2. The foetal ejection reflex in human triggers the release of _____ hormone from _____.

Fill in the blanks by choosing right option.

(A) oxytocin, foetal pituitary

(B) oxytocin, maternal pituitary

(C) human chorionic gonadotropin, placenta

(D) progesterone, corpus luteum

3. A DNA molecule is 160 base pairs long. It has 30% Guanine. How many Adenine bases are present in this DNA molecule ?

(A) 48

(B) 64

(C) 96

(D) 192

4. In *Pisum sativum*, the flower colour may be violet (V) or white (v). What proportion of the offspring in a cross of 'VV' × 'vv' would be expected to be violet ?

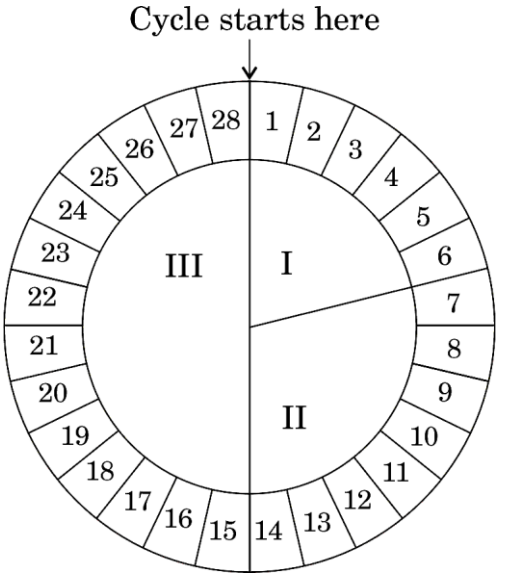
(A) 25%

(B) 50%

(C) 75%

(D) 100%

5. In a human female, menstrual cycle of 28 days is represented by the diagram given below.



Select the correct statement related with this diagram.

(A) Primary follicle of ovary matures into Graafian follicle in phase II.

(B) The hormone secreted in large amounts in phase III is also responsible for maintaining pregnancy in human females.

(C) Corpus luteum secretes progesterone in phase I, however it degenerates completely in phase III.

(D) Both (A) and (B).

6. Arrange the following in the correct sequence of their evolution and select the correct option :

(i) Seaweed

(ii) Invertebrates

(iii) Jawless fish

Options :

(A) (i), (ii), (iii)

(B) (i), (iii), (ii)

(C) (ii), (iii), (i)

(D) (ii), (i), (iii)

7. *Monascus purpureus* is a yeast used commercially in the production of which one of the following ?

(A) Ethanol
(B) Streptokinase
(C) Citric acid
(D) Statins

8. Given below is the restriction site of a restriction endonuclease Pst I and the cleavage sites on a DNA molecule.

5′ C — T – G – C – A ↓ G 3′

3′ G — A – C – G – T — C 5′ ↑

Choose the option that gives the correct resultant fragments.

(A) 5′ C – T – G C – A – G 3′
3′ G – A – C – G – T C 5′

(B) 5′ C – T G – C – A – G 3′
3′ G – A – C – G T – C 5′

(C) 5′ C – T – G – C A – G 3′
3′ G – A – C – G T – C 5′

(D) 5′ C – T – G – C – A G 3′
3′ G A – C – G – T – C 5′

9. Choose a correct option that shows an interaction in which one species benefits while the other is neither harmed nor benefitted.

(A) Mycorrhizal associations between fungi and roots of higher plants
(B) Sea anemone and clownfish
(C) Abingdon tortoises and goats in the Galapagos Island
(D) Cuscuta on hedge plants

10. Transgenic animals have their genetic material manipulated. Select the correct option in reference to transgenic animals.

(A) Foreign DNA and RNA are present in their cells.
(B) Foreign RNA is present in all of their cells.
(C) Foreign DNA is present in all of its cells.
(D) Foreign RNA is present in some of its cells.

11. Select the odd option in the context of convergent evolution.

(A) Eyes of Octopus and Mammals

(B) Flippers of Penguins and Dolphins

(C) Flying Squirrel and Flying Phalanger

(D) Thorns of Bougainvillea and Tendrils of Cucurbita

12. Which of the following fish led to the extinction of an ecologically unique assemblage of more than 200 species of cichlid fish in Lake Victoria of East Africa ?

(A) Catla Catla

(B) Dogfish

(C) Nile Perch

(D) African Catfish

*For Questions number **13** to **16**, two statements are given – one labelled as Assertion (A) and the other labelled as Reason (R). Select the correct answer to these questions from the codes (A), (B), (C) and (D) as given below.*

(A) Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of the Assertion (A).

(B) Both Assertion (A) and Reason (R) are true, but Reason (R) is ***not*** the correct explanation of the Assertion (A).

(C) Assertion (A) is true, but Reason (R) is false.

(D) Assertion (A) is false, but Reason (R) is true.

13. *Assertion (A) :* The embryo with 8 to 16 blastomeres is called a morula.

Reason (R) : The morula continues to divide and transform into trophoblast.

14. *Assertion (A) :* Repetitive sequences make up a very large portion of human genome.

Reason (R) : Repetitive sequences do not have direct coding functions in the genome.

15. *Assertion (A) :* Trichoderma species are free living fungi that are very common in the root ecosystems.

Reason (R) : They are effective bio-control agents of several plant pathogens.

16. *Assertion (A) :* The use of chitinase enzyme is necessary for the separation of DNA from yeast cells but not in the case of Spirogyra.

Reason (R) : Fungal cell wall is made up of fungal chitin.

SECTION B

17. (a) Mention the functions of each of the following : *2*

(i) Tassels of Corn Cob

(ii) Scutellum

OR

(b) Farmers prefer apomictic seeds over hybrid seeds. Give any two reasons. *2*

18. Define the term 'amniocentesis'. Why has the government imposed a statutory ban in spite of its importance in the medical field ? *2*

19. Name the lymphoid organ that acts as a large reservoir of erythrocytes. Explain its role as a lymphoid organ. *2*

20. (a) Suggest how a virus-free healthy plant can be obtained from a diseased sugarcane plant. *2*

OR

(b) In order to force bacteria to take up the recombinant DNA, they must be made competent. Explain how it can be achieved. *2*

21. (a) Differentiate between grazing food chain and detritus food chain. *2*

OR

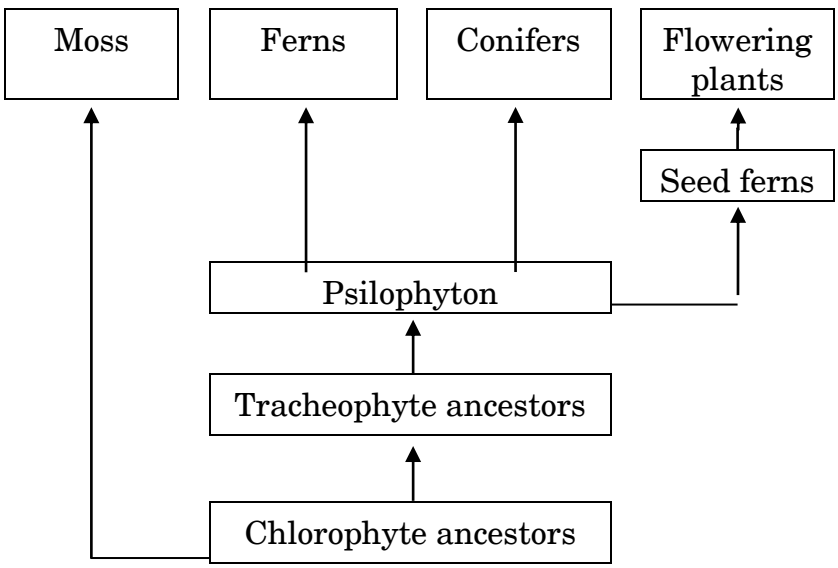
(b) Ecological pyramids are widely accepted but they still have some limitations. Write any two limitations. *2*

SECTION C

22. List any three outbreeding devices that flowering plants have developed for cross-pollination and explain how they help to encourage cross-pollination. *3*

23. Draw a labelled diagram of a 'replicating fork' showing the polarity. Why does DNA replication occur within such 'fork' ? *3*

24. Study the given chart showing evolution of plants. Answer the following questions : *3*



(a) Identify the plant which acts as an immediate ancestor of both ferns and conifers.

(b) Name the nearest ancestors of flowering plants.

(c) Name the most primitive group of plants.

(d) Psilophyton provides common ancestry to which classes ?

(e) Name the common ancestor of psilophyton and seed ferns.

(f) Name the common ancestor of mosses and tracheophytes.

25. Mention a product of human welfare obtained with the help of each one of the following : *3*

(a) *Saccharomyces cerevisiae*

(b) *Propionibacterium shermanni*

(c) *Aspergillus niger*

(d) *Trichoderma polysporum*

(e) *Acetobacter aceti*

(f) *Streptococcus*

26. Transgenic animals are produced by man. Explain any three ways in which such animals can be beneficial to humans. *3*

27. Explain Gause's 'Competitive Exclusion Principle' with the help of a suitable example. *3*

28. Explain the level of biodiversity at genetic, species and ecological levels with the help of one example each. *3*

SECTION D

Questions No. ***29*** *and* ***30*** *are Case-Based questions. Each question has* ***3*** *sub-questions with internal choice in one sub-question.*

29. Read the following passage and answer the questions that follow : *4*

The process of copying genetic information from template strand of DNA into RNA is called transcription. It is mediated by RNA polymerase. Transcription takes place in the nucleus of eukaryotic cells. In transcription, only a segment of DNA and only one of the strands is copied into RNA.

(a) Why is the strand of DNA with 3′ $\longrightarrow$ 5′ polarity transcribed and not the other strand of 5′ $\longrightarrow$ 3′ polarity ? *1*

(b) (i) Why is hnRNA required to undergo splicing ? *1*

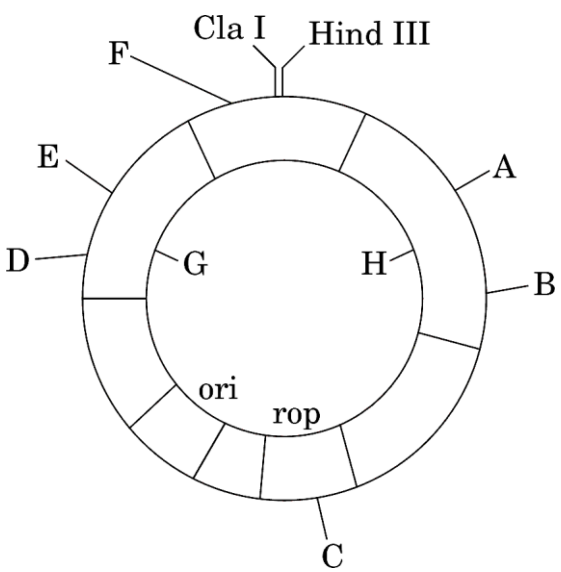
OR

(b) (ii) Mention the two additional processes which hnRNA needs to undergo after splicing to become functional. *1*

(c) Why is only one strand of the DNA transcribed ? Give two reasons. *1+1=2*

30. Read the following passage and answer the questions that follow : *4*

We know that plasmids and bacteriophages are the most commonly used vectors in biotechnology experiments. If we can link an alien piece of DNA to the plasmid DNA, the alien DNA can be multiplied equal to the copy number of the plasmid. Engineered vectors are used these days. Study the diagram of the *E. coli* cloning vector pBR322 and answer the questions that follow :



(a) Why are plasmids and bacteriophages used as cloning vectors ? *1*

(b) (i) Identify : $\frac{1}{2}+\frac{1}{2}=1$

(I) The gene in the cloning vector that controls the copy number of the vector.

(II) The restriction site – C in the 'rop' gene.

OR

(b) (ii) Identify and name two selectable markers shown in the diagram. *1*

(c) Name the two restriction sites each in the two genes you have identified as selectable markers. *2*

SECTION E

31. (a) Briefly explain the events of fertilisation and implantation in an adult human female. *5*

OR

(b) (i) Arrange the following hormones in sequence of their secretion in a pregnant woman :

hCG; LH; FSH; Relaxin.

(ii) Mention the source and the functions of the above mentioned hormones. *1+4=5*

32. (a) Work out separate monohybrid crosses up to F_2 generation between two pea plants and two *Antirrhinum* plants, both having contrasting traits with respect to the colour of the flower. Comment on the patterns of inheritance in the crosses carried out in such two cases. *5*

OR

(b) Answer the following questions : *2+3=5*

(i) How does a chromosomal disorder differ from a Mendelian disorder ? Write one example for each.

(ii) Name the phenomenon that leads to situations like 'XO' abnormality in humans. Also name this genetic disorder. How are individuals with an XO chromosomal abnormality affected ? Write its symptoms as well as karyotype.

33. (a) (i) Draw the structure of an antibody molecule and label any four of its parts.

(ii) Differentiate between active and passive immunity. Write any three differences. *2+3=5*

OR

(b) (i) (I) Write the scientific names of the two species of filarial worms causing filariasis.

(II) How do they affect the body of infected persons ?

(III) How does the disease spread ?

(ii) Mention the source and the role of the following in providing defence against infection in the human body :

(I) Histamine

(II) Interferons *1+1+1+2=5*