[ENGLISH VERSION]

Regular Candidates will answer questions from Groups A, B, C and D.

External Candidates will answer questions from Group E in addition to Groups A, B, C and D.

(Special Instruction for Visually Handicapped Candidates)

*Answer Question No. **4.1(A)** instead of Question No. **4.1** in Group D.*

Instruction on how many questions from a group must be attempted is provided in the beginning of each group.

Group 'A'

(All Questions are Compulsory)

1. **Choose the correct answer for each question and write it with its respective serial number :–** 1×15=15

1.1 Which of the following is the correct sequence of reflex arc ?

(a) Receptor → Efferent Nerve → Effector → Nerve Centre → Afferent Nerve

(b) Receptor → Nerve Centre → Afferent Nerve → Efferent Nerve → Effector

(c) Receptor → Afferent Nerve → Nerve Centre → Efferent Nerve → Effector

(d) Receptor → Effector → Nerve Centre → Afferent Nerve → Efferent Nerve

1.2 Which of the following statement is not correct ?

(a) Thyroxine controls the metabolism of the body.

(b) Progesterone controls growth of the uterus, formation of placenta during pregnancy and the process of child birth.

(c) Insulin increases the rate of glycogenesis.

(d) Adrenaline decreases cardiac output.

1.3 The refractive media of eye are —

(a) Cornea, Aqueous Humor, Lens, Vitreous Humor

(b) Sclera, Choroid, Iris, Retina

(c) Cornea, Choroid, Lens, Retina

(d) Aqueous Humor, Iris, Vitreous Humor, Choroid

1.4 Consider the differences between mitosis of Plant cell and Animal cell and select which are correct —

Mitosis of Plant cell	Mitosis of Animal cell
I. Spindle fibres are formed from centriole.	Spindle fibres are formed from microtubules.
II. Cytokinesis is accomplished through the formation of cell plate.	Cytokinesis is accomplished through furrowing or cleavage.
III. The daughter cells formed remain attached side by side.	The daughter cells formed separate from each other.
IV. Cytokinesis proceeds from periphery towards the centre of the cell.	Cytokinesis proceeds from centre towards periphery of the cell.

(a) I, IV (b) II, III

(c) II, IV (d) III, IV

1.5 Which of the following patterns of pairing of nitrogenous bases of DNA is correct ?

(a) A ≡ T (b) G = C

(c) A – T (d) G ≡ C

1.6 Which of the following reactants was not used in the experiment of Miller and Urey ?

(a) CH_4 (b) H_2S

(c) NH_3 (d) H_2

1.7 Which of the following is not a feature of waggle dance of the bees ?

(a) Waggle dance is seen when the source of food is beyond 100 metres from the bee hive.

(b) Waggle dance assumes the form of the numeral '8'.

(c) Bees move clock-wise and anti-clock-wise once each alternatively while performing the waggle dance.

(d) The downward direction of waggle dance indicates the location of the source of food to be on the opposite side of the sun.

1.8 Which of the following Pairs regarding endangered species and their respective cause of endangerment is correct ?

(a) Invasion of exotic species — Mourala fish

(b) Pollution — One-horned Rhinoceros

(c) Poaching — Vulture

(d) Global warming and climatic change — Cockroach

1.9 The material associated with biomagnification is —

(a) Rotten Leaves
(b) Chlorinated Insecticide
(c) Animal excreta
(d) Paper

1.10 *Nitrosomonas*, *Rhizobium*, *Nitrobacter*, *Pseudomonas* — which of these microbes is associated with the fourth step of the Nitrogen Cycle ?

(a) *Rhizobium*
(b) *Pseudomonas*
(c) *Nitrosomonas*
(d) *Nitrobacter*

1.11 How many of the following statements regarding cross-pollination are correct ?

- Agents are required for cross-pollination.
- New traits originate in the offspring plants as a result of cross-pollination.
- Wastage of pollen grains is less in cross-pollination as it does not depend on agents.
- Wastage of pollen grains is more in cross-pollination as it depends on agents.

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

1.12 What would be the probability in percentage of 4th child to be a daughter born to parents already having three consecutive sons ?

(a) 100%
(b) 0%
(c) 50%
(d) 75%

1.13 Determine what would be the ratio of the types of gametes produced from plants having genotypes YyRR and YYRr ?

(a) 2 : 1
(b) 1 : 2
(c) 2 : 2
(d) 1 : 4

1.14 Which of the following crosses would yield tall and dwarf traits in the ratio of 1 : 1 in the F_1 generation ?

(a) Tt × Tt
(b) TT × Tt
(c) TT × tt
(d) Tt × tt

1.15 Which of the following pairs is not homologous organ ?

(a) Hand of Man and the foreleg of Horse
(b) Wing of Bird and the Flipper of Whale
(c) Wing of Bird and the Wing of Insect
(d) Foreleg of Horse and the Flipper of Whale

Group 'B'

2. **Answer 21 questions out of the 26 questions given below, as instructed.** 1×21=21

Decide whether the following statements are true or false (any five) : 1×5=5

2.1 While looking at a distant object the focal length of the ocular lens increases if its curvature decreases.

2.2 Daughter chromosomes move towards respective poles during anaphase stage of mitosis of animal cell.

2.3 It is homozygous dominant in one locus and heterozygous dominant in the other locus — example of such one genotype is BBrr.

2.4 Equus possessed 4 digits in the forelimb and three digits in the hindlimb.

2.5 One of the efforts for the conservation of Red Panda is captive breeding.

2.6 The hormone other than thyroxine assisting in metabolism is insulin.

Answer in a single word or in a single sentence (any six) : 1×6=6

2.7 Choose the odd word and write it :

Hypothalamus, Pons, Medulla Oblongata, Cerebellum.

2.8 What is the function of Schwann cell ?

2.9 On the basis of the relationship between the first pair of words, write a suitable word in the gap of the second pair.

Fragmentation : Spirogyra :: Budding : ————.

2.10 Which of the following genotypes is completely different from the rest in respect of its phenotype — YYRR, yyRR, YYRr and YyRR ?

2.11 What might be the genotype of the mother carrying the gene for colour blindness ?

2.12 What is the first observation of Darwin in his theory related with evolution ?

2.13 Among the following four terms, one includes the other three. Find it out and write it :

Submergence of islands, Destruction of mangrove plant, Environmental crisis of Sunderban, Loss of balance of Prey-Predator number.

2.14 What is the main role of JFM ?

Fill in the blanks with proper words in the following sentences (any five) : 1×5=5

2.15 In human body in all _____ pairs of cranial nerves and spinal nerves are present.

2.16 _____ having special polarity protects the two ends of chromosome from erosion.

2.17 The genotype of a guineapig having black coloured and rough hair is _____.

2.18 Ontogeny repeats _____.

2.19 Asthma is caused when the _____ of animals enters the respiratory system of human through breathing.

2.20 The economic purpose of poaching is animal's _____.

Match the words in Column A with the most appropriate words in Column B and rewrite the correct pair mentioning the serial no. of both columns (any five) : 1×5=5

Column A	Column B
2.21 ADH	(a) Decline in Wetland
2.22 Amitosis	(b) Convergent Evolution
2.23 Thalassaemia	(c) Palash (Flame of the forest)
2.24 Analogous organ	(d) Spindle fibre is not formed
2.25 Increase in human population	(e) Decreases the volume of urine through reabsorption of water from the distal convoluted tubule of nephron
2.26 Ornithophilons flower	(f) Paddy
	(g) Recessive Mutant gene located on Autosome

Group 'C'

3. **Answer any 12 questions each in 2-3 sentences out of the 17 questions given below :** 2×12=24

3.1 Show the list of substances synthesised during G_1 and G_2 phases of cell cycle with the help of table.

3.2 Explain the following two methods of asexual reproduction :

- Budding
- Regeneration

3.3 What changes can occur if the amount of heterochromatin increases in Chromosome compared to euchromatin ?

3.4 Explain the following two terms related with heredity :

- Genotype
- Hybridization

3.5 If an apparently normal female marries a normal male and if two sons are born to them then show with the help of a cross the probability of haemophilia in the sons.

3.6 Compare between eutrophication and biomagnification on the basis of the following two points :

- Cause
- Effect

3.7 Which environmental problems arise if nitrogen cycle is hampered ?

3.8 Prepare a list of endangered biodiversities of Indo-Burma and Sundaland hotspots.

3.9 If the temperature and acidity of sea-water increase what effects would it impose on marine biodiversities ?

3.10 Mention two roles of Auxin hormone in the growth of plants ?

3.11 How does a person perform the process of visual accommodation while walking on road ?

3.12 Mention one role each of hypothalamus and medulla oblongata in the 24 hours daily life of a person.

3.13 Establish the relationship between neuron, nerve fibre and nerve.

3.14 With the help of a table show the genotypes bearing genotypic ratio two (2) produced in F_2 generation as a result of a cross between a pea plant having pure round yellow coloured seed (RRYY) and another pea plant having pure wrinkled green coloured seed (rryy).

3.15 Give any two examples of probable struggle for existence among animals who might dwell in a tall tree having hollow cavities.

3.16 Establish the relationship between the ability to withstand extreme water loss and the shape of RBC in camel.

3.17 Explain how the features of digits have changed in the course of evolution of horse.

Group 'D'

4. **Write all the 6 questions or their alternatives given below. Visually handicapped candidates have to answer Question No. 4.1 (A) instead of Question No. 4.1. The marks allotted for each question are 5 (the division of marks is either 3+2, 2+3 or 5)** 5×6=30

4.1 Draw a scientific diagram of vertical section of human eyeball and label the following parts :

(a) Cornea (b) Lens

(c) Vitreous Humor (d) Retina 3+2=5

OR

Draw a scientific diagram of anaphase stage of mitosis of animal cell and label the following parts :

(a) Daughter chromosome (b) Continuous fibre

(c) Centriole (d) Chromosomal fibre 3+2=5

(FOR VISUALLY HANDICAPPED CANDIDATES ONLY)

4.1(A) Write one function each of the following five parts of eyeball of human eye :

(a) Cornea (b) Lens

(c) Retina (d) Choroid

(e) Iris

1×5=5

OR

Describe the following features occurring during anaphase stage of animal cell division :

(a) Division of centromere

(b) Formation of daughter chromosome

(c) Types of Spindle fibre

(d) Movement of daughter chromosome towards pole

(e) Formation of stem body

1×5=5

4.2 What is the role of Cryopreservation in the conservation of biodiversities ? What informations may be found from PBR regarding conservation ? 2+3=5

OR

Prepare a list of animals being endangered by poaching. Which environmental factors have the potentialities to increase the chance of developing cancer ? 3+2=5

4.3 Write three inferences deduced from the observations as mentioned in Darwin's theory of origin of new species by means of natural selection with the help of a table. Explain the problem-solving ability of Chimpanzee regarding procurement of food. 3+2=5

OR

Show the major events of evolution with the help of a chart. What are the roles of air sacs in the flight of pigeon ? 3+2=5

4.4 Prepare a list of diseases linked with pollution as observed by a doctor among her or his patients in a whole day. Which in-situ measures are associated with the conservation of tiger and one-horned rhinoceros in the same national park ? 2+3=5

OR

Explain the relationship between the decline in the number of biodiversities with that of overexploitation with the help of two examples. Construct a mental map of problems caused by ever-increasing human population. 2+3=5

4.5 Establish the interrelationship between gene, DNA and chromosome. What are the advantages of vegetative propagation ? 2+3=5

OR

How is micropropagation performed ? Which phenomena occur during telophase stage of mitosis in an animal cell ? 2+3=5

4.6 Mention the dominant and recessive traits of two characters related with seed and one character related with flower of Pea plant. Very often it is experienced that a colour-blind son is born to apparently normal parents. Show with the help of a cross how it happens. 3+2=5

OR

What is the role of genetic counselling in the eradication of genetic diseases from the society ? Guineapig with Black-smooth hair is produced in F_2 generation resulting from a cross between pure black-rough haired guineapig (BBRR) with pure white-smooth haired guineapig (bbrr). Show their possible genotypes and genetypic ratios with the help of a table. 2+3=5

(FOR EXTERNAL CANDIDATES ONLY)

Group 'E'

5. **Answer any four questions :** 1×4=4

5.1 Write one feature of epithelial tissue.

5.2 What is the function of Golgi body ?

5.3 Write one function of sclerenchyma tissue.

5.4 Write one advantage of self-pollination.

5.5 Give one example of proteolytic enzyme.

6. **Answer any three questions :** 2×3=6

6.1 Write two structural features of nerve.

6.2 Write the names of two nitrogeneous excretory products of plants.

6.3 Write one function each of mitochondria and chloroplast.

6.4 Write the names of two sanctuaries of West Bengal.