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NEET (UG) 2019 — Biology (Botany + Zoology)

Exam date: 5 May 2019 • Test Booklet Code: R1 • Questions 1–90 (90 questions, all compulsory) • +4 / –1

Questions as they appeared in NEET (UG) 2019 conducted by NTA. Answers per NTA final key. Explanations by competitorspoint.com.

Biology — Botany + Zoology (Q. 1–90, all compulsory; questions are mixed as in the original paper)

1. Match the following genes of the Lac operon with their respective products :

Column-I		Column-II	
(a)	i gene	**(i)**	β-galactosidase
(b)	z gene	**(ii)**	Permease
(c)	a gene	**(iii)**	Repressor
(d)	y gene	**(iv)**	Transacetylase

Select the correct option.

(1) (a)-(iii), (b)-(iv), (c)-(i), (d)-(ii)
(2) (a)-(i), (b)-(iii), (c)-(ii), (d)-(iv)
(3) (a)-(iii), (b)-(i), (c)-(ii), (d)-(iv)
(4) (a)-(iii), (b)-(i), (c)-(iv), (d)-(ii)

2. Match the following structures with their respective location in organs

Column-I		Column-II	
(a)	Crypts of Lieberkuhn	**(i)**	Pancreas
(b)	Glisson's Capsule	**(ii)**	Duodenum
(c)	Islets of Langerhans	**(iii)**	Small intestine
(d)	Brunner's Glands	**(iv)**	Liver

Select the correct option from the following

(1) (a)-(iii), (b)-(ii), (c)-(i), (d)-(iv)
(2) (a)-(iii), (b)-(i), (c)-(ii), (d)-(iv)
(3) (a)-(ii), (b)-(iv), (c)-(i), (d)-(iii)
(4) (a)-(iii), (b)-(iv), (c)-(i), (d)-(ii)

3. What is the direction of movement of sugars in phloem?

(1) Bi-directional
(2) Non-multidirectional
(3) Upward
(4) Downward

4. The ciliated epithelial cells are required to move particles or mucus in a specific direction. In humans, these cells are mainly present in

(1) Bronchioles and Fallopian tubes
(2) Bile duct and Bronchioles
(3) Fallopian tubes and Pancreatic duct
(4) Eustachian tube and Salivary duct

5. Which of the following is the most important cause for animals and plants being driven to extinction?

(1) Alien species invasion
(2) Habitat loss and fragmentation
(3) Drought and floods
(4) Economic exploitation

6. Which of the following contraceptive methods do involve a role of hormone?

(1) Pills, Emergency contraceptives, Barrier methods.
(2) Lactational amenorrhea, Pills Emergency contraceptives.
(3) Barrier method, Lactational amenorrhea, Pills.
(4) CuT, Pills, Emergency contraceptives.

7. Which of the following pair of organelles does not contain DNA?

(1) Nuclear envelope and Mitochondria
(2) Mitochondria and Lysosomes
(3) Chloroplast and Vacuoles
(4) Lysosomes and Vacuoles

8. Placentation in which ovules develop on the inner wall of the ovary or in peripheral part, is

(1) Free central
(2) Basal
(3) Axile
(4) Parietal

9. The Earth Summit held in Rio de Janeiro in 1992 was called

(1) for immediate steps to discontinue use of CFCs that were damaging the ozone layer
(2) to reduce CO_2 emissions and global warming
(3) for conservation of biodiversity and sustainable utilization of its benefits
(4) to assess threat posed to native species by invasive weed species

10. Purines found both in DNA and RNA are

(1) Cytosine and thymine
(2) Adenine and thymine
(3) Adenine and guanine
(4) Guanine and cytosine

11. Match the following hormones with the respective disease

Column-I		Column-II	
(a)	Insulin	**(i)**	Addison's disease
(b)	Thyroxin	**(ii)**	Diabetes insipidus
(c)	Corticoids	**(iii)**	Acromegaly
(d)	Growth Hormone	**(iv)**	Goitre
		(v)	Diabetes mellitus

Select the correct option.

(1) (a)-(ii), (b)-(iv), (c)-(i), (d)-(iii)
(2) (a)-(v), (b)-(i), (c)-(ii), (d)-(iii)
(3) (a)-(ii), (b)-(iv), (c)-(iii), (d)-(i)
(4) (a)-(v), (b)-(iv), (c)-(i), (d)-(iii)

12. The correct sequence of phases of cell cycle is

(1) $G_1 \rightarrow S \rightarrow G_2 \rightarrow M$ **(2)** $M \rightarrow G_1 \rightarrow G_2 \rightarrow S$
(3) $G_1 \rightarrow G_2 \rightarrow S \rightarrow M$ **(4)** $S \rightarrow G_1 \rightarrow G_2 \rightarrow M$

13. Which of the following sexually transmitted diseases is not completely curable?

(1) Chlamydiasis **(2)** Gonorrhoea
(3) Genital warts **(4)** Genital herpes

14. Polyblend, a fine powder of recycled modified plastic, has proved to be a good material for

(1) Making tubes and pipes **(2)** Making plastic sacks
(3) Use as a fertilizer **(4)** Construction of roads

15. The shorter and longer arms of a submetacentric chromosome are referred to as

(1) m-arm and n-arm respectively
(2) s-arm and l-arm respectively
(3) p-arm and q-arm respectively
(4) q-arm and p-arm respectively

16. Following statements describe the characteristics of the enzyme Restriction Endonuclease. Identify the incorrect statement.

(1) The enzyme recognizes a specific palindromic nucleotide sequence in the DNA.
(2) The enzyme cuts DNA molecule at identified position within the DNA.
(3) The enzyme binds DNA at specific sites and cuts only one of the two strands.
(4) The enzyme cuts the sugar-phosphate backbone at specific sites on each strand.

17. Persistent nucellus in the seed is known as

(1) Tegmen **(2)** Chalaza
(3) Perisperm **(4)** Hilum

18. Identify the cells whose secretion protects the lining of gastro-intestinal tract from various enzymes.

(1) Duodenal Cells **(2)** Chief Cells
(3) Goblet Cells **(4)** Oxyntic Cells

19. Which of the following statements is not correct?

(1) Lysosomes are formed by the process of packaging in the endoplasmic reticulum
(2) Lysosomes have numerous hydrolytic enzymes
(3) The hydrolytic enzymes of lysosomes are active under acidic pH
(4) Lysosomes are membrane bound structures

20. Match the following organisms with the products they produce

Column-I		Column-II	
(a)	Lactobacillus	**(i)**	Cheese
(b)	Saccharomyces cerevisiae	**(ii)**	Curd
(c)	Aspergillus niger	**(iii)**	Citric Acid
(d)	Acetobacter aceti	**(iv)**	Bread
		(v)	Acetic Acid

Select the correct option.

(1) (a)-(ii), (b)-(i), (c)-(iii), (d)-(v)
(2) (a)-(ii), (b)-(iv), (c)-(v), (d)-(iii)
(3) (a)-(ii), (b)-(iv), (c)-(iii), (d)-(v)
(4) (a)-(iii), (b)-(iv), (c)-(v), (d)-(i)

21. Which part of the brain is responsible for thermoregulation?

(1) Medulla oblongata **(2)** Cerebrum
(3) Hypothalamus **(4)** Corpus callosum

22. In Antirrhinum (Snapdragon), a red flower was crossed with a white flower and in F_1 generation pink flowers were obtained. When pink flowers were selfed, the F_2 generation showed white, red and pink flowers. Choose the incorrect statement from the following :

(1) Law of Segregation does not apply in this experiment
(2) This experiment does not follow the Principle of Dominance.
(3) Pink colour in F_1 is due to incomplete dominance.
(4) Ratio of F_2 is 1/4 (Red) : 2/4 (Pink) : 1/4 (White)

23. Which of the following can be used as a biocontrol agent in the treatment of plant disease?

(1) Lactobacillus **(2)** Trichoderma
(3) Chlorella **(4)** Anabaena

24. Select the correct group of biocontrol agents.

(1) Nostoc, Azospirillum, Nucleopolyhedrovirus
(2) Bacillus thuringiensis, Tobacco mosaic virus, Aphids
(3) Trichoderma, Baculovirus, Bacillus thuringiensis
(4) Oscillatoria, Rhizobium, Trichoderma

25. The frequency of recombination between gene pairs on the same chromosome as a measure of the distance between genes was explained by :

(1) Sutton Boveri **(2)** T.H. Morgan
(3) Gregor J. Mendel **(4)** Alfred Sturtevant

26. Respiratory Quotient (RQ) value of tripalmitin is

(1) 0.09 **(2)** 0.9
(3) 0.7 **(4)** 0.07

27. What would be the heart rate of a person if the cardiac output is 5 L, blood volume in the ventricles at the end of diastole is 100 mL and at the end of ventricular systole is 50 mL?

(1) 125 beats per minute **(2)** 50 beats per minute
(3) 75 beats per minute **(4)** 100 beats per minute

28. From evolutionary point of view, retention of the female gametophyte with developing young embryo on the parent sporophyte for some time, is first observed in

(1) Gymnosperms **(2)** Liverworts
(3) Mosses **(4)** Pteridophytes

29. Which of the following ecological pyramids is generally inverted?

(1) Pyramid of biomass in a sea
(2) Pyramid of numbers in grassland
(3) Pyramid of energy
(4) Pyramid of biomass in a forest

30. Colostrum the yellowish fluid, secreted by mother during the initial days of lactation is very essential to impart immunity to the new born infants because it contains

(1) Immunoglobulin A **(2)** Natural killer cells
(3) Monocytes **(4)** Macrophages

31. Phloem in gymnosperms lacks :

(1) Both sieve tubes and companion cells
(2) Albuminous cells and sieve cells
(3) Sieve tubes only
(4) Companion cells only

32. Match the following organisms with their respective characteristics :

Column-I		Column-II	
(a)	Pila	**(i)**	Flame cells
(b)	Bombyx	**(ii)**	Comb plates
(c)	Pleurobrachia	**(iii)**	Radula
(d)	Taenia	**(iv)**	Malpighian tubules

Select the correct option from the following :

(1) (a)-(iii), (b)-(ii), (c)-(iv), (d)-(i)
(2) (a)-(iii), (b)-(ii), (c)-(i), (d)-(iv)
(3) (a)-(iii), (b)-(iv), (c)-(ii), (d)-(i)
(4) (a)-(ii), (b)-(iv), (c)-(iii), (d)-(i)

33. Use of an artificial kidney during hemodialysis may result in :

(a). Nitrogenous waste build-up in the body
(b). Non-elimination of excess potassium ions
(c). Reduced absorption of calcium ions from gastro-intestinal tract
(d). Reduced RBC production

Which of the following options is the most appropriate?

(1) (a) and (d) are correct **(2)** (a) and (b) are correct
(3) (b) and (c) are correct **(4)** (c) and (d) are correct

34. Which of the following statements is correct?

(1) Cornea consists of dense matrix of collagen and is the most sensitive portion of the eye.
(2) Cornea is an external, transparent and protective proteinacious covering of the eye-ball.
(3) Cornea consists of dense connective tissue of elastin and can repair itself.
(4) Cornea is convex, transparent layer which is highly vascularised.

35. Select the incorrect statement.

(1) Human males have one of their sex-chromosome much shorter than the other
(2) Male fruit fly is heterogametic
(3) In male grasshoppers 50% of sperms have no sex-chromosome
(4) In domesticated fowls, sex of progeny depends on the type of sperm rather than egg

36. The concept of “Omnis cellula-e cellula” regarding cell division was first proposed by

(1) Aristotle **(2)** Rudolf Virchow
(3) Theodore Schwann **(4)** Schleiden

37. Which of the statements given below is not true about formation of Annual Rings in trees?

(1) Annual rings are not prominent in trees of temperate region.
(2) Annual ring is a combination of spring wood and autumn wood produced in a year
(3) Differential activity of cambium causes light and dark bands of tissue early and late wood respectively.
(4) Activity of cambium depends upon variation in climate.

38. Thiobacillus is a group of bacteria helpful in carrying out

(1) Denitrification **(2)** Nitrogen fixation
(3) Chemoautotrophic fixation **(4)** Nitrification

39. Due to increasing air-borne allergens and pollutants, many people in urban areas are suffering from respiratory disorder causing wheezing due to

(1) reduction in the secretion of surfactants by pneumocytes.
(2) benign growth on mucous lining of nasal cavity
(3) inflammation of bronchi and bronchioles
(4) proliferation of fibrous tissues and damage of the alveolar walls

40. In some plants, the female gamete develops into embryo without fertilization. This phenomenon is known as

(1) Parthenogenesis **(2)** Autogamy
(3) Parthenocarpy **(4)** Syngamy

41. Select the correct option.

(1) There are seven pairs of vertebrosternal, three pairs of vertebrochondral and two pairs of vertebral ribs.
(2) 8th, 9th and 10th pairs of ribs articulate directly with the sternum.
(3) 11th and 12th pairs of ribs are connected to the sternum with the help of hyaline cartilage.
(4) Each rib is a flat thin bone and all the ribs are connected dorsally to the thoracic vertebrae and ventrally to the sternum.

42. How does steroid hormone influence the cellular activities?

(1) Using aquaporin channels as second messenger
(2) Changing the permeability of the cell membrane
(3) Binding to DNA and forming a gene-hormone complex
(4) Activating cyclic AMP located on the cell membrane

43. Select the correctly written scientific name of Mango which was first described by Carolus Linnaeus

(1) Mangifera Indica **(2)** Mangifera indica Car. Linn.
(3) Mangifera indica Linn. **(4)** Mangifera indica

44. What map unit (Centimorgan) is adopted in the construction of genetic maps?

(1) A unit of distance between genes on chromosomes, representing 50% cross over.
(2) A unit of distance between two expressed genes representing 10% cross over.
(3) A unit of distance between two expressed genes representing 100% cross over.
(4) A unit of distance between genes on chromosomes, representing 1% cross over.

45. Cells in G_0 phase :

(1) terminate the cell cycle **(2)** exit the cell cycle
(3) enter the cell cycle **(4)** suspend the cell cycle

46. Which one of the following statements regarding post-fertilization development in flowering plants is incorrect?

(1) Ovules develop into embryo sac
(2) Ovary develops into fruit
(3) Zygote develops into embryo
(4) Central cell develops into endosperm

47. Which of the following features of genetic code does allow bacteria to produce human insulin by recombinant DNA technology?

(1) Genetic code is specific
(2) Genetic code is not ambiguous
(3) Genetic code is redundant
(4) Genetic code is nearly universal

48. Which of the following glucose transporters is insulin-dependent?

(1) GLUT IV **(2)** GLUT I
(3) GLUT II **(4)** GLUT III

49. Under which of the following conditions will there be no change in the reading frame of following mRNA?
5′ AACAGCGGUGCUAUU 3′

(1) Deletion of GGU from 7th, 8th and 9th positions
(2) Insertion of G at 5th position
(3) Deletion of G from 5th position
(4) Insertion of A and G at 4th and 5th positions respectively

50. Select the hormone-releasing Intra-Uterine Devices.

(1) Lippes Loop, Multiload 375 **(2)** Vaults, LNG-20
(3) Multiload 375, Progestasert **(4)** Progestasert, LNG-20

51. Variations caused by mutation, as proposed by Hugo de Vries are

(1) small and directionless **(2)** random and directional
(3) random and directionless **(4)** small and directional

52. Expressed Sequence Tags (ESTs) refers to :

(1) Novel DNA sequences
(2) Genes expressed as RNA
(3) Polypeptide expression
(4) DNA polymorphism

53. What triggers activation of protoxin to active Bt toxin of Bacillus thuringiensis in boll worm?

(1) Acidic pH of stomach
(2) Body temperature
(3) Moist surface of midgut
(4) Alkaline pH of gut

54. Match the hominids with their correct brain size :

Column-I		Column-II	
(a)	Homo habilis	**(i)**	900 cc
(b)	Homo neanderthalensis	**(ii)**	1350 cc
(c)	Homo erectus	**(iii)**	650–800 cc
(d)	Homo sapiens	**(iv)**	1400 cc

Select the correct option.

(1) (a)-(iv), (b)-(iii), (c)-(i), (d)-(ii)
(2) (a)-(iii), (b)-(i), (c)-(iv), (d)-(ii)
(3) (a)-(iii), (b)-(ii), (c)-(i), (d)-(iv)
(4) (a)-(iii), (b)-(iv), (c)-(i), (d)-(ii)

55. Which of the following pairs of gases is mainly responsible for green house effect?

(1) Carbon dioxide and Methane
(2) Ozone and Ammonia
(3) Oxygen and Nitrogen
(4) Nitrogen and Sulphur dioxide

56. Match Column - I with Column - II

Column-I		Column-II	
(a)	Saprophyte	**(i)**	Symbiotic association of fungi with plant roots
(b)	Parasite	**(ii)**	Decomposition of dead organic materials
(c)	Lichens	**(iii)**	Living on living plants or animals
(d)	Mycorrhiza	**(iv)**	Symbiotic association of algae and fungi

Choose the correct answer from the option given below

(1) (a)-(ii), (b)-(iii), (c)-(iv), (d)-(i)
(2) (a)-(i), (b)-(ii), (c)-(iii), (d)-(iv)
(3) (a)-(iii), (b)-(ii), (c)-(i), (d)-(iv)
(4) (a)-(ii), (b)-(i), (c)-(iii), (d)-(iv)

57. Which of the following is true for Golden rice?

(1) It has yellow grains, because of a gene introduced from a primitive variety of rice
(2) It is Vitamin A enriched, with a gene from daffodil
(3) It is pest resistant, with a gene from Bacillus thuringiensis
(4) It is drought tolerant, developed using Agrobacterium vector

58. What is the genetic disorder in which an individual has an overall masculine development gynaecomastia, and is sterile ?

(1) Down's syndrome
(2) Turner's syndrome
(3) Klinefelter's syndrome
(4) Edward syndrome

59. Extrusion of second polar body from egg nucleus occurs :

(1) simultaneously with first cleavage
(2) after entry of sperm but before fertilization
(3) after fertilization
(4) before entry of sperm into ovum

60. A gene locus has two alleles A, a. If the frequency of dominant allele A is 0.4, then what will be the frequency of homozygous dominant, heterozygous and homozygous recessive individuals in the population?

(1) 0.16(AA); 0.36(Aa); 0.48(aa)
(2) 0.36(AA); 0.48(Aa); 0.16(aa)
(3) 0.16(AA); 0.24(Aa); 0.36(aa)
(4) 0.16(AA); 0.48(Aa); 0.36(aa)

61. What is the fate of the male gametes discharged in the synergid?

(1) One fuses with the egg and other fuses with central cell nuclei.
(2) One fuses with egg other(s) degenerate (s) in the synergid.
(3) All fuse with the egg.
(4) One fuses with the egg, other(s) fuse(s) with synergid nucleus.

62. In a species, the weight of newborn ranges from 2 to 5 kg. 97% of the newborn with an average weight between 3 to 3.3 kg survive whereas 99% of the infants born with weights from 2 to 2.5 kg or 4.5 to 5 kg die. Which type of selection process is taking place?

(1) Cyclical Selection
(2) Directional Selection
(3) Stabilizing Selection
(4) Disruptive Selection

63. Which of the following muscular disorders is inherited?

(1) Botulism
(2) Tetany
(3) Muscular dystrophy
(4) Myasthenia gravis

64. Which of the following protocols did aim for reducing emission of chlorofluorocarbons into the atmosphere?

(1) Geneva Protocol
(2) Montreal Protocol
(3) Kyoto Protocol
(4) Gothenburg Protocol

65. Consider the following statement :

(A). Coenzyme or metal ion that is tightly bound to enzyme protein is called prosthetic group.

(B). A complete catalytic active enzyme with its bound prosthetic group is called apoenzyme.

Select the correct option.

(1) (A) is false but (B) is true.
(2) Both (A) and (B) are true.
(3) (A) is true but (B) is false.
(4) Both (A) and (B) are false.

66. Consider following features

(a). Organ system level of organisation
(b). Bilateral symmetry
(c). True coelomates with segmentation of body

Select the correct option of animal groups which possess all the above characteristics

(1) Annelida, Mollusca and Chordata
(2) Annelida, Arthropoda and Chordata
(3) Annelida, Arthropoda and Mollusca
(4) Arthropoda, Mollusca and Chordata

67. Pinus seed cannot germinate and establish without fungal association. This is because :

(1) its seeds contain inhibitors that prevent germination.
(2) its embryo is immature.
(3) it has obligate association with mycorrhizae.
(4) it has very hard seed coat.

68. Select the correct sequence of organs in the alimentary canal of cockroach starting from mouth

(1) Pharynx → Oesophagus → Ileum → Crop → Gizzard → Colon → Rectum
(2) Pharynx → Oesophagus → Crop → Gizzard → Ileum → Colon → Rectum
(3) Pharynx → Oesophagus → Gizzard → Crop → Ileum → Colon → Rectum
(4) Pharynx → Oesophagus → Gizzard → Ileum → Crop → Colon → Rectum

69. Which of the following statements regarding mitochondria is incorrect?

(1) Mitochondrial matrix contains single circular DNA molecule and ribosomes.
(2) Outer membrane is permeable to monomers of carbohydrates, fats and proteins.
(3) Enzymes of electron transport are embedded in outer membrane.
(4) Inner membrane is convoluted with infoldings.

70. Drug called 'Heroin' is synthesized by

(1) nitration of morphine
(2) methylation of morphine
(3) acetylation of morphine
(4) glycosylation of morphine

71. Conversion of glucose to glucose-6-phosphate, the first irreversible reaction of glycolysis, is catalyzed by

(1) Phosphofructokinase
(2) Aldolase
(3) Hexokinase
(4) Enolase

72. DNA precipitation out of a mixture of biomolecules can be achieved by treatment with

(1) Chilled chloroform
(2) Isopropanol
(3) Chilled ethanol
(4) Methanol at room temperature

73. Which of the following is a commercial blood cholesterol lowering agent?

(1) Lipases
(2) Cyclosporin A
(3) Statin
(4) Streptokinase

74. Which one of the following equipments is essentially required for growing microbes on a large scale, for industrial production of enzymes?

(1) Bioreactor
(2) BOD incubator
(3) Sludge digester
(4) Industrial oven

75. Which of the following statements is incorrect?

(1) Prions consist of abnormally folded proteins.
(2) Viroids lack a protein coat.
(3) Viruses are obligate parasites.
(4) Infective constituent in viruses is the protein coat.

76. Grass leaves curl inwards during very dry weather. Select the most appropriate reason from the following

(1) Tyloses in vessels
(2) Closure of stomata
(3) Flaccidity of bulliform cells
(4) Shrinkage of air spaces in spongy mesophyll

77. Xylem translocates

(1) Water, mineral salts, some organic nitrogen and hormones
(2) Water only
(3) Water and mineral salts only
(4) Water, mineral salts and some organic nitrogen only

78. Select the correct sequence for transport of sperm cells in male reproductive system.

(1) Testis → Epididymis → Vasa efferentia → Vas deferens → Ejaculatory duct → Inguinal canal → Urethra → Urethral meatus

(2) Testis → Epididymis → Vasa efferentia → Rete testis → Inguinal canal → Urethra

(3) Seminiferous tubules → Rete testis → Vasa efferentia → Epididymis → Vas deferens → Ejaculatory duct → Urethra → Urethral meatus

(4) Seminiferous tubules → Vasa efferentia → Epididymis → Inguinal canal → Urethra

79. Which of these following methods is the most suitable for disposal of nuclear waste?

(1) Bury the waste within rocks deep below the Earth's surface

(2) Shoot the waste into space

(3) Bury the waste under Antarctic ice-cover

(4) Dump the waste within rocks under deep ocean

80. Which of the following immune responses is responsible for rejection of kidney graft?

(1) Cell-mediated immune response

(2) Auto-immune response

(3) Humoral immune response

(4) Inflammatory immune response

81. What is the site of perception of photoperiod necessary for induction of flowering in plants?

(1) Leaves **(2)** Lateral buds

(3) Pulvinus **(4)** Shoot apex

82. Identify the correct pair representing the causative agent of typhoid fever and the confirmatory test for typhoid.

(1) Salmonella typhi / Widal test

(2) Plasmodium vivax / UTI test

(3) Streptococcus pneumoniae / Widal test

(4) Salmonella typhi / Anthrone test

83. Concanavalin A is

(1) a pigment **(2)** an alkaloid

(3) an essential oil **(4)** a lectin

84. It takes very long time for pineapple plants to produce flowers. Which combination of hormones can be applied to artificially induce flowering in pineapple plants throughout the year to increase yield?

(1) Cytokinin and Abscisic acid

(2) Auxin and Ethylene

(3) Gibberellin and Cytokinin

(4) Gibberellin and Abscisic acid

85. Select the incorrect statement.

(1) Inbreeding helps in accumulation of superior genes and elimination of undesirable genes

(2) Inbreeding increases homozygosity

(3) Inbreeding is essential to evolve purelines in any animal.

(4) Inbreeding selects harmful recessive genes that reduce fertility and productivity

86. Which of the following statements is incorrect?

(1) Yeasts have filamentous bodies with long thread-like hyphae.

(2) Morels and truffles are edible delicacies.

(3) Claviceps is a source of many alkaloids and LSD.

(4) Conidia are produced exogenously and ascospores endogenously.

87. Tidal Volume and Expiratory Reserve Volume of an athlete is 500 mL and 1000 mL, respectively. What will be his Expiratory Capacity if the Residual Volume is 1200 mL?

(1) 2700 mL **(2)** 1500 mL

(3) 1700 mL **(4)** 2200 mL

88. Which one of the following is not a method of in situ conservation of biodiversity?

(1) Sacred Grove **(2)** Biosphere Reserve

(3) Wildlife Sanctuary **(4)** Botanical Garden

89. Which of the following factors is responsible for the formation of concentrated urine?

(1) Hydrostatic pressure during glomerular filtration

(2) Low levels of antidiuretic hormone

(3) Maintaining hyperosmolarity towards inner medullary interstitium in the kidneys.

(4) Secretion of erythropoietin by Juxtaglomerular complex

90. Match the Column-I with Column-II

Column-I		Column-II	
(a)	P - wave	**(i)**	Depolarisation of ventricles
(b)	QRS complex	**(ii)**	Repolarisation of ventricles
(c)	T - wave	**(iii)**	Coronary ischemia
(d)	Reduction in the size of T-wave	**(iv)**	Depolarisation of atria
		(v)	Repolarisation of atria

Select the correct option.

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

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

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

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

Answer key & explanations

Questions as they appeared in NEET (UG) 2019 conducted by NTA. Answers per NTA final key. Explanations by competitorspoint.com. Answer key: NTA NEET (UG) 2019 final answer key (exam date 05.05.2019), Book R1. No questions were dropped or awarded as bonus for Q1–90.

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

1. Ans (4) In the lac operon, i codes for the repressor, z for β-galactosidase, y for permease and a for transacetylase.

2. Ans (4) Crypts of Lieberkuhn – small intestine; Glisson's capsule – liver; islets of Langerhans – pancreas; Brunner's glands – duodenum.

3. Ans (1) Phloem transport is bi-directional, from source to sink, and source–sink relations can reverse.

4. Ans (1) Ciliated epithelium lines the bronchioles and fallopian tubes, moving mucus or ova in one direction.

5. Ans (2) Habitat loss and fragmentation is the most important cause of extinction.

6. Ans (2) Lactational amenorrhea depends on prolactin-related suppression of ovulation, and pills and emergency contraceptives are hormonal.

7. Ans (4) Lysosomes and vacuoles lack DNA; mitochondria and chloroplasts have their own DNA.

8. Ans (4) In parietal placentation, ovules develop on the inner wall of the ovary (e.g., mustard, Argemone).

9. Ans (3) The 1992 Rio Earth Summit called for conservation of biodiversity and sustainable use of its benefits.

10. Ans (3) Adenine and guanine are the purines common to DNA and RNA.

11. Ans (4) Insulin – diabetes mellitus; thyroxin – goitre; corticoids – Addison's disease; GH – acromegaly.

12. Ans (1) The cell cycle proceeds $G_1 \rightarrow S \rightarrow G_2 \rightarrow M$.

13. Ans (4) Genital herpes (viral) and hepatitis B and HIV are not completely curable.

14. Ans (4) Polyblend mixed with bitumen is used in road construction.

15. Ans (3) The short arm is the p-arm and the long arm is the q-arm.

16. Ans (3) Restriction endonucleases cut both strands of DNA, not just one.

17. Ans (3) Residual persistent nucellus in seeds is the perisperm (e.g., black pepper, beet).

18. Ans (3) Mucus from goblet cells protects the gut lining from enzymes and HCl.

19. Ans (1) Lysosomes are formed by packaging in the Golgi apparatus, not the ER.

20. Ans (3) Lactobacillus – curd; Saccharomyces cerevisiae – bread; Aspergillus niger – citric acid; Acetobacter aceti – acetic acid.

21. Ans (3) The hypothalamus regulates body temperature.

22. Ans (1) Segregation does apply: F_2 shows 1 red : 2 pink : 1 white, so statement (1) is incorrect.

23. Ans (2) Trichoderma is a free-living fungal biocontrol agent against plant pathogens.

24. Ans (3) Trichoderma, baculoviruses (NPV) and Bacillus thuringiensis are biocontrol agents.

25. Ans (4) Alfred Sturtevant used recombination frequency to map distances between genes.

26. Ans (3) Tripalmitin: $2\ C_{51}H_{98}O_6 + 145\ O_2 \rightarrow 102\ CO_2 + 98\ H_2O$, so RQ = 102/145 ≈ 0.7.

27. Ans (4) Stroke volume = 100 – 50 = 50 mL, so heart rate = 5000/50 = 100 beats per minute.

28. Ans (4) Seed habit (retention of the female gametophyte with the embryo on the sporophyte) first appeared in pteridophytes such as Selaginella and Salvinia.

29. Ans (1) The pyramid of biomass in the sea is inverted (small phytoplankton biomass supports a larger fish biomass).

30. Ans (1) Colostrum is rich in IgA antibodies.

31. Ans (1) Gymnosperm phloem lacks sieve tubes and companion cells.

32. Ans (3) Pila – radula; Bombyx – Malpighian tubules; Pleurobrachia – comb plates; Taenia – flame cells.

33. Ans (4) The kidney makes calcitriol (needed for Ca^{2+} absorption) and erythropoietin, so a dialysis patient may show reduced Ca^{2+} absorption and RBC production.

34. Ans (1) The cornea is collagen-rich, avascular and the most sensitive part of the eye.

35. Ans (4) In birds, females are heterogametic (ZW), so the egg, not the sperm, decides the sex of the progeny.

36. **Ans (2)** Rudolf Virchow proposed Omnis cellula-e cellula.

37. **Ans (1)** Annual rings are prominent in temperate trees because of seasonal cambial activity; statement (1) is false.

38. **Ans (1)** Thiobacillus denitrificans carries out denitrification.

39. **Ans (3)** Asthma (wheezing) results from inflammation of the bronchi and bronchioles.

40. **Ans (1)** Development of an embryo from an unfertilized female gamete is parthenogenesis.

41. **Ans (1)** There are 7 pairs of true (vertebrosternal), 3 pairs of vertebrochondral (false) and 2 pairs of floating (vertebral) ribs.

42. **Ans (3)** Steroid hormones enter the cell and bind intracellular receptors; the hormone–receptor complex binds DNA to alter gene expression.

43. **Ans (3)** Binomials are italicized/underlined with the genus capitalized, the species epithet in lower case, and the author abbreviated: Mangifera indica Linn.

44. **Ans (4)** 1 map unit (centimorgan) equals 1% recombination (crossing over).

45. **Ans (4)** [source copy prints (2); NTA final key gives (4)] Cells in G_0 are metabolically active but no longer proliferate; NTA's final key takes this as suspending the cell cycle.

46. **Ans (1)** Ovules develop into seeds, not embryo sacs.

47. **Ans (4)** The near-universal genetic code lets bacteria translate human genes into human insulin.

48. **Ans (1)** GLUT-4, in muscle and adipose tissue, is insulin-dependent.

49. **Ans (1)** Deleting three consecutive bases (GGU, one codon) keeps the downstream reading frame intact.

50. **Ans (4)** Progestasert and LNG-20 are hormone-releasing IUDs.

51. **Ans (3)** De Vries proposed that mutations are random and directionless.

52. **Ans (2)** ESTs are the sequences of genes expressed as RNA (Human Genome Project).

53. **Ans (4)** The alkaline pH of the insect gut solubilizes the protoxin and converts it to active Bt toxin.

54. **Ans (4)** Homo habilis – 650–800 cc; Homo erectus – 900 cc; Neanderthals – 1400 cc; Homo sapiens – about 1350 cc.

55. **Ans (1)** CO_2 and methane are the main greenhouse gases.

56. **Ans (1)** Saprophyte – decomposition; parasite – living on living hosts; lichens – algae and fungi; mycorrhiza – fungi and plant roots.

57. **Ans (2)** Golden rice is enriched with vitamin A (β-carotene) using genes including one from daffodil.

58. **Ans (3)** Klinefelter's syndrome (XXY) gives masculine development with gynaecomastia and sterility.

59. **Ans (2)** Entry of the sperm induces completion of meiosis II and extrusion of the second polar body before fusion of nuclei (fertilization).

60. **Ans (4)** p = 0.4 and q = 0.6, so AA = 0.16, Aa = 2pq = 0.48 and aa = 0.36.

61. **Ans (1)** One male gamete fuses with the egg (syngamy) and the other with the polar nuclei or central cell (triple fusion).

62. **Ans (3)** Favouring the average and eliminating both extremes is stabilizing selection.

63. **Ans (3)** Muscular dystrophy is a genetic (inherited) disorder.

64. **Ans (2)** The Montreal Protocol (1987) aimed to reduce CFCs and other ozone-depleting substances.

65. **Ans (3)** [source copy prints (4); NTA final key gives (3)] A tightly bound coenzyme or metal ion is a prosthetic group (A true); an enzyme with its prosthetic group is a holoenzyme, not an apoenzyme (B false).

66. **Ans (2)** Annelida, Arthropoda and Chordata are organ-system level, bilateral, segmented true coelomates; Mollusca are unsegmented.

67. **Ans (3)** Pinus has an obligate mycorrhizal association needed for seed germination and establishment.

68. **Ans (2)** Cockroach gut: pharynx → oesophagus → crop → gizzard → ileum → colon → rectum.

69. **Ans (3)** The enzymes of the electron transport chain are in the inner mitochondrial membrane.

70. **Ans (3)** Heroin (diacetylmorphine) is made by acetylation of morphine.

71. **Ans (3)** Hexokinase converts glucose to glucose-6-phosphate.

72. **Ans (3)** Purified DNA precipitates on adding chilled ethanol.

73. **Ans (3)** Statins (from Monascus purpureus) lower blood cholesterol.

74. **Ans (1)** Large-scale culture of microbes uses bioreactors.

75. **Ans (4)** The infective constituent of viruses is the nucleic acid, not the protein coat.

76. **Ans (3)** In dry weather, flaccid bulliform cells make grass leaves roll inward, reducing water loss.

77. **Ans (1)** Xylem carries water, mineral salts, some organic nitrogen and hormones.

78. **Ans (3)** Sperm path: seminiferous tubules → rete testis → vasa efferentia → epididymis → vas deferens → ejaculatory duct → urethra → urethral meatus.

79. **Ans (1)** The suggested method is storage in suitable shielded containers buried in rocks deep below the Earth's surface (about 500 m).

80. **Ans (1)** Graft rejection is due to the cell-mediated (T-cell) immune response.

81. **Ans (1)** Leaves perceive the photoperiod and send a signal to the shoot apices.

82. **Ans (1)** Typhoid is caused by Salmonella typhi and confirmed by the Widal test.

83. **Ans (4)** Concanavalin A is a lectin.

84. **Ans (2)** Auxins (NAA, 2,4-D) and ethylene promote synchronized flowering in pineapple.

85. **Ans (4)** Inbreeding exposes harmful recessive genes, which are then eliminated by selection; it does not select them, so (4) is incorrect.

86. **Ans (1)** Yeasts are unicellular, not filamentous with hyphae.

87. **Ans (2)** Expiratory capacity = TV + ERV = 500 + 1000 = 1500 mL.

88. **Ans (4)** A botanical garden is ex situ conservation.

89. **Ans (3)** Concentrated urine depends on the medullary osmotic gradient (counter-current mechanism).

90. **Ans (2)** P – depolarisation of atria; QRS – depolarisation of ventricles; T – repolarisation of ventricles; reduced T-wave – coronary ischemia.