

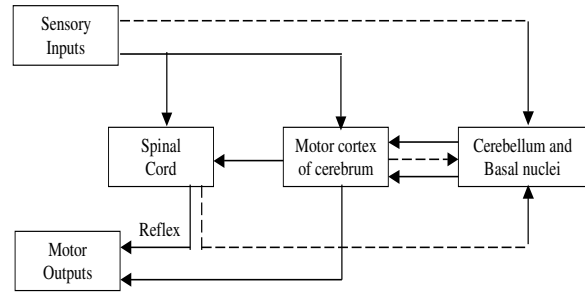
Question Paper

1. Oxidoreductase enzyme having the same substrate donating and accepting electrons is:
 - a) ATPase
 - b) Peroxidase
 - c) Catalase
 - d) LDH.
2. Which gas in the primitive atmosphere must have contributed to the origin of all types of simple organic molecules?
 - a) methane
 - b) ammonia
 - c) hydrocyanic acid
 - d) hydrogen sulphide
3. In a 3.2 kbp long piece of DNA, 820 adenine bases were found. What would be the number of cytosine bases?
 - a) 1560
 - b) 1480
 - c) 780
 - d) 740
4. On a planet from a distant galaxy, the pilot vehicle collected a sample of bacteria-like material. On analysis, it showed proteins having 30 types of amino acids while the DNA had 6 types of bases. In the genetic code, which is assumed to work in an identical manner, a sequence of how many bases must be serving as a codon?
 - a) 2
 - b) 3
 - c) 4
 - d) 5
5. About two-thirds of the energy consumption in a cell, at its lowest metabolic activity, is for operating sodium potassium pump, because it:
 - a) maintains appropriate membrane potential
 - b) helps in co-transport of metabolites
 - c) maintains high intracellular potassium contents
 - d) all of these
6. In C-4 and CAM pathways, a variety of organic and amino acids are synthesized as a result of carbon fixation. This is necessary to:
 - a) support intermediary metabolism
 - b) recover CO₂ readily
 - c) to prevent reversible reactions
 - d) to ensure exchange with respiratory pathway
7. Most of the algae lack skeleton since:
 - a) specific gravity of water is high so that water supports their weight
 - b) hydrostatic skeleton provides internal support
 - c) synthesis of secondary wall material or external deposits is energy intensive
 - d) all the above.
8. The primitive nature of sporophyte of *Riccia* is **not** on account of:
 - a) small number of sterile cells
 - b) sporogonium remaining embedded in the gametophytic thallus
 - c) existence over a short duration
 - d) lack of special mechanism for spore dispersal.

9. Differentiation of an embryonic cell into which of the following would consume maximum energy?
- mesophyll cell
 - xylem vessel
 - sieve cell
 - sclereide
10. The reason for confinement of needle like crystals of calcium oxalate, called raphides, to a special vacuole seems to be:
- preventing physical injury
 - availability of calcium in the sap
 - isolation from metabolically active cytoplasm
 - inability of other organelles to store them
11. Which of the following has maximum lipid contents?
- ciliated epithelium
 - smooth muscles
 - areolar tissue
 - nervous tissue
12. Despite the diversity in time, ferns could never become true land plants due to:
- independent sporophytic and gametophytic phases
 - motile male gametes
 - presence of archegonia
 - lack of xylem vessels.
13. Among the offspring of a trihybrid cross, the ratio of individuals heterozygous for all genes to those having other genotypes is:
- 1:8
 - 1:3
 - 3:1
 - 3:2
14. If vestigial organs indicate ancestry, vestigial muscles for moving pinnae present in man suggest that human ancestors were:
- unable to ward flies by hands
 - troubled more by flies to claim hands as well as movable pinnae to ward them
 - quadrupedal so that hands could not be employed to ward flies
 - without tail that could otherwise be used to ward flies.
15. According to Bentham and Hooker's system of classification, flowering plants having which of the following floral characters would be the most primitive?
- gamophyllous perianth and tricarpellary syncarpous, superior ovary
 - gamopetalous corolla and bicarpellary syncarpous, inferior ovary
 - polypetalous corolla and polycarpellary apocarpous gynoecium with superior ovaries.
 - polypetalous corolla and bicarpellary syncarpous gynoecium with inferior ovary.
16. The stinging cells in Cnidarians operate by increase in hydrostatic pressure within the nematocyst as the cnidocil perceives:
- pressure
 - chemicals
 - current
 - both a and b.

17. In her waggle dance if a scout bee is wagging the abdomen only a few times per minute, it is suggestive of:
- poor source of food
 - distant source of food
 - rich source of food
 - closer source of food.
18. The size of house sparrows, *Passer domesticus*, increases proportionately with farther north their habitats. This is an example of:
- polymorphism
 - cline
 - gradualism
 - pleiotropism
19. Resistance of the bacteria to antibiotics can be explained by:
- beneficial mutations induced by antibiotics
 - reduction in the potency of antibiotics
 - induced synthesis of resistance proteins
 - better survival and propagation of previously resistant forms
20. Restriction endonuclease enzyme cleaves a DNA molecule only at the:
- time of replication
 - 5' terminals of genes
 - specific nucleotide sequences
 - long terminal repeats of nucleotides
21. Feathers that form exoskeleton of birds are largely formed of proteins exhibiting this conformation.
- alpha helix
 - beta pleated
 - mixed helical and sheets
 - globular
22. Erythrocytes of man have 0.154 M sodium concentration. If placed in 0.2 M solution of sodium, they would:
- hemolyse due to influx of water
 - hemolyse due to influx of sodium
 - crenate (shrink) due to efflux of water
 - crenate due to efflux of sodium
23. The embryonic development that permits the egg to possess minimum amount of yolk is:
- oviparous
 - ovo-viviparous
 - viviparous
 - amount of yolk in egg and development are not interrelated
24. Why is it necessary to fix a tissue prior to microscopic examination?
- to have a firm support
 - to distinguish sub cellular components
 - to afford an unimpeded three dimensional view of the cell
 - to prevent autolysis and preserve cellular organization
25. Mark the odd pair out:
- nucleolus - organization of ribosomes
 - lysosomes - oxidative degradation
 - cytoskeleton - relative movement of organelles
 - endoplasmic reticulum - modification of proteins
26. How many types of tetrapeptide molecules can be synthesized from three types of amino acids?

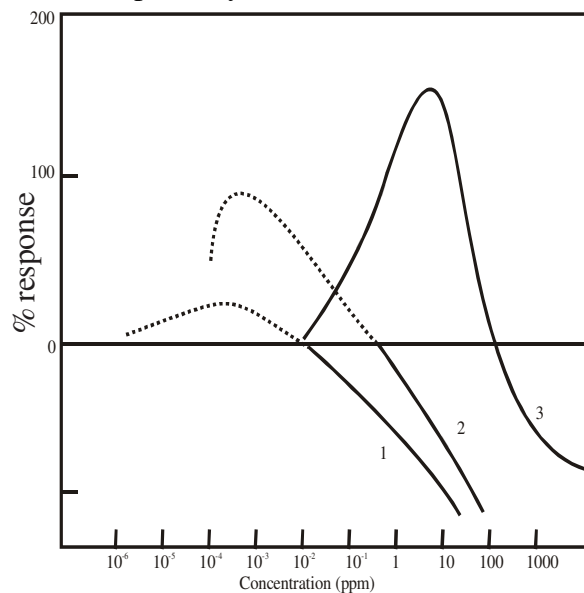
- a) 27
b) 64
c) 81
d) 256
27. Though the Eastern and Western meadowlarks inhabit the same areas of prairie and look almost alike, the recognition of mates of their own species is possible through distinctive courtship songs. This is an example of prezygotic:
- a) physiological isolation
b) ecological isolation
c) ethological isolation
d) physiognomic isolation
28. The pathway of photosynthesis exhibited by plants in which the stomata open during night and close during day is:
- a) C_4 - pathway
b) C_3 - pathway
c) Calvin-Benson pathway
d) CAM- pathway
29. The exoskeleton of reptiles is in the form of horny dry epidermal scales that are largely made of:
- a) chitin
b) proteins
c) polysaccharides
d) calcium carbonate
30. The hierarchy of motor control has been shown in the diagram. Which in your opinion, is the highest control level among the following?



- a) Spinal Cord
b) motor cortex of cerebrum
c) cerebellum and basal nuclei
d) both b and c
31. In the immune system, which of the following cells employ membrane mounted antibodies to collect specific antigens?
- a) helper T cells
b) presentation cells
c) B cells
d) killer cells
32. Callose is a complex carbohydrate associated with:
- a) sieve tubes
b) xylem tracheids
c) stone cells
d) aerenchyma
33. In comparison to the gram negative bacteria, the gram positive bacteria:
- a) are more antigenic
b) have more complex organization
c) are more primitive
d) retain violet dye rather than red
34. Earthworm feeds on soil. In an ecosystem, it occupies the functional position of:
- a) macro-consumer

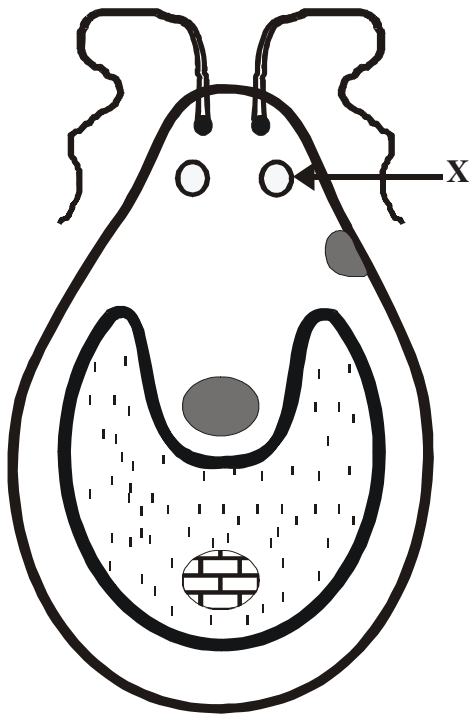
- b) micro-consumer
 - c) producer
 - d) decomposer
35. Mosses have narrow, elongated cells for transporting sap. Tracheids in ferns serve the same function. This represents:
- a) co-evolution
 - b) convergent evolution
 - c) divergent evolution
 - d) micro-evolution
36. Injured cells release a substance for dilation of blood vessels and increase the permeability of their walls so that the healing materials can be transported to the site of wound. This substance is:
- a) histamine
 - b) dopamine
 - c) angiogen
 - d) pyrogen
37. Pericarp of fleshy fruits serves the main function of:
- a) nourishing the seeds
 - b) protecting the seeds from the surrounding
 - c) attracting the animals for seed dispersal
 - d) preventing germination of seeds
38. Natural selection can eliminate a deleterious allele, arising out of mutation, only when it is:
- a) recessive
 - b) dominant
 - c) co-dominant
 - d) morphologically distinct

39. Antibodies that are central to the immune responses have probably originated from these membrane proteins:
- a) cell adhesion molecules
 - b) ionophores
 - c) glycoporphins
 - d) lectins
40. The diagram shows growth responses of **stem**, **root** and **buds** to the application of auxin in varying concentrations. Identify the lines 1, 2 and 3 with the organs respectively.



- a) 2, 1, 3
 - b) 1, 3, 2
 - c) 3, 2, 1
 - d) 3, 1, 2
41. Inhibition of primary as well secondary growth in plants is a function of:
- a) abscisic acid
 - b) naphthalene acetic acid
 - c) gibberellic acid
 - d) cytokinin

42. Cholesterol and its derivatives are found in plasma membrane of homoeotherms to maintain its:
- fluidity at low temperature
 - asymmetry at high temperature
 - integrity at varying temperature
 - resting potential
43. The correct order on the basis of increasing resistance offered to their movement across a plasma membrane is:
- $\text{Na}^+ < \text{Ca}^{+2} < \text{Fe}^{+3} < \text{Cl}^-$
 - $\text{Fe}^{+3} < \text{Ca}^{+2} < \text{Na}^+ < \text{Cl}^-$
 - $\text{Cl}^- < \text{Na}^+ < \text{Ca}^{+2} < \text{Fe}^{+3}$
 - $\text{Cl}^- < \text{Fe}^{+3} < \text{Ca}^{+2} < \text{Na}^+$
44. In a plant, two genes have cumulative influence on the weight of fruits. Each dominant allele adds 10 g to a basic weight of 30 g. In a cross between plants having fruits weighing 50 g each, what percent of the offspring would bear fruits weighing 40 g?
- 12.5
 - 25
 - 37.5
 - 50
45. In sweet cuisines a little salt is customarily added so as to:
- enhance their taste
 - check their fouling
 - reduce their calorific value
 - enhance their digestion
46. Elaters in liverworts and peristomal teeth in mosses have this feature in common:
- they have identical structure
 - they have identical location
 - they are hygroscopic
 - they are gametophytic
47. In sexual reproduction, this must have been the most primitive combination:
- autogamy and isogamy
 - allogamy and merogamy
 - hologamy and anisogamy
 - allogamy and oogamy
48. Shades of red are common in the coloration of deep sea animals since it is:
- helpful in absorbing energetic shorter wavelength radiations effectively
 - closest to reradiating no light
 - the commonest of all basic colors
 - the only color visible in darkness
49. Which of the following hormones is not secreted by human placenta?
- relaxin
 - lactogen
 - gonadotropin
 - oxytocin
50. Identify 'X' in the diagram of *Chlamydomonas* alga.



- a) basal bodies
 b) contractile vacuule
 c) eye spot
 d) starch granule
51. Antitranspirants are sprayed on crop plants so as to increase their productivity since transpiration:
- a) increases irrigational requirements
 b) is an energy dissipating process
 c) hampers mineral absorption
 d) is not very significant in ascent of sap
52. The pale winter coat of European mammals is significant in:
- a) conserving heat
 b) conserving moisture
 c) induction of hibernation
 d) providing camouflage
53. An enzyme inhibitor, chemically homologous to the substrate, exhibits:
- a) allosteric modulation
 b) competitive inhibition
 c) non-competitive inhibition
 d) un-competitive inhibition
54. If an animal has legs folded in a 'Z' like manner, its mode of locomotion will most probably be:
- a) cursorial
 b) fossorial
 c) saltatory
 d) swimming
55. The plant growth regulator functioning at the place of its production itself is:
- a) gibberellic acid
 b) indole butyric acid
 c) heteroauxin
 d) ethylene
56. The mountain blue birds build nests to attract females and exhibit aggression towards other males during breeding season. Which of the following is likely to give the birds maximal evolutionary fitness?
- a) stronger aggressive behavior only during egg laying by female
 b) stronger aggressive behavior during nest building rather than during hatching of eggs
 c) stronger aggression when first egg is laid than during nest building
 d) greater aggression during hatching of eggs than during nest building

57. Morphogenetic movements of blastomeres during gastrulation are often on account of an asymmetric accumulation of:

- a) microfilaments and microtubule complex
- b) ergastic material
- c) lysosomes
- d) both a and c

58. Which molecules can function most effectively as chemical signals in aquatic habitat?

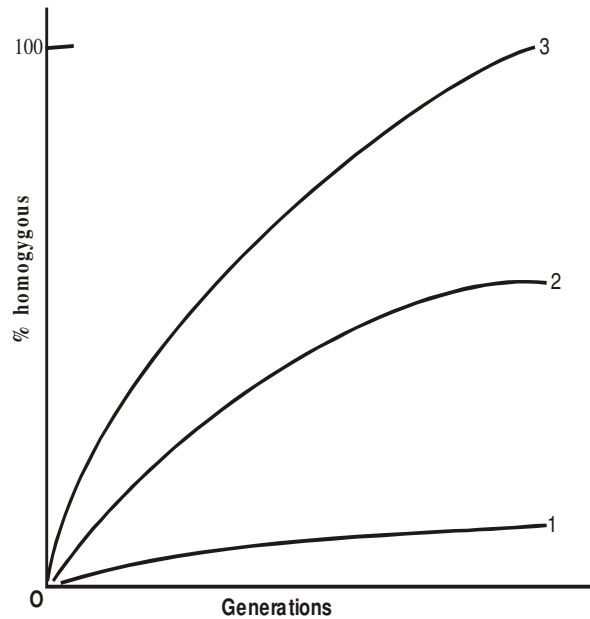
- a) amines
- b) proteins
- c) purines
- d) steroids

59. Age determination based on growth rings is not possible for trees growing in this type of forest:

- a) temperate deciduous
- b) tropical evergreen
- c) tropical deciduous
- d) temperate evergreen

60. The accompanying diagram shows percentage of homozygotes in successive generations under different degrees of inbreeding through **brother and sister**, **first cousins** and **second cousins**.

Match the lines numbered 1, 2 and 3 with the above mentioned breeding pairs.



- a) 1,2,3
- b) 2,1,3
- c) 3, 1, 2
- d) 3, 2, 1.

61. Ammonifying micro-organisms are:

- a) aerobic
- b) microaerobic
- c) anaerobic
- d) any of these

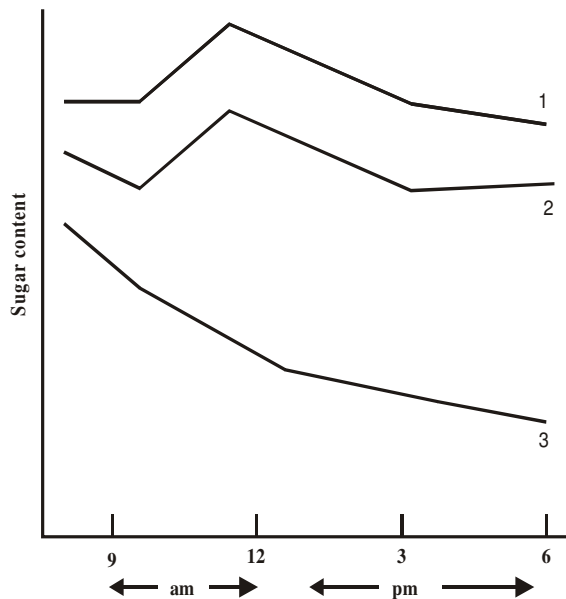
62. Botulism, a fatal food poisoning, is caused by *Clostridium botulinum* that spreads most commonly through:

- a) un-cooked vegetables
- b) under-cooked meat
- c) tinned meat
- d) stale milk

63. The most complex type of stele found in ferns is:
- solenostele
 - siphonostele
 - atactostele
 - dictyostele
64. Which of the following is the unique parasitic adaptation in liverfluke?
- paedogenesis
 - presence of ventral sucker
 - cuticle replacing epidermis
 - absence of alimentary canal
65. The structural and functional limitations compel these insectivorous plants to grow along the wetter heaths and moors that are typically acid, mineral deficient habitats.
- sundew
 - pitcher
 - Venus's fly trap
 - bladderwort
66. Valinomycin, a ring like mobile carrier protein that shuttles between the extra-cytoplasmic and cytoplasmic surfaces of plasma membrane randomly and can hold a K^+ at its hydrophilic centre, is secreted by certain microbes to kill the competitors by inducing in their cells:
- loss of K^+
 - accumulation of K^+
 - intake of K^+
 - exchange of K^+ for Na^+
67. The muscles responsible for inhaling as well as exhaling air during respiration of frog are inserted at:
- sternum
 - scapulla
 - hyoid apparatus
 - skull
68. The effect on plane-polarised light using polarimeter was studied for three solutions: (1) 5g glucose in 100 ml water; (2) 2.5g glucose and 2.5g sucrose in 100 ml water; (3) 5g sucrose in 100 ml water. Which of the following would be the observation?
- solution 1 and 2 would be dextrorotatory while 3 would be levorotatory
 - all solutions would be dextrorotatory but 3 would produce greater degree of rotation
 - all solutions are levorotatory but 1 would produce greater degree of rotation
 - solutions 1 and 2 would be levorotatory while 1 would be dextrorotatory
69. The greatest disadvantage for the aquatic animals in comparison to the terrestrial ones, in respiratory gas exchange, is that:
- diffusion of gases is much slower in water than in air
 - CO_2 with chemical affinity towards water is in greater concentration in water
 - respiratory surfaces may collapse in water
 - concentration of oxygen in water is significantly lower than in air

70. Complete ring of phloem was removed from stem of a plant, 30 cm above the ground and sugar content of the phloem tissue was compared with that of a normal plant.

If the line numbered 2 represents the plot of sugar content of phloem from normal plant, the lines of 1 and 3 would represent the sugar content of phloem:

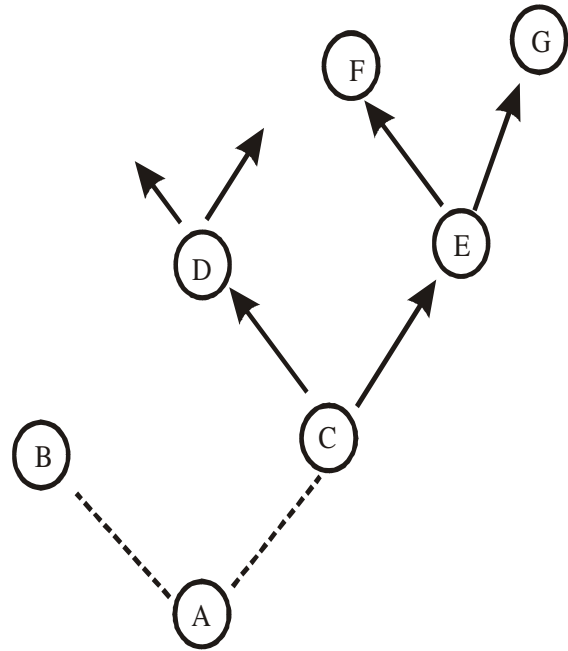


- a) immediately above and below the ring.
 b) Immediately below and above the ring.
 c) In the leaves and roots
 d) In the roots and leaves.
71. Genetic drift is likely to occur when:
 a) a few individuals colonize an island
 b) there is a significant immigration
 c) an epidemic eliminates large portion of a population

- d) there is a spurt in natality
72. Which of the following organs differentiates the earliest?
 a) heart
 b) liver
 c) notochord
 d) brain
73. An adaptation to dissipate excess heat in an animal is:
 a) large body size
 b) dark, dense hair
 c) thick layer of subcutaneous fat
 d) long, thin pinnae
74. When natural selection is disruptive, which of the following is favoured?
 a) intermediate forms of a trait
 b) both extreme forms of a trait
 c) disjunction of traits from environment
 d) one extreme form over the other extreme form of a trait
75. The condition of one of the identical twins having hare lip and the other having a normal lip can be explained by:
 a) incomplete penetrance
 b) reversible expressivity
 c) variable pleiotropy
 d) variable expressivity
76. The breeding songs of male cricket attract the females of the same species. If the recorded song of male of species A is played at one end and that of a hybrid AB

is played at another end of a Y maze to which the female of species B has been accustomed to and is at the third end of the maze, she would move:

- a) towards male of species A
 - b) towards hybrid male AB
 - c) towards any of them without bias
 - d) towards none of them
77. The homogenous group among the following is:
- a) silver fish, cray fish, seer fish
 - b) sea hare, sea lily, sea cucumber
 - c) glass sponge, bath sponge, simple sponge
 - d) seat worm, acorn worm, flat worm
78. Which of the following is not concerned with excretion?
- a) solenocytes
 - b) flame cells
 - c) antennary glands
 - d) enteric caeca
79. The least potential towards regeneration can be noticed in:
- a) limb of salamander
 - b) tail of wall lizard
 - c) toe of hamster
 - d) walking leg of crab
80. In the cladogram showing phylogenetic inter-relationship between the taxa, if B- represents Hemichordata, C-Chordata, E-Vertebrata and G-Gnathostoma, then A, D and F would respectively be:



- a) Annelida, Cyclostomata, Pisces
 - b) Echinodermata, Cyclostomata, Tetrapoda
 - c) Echinodermata, Protochordata, Cyclostomata
 - d) Protochordata, Cyclostomata, Pisces
81. Soil tends to be pale and acidic when:
- a) precipitation is excessive
 - b) temperature is very high
 - c) populated heavily with burrowers
 - d) only grasses and mosses grow on it
82. Biennial variety of a crop plant can be transformed into annual by subjecting it to vernalization. Which one of the following is an erroneous protocol for the same?
- a) soak seeds → aerate → expose to cold → dry at low temperature
 - b) allow seeds to germinate → expose to cold → dry at low temperature

- c) germinate seeds → expose to cold → dry at room temperature → store
- d) soak seeds → aerate → expose to low temperature → dry in hot air

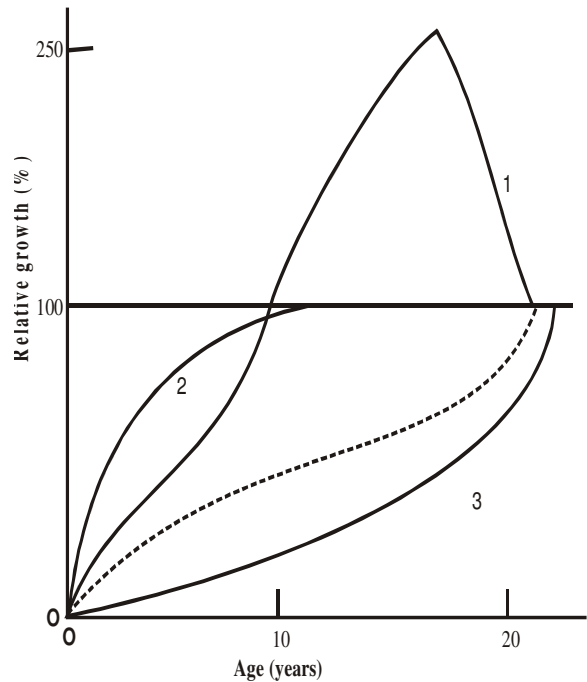
83. One of the reasons for self sterility is the failure of pollen grains to germinate when the pollen and stigma receiving them possess one of the alleles, among A, B and C, in common. What proportion of the pollen grains from a plant with genotype AB would succeed in germinating on the stigma of another having genotype of BC?

- a) 25 %
- b) 50 %
- c) 75 %
- d) 100 %

84. The observation that different cells of the same organism perform different functions, is possible due to the fact that:

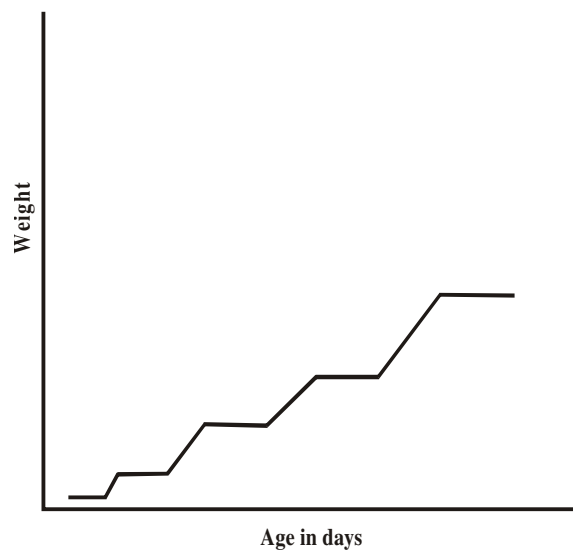
- a) factors other than genetic material decide the functions of cells
- b) different cells carry different genetic information specific to their functions
- c) different portions of the genetic material function in different cells
- d) location and arrangement of cells is responsible for differences in functions

85. The accompanying diagram shows the relative growth of **brain, thymus gland** and **reproductive organs** along with that of the **whole body** (in broken lines). Identify the numbered curves with the organs mentioned above.

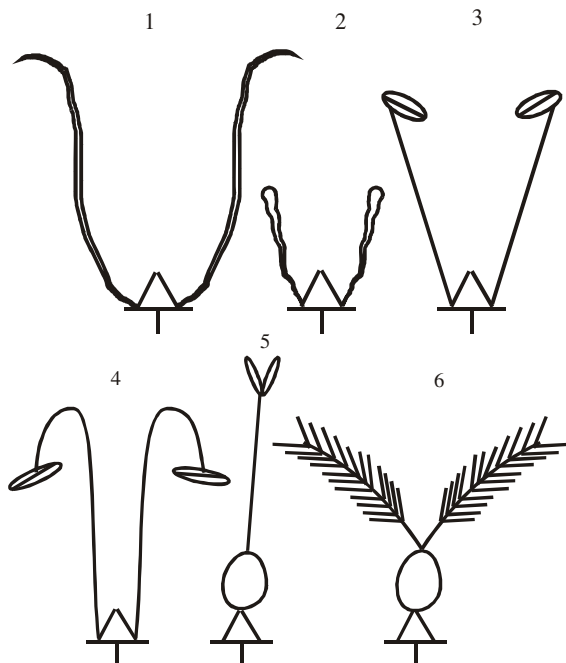


- a) 2, 1, 3
- b) 1, 2, 3
- c) 2, 3, 1
- d) 3, 1, 2

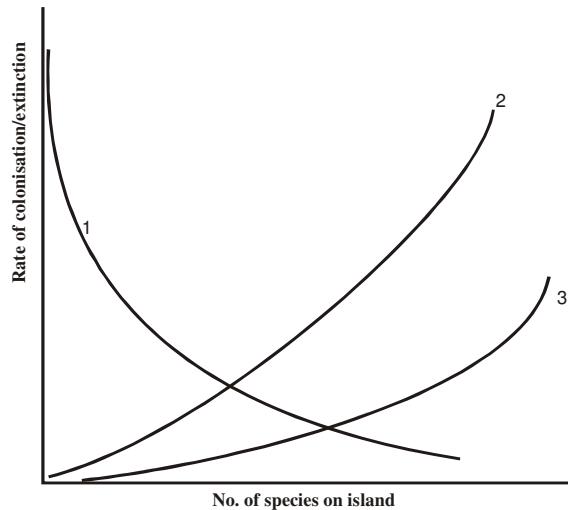
86. The accompanying growth curve can be that of a



- a) pigeon
 - b) rat
 - c) bug
 - d) frog
87. In which of the cellular components, hydrogen bonding plays a crucial role in maintaining the organization?
- a) starch granules
 - b) cellular fibrils
 - c) fat bodies
 - d) glycogen bodies
88. The largest cell among the following is:
- a) human erythrocyte
 - b) bovine hepatocyte
 - c) spermatozoan of lizard
 - d) frog egg
89. Which floral features shown above can be put together to represent an anemophilous flower?



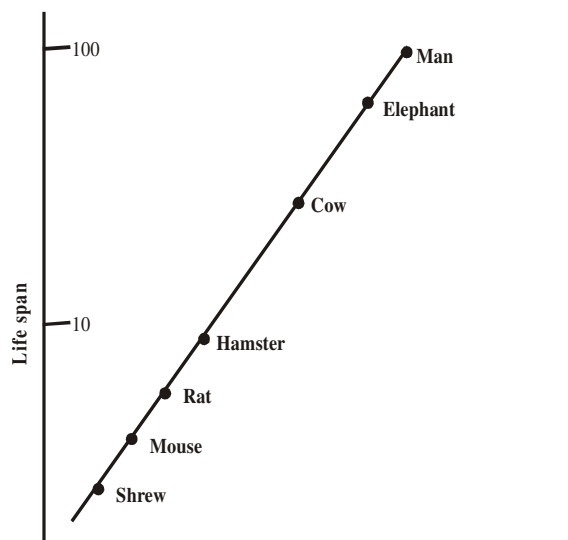
- a) 1, 3 and 6
 - b) 2, 4, and 6
 - c) 2, 3 and 5
 - d) 1, 4 and 5
90. Gonadal cavities forming permanent coelomic cavity, is a feature of some:
- a) echinoderms
 - b) annelids
 - c) mollusks
 - d) hemichordates
91. Number of species against the rate of colonization and extinction has been plotted for (A) extinction, provided it is a large island; (B) extinction, provided it is a small island; (C) colonization. Which lines numbered 1, 2 and 3 indicate the conditions mentioned above



- a) B, C, A
- b) C, B, A
- c) C, A, B
- d) A, C, B

92. Which of the following structure/s in a cell provide/s unequivocal proof of plant origin?
- plasmodesmata
 - cell wall
 - chloroplasts
 - all these
93. Eustachian tube is supported by:
- areolar tissue
 - hyaline cartilage
 - yellow elastic cartilage
 - bone
94. An unusual polysaccharide, formed of fructose residues and representing reserved food in tubers, is:
- callose
 - inulin
 - glycogen
 - hemicellulose
95. A pistillate flower of tetraploid angiosperm is pollinated by pollen from staminate flower of diploid plant. What would be the ploidy in endosperm of seeds thus formed?
- $3n$
 - $4n$
 - $5n$
 - $6n$
96. The analogue of hirudin, from the saliva of leech, found in human blood is:
- heparin
 - histamine

- antithrombin
 - gamma-globulin
97. In a guava fruit there were 300 seeds. How many meiotic divisions must have been involved in the development of this fruit?
- 75
 - 300
 - 375
 - 450
98. Which of the following parts of eye ball is not mesodermal in origin?
- iris
 - lens
 - ciliary body
 - choroid layer
99. Study the plot of relative repair rate against life span and choose the correct statement from the following:



- a) longevity is proportionate to the investment of energy in synthesizing repair enzymes.
 - b) Repair rate is proportionate of the size of the body.
 - c) Herbivory positively influences repair ability.
 - d) Birds have comparatively lesser repair ability than mammals
100. What is not true about the prokaryotic genes?
- a) they are ready to be transcribed any time
 - b) their expression is regulated by promoter sequences
 - c) they have introns and exons
 - d) they are shorter than the eukaryotic genes



Answer Sheet

1	c	26	c	51	b	76	d
2	b	27	c	52	d	77	c
3	c	28	d	53	b	78	d
4	a	29	b	54	c	79	c
5	b	30	c	55	d	80	c
6	c	31	c	56	b	81	a
7	b	32	a	57	a	82	d
8	d	33	d	58	b	83	b
9	d	34	a	59	b	84	c
10	c	35	b	60	d	85	a
11	d	36	a	61	c	86	c
12	b	37	c	62	c	87	b
13	a	38	b	63	d	88	d
14	c	39	a	64	a	89	b
15	c	40	d	65	a	90	b
16	d	41	a	66	a	91	b
17	b	42	a	67	c	92	a
18	b	43	c	68	b	93	c
19	d	44	b	69	d	94	b
20	c	45	d	70	a	95	c
21	b	46	c	71	a	96	a
22	c	47	a	72	c	97	c
23	c	48	b	73	d	98	b
24	d	49	d	74	b	99	a
25	b	50	b	75	a	100	c