Column was then washed with buffer of pH 6.8 and fraction collected is labelled as A. A second buffer of pH 5 was then passed through and fraction is collected which is labelled as B. Similarly a third C fraction is collected with buffer of pH 9. Which of these fractions will show maximum concentration of the novel protein ?  
(a) Fraction A (b) Fraction B (c) Fraction C (d) Fraction B and C both

**Ans.** [a]

**Sol.** Protein is denatured by pH < 6 and > 8 protein B and protein C is denatured by protein A will not denatured so it contain maximum concentration.

75. Three proteins A, B and C of equal molecular weight are being investigated in a study. They contain six, four and four cysteine residues respectively. Only Proteins A and B were treated with  $\beta$ -mercaptoethanol (which reduces disulphide bond) and heated in boiling water bath for a few minutes. Which of the following is expected in the SDS PAGE gel run ?  
(a) Protein C will move fastest.  
(b) Protein B will move fastest.  
(c) Proteins A and B will move at the same speed but faster than C  
(d) Proteins B and C will move at the same speed.

**Ans.** [b]

**Sol.** A = 6 Cysteine residue  
B = 4 Cysteine residue  
C = 4 Cysteine residue

A & B is denatured by  $\beta$ -mercaptoethanol so it molecular weight or size will be reduced and  $\beta$  protein become smallest and it move fastest.

76. Eukaryotic protein synthesis starts with Methionine coded by AUG an terminates at sequence UAA or UAG or UGA in mRNA. The longest polypeptide chain formed by DNA sequence given below will have -  
5'-TATGAGGATACCACACAACAGCTAGTTC TAAGCCTATTAGCGCTG-3'  
(a) 7 amino acids (b) 6 amino acids (c) 8 amino acids (d) 11 amino acids

**Ans.** [a]

**Sol.** 7 amino acids will be fomed from AUG (start) to UAG (stop) codon mRNA sequence from this DNA -

5'- UAUGAGGAUACACACAACAGCUAGUUCUAAGCCUAUUAGCGCUG -3'

77. Considering levels of organizational hierarchy in biological world, the correct relationship is -

- (a) Cells : Tissues : : Biosphere : Population
- (b) Molecules : Tissues : : Ecosystem : Communities
- (c) Communities : Population : : Organs : Tissues
- (d) Cells : Organelles : : Population : Organisms

**Ans.** [b]

78. Which of the following is/are the examples of structural polysaccharides ?

- (i) Microfibrils                      (ii) Chitin                      (iii) Glycogen                      (iv) Starch
- (a) i & ii                      (b) ii & iv                      (c) i & iv                      (d) i, ii & iii

**Ans.** [a]

**Sol.** Micro fibril are cellulose fibril present in cell wall chitin form the cell wall in fungi and exo-skeleton of insect.

79. In the sickle cell anemia which of the following is affected ?

- (i) Primary structure of haemoglobin
- (ii) Secondary structure of haemoglobin
- (iii) Tertiary structure of haemoglobin
- (iv) Quaternary structure of haemoglobin
- (a) Only iii & iv                      (b) Only i & ii                      (c) Only i, ii & iii                      (d) All the four

**Ans.** [d]

**Sol.** Mainly primary structure is affected but if primary will be effect than secondary, tertiary and quaternary will also be affected.

80. Cholesterol serves the role of 'temperature buffer' in biological membrane because -

- (a) it resists fluidity changes of membrane at low temperature
- (b) it resists change of pH of membrane core at any temperature
- (c) it resists movement of phospholipids at all temperature
- (d) it promotes close packing of phospholipids and increase temperature required for membrane to solidify.

**Ans.** [a]

**Sol.** Cholesterol is a rigid molecule thus it present the close packing of lipid molecule at low temperature thus it maintain the membrane fluidity at low temperature by presenting the freezing of membrane.