

ENGLISH VERSION

DIRECTIONS

For Regular candidates, the questions of Group 'A', 'B', 'C' and 'D' will have to be answered.

Special Instruction for Sightless Candidates

In Group 'D' instead of Question No. 4.1, 4.1(A) will have to be answered.

For External Candidates, the questions of Group 'E' will also have to be answered in addition to Group 'A', 'B', 'C' and 'D'.

Instructions regarding the number of questions to be attempted have been indicated at the beginning of each group.

GROUP—'A'

(Answer to all questions is compulsory)

1. Write the answer in a complete sentence by choosing the correct answer for each question with respective serial number. 1 x 15 = 15

1.1. Select the correct pair.

- (a) Sclera—Absorbs excess light within eyeball
- (b) Choroid—Provides definite shape of the eyeball
- (c) Lens—Causes refraction of light and accomplishes accommodation
- (d) Retina—Holds the lens with the help of the suspensory ligaments

1.2 Identify which of the following statements is not true regarding Adrenaline

- (a) Increases the rate of heartbeat
- (b) Helps in the production of spermatozoa during adolescence
- (c) Increases cardiac output
- (d) Increases systolic blood pressure

1.3 Select which of the following is the feature of tropic movement

- (a) Induced movement of curvature of particular parts of plant controlled by the direction of the stimulus
- (b) It is one type of turgor movement
- (c) Induced movement of curvature of particular parts of plant controlled by the intensity of the stimulus
- (d) Does not occur under the influence of Auxin

1.4 Match the words of Column-A with that of Column-B and select which of the following options is correct —

Column-A	Column-B
A. CSF	(i) Protects Central Nervous System from mechanical injury
B. Meninges	(ii) Helps in the formation of myelin sheath
C. Neuroglia	(iii) Acts as shock absorber

- (a) A-(ii) B-(iii) C-(i)
- (b) A-(iii) B-(i) C-(ii)
- (c) A-(i) B-(ii) C-(iii)
- (d) A-(i) B-(iii) C-(ii)

1.5 Decide which of the following sequence is correct —

- (a) Receptor → Effector → Sensory Nerve → Motor Nerve → Nerve Centre
- (b) Receptor → Nerve Centre → Motor Nerve → Sensory Nerve → Effector
- (c) Receptor → Sensory Nerve → Nerve Centre → Motor Nerve → Effector
- (d) Receptor → Motor Nerve → Sensory Nerve → Nerve Centre

1.6 Select the correct pair —

- (a) Telophase — Movement of daughter chromosomes towards poles
- (b) Telophase — Disappearance of Nuclear Membrane and Nucleolus
- (c) Telophase — Formation of spindle fibre
- (d) Telophase — Reappearance of Nuclear Membrane and Nucleolus

1.7 The name of terminal parts of Chromosome is —

- (a) Centromere
- (b) Telomere
- (c) Nucleolar Organizer
- (d) Satellite

1.8 Identify which of the following statements is not true regarding cross pollination —

- (a) Requires agent
- (b) Origin of new hereditary features
- (c) Maintains the purity of species
- (d) Rate of germination of seeds is higher

- 1.9 Consider the differences between asexual and sexual reproduction and select which of the options is/are correct—

Asexual Reproduction	Sexual Reproduction
I. Requires two parental organisms of opposite sex belonging to same species.	Offsprings can be formed from a single parental organism.
II. This type of reproduction is completed through cell division or through the production of spores.	This type of reproduction is completed through the production of gametes and their union.
III. Depends on amitosis, mitosis and meiosis.	Depends on meiosis.
IV. Variations are found in offsprings.	The offsprings become identical to their parents.

(a) I, IV

(b) II, III

(c) III, IV

(d) I, II

- 1.10 Select the correct pair in case of human :

(a) Normal pattern of chromosome of ovum — $22A + XX$

(b) Normal pattern of chromosome of ovum — $22A + Y$

(c) Normal pattern of chromosome of ovum — $22A + X$

(d) Normal pattern of chromosome of ovum — $22A + XY$

1.11 Determine which of the following genotypes is homozygous for both the loci —

- (a) BbRr
- (b) BBRR
- (c) BbRR

☒ (d) bbrr

1.12 Identify the genotype of guineapig having white coat colour and rough hair —

- (a) bbRR, bbrr
- (b) BBRR, bbrr
- ☒ (c) bbRR, bbRr
- (d) BbRr, BbRR

1.13 Decide which of the following two were selected by Mendel as dominant traits

- ☒ (a) Length of stem — Long, Shape of seed — Round
- (b) Position of flower — Terminal, Colour of flower — White
- (c) Colour of cotyledon — Green, Shape of seed — Wrinkled
- (d) Length of stem — Dwarf, Shape of seed — Wrinkled

1.14 Determine the nature of pea plant germinated from the seed produced as a result of pollination between a hybrid tall (Tt) and a pure dwarf (tt) pea plant —

- (a) 100% Tall
- ☒ (b) 50% Tall, 50% Dwarf
- (c) 100% Dwarf
- (d) 75% Tall, 25% Dwarf

1.15 Decide which of the following diseases can be prevented by taking suggestions from pre-marital genetic counselling -

(a) Goitre

(b) Malaria

☒ (c) Thalassaemia

(d) Tuberculosis

GROUP—'B'

2. Answer/21 questions out of 26 questions given below as instructed.

$$1 \times 21 = 21$$

Fill in the blanks with proper words in the following sentences (any five):

$$1 \times 5 = 5$$

2.1 _____ hormone is found in very high amount in the ripe seeds of plants.

2.2 Reflex action is fast, spontaneous and _____.

2.3 In _____ cell division spindle fibres are not formed.

2.4 _____ is an entomophilous flower.

2.5 The gene having the power of rolling tongue is _____.

2.6 As the gene responsible for haemophilia is recessive, so the symptoms of this disease is only manifested in _____ condition.

Decide whether the following statements are true or false (any five) :

$$1 \times 5 = 5$$

2.7 The focal length of lens increases in case of seeing distant objects.

2.8 Each nucleoside contains nitrogenous base and phosphoric acid.

2.9. There is no role of female in determining sex of human.

2.10 If any pea plant contains either TT or tt trait, then the pea plant becomes heterozygous with respect to such alleles.

2.11 As the flowers of pea plant are unisexual, so self-pollination and if needed, cross pollination can be performed.

2.12 The daughter cells are changed and modified in different ways during cell differentiation phase to form tissue, organ and system.

Match the words in Column-A with those which are most appropriate in Column-B and re-write the correct pair mentioning the serial no. of both columns (any five) :

1 x 5 = 5

Column-A	Column-B
2.13 Diabetes insipidus	(a) Law of Independent Assortment
2.14 Schwann cell	(b) Brittleness of bone
2.15 Meiosis	(c) Exists between neurolemma and myelin sheath of axon
2.16 Senescence phase	(d) Hyposecretion of ADH
2.17 Genetic disease	(e) Spore mother cell and germ mother cell
2.18 The second law of Mendel	(f) Colour blindness
	(g) Law of Segregation

Answer in a single word or in a single sentence (any six) :

1 x 6 = 6

2.19 Choose the odd one and write it :

Olfactory nerve, (Vagus nerve) Optic nerve, Auditory nerve

2.20 What is the fate of hormone in animal body after its function is over ?

2.21 A pair of related terms is given below. On the basis of the relationship in the first pair write the suitable word in the gap of the second pair.

Purine : Adenine :: Pyrimidine : _____

2.22 What happens if the functions of checkpoints in cell cycle get hampered ?

2.23 What is hybridization ?

2.24 What is dominant trait ?

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

Increase in Basal Metabolic Rate, (Thyroxine) Gradual maturation of Red Blood Corpuscle, Exophthalmic Goitre

2.26 In which phase of Interphase the proteins essential for the formation of spindle fibres is synthesized ?

GROUP—'C'

3. Answer any 12 questions in 2-3 sentences out of 17 questions given below :

2 x 12 = 24

3.1 Prepare a list of hormones which control the following functions —

- Causes increase in the length of bones through mineralisation of the matrix of cartilage located at the terminal parts of long bones.
- Transforms ruptured follicle into a temporary endocrine gland namely Corpus Luteum and provides necessary stimulation for the secretion of Progesterone hormone from that gland.
- Inhibits the production of glucose in liver from protein and lipid.
- Causes contraction of uterine muscles during parturition.

3.2 Explain the causes of Myopia and Hyperopia.

3.3 Explain what phenomena happen when the following muscles contract :

- Flexor muscle
- Extensor muscle
- Abductor muscle
- Rotator muscle

3.4 Prepare a list of functions controlled by Auxin related with the growth of plants.

- 3.5 Distinguish between the mitosis of plant cell with the mitosis of animal cell on the basis of the following features --
- Formation of spindle fibres
 - Process of cytokinesis
- 3.6 Explain how Bryophyllum undergoes vegetative propagation with the help of adventitious bud.
- 3.7 Tabulate which changes occur in a chromosome during Anaphase of Karyokinesis.
- 3.8 Describe how Yeast completes the process of budding.
- 3.9 Prepare a list of changes which occur during the adolescence phase of human development.
- 3.10 Explain the following two significances of meiotic cell division --
- Maintains the constant number of chromosome in a species
 - Origin of variation in an organism
- 3.11 State Mendel's second law of heredity.
- 3.12 Prove the authenticity of the statement -- "The phenotypic and genotypic ratio remain identical in case of Incomplete Dominance".
- 3.13 Write two causes behind Mendel's success in conducting experiments on heredity.

3.14 "Dispersal of animals is one of the driving force of locomotion" Judge the statement with the help of proper examples.

3.15 Show the chemical constituents of chromosome with the help of a table.

3.16 Compare between DNA and RNA on the basis of following features —

- Nature of carbohydrate
- Nature of pyrimidine base

3.17 "Some phenotypes may have multiple genotypes and some other phenotypes may have a single genotype" — Justify the statement from the results derived from the dihybrid experiment in case of pea plant.

GROUP — 'D'

(Long Answer Type Questions)

4.1 Write the 6 questions or their alternatives given below. Sightless candidates have to answer question No. 4.1(A) instead of question no. 4.1 The marks allotted for each question is 5 (the division of marks is either 3+2, 2+3 or 5) :

$$5 \times 6 = 30$$

4.1 Draw a scientific diagram of a neurone and label the following parts

$$3 + 2 = 5$$

- (a) Axon
- (b) Node of Ranvier
- (c) Dendron
- (d) Schwann Cell

OR

Draw a scientific diagram of the morphological structure of an eukaryotic chromosome and label the following parts — $3 + 2 = 5$

- (a) Chromatid
- (b) Telomere
- (c) Centromere
- (d) Nucleolar Organizer

(FOR SIGHTLESS CANDIDATES ONLY)

4.1 (A) Write the functions of each of the following part of a neurone :

$1 \times 5 = 5$

- (a) Dendron
- (b) Axon
- (c) Myelin Sheath
- (d) Schwann Cell
- (e) Node of Ranvier

OR

Write the functions of the following structural parts of an eukaryotic chromosome :

$1 \times 5 = 5$

- (a) Centromere
- (b) Nucleolar Organizer
- (c) Chromatid
- (d) Telomere
- (e) Kinetochore

4.2 Compare the antagonistic functions of the following three pairs of hormones in human body :

- Insulin and Glucagon
- Estrogen and Progesterone
- FSH and LH

Explain the relationship between hind brain and the function of control of breathing mechanism.

$$3 + 2 = 5$$

OR

The following physiological functions of a person wounded in an accident are found hampered. Write the name of the parts of brain attached with those functions :

- Speech
- Hunger, thirst and sleep
- Posture and the equilibrium of the body
- Movement of tongue and swallowing of food

Explain the mechanism of feedback control of function of hormone with the help of an suitable example.

$$3 + 2 = 5$$

4.3 Prepare a list of role of artificial plant hormones in agriculture and horticulture. What are the influences of Insulin hormone on the absorption and metabolism of glucose in human body ?

$$2 + 3 = 5$$

OR

Write three differences between binocular vision with that of monocular vision on the following three aspects :

- Formation of image
- Field of vision
- Depth

Write differences between inborn and acquired reflex actions on any two of the following aspects —

- Nature
- Condition
- Prior experience
- Neural pathway

3 + 2 = 5

4.4 Show the alternation of generation in fern with the help of a word diagram.

5

OR

Show the process of sexual reproduction in flowering plants with the help of word diagram.

5

4.5 Distinguish between Mitosis and Meiosis on the basis of the following three aspects —

- Site of occurrence
- Nature of division of chromosome
- Number of cells produced

Explain the following phenomena related with meiotic cell division —

- Separation of chromosome and chromatid
- Crossing over

3 + 2 = 5

OR

Distinguish between the cytokinesis of plant cell with the cytokinesis of animal cell on the basis of the following aspects :

- Process
- Time of initiation
- Role of Golgi bodies

Establish the interrelationships among gene, DNA and chromosome.

3 + 2 = 5

4.6 Predict what would be the hereditary results in the following cases :

- One of the parents is thalassaemic and the other is carrier of thalassaemic gene.
- Both of the parents are carrier of thalassaemic gene

What are the symptoms of Thalassaemia ?

2 + 3 = 5

OR

Tabulate three pairs of opposite traits regarding seed of pea plant as selected by Mendel. Show the process of sex determination in man with the help of a checker board.

3 + 2 = 5

GROUP—'E'

(For External Candidates Only)

5. Answer any four questions :

1 x 4 = 4

- 5.1 Write a feature of connective tissue.
- 5.2 Which cell organelle is termed as "power house" of cell ?
- 5.3 Write a function of Collenchyma tissue.
- 5.4 Give example of an ornithophilous flower.
- 5.5 Give example of an amylolytic enzyme.

6. Answer any three questions :

2 x 3 = 6

- 6.1 Name any two structural parts of Neurone.
- 6.2 Write the name of two non-nitrogenous excretory products of plant
- 6.3 Write one function each of ribosome and lysosome.
- 6.4 Name two endangered animals of West Bengal.