

Series : Y7XWZ



SET~2

रोल नं.
Roll No.



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नोट

- (I) कृपया जाँच कर लें कि इस प्रश्न-पत्र में मुद्रित पृष्ठ 27 हैं।
- (II) प्रश्न-पत्र में दाहिने हाथ की ओर दिए गए प्रश्न-पत्र कोड को परीक्षार्थी उत्तर-पुस्तिका के मुख-पृष्ठ पर लिखें।
- (III) कृपया जाँच कर लें कि इस प्रश्न-पत्र में 33 प्रश्न हैं।
- (IV) कृपया प्रश्न का उत्तर लिखना शुरू करने से पहले, उत्तर-पुस्तिका में यथा स्थान पर प्रश्न का क्रमांक अवश्य लिखें।
- (V) इस प्रश्न-पत्र को पढ़ने के लिए 15 मिनट का समय दिया गया है। प्रश्न-पत्र का वितरण पूर्वाह्न में 10.15 बजे किया जाएगा। 10.15 बजे से 10.30 बजे तक परीक्षार्थी केवल प्रश्न-पत्र को पढ़ेंगे और इस अवधि के दौरान वे उत्तर-पुस्तिका पर कोई उत्तर नहीं लिखेंगे।

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प्रश्न-पत्र कोड
Q.P. Code 57/7/2

परीक्षार्थी प्रश्न-पत्र कोड को उत्तर-पुस्तिका के मुख-पृष्ठ पर अवश्य लिखें।

Candidates must write the Q.P. Code on the title page of the answer-book.

NOTE

- (I) Please check that this question paper contains 27 printed pages.
- (II) Q.P. Code given on the right hand side of the question paper should be written on the title page of the answer-book by the candidate.
- (III) Please check that this question paper contains 33 questions.
- (IV) Please write down the Serial Number of the question in the answer-book at the given place before attempting it.
- (V) 15 minute time has been allotted to read this question paper. The question paper will be distributed at 10.15 a.m. From 10.15 a.m. to 10.30 a.m., the candidates will read the question paper only and will not write any answer on the answer-book during this period.



जीव विज्ञान (सैद्धान्तिक)
BIOLOGY (Theory)



निर्धारित समय : 3 घण्टे

Time allowed : 3 hours

अधिकतम अंक : 70

Maximum Marks : 70



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General Instructions :

Read the following instructions carefully and follow them :

- (i) *This question paper contains **33** questions. **All** questions are **compulsory**.*
- (ii) *Question paper is divided into **five** sections – Sections **A, B, C, D** and **E**.*
- (iii) ***Section A** – questions number **1** to **16** are multiple choice type questions. Each question carries **1** mark.*
- (iv) ***Section B** – questions number **17** to **21** are very short answer type questions. Each question carries **2** marks.*
- (v) ***Section C** – questions number **22** to **28** are short answer type questions. Each question carries **3** marks.*
- (vi) ***Section D** – questions number **29** and **30** are case-based questions. Each question carries **4** marks. Each question has subparts with internal choice in one of the subparts.*
- (vii) ***Section E** – questions number **31** to **33** are long answer type questions. Each question carries **5** marks.*
- (viii) *There is no overall choice. However, an internal choice has been provided in Sections **B, D** and **E** of the question paper. A candidate has to write answer for only **one** of the alternatives in such questions.*
- (ix) *Kindly note that there is a separate question paper for Visually Impaired candidates.*
- (x) *Wherever necessary, neat and properly labelled diagrams should be drawn.*

SECTION A

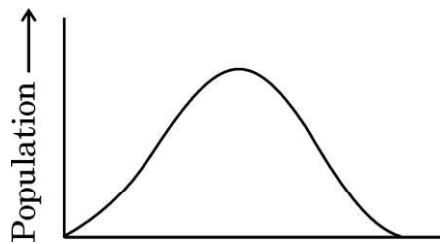
*Questions no. **1** to **16** are Multiple Choice Type Questions, carrying **1** mark each. Choose the best option.* **16**×**1**=**16**

1. pBR which is frequently used as a vector for cloning gene in *E. coli* is a/an :
- (A) Original bacterial plasmid
 - (B) Modified bacterial plasmid
 - (C) Viral genome
 - (D) Transposon

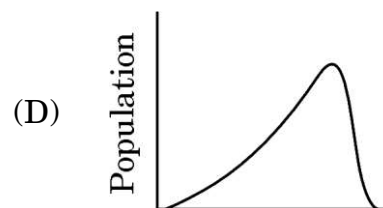
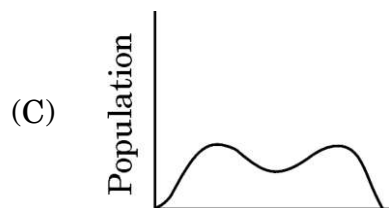
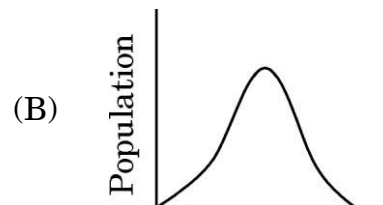
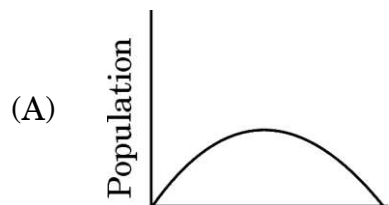


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2. The given graph shows the range of variation among population members, for a trait determined by multiple genes. If this population is subjected to disruptive selection for several generations, which of the following distributions is most likely to result ?



Choose the correct option :



3. Which one of the following immune system components does **not** correctly match with its respective role ?
- (A) Interferons – Secreted by virus-infected cells and protect non-infected cells from further viral infection.
 - (B) Macrophages – Mucus-secreting cells that trap microbes entering into the body.
 - (C) B-Lymphocytes – Produce antibodies in response to pathogens into blood to fight with them.
 - (D) IgA – Present in colostrum in early days of lactation to protect infants from diseases.



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4. During the process of oogenesis in human female, the primary oocyte results in the formation of which of the following ?
Choose the correct option.
- (A) Unequal cells – a smaller haploid secondary oocyte and a larger diploid polar body
 - (B) Unequal cells – a larger haploid secondary oocyte and a smaller haploid polar body
 - (C) Unequal cells – a smaller diploid secondary oocyte and a larger haploid polar body
 - (D) Equal cells – a haploid secondary oocyte and a haploid polar body
5. A dwarf pea plant was treated with gibberellic acid and it becomes as tall as a tall pea plant. If these treated pea plants are crossed with pure tall pea plants, the phenotypic ratio in F_1 generation will be :
- (A) All tall
 - (B) 50% tall, 50% dwarf
 - (C) 75% tall, 25% dwarf
 - (D) 25% tall, 75% dwarf
6. Out of the following, select the correct match :
- (A) Transgenic cow milk – Human beta-lactalbumin protein
 - (B) ELISA – Antigen antibody interaction
 - (C) Corn Borer – Cry II Ab gene
 - (D) Cotton plant – *Meloidegyne Incognitia*
7. The following information is about drugs and tobacco. Select the correct statement from the options given below.
- (A) Cocaine is given to patients after surgery as it stimulates recovery.
 - (B) Chewing tobacco lowers blood pressure and heart rate.
 - (C) Barbiturates when given to criminals makes them tell the truth.
 - (D) Morphine is often given to persons who have undergone surgery as a painkiller.



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8. India has only 2.4% of the world's land area but its share of the global species diversity is :
- (A) 8.1%
- (B) 12.9%
- (C) 7.3%
- (D) 5.1%
9. Name the microbe that is used as biocontrol agent for controlling pest butterfly caterpillars :
- (A) *Streptococcus* spp.
- (B) *Trichoderma* spp.
- (C) *Bacillus thuringiensis*
- (D) *Saccharomyces cerevisiae*
10. Study the table given below showing the relationship between organism, its trophic level and kind of food chain it belongs to.

Organism	Trophic level	Food chain
Eagle	P	Grazing
Earthworm	Primary consumer	Q
Frog	R	Grazing

Select the option that correctly identifies P, Q and R in the table given below :

	P	Q	R
A	Top Carnivore	Detritus	Secondary Consumer
B	Top Carnivore	Detritus	Primary Consumer
C	Scavenger	Grazing	Secondary Consumer
D	Scavenger	Grazing	Producer



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11. What are minisatellites ?
- (A) 10 – 40 bp sized small sequences within the genes.
 - (B) Short coding repetitive sequences region on the eukaryotic genome.
 - (C) Short non-coding repetitive sequences forming a large portion of eukaryotic genome.
 - (D) Regions of coding strand of DNA.
12. Choose the option that correctly describes the gynoecium of *Michelia* :
- (A) Multicarpellary, Apocarpous
 - (B) Bicarpellary, Apocarpous
 - (C) Multicarpellary, Syncarpous
 - (D) Bicarpellary, Syncarpous

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)* : A piece of DNA inserted into an alien organism generally does not replicate, if not inserted into a chromosome.
- Reason (R)* : Chromosomes have specific sequences called 'ori' region, where DNA replication is initiated.



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14. *Assertion (A)* : Swiss cheese is characterized by large holes due to CO₂ production.

Reason (R) : It is ripened by growing a specific fungi.

15. *Assertion (A)* : Human male is referred to as heterogametic.

Reason (R) : The male produces millions of sperms of the same kind.

16. *Assertion (A)* : Replication of DNA takes place in S phase of the cell cycle.

Reason (R) : DNA replication and cell division cycle should be highly coordinated.

SECTION B

17. (a) Biotechnology has helped farmers to get pest-resistant cotton plants. Explain the technique adopted along with its mode of action. 2

OR

- (b) Explain any two molecular diagnostic techniques that help to detect pathogens from suspected patient. 2

18. (a) How does a human body respond when vaccine is introduced into it ? It is said that vaccinations are a must for a healthy society. Justify. 2

OR

- (b) Humans have innate immunity for protection against pathogens that may enter the gut along with food. What are the two barriers in our body that protect it from such pathogens ? 2



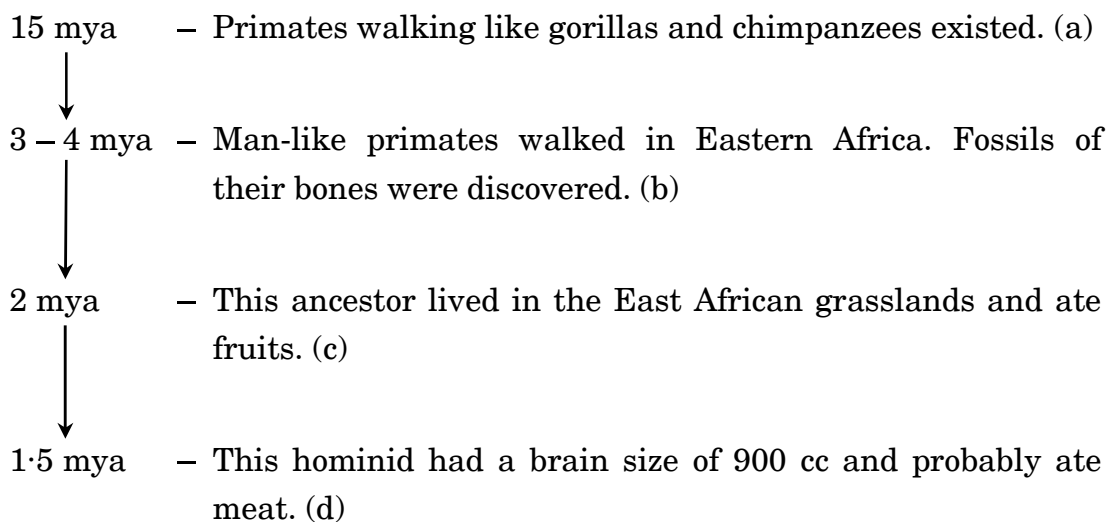
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19. (a) "A fully developed foetus initiates its delivery from the mother's womb." Explain. 2

OR

- (b) Give reasons for the following : 2
- (i) Why can a woman generally not conceive a child after 50 years of age ?
- (ii) Polar bodies are formed during oogenesis and not during spermatogenesis.

20. A few stages and their respective time period in the evolutionary history of human beings are mentioned in the flowchart given below :



Based on the above information, answer the following questions : 2

- (a) Name one primate about 15 mya.
- (b) Name one place where fossils of primates were discovered in Eastern Africa.
- (c) Name the ancestor that lived in the East African grasslands about 2 mya.
- (d) Name the hominid that was found around 1.5 mya.



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21. (a) Write the scientific name of the fruit fly.
(b) Why did Morgan prefer to work with fruit flies for his experiments ? State two reasons. 2

SECTION C

22. Name the type of food chains responsible for the flow of larger fraction of energy in an aquatic ecosystem and a terrestrial ecosystem, respectively. Mention any two differences between the two food chains. 3
23. Name the process involved in the production of nematode-resistant tobacco plants, using genetic engineering. Explain the strategy adopted to develop such plants. 3
24. The base sequence in one of the strands of DNA is :
“TAGCATGAT”
(a) Give the base sequence of its complementary strand.
(b) How are these base pairs held together in DNA molecule ?
(c) Explain the base complementarity rule. Name the scientist who framed this rule. 3
25. A village health worker was taking a session with women. She tells them that one has to be careful while using oral pills as a method of birth control. Wrong usage can actually promote conception.
(a) Analyse the above statement and compare the merits and demerits of using oral pills and surgical methods of birth control.
(b) Village women are confused as to how a thin metallic copper loop can provide protection against pregnancy. Explain the mode of action of IUDs. Give two points. 3



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26. (a) Mention any two advantages of micropropagation techniques.
(b) Write in brief how the process is carried out in the laboratory.
(c) Name any two important food plants grown commercially by this method. 3
27. (a) "The process of evolution of different species in a given geographical area starts from a point and literally radiates to other geographical areas." Explain it with an example.
(b) Cite an example where more than one adaptive radiation has occurred in an isolated geographical area. Name the type of evolution your example depicts. 3
28. A person is suffering from high grade fever. Which symptoms will help to identify if he/she is suffering from Typhoid, Pneumonia or Malaria ? 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. The following question is based on pollination. Study the figures carefully and answer the questions that follow. 4

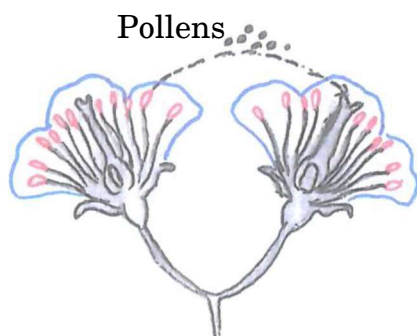


Figure A

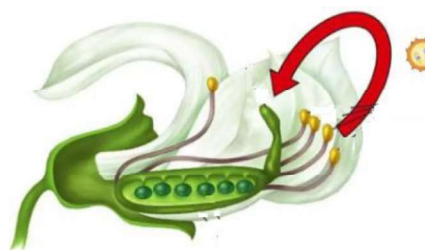


Figure B

- (a) Give the scientific terms for the processes taking place in Figures A and B respectively. 1
- (b) Mention two conditions necessary for the process occurring in Figure B. 2
- (c) (i) State one advantage and one disadvantage of the process occurring in Figure B. 1

OR

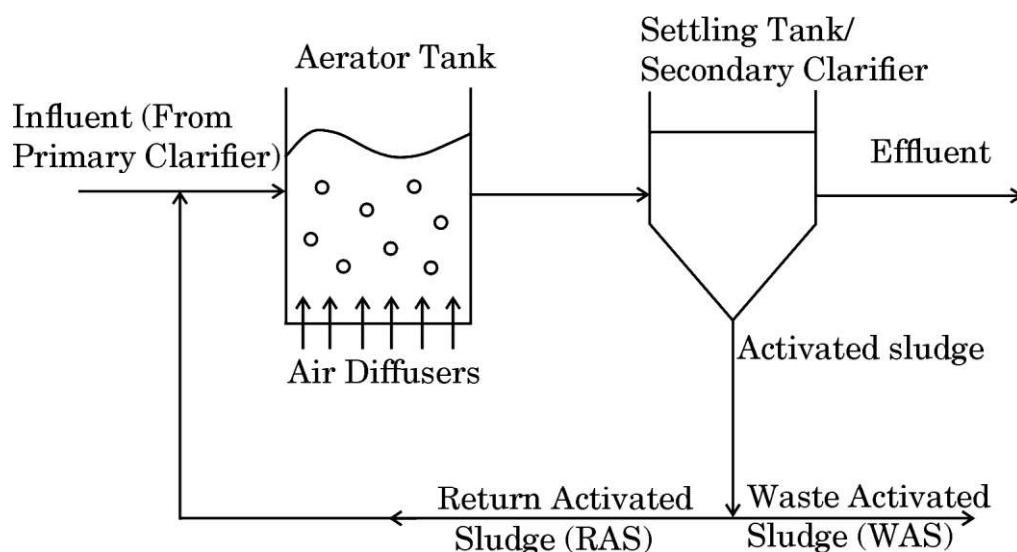
- (c) (ii) Name one plant where, in some flowers only, the process in Figure B takes place and give the reason responsible for it. 1



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30. Study the figure given below and answer the questions that follow.

4



- (a) Identify the figure and state its importance. 1
- (b) Why is air diffused into the aerator tank ? Explain. 2
- (c) (i) What changes take place in the settling tank ? 1

OR

- (c) (ii) How is BOD related to organic matter present in the water ? 1

SECTION E

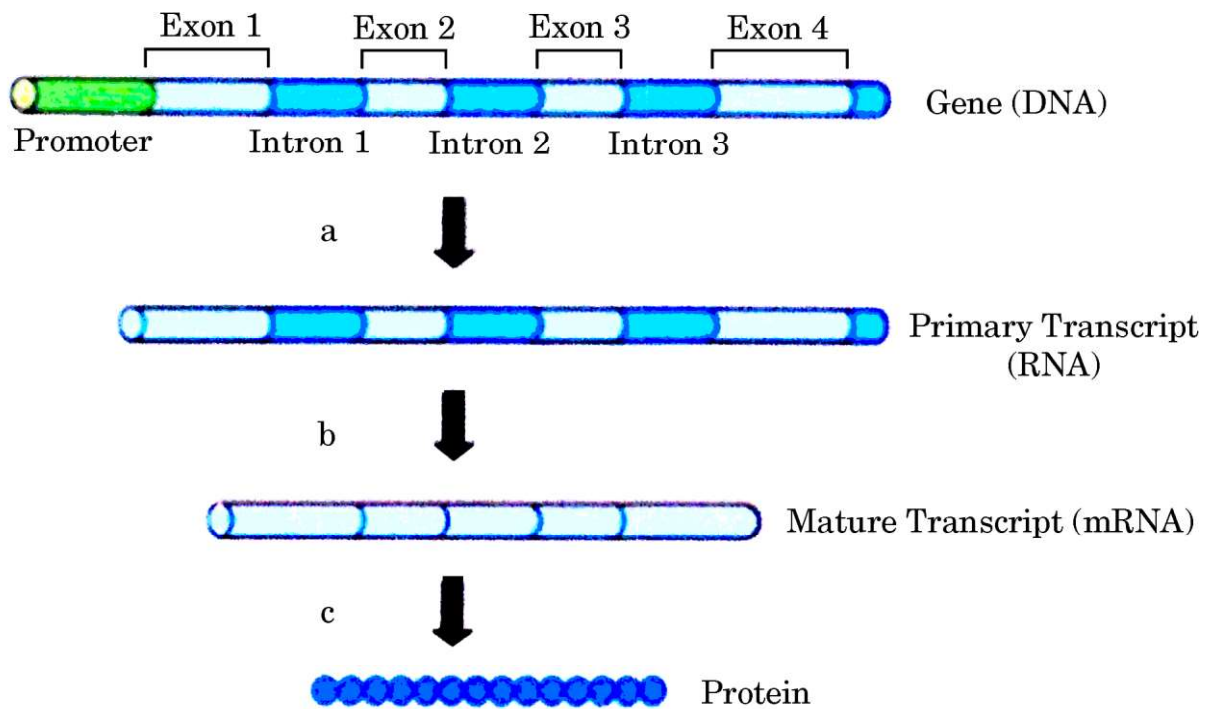
31. (a) (i) What is a test cross ? How can we find out the zygosity of a plant by the use of test cross ?
- (ii) Why are human females rarely haemophilic ? Explain with the help of a cross. Under what conditions can a haemophilic female be born ? How do haemophilic patients suffer ? 5

OR



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(b) Name the two events 'a' and 'c' shown in the diagram below.



- (i) Mention where in the cell these events take place.
- (ii) Explain the changes taking place during event 'b' and mention why these are needed.

5

32. (a) (i) How does alien species invasion cause a decline in biodiversity? Explain.

How have the following contributed to biodiversity loss?

- I. Nile Perch
- II. *Lantana* and *Eichhornia*
- III. *Clarias gariepinus*

- (ii) Why have certain regions been declared as biodiversity hotspots by environmentalists of the world? Name any two such regions in India.

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OR



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- (b) (i) Write an equation for Verhulst-Pearl Logistic Growth Curve where :

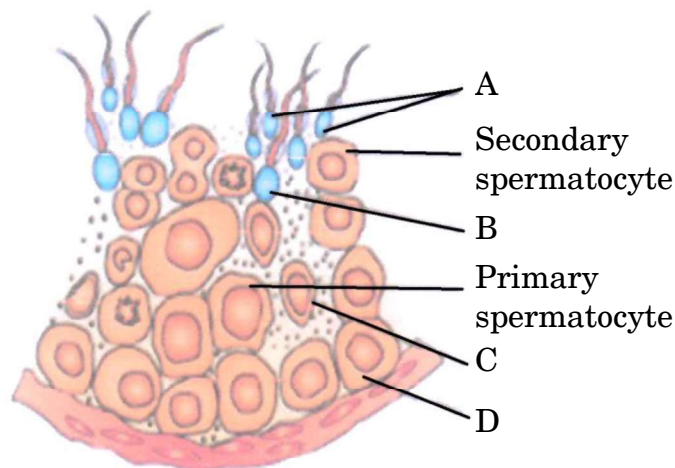
N = Population density at time 't'

r = Intrinsic rate of natural increase

- (ii) Draw a graph for a population whose population density has reached carrying capacity.
- (iii) Draw a growth curve where resources are non-limiting to growth of population.
- (iv) Which growth curve is considered more realistic and why ? Explain.

5

33. (a) Study the given diagram showing the sectional view of a seminiferous tubule.



Answer the following questions :

2+1+2=5

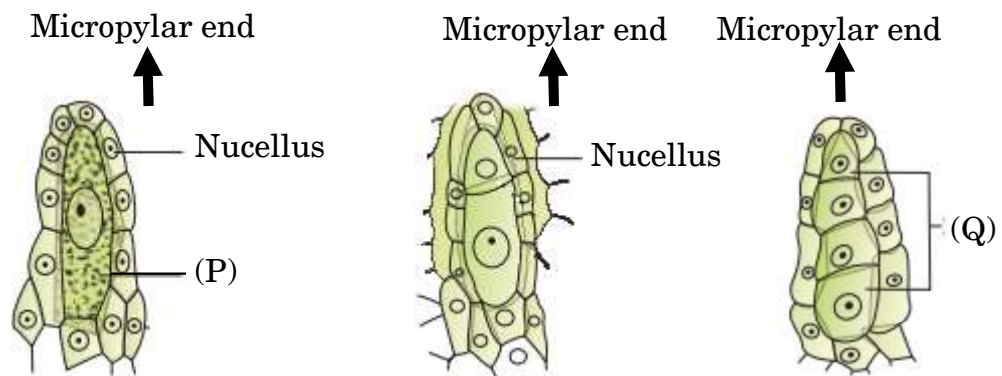
- (i) Label A, B, C and D in the figure.
- (ii) What will be the number of chromosomes in secondary spermatocyte and spermatid respectively ?
- (iii) Explain the terms — Spermiogenesis and Spermiation.

OR



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- (b) Study the figures given below showing initial stages in the formation of female gametophyte and answer the questions that follow.



- (i) Identify (P) and (Q).
- (ii) I. What kind of division does cell (P) undergo to form (Q) ?
- II. How many (Q) cells form the embryo sac ? What is the name given to such kind of development ?
- III. How many free nuclear mitotic divisions will the functional megaspore undergo to form the embryo sac ?
- IV. Describe the structure of a mature female gametophyte. 5

