

BIOLOGY

1. In 'Lac Operon' concept, the structural genes (z, y and a) will code for the following enzymes respectively:

(A) β -galactosidase; lipase; transacetylase
 (B) β -galactosidase; carboxylase; transacetylase
 (C) β -galactosidase; permease; transacetylase
 (D) β -galactosidase; permease; acetylase

Answer (C)

Sol. lac Z $\rightarrow$ β galactosidase

lac y $\rightarrow$ Permease

lac a $\rightarrow$ transacetylase

2. Thorns of *Bougainvillea* and tendrils of *Cucurbita* represent which type of examples?

(A) Homologous organs
 (B) Analogous organs
 (C) Vestigial organs
 (D) None of these

Answer (A)

Sol. Thorns of *Bougainvillea* = Stem Modification

Function = Protection

Tendrils of *Cucurbita* = Stem Modification

Function = support

In both structure same } Homologous organ
 Function different }

3. In β globin chain of haemoglobin of an individual, if the six amino acid composition Glutamic acid (Glu) is replaced by Valine (Val), then the individual will be suffering from:

(A) Albinism
 (B) Haemophilia
 (C) Sickle-cell anaemia
 (D) Phenylketonuria

Answer (C)

Sol. Sickle cell Anaemia is caused by mutation of the gene controlling β -chain of haemoglobin due to which sixth amino acid composition Glutamic acid is replaced by valine.

4. First transgenic cow 'Rosie' produced which type of human-protein enriched milk?

(A) Casein (B) Alpha-lactalbumin
 (C) Pacasein (D) Albumin

Answer (B)

Sol. The transgenic cow Rosie developed in 1997 secreted human protein alpha-lactalbumin enriched milk.

5. Which of the following interspecific interaction is represented by (+, 0)?

(A) Mutualism (B) Commensalism
 (C) Amensalism (D) Competition

Answer (B)

Sol. Commensalism (+, 0)

Mutualism (+, +)

Amensalism (–, 0)

Competition (–, –)

6. In relative contribution of various greenhouse gases to total global warming which gas is having 14% contribution?

(A) N_2O (B) CFC
 (C) Methane (D) CO_2

Answer (B)

Sol. N_2O – 6% CFC – 14%

Methane – 20% CO_2 – 60%

7. Match the column I with column II and write the correct option.

Column-I	Column-II
(i) Cellular barrier	(p) Saliva in the mouth
(ii) Physiological barrier	(q) Interferons
(iii) Cytokine barrier	(r) Natural killer (type of lymphocyte)
(iv) Physical barrier	(s) Mucus coating of the respiratory tract

(A) (i – r), (ii – q), (iii – s), (iv – p)

(B) (i – r), (ii – p), (iii – q), (iv – s)

(C) (i – p), (ii – s), (iii – r), (iv – q)

(D) (i – p), (ii – q), (iii – s), (iv – r)

Answer (B)

Sol. Skin and mucus coating of the respiratory tract are physical barriers of innate immunity.

8. Identify the palindromic sequence from the following:

(A) 5'- GAATTC - 3' (B) 5' - GAATTC - 3;
3' - CTTAAG - 5' 3' - CUUAAG - 5'
(C) 5' - TCATCA - 3' (D) 5'- TACCAT - 3'
3' - AGTAGT - 5' 3' - ATGGTA - 5'

Answer (A)

Sol. 5'- GAATTC - 3'

3' - CTTAAG - 5'

This is a palindromic sequence recognised by *EcoRI*.

9. What will be the percentage of affected son, whose father is colour-blind and mother is normal?

(A) 0%
(B) 50%
(C) 25%
(D) 100%

Answer (A)

Sol. $X^cY - XX$

↓

$X^cY \rightarrow 0\%$

	X^c	Y
X	X^cX	XY
X	X^cX	XY

10. Which part of the fallopian tube is close to ovary?

(A) Infundibulum (B) Isthmus
(C) Ampulla (D) Fimbriae

Answer (A)

Sol. Fimbriae are projections on the edge of infundibulum part of fallopian tube.

11. Which of the following match pair is the correct one?

(A) *Hydra*: Pseudopodiospores
(B) *Amoeba*: Gemmules
(C) Sponges: Zoospores
(D) *Penicillium*: Conidia

Answer (D)

Sol. *Hydra* = Budding

Amoeba = Binary fission

Sponges = Gemmule formation

Penicillium = Conidia

12. Isogametes are found in:

(A) *Fucus*
(B) Homo-sapiens
(C) *Cladophora*
(D) None of the above

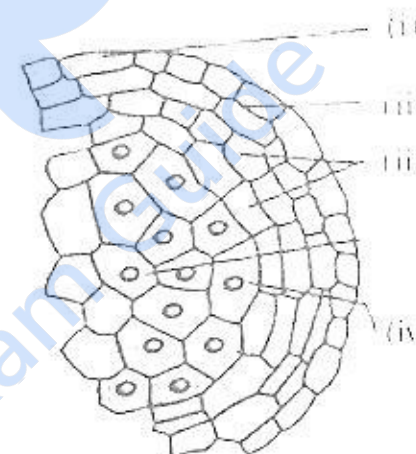
Answer (C)

Sol. *Fucus* → Heterogametes

Homo-sapiens → Heterogametes

Cladophora = Isogametes

13. Which of the following is the correct option for the figure given below?



(A) (i) Epidermis (ii) Endothecium
(iii) Middle layer (iv) Tapetum
(B) (i) Epidermis (ii) Middle layer
(iii) Endothecium (iv) Tapetum
(C) (i) Tapetum (ii) Middle layer
(iii) Endothecium (iv) Epidermis
(D) (i) Epidermis (ii) Tapetum
(iii) Middle layer (iv) Endothecium

Answer (A)

Sol. The given figure is of enlarged view of one microsporangium. Labelled parts are:

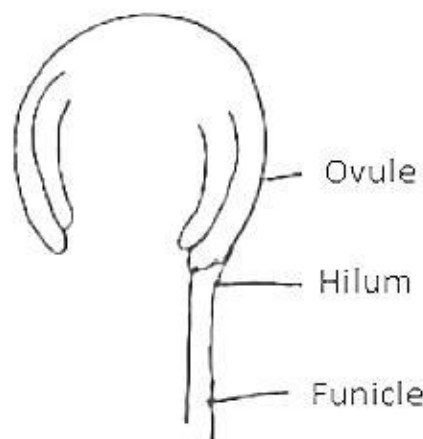
(i) Epidermis
(ii) Endothecium
(iii) Middle layer
(iv) Tapetum

14.is the region on which, the ovule is connected to funicle.

- (A) Chalaza
- (B) Hilum
- (C) Micropylar region
- (D) Nucellus

Answer (B)

Sol. Hilum is the junction between funicle and body of ovule.



15. Statement – 'X': Apomixis is seen in few flowering plant such as some species of Asteraceae and grasses.

Statement - 'Y': Apomixis is a form of asexual reproduction that mimics sexual reproduction.

Statement – 'Z': In some species of apomictic seeds, the diploid egg cell is formed without reduction division.

Choose the correct option:

- (A) 'X' & 'Y' are correct and 'Z' is incorrect.
- (B) 'X' is correct and 'Y' & 'Z' are incorrect.
- (C) 'X' is incorrect and 'Y' & 'Z' are correct
- (D) All the above X, Y and Z statements are correct

Answer (D)

Sol. All statements X, Y and Z are correct.

16. Which of the following pathway is correct for the transport of spermatozoa?

- (A) From seminiferous tubules to → rete testis → vasa efferentia → Epididymis.
- (B) From seminiferous tubules to → vas deferens → vasa efferentia → rete testis

(C) From seminiferous tubules to → vasa efferentia → rete testis → vas deferens

(D) From seminiferous tubules to → rete testis → vas deferens → vasa efferentia

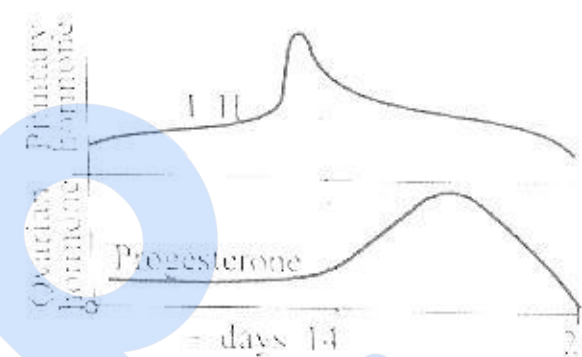
Answer (A)

Sol. The correct route is:

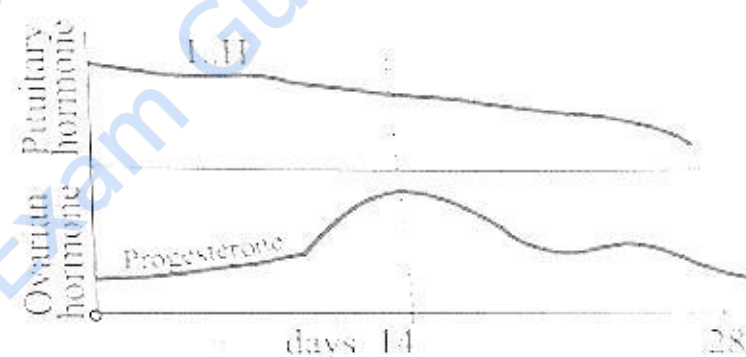
Seminiferous tubules → rete testis → vasa efferentia → epididymis → vasa deferens.

17. Which is the correct graphical representation option of the pituitary hormone and ovarian hormone in menstrual cycle?

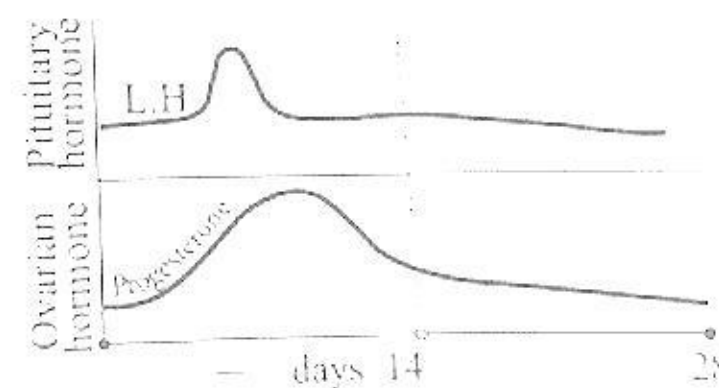
(A)



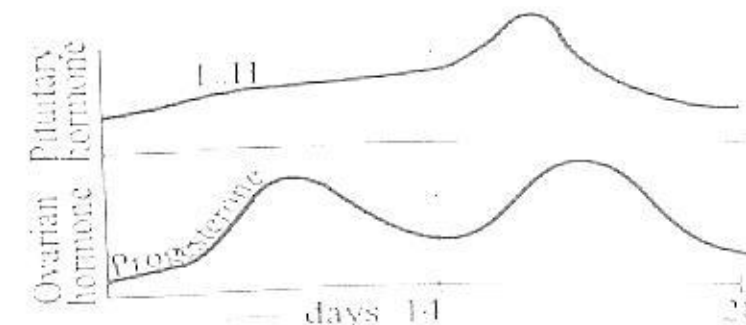
(B)



(C)



(D)



Answer (A)

Sol. Pituitary hormone LH peaks during middle of menstrual cycle. Progesterone secretion declines towards end of luteal phase.

18. Foetus develop its limbs and digits in.....during embryonic development.

- (A) Four weeks
- (B) Eight weeks
- (C) Twelve weeks
- (D) Two weeks

Answer (B)

Sol. By the end of second month of pregnancy, the foetus develops limbs and digits.

19. Multiload 375 istype of IUDs.

- (A) Non-medicated
- (B) Hormone releasing
- (C) Cu releasing
- (D) Mg releasing

Answer (C)

Sol. Multiload 375 and Cu7 are copper releasing medicated IUDs.

20.is natural category of contraceptive method:

- (A) Sterilisation
- (B) Coitus interruptus
- (C) Consuming pills
- (D) Using Condoms

Answer (B)

Sol. Sterilisation, consuming pills and using condoms are artificial methods of contraception.

21. Yellowish fluid 'colostrum' secreted by mother during the initial days of lactation, is an example of:

- (A) Passive immunity
- (B) Auto immunity
- (C) Active immunity
- (D) Cell-mediated immunity

Answer (A)

Sol. Colostrum is rich in IgA and provides natural immunity to newly born.

22. Match the following:

Column-I**Column-II**

- | | |
|--------------------------------|-------------------------------|
| (i) <i>Papaver somniferum</i> | (p) Marijuana |
| (ii) <i>Cannabis sativa</i> | (q) Cocaine |
| (iii) <i>Erythroxylum coca</i> | (r) Hallucinogenic properties |
| (iv) <i>Datura</i> | (s) Opioids |

Choose the right option showing the correct match

- (A) (i – s), (ii – p), (iii – q), (iv – r)
- (B) (i – q), (ii – r), (iii – s), (iv – p)
- (C) (i – p), (ii – q), (iii – r), (iv – s)
- (D) (i – r), (ii – s), (iii – p), (iv – q)

Answer (A)

Sol. *Papaver somniferum* is the poppy plant and source of opiate narcotics.

- (ii) *Cannabis sativa*
- (iii) *Erythroxylum coca*

23. A person is suffering from chronic inflammation of lymphatic vessels of lower limbs and gross deformities of genital organs. Identify the disease, the person is suffering from:

- (A) Amoebiasis
- (B) Ascariasis
- (C) Filariasis
- (D) Malaria

Answer (C)

Sol. Infection by *Wuchereria bancrofti* causes blockage in lymphatic circulation leading to filariasis.

24. Pusa Swarnim is ☒ type of plant variety which is resistance to ☐ disease.

- | | |
|---|---|
| (A) ☒ - Wheat | ☐ - Black rot |
| (B) ☒ - Brassica | ☐ - White rust |
| (C) ☒ - Cauliflower | ☐ - Leaf curl |
| (D) ☒ - Cowpea | ☐ - Bacterial blight |

Answer (B)

Sol. Pusa Swarnim is *Brassica* type of plant variety bred by hybridisation and selection for disease resistance to white rust.

25. Choose the correct option for X, Y and Z.

Crop	Variety	Insect Pests
(i) Rape seed Mustard	Pusa Gaurav	<u>Z</u>
(ii) <u>X</u>	Pusa Sem 2	Jassids
(iii) Okra	<u>Y</u>	Shoot borer

- (A) X- flat bean Y –Pusa A-4 Z-Aphids
 (B) X-*Brassica* Y-Pusa A-4 Z-Shoot borer
 (C) X-flat bean Y-Pusa Sem 3 Z-Fruit borer
 (D) X-*Brassica* Y-Pusa Sawani Z-Fruit borer

Answer (A)

Sol. X → Flat bean, Y → Pusa A-4, Z → Aphids.

26. Which of the following is used as immunosuppressive agent in organ transplant patients?

- (A) Statins (B) Streptokinase
 (C) Cyclosporin A (D) Lipase

Answer (C)

Sol. Cyclosporin – A produced by *Trichoderma polysporum* and used as Immunosuppressive agent in organ – transplant patients.

27. Choose the correct option for the statements for Mycorrhiza:

- (i) It absorbs phosphorus from soli.
 (ii) It forms root nodules with the association of Rhizobium
 (iii) They are resistance to root-borne pathogens, tolerance to salinity & drought.
 (iv) They fix atmospheric nitrogen.
 (A) (i) and (ii) (B) (i) and (iii)
 (C) (i), (ii) and (iii) (D) (ii) and (iv)

Answer (B)

Sol. Mycorrhiza absorbs phosphorus from soil and provide resistance to root-borne pathogens, tolerance to salinity & drought.

Statements (ii) and (iv) are correct for *Rhizobium*.

28. In recombinant DNA technology, which dye is used to stain the separated DNA fragments which can be visualised by exposure to UV radiation.

- (A) Ethidium bromide (B) Safranin
 (C) Leishman's stain (D) Acetocarmine

Answer (A)

Sol. Ethidium bromide is an intercalating agent that stains DNA and RNA.

29. '*Meloidogyne incognita*' infects the root of which plant and causes a great reduction in yield

- (A) Tomato
 (B) Corn
 (C) Cotton
 (D) Tobacco

Answer (D)

Sol. *Meloidogyne incognita* is a nematode.

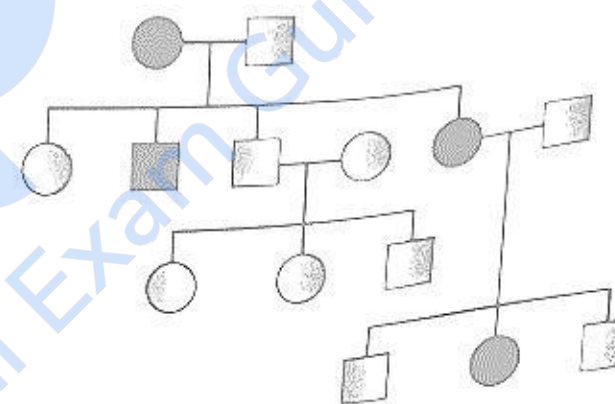
30. Which of the following statement is incorrect for 'Genetically Modified plants'?

- (A) Increase the reliance on chemical pesticides
 (B) Enhanced nutritional value of good
 (C) Increase efficiency of mineral uses by plants
 (D) Made crops more tolerant to abiotic stresses (cold, drought, salt, heat)

Answer (A)

Sol. GM crops exhibit reduced reliance on pesticides.

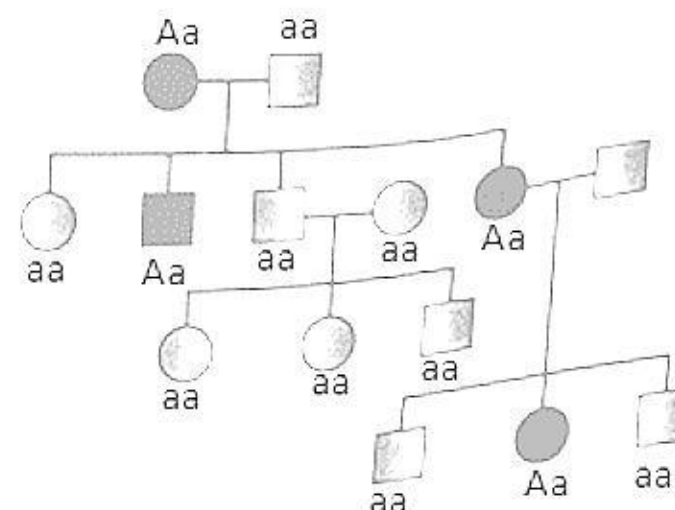
31. Choose the correct option for the pedigree analysis given below:



- (A) Autosomal dominant pedigree
 (B) Autosomal recessive pedigree
 (C) 'X'- linked dominant pedigree
 (D) 'X'- linked recessive pedigree

Answer (A)

Sol.



32. In 'Mendel' dihybrid cross, which of the following result was obtained in F_2 generation?

- (A) 9 : 3 : 3 : 1 → genotype
 (B) 1 : 1 : 1 : 1 → genotype
 (C) 9 : 3 : 3 : 1 → phenotype
 (D) 1 : 1 : 1 : 1 → phenotype

Answer (C)

Sol. YYRR x yyrr

$$\begin{array}{c} \downarrow \\ F_1 \quad YyRr \\ F_2 \quad YR : Yr : yR : yr \\ \quad 9 : 3 : 3 : 1 \end{array}$$

In mendel dihybrid cross, following result was obtained in F_2 generfation.

$$\begin{array}{l} 9 : 3 : 3 : 1 \rightarrow \text{Phenotype} \\ 1 : 2 : 1 : 2 : 4 : 2 : 1 : 2 : 1 \rightarrow \text{Genotype} \end{array}$$

33. Which kind of inheritance is show by human blood group?

- (i) Incomplete dominance
 (ii) Co-dominance
 (iii) Multiple allele
 (iv) Pleiotropy
 (A) (i) and (ii) (B) (ii) and (iv)
 (C) (ii) and (iii) (D) (iii) and (iv)

Answer (C)

Sol. Human blood group shows the inheritance of co-dominance as well as Multiple allelism

34. 'Central dogma' was proposed by [X] and these are the processes [Y], [Z] comes in it respectively. Choose the correct option.

- (A) [X] - Watson & Crick [Y] - transformation
 [Z] - replication
 (B) [X] - Francis Crick [Y] - transcription
 [Z] - translation
 (C) [X] - Frederick Griffith [Y] - transformation
 [Z] - transcription
 (D) [X] - Hershey & Chase [Y] - replication
 [Z] - translation

Answer (B)

Sol. Central dogma is proposed by Francis Crick.



35. Which was having lowest brain capacity during human evolution?

- (A) Neanderthal man
 (B) *Homo sapiens*
 (C) *Homo habilis*
 (D) *Homo erectus*

Answer (C)

Sol. *Homo habilis* had cranial capacity of 650-800 c.c.

36. Through 'electrostatic precipitator' which of the following matter is removed?

- (A) Particulate
 (B) Gaseous
 (C) Liquids
 (D) None of the above

Answer (A)

Sol. 99% of Particulate matters are removed by 'Electrostatic Precipitator'.

37. Which of the following is called the 'Terror of Bengal'?

- (A) Carrot grass
 (B) Bloom-forming algae
 (C) Lantana
 (D) Water hyacinth

Answer (D)

Sol. Water hyacinth was introduced in Bengal because of its beautiful flowers and shape of leaves. Fast growth of water hyacinth (*Eichhornia*) causes death of fishes and food Scarcity that's why it is called 'Terror of Bengal'.

38. The largely tropical Amazonian rain forest in South America hasnumbers of bird species.

- (A) 3000 (B) 427
 (C) 1300 (D) 378

Answer (C)

Sol. 1300 – Birds
 3000 – fishes
 427 - Mammals
 378 - reptiles

39. Bacterial and fungal enzymes degrade detritus into simpler inorganic substances. This process is called as.....

- (A) Catabolism
- (B) Mineralisation
- (C) Humification
- (D) Fragmentation

Answer (A)

Sol. Bacterial and fungi secrete digestive enzyme over the detritus. The enzyme changes complex organic compounds into simple inorganic substances. This process is called as catabolism.

40. Verhulst - Pearl Logistic Growth is described by the following equation:

- (A) $\frac{dN}{dt} = rN$
- (B) $\frac{dN}{dt} = rN \left(\frac{K - N}{K} \right)$
- (C) $\frac{dt}{dN} = rN \left(\frac{K}{K - N} \right)$
- (D) $\frac{dN}{dt} = rN \left(\frac{K + N}{K} \right)$

Answer (B)

Sol. Verhulst - Pearl Logistic Growth is described by equation: $\frac{dN}{dt} = rN \left(\frac{K - N}{K} \right)$.

