

Biology - 2020

Full Marks : 35

(Time: 3 Hours)

Pass Marks : 11½

General Instructions:

- Q. Nos. 1 to 10 are Multiple Choice/Objective Type each of 1 mark.
- Q. Nos. 11 to 13 are Very Short Answer (VSA) Type each of marks.
- Q. Nos. 14 to 16 are Short Answer Type each of 3 marks.
- Q. Nos. 17 and 18 are Long Answer Type each of 5 marks.

Group-A

(Multiple Choice / Objective Type Questions)

Choose the correct answer :

1x10=10

1. Mycorrhiza shows
 - (a) Parasitism
 - (b) Commensalism
 - (c) Mutualism
 - (d) None of these
 Ans. (a)
2. If chromosome number in diploid cell of maize is 20, then the chromosome number in gametes maize will be
 - (a) 10
 - (b) 20
 - (c) 5
 - (d) None of these
 Ans. (a)
3. Organization responsible for maintaining Red data book is
 - (a) IUCN
 - (b) CITES
 - (c) WWF
 - (d) IBWL
 Ans. (a)
4. Breeding crops with higher levels of vitamins, minerals and protein is called as
 - (a) Bio-magnification
 - (b) Bio-fortification
 - (c) Single cell protein
 - (d) Somaclone
 Ans. (b)
5. What is the percentage of energy that passes from one trophic level to the next trophic level?
 - (a) 10%
 - (b) 20%
 - (c) 50%
 - (d) 100%
 Ans. (a)
6. The book 'Origin of Species' was written by
 - (a) Malthus
 - (b) Haldance
 - (c) Darwin
 - (d) Lamarck
 Ans. (c)
7. The process of formation of RNA from DNA is
 - (a) Translation
 - (b) Transamination
 - (c) Replication
 - (d) Transcription
 Ans. (d)
8. A mature angiosperm embryo sac is
 - (a) 7 celled-7 nucleate
 - (b) 8 celled-8 nucleate
 - (c) 7 celled-8 nucleate
 - (d) 8 celled-7 nucleate
 Ans. (c)
9. The ratio of monohybrid cross is
 - (a) 9 : 3 : 3 : 1
 - (b) 3 : 1
 - (c) 1 : 2 : 1
 - (d) 2 : 1
 Ans. (b)
10. What are herbivores in an ecosystem?
 - (a) Primary consumer
 - (b) Secondary consumer
 - (c) Tertiary consumer
 - (d) Autotrophs
 Ans. (a)

Group-B

(Very Short Answer Type Questions)

11. Define ecological succession.
 Ans. Ecological succession is the formation of a series of the biotic communities at the same site over a period of time, one after the other, till a stable climax community develops over the area which is perfectly adapted to the climate of that region. Both biotic and abiotic forces operate in the process.
12. Write the names of two nucleic acids.
 Ans. Names of two nucleic acids-
 (a) DNA
 (b) RNA
13. Define Test cross and draw diagram.
 Ans. Test cross is a cross between genetically unknown individual with a fully recessive traits to determine whether an individual is homozygous or heterozygous.

Tt x tt

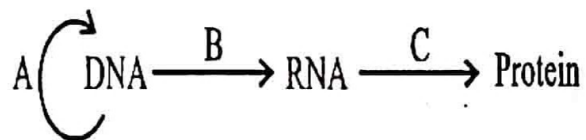
	T	t
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Group-C

(Short Answer Type Questions)

3x3=9

14. Write the names of A, B and C in the following picture:



- Ans. A – Replicated
 B – Transcription
 C – Translation

15. What is greenhouse effect? Write the names of two gases affecting greenhouse effect.

Ans. The phenomenon of keeping the earth warm due to presence of certain radiatively active gases in the atmosphere is called green house effect. The greenhouse effect disturbs the way the earth's climate maintains the balance between incoming and outgoing energy by allowing short wave radiation from the sun to penetrate through to warm the earth.

Increasing concentration of greenhouse gases including carbon dioxide methane and man made CFCs may enhance the green-house effect and cause global warming.

16. What is restriction enzyme? Give example.

Ans. Restriction enzymes are also called as molecular scissors.

With the help of restriction enzymes it is possible to cut a DNA sequence. When restriction enzymes make a cut in the DNA strand, it will leave single strand portions at the ends. These are overhanging called sticky ends. Sticky ends can form hydrogen bonds with their complementary cut by DNA ligase

Example - RI - Escherichia coli

Haemophilus influenza

Group - D

(Long Answer Type Questions)

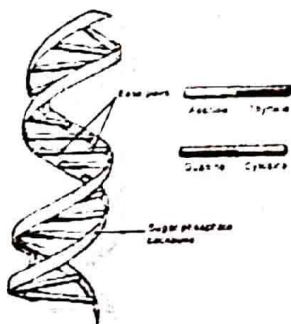
5x2=10

17. Draw a well labelled diagram of DNA double helix.

डी.एन.ए. द्विकुंडलिनी का नामांकित चित्र बनाएँ।

Ans. Double helix DNA-

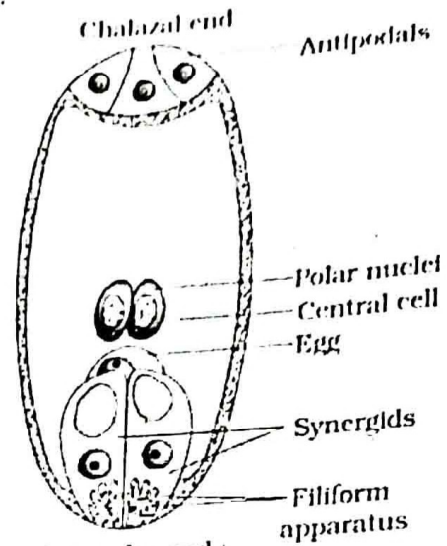
1. It is made up of two polynucleotide chains having anti-parallel polarity i.e., if one has 5'3' polarity other has 3'-5'.
2. The backbone is made up of sugar phosphate with nitrogenous bases projecting out.
3. The adenine pairs with thymine by two hydrogen bonds, whereas the cytosine pairs with guanine by three hydrogen bonds.
4. The plain of one base pair stack over the other in double helix. This along with hydrogen bonds confers stability to the helical structure.



OR

With a neat diagram explain the development of 7-celled, 8-nucleate female gametophyte in angiosperms.

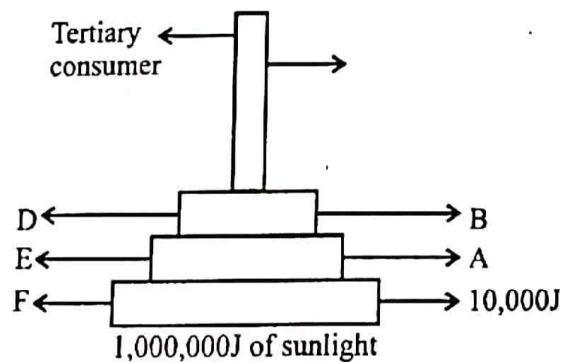
Ans.



The female gametophyte of plants is formed from a single functional megaspore with the help of four mitotic divisions. These mitotic divisions give rise to 8 nuclei. Later, these nuclei assemble into 7 cells Both chalazal and micropylar end has three cells. The three cells at chalaza are called antipodal cells while those at micropylar end constitute egg apparatus. The egg apparatus includes two larger cells called synergid while the egg is the smallest cell that acts as a female gamete. Two nuclei migrate to the centre and together they form a single cell called central cell. This central cell consist of two nuclei called polar nuclei

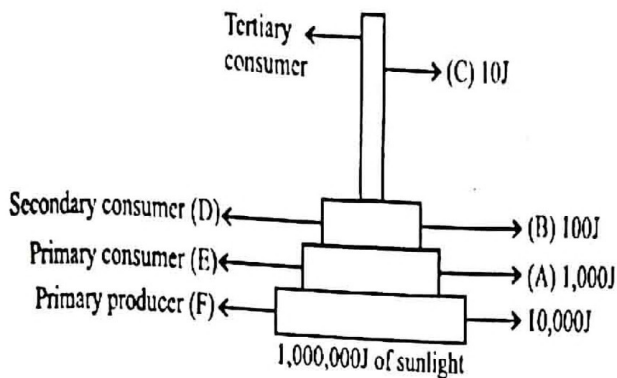
18. Write the answers of following questions: 2+3

- (i) What is ecological pyramid?
- (ii) Write the suitable names of A, B, C, D, E and F in the given picture.



Ans. (i) The graphic representation of the trophic structure (organism in various trophic level) of a food chain, is a ecological pyramid.

(ii)



OR

What is global warming? Discuss the cause and effect of global warming. What measures need to be taken to control global warming?

Ans. Global warming is the long-term rise in the average temperature of the earth's climate.

It is caused by increased concentrations of greenhouse gases in the atmosphere, mainly from human activities such as burning of fossil fuels, deforestation and farming.

Effects:-

- (i) Increase in mean temperature of earth.
- (ii) Increase in size of ozone hole.
- (iii) Due to thermal expansion of oceans the sea level will rise causing severe problem in the form of heavy flood.
- (iv) Rise in global temperature will reduce the flood production.

Measures to control global warming:-

(i) Limiting use of fossil fuels so as to reduce emission of greenhouse.

(ii) Using more energy saving appliances.

Increasing vegetation cover and forest area so as to use more CO₂ in photosynthesis.

(iii) Replacing CFC with chemicals which do not possess greenhouse effect.

Section - B - (Zoology)

Full Marks - 35

Pass Marks - 11½

General Instructions:

- Q. Nos. 19 to 28 are Multiple Choice/Objective Type each of 1 mark.
 Q. Nos. 29 to 31 are Very Short Answer (VSA) Type each of 2 marks.
 Q. Nos. 32 to 34 are Short Answer Type each of 3 marks
 Q. Nos. 35 and 36 are Long Answer Type each of 5 marks.

Group - A

(Multiple Choice / Objective Type Questions)

Choose the correct answer : 1x10=10

19. Conservation of organisms in their natural habitat is called as

- (a) In situ conservation (b) Ex situ conservation
 (c) both (a) and (b) (d) None of these

Ans. (a)

20. A person suffering from color blindness cannot differentiate which of the following colors?

- (a) Blue and green color (b) Red and green colour
 (c) Red and yellow colour (d) Red and blue colour

Ans. (b)

21. Which of the following is a sexually transmitted disease?

- (a) Cholera (b) Syphilis
 (c) Typhoid (d) Elephantiasis

Ans. (b)

22. How many sperms are produced from a single spermatogonium?

- (a) 6 (b) 1
 (c) 4 (d) 3

Ans. (c)

23. The structure which provides vascular connection between foetus and uterus is called as

- (a) Placenta (b) Fallopian tube
 (c) Trophoblast (d) Endometrium

Ans. (a)

24. The ratio of dihybrid cross is

- (a) 3:1 (b) 9:3:3:1
 (c) 9:7 (d) 12:3:1

Ans. (b)

25. The toxin protein produced by B-thuringiensis is

- (a) Lysin (b) Ligase
 (c) Cry protein (d) Histamin

Ans. (c)

26. Who proposed the 'Theory of Natural Selection'?

- (a) Charles Darwin (b) Malthus
 (c) Lamarck (d) None of them

Ans. (a)

27. Which of the following is the cause of skin cancer and high mutation rate?

- (a) CO₂ pollution (b) CO pollution
 (c) Acid rain (d) Ozone depletion

Ans. (d)

28. An enzyme catalyzing the removal of nucleotides from the ends of DNA is
- (a) Endonuclease (b) Exonuclease
(c) DNA ligase (d) Helicase
- Ans. (b)

Group - B

(Very Short Answer Type Questions) 2x3=6

29. What is ozone hole?

Ans. ozone hole refers to thinning of stratospheric ozone layer from where harmful radiations from the sun can pass through it. It is called protective layer because it absorbs major part of harmful UV rays coming from the sun.

30. Name two infectious diseases.

Ans. (i) Influenza
(ii) Tuberculosis

31. What is co-dominance? Give one example.

Ans. When two alleles for a trait are equally expressed with neither being recessive or dominant, it creates co-dominance.

Example- person with AB blood, which means that both A and B allele are equally expressed.

Group - C

(Short Answer Type Questions) 3x3=9

32. Write the differences between spermatogenesis and oogenesis.

Ans. Spermatogenesis	Oogenesis
(a) It takes place in the seminiferous tubules of the testis by repeated division of spermatogonia in males.	It takes place in the graafian follicles of the ovary by repeated division of oocytes in the females.
(b) It occurs in four stages- spermatocytogenesis, meiosis-I, Meiosis II spermiogenesis	It occurs in three stages cytogenesis, meiosis I and meiosis II
(c) Primary spermatocyte gives rise to four spermatozoa and three polar bodies	Primary oocyte give rise to one ovum and three polar bodies
(d) They are motile and without food reserves	Ova are non-motile and generally full of food reserve.

33. What is genetic engineering? How is it beneficial?

Ans. Techniques to alter the chemistry of genetic material to introduce these into host organisms and thus change in phenotype of the host organs, is called genetic engineering.

Benefits:-

- (i) Genetic engineering has potential to cure genetic diseases through gene therapy.
- (ii) Faster growing plant and animals.
- (iii) More nutritious food.

34. What is amniocentesis? Write the use of amniocentesis.
- Ans. Amniocentesis is a procedure in which amniotic fluid is removed from the uterus for treatment to find particular illness.

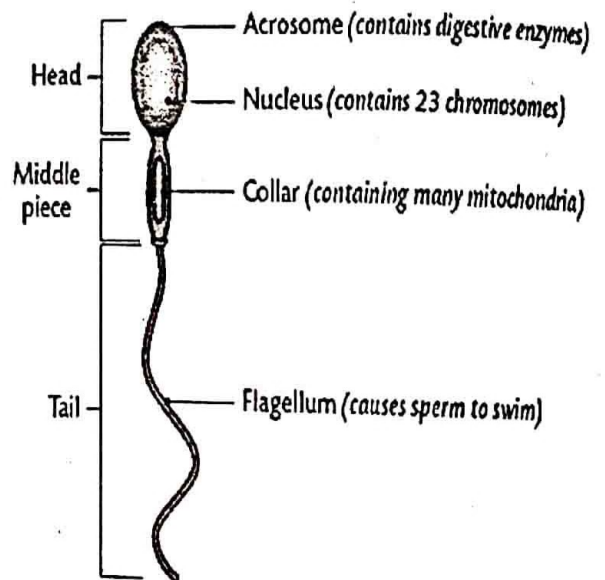
It is used for diagnosis of chromosomal abnormalities, foetal infection as well as for sex determination.

Group - D

(Long Answer Type Questions) 5x2=10

35. With the help of a diagram describe the structure of human sperm.

Ans.



Sperm is a microscopic, motile structure composed of head, neck, a middle piece and a tail. The sperm head contains an elongated haploid nucleus and the anterior portion is covered by cap-like structure Acrosome. Middle piece contains numerous mitochondria Tail helps the sperm to swim to reach the egg cell. Seminal plasma along with sperm constitutes the semen.

OR

- What is population? List any three characteristics of population.
- Ans. All the organisms of same group or species which live in a particular geographical area.

Characteristics

(i) **Population Size** :- is the number of individual in a population at a given time. Population size varies from one habitat to another. The size of plant population can also change during the year. The availability of resources such as water, increase plant growth.

(ii) **Population density** :- is a measure of the number of individual in a certain space at a particular time. It is related to population size. If population size increases and all the individuals remain in the same area, then population density increases too.

(iii) **Age structure**:- In most of the population individuals are of different age. The proportion of individuals in each age group is called age structure of that population. The ratio of the various age groups determines the reproductive status of the population. There are three major ecological ages in any population these are, pre-reproductive, reproductive and post reproductive.

36. Write in detail the process of semiconservative replication of DNA.

Ans. Replication means making copy of the parent DNA molecule which is semi conservative process in which each of the two daughter molecules is having one old and other new strand of DNA. The process requires a number of enzymes prominently the DNA dependent DNA polymerase. The DNA polymerase cannot initiate by their own process of replication. The process initiates at a definite region in E.coli, called Origin of replication.

For long DNA molecule, since the two strands of DNA cannot be separated in its entire length due to very high energy requirement, the replication occurs with a small opening of the DNA helix called as replication fork. The DNA dependent DNA polymerases catalyzed polymerization only in one direction i.e., 5'-3'.

Consequently at the replication fork on one strand where the template is with 3'-5' polarity, the replication is continuous. The discontinuously synthesized fragments are later joined by the enzyme DNA ligase.

OR

Match Column A with Column B:

1x5

Column-A	Column-B
(a) Yeast	(i) Plasmid
(b) Use and disuse of organs	(ii) Nitrogen fixation
(c) Vector	(iii) Budding
(d) Light	(iv) Lamarck
(e) Azotobacter	(v) Abiotic of factors

Ans. Column A

Column B

(a) → (iii)

(b) → (iv)

(c) → (i)

(d) → (v)

(e) → (ii)