Series OSR/C

कोड नं. **57/3**
Code No.

रोल नं.
Roll No.

परीक्षार्थी कोड को उत्तर-पुस्तिका के मुख-पृष्ठ पर अवश्य लिखें ।
Candidates must write the Code on the title page of the answer-book.

- कृपया जाँच कर लें कि इस प्रश्न-पत्र में मुद्रित पृष्ठ **11** हैं ।
- प्रश्न-पत्र में दाहिने हाथ की ओर दिए गए कोड नम्बर को छात्र उत्तर-पुस्तिका के मुख-पृष्ठ पर लिखें ।
- कृपया जाँच कर लें कि इस प्रश्न-पत्र में **30** प्रश्न हैं ।
- **कृपया प्रश्न का उत्तर लिखना शुरू करने से पहले, प्रश्न का क्रमांक अवश्य लिखें ।**
- 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 छात्र केवल प्रश्न-पत्र को पढ़ेंगे और इस अवधि के दौरान वे उत्तर-पुस्तिका पर कोई उत्तर नहीं लिखेंगे ।
- Please check that this question paper contains **11** printed pages.
- Code number given on the right hand side of the question paper should be written on the title page of the answer-book by the candidate.
- Please check that this question paper contains **30** questions.
- **Please write down the Serial Number of the question before attempting it.**
- 15 minutes 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 students 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 *अधिकतम अंक : 70*

Time allowed : 3 hours *Maximum Marks : 70*

सामान्य निर्देश :

(i) ***सभी*** *प्रश्न अनिवार्य हैं ।*

(ii) *इस प्रश्न-पत्र में चार खण्ड* ***A, B, C*** *और* ***D*** *हैं । खण्ड* ***A*** *में* ***8*** *प्रश्न हैं जिनमें प्रत्येक का* ***एक*** *अंक है, खण्ड* ***B*** *में* ***10*** *प्रश्न हैं जिनमें प्रत्येक के* ***दो*** *अंक हैं, खण्ड* ***C*** *में* ***9*** *प्रश्न हैं जिनमें प्रत्येक के* ***तीन*** *अंक हैं तथा खण्ड* ***D*** *में* ***3*** *प्रश्न हैं जिनमें प्रत्येक के* ***पाँच*** *अंक हैं ।*

(iii) *कोई समग्र चयन-विकल्प (ओवरऑल चॉइस) उपलब्ध नहीं है । फिर भी,* ***2*** *अंकों वाले एक प्रश्न में,* ***3*** *अंकों वाले एक प्रश्न में और* ***5*** *अंकों वाले सभी तीनों प्रश्नों में भीतरी चयन-विकल्प दिए गए हैं । ऐसे प्रश्नों में विद्यार्थी को केवल एक ही विकल्प का उत्तर देना है ।*

(iv) *जहाँ भी आवश्यक हो, बनाए जाने वाले आरेख साफ़-सुथरे तथा समुचित रूप में नामांकित हों ।*

General Instructions :

(i) ***All*** *questions are compulsory.*

(ii) *This question paper consists of four Sections* ***A, B, C*** *and* ***D****. Section* ***A*** *contains* ***8*** *questions of* ***one*** *mark each, Section* ***B*** *is of* ***10*** *questions of* ***two*** *marks each, Section* ***C*** *is of* ***9*** *questions of* ***three*** *marks each and Section* ***D*** *is of* ***3*** *questions of* ***five*** *marks each.*

(iii) *There is no overall choice. However, an internal choice has been provided in one question of* ***2*** *marks, one question of* ***3*** *marks and all the three questions of* ***5*** *marks weightage. A student has to attempt only one of the alternatives in such questions.*

(iv) *Wherever necessary, the diagrams drawn should be neat and properly labelled.*

खण्ड A

SECTION A

1. जैल-वैद्युतकरण संचलन में आधात्री के रूप में इस्तेमाल किए जाने वाले पदार्थ का नाम लिखिए और इसकी भूमिका भी बताइए । *1*

Name the material used as matrix in gel-electrophoresis and mention its role.

2. कृषि भूमि में नीले-हरे शैवाल लगाए जाने के पक्ष में एक कारण बताइए । *1*

State one reason for adding blue-green algae to the agricultural soil.

3. एक कवक का एक-एक ऐसा उदाहरण दीजिए जिसमें जनन इनके द्वारा होता है :

(a) मुकुलन

(b) कोनीडिया *1*

Give one example each of a fungus which reproduces by :

(a) budding

(b) conidia

4. ऐसा क्यों है कि बच्चे को स्तन-पान कराती माँ में ऐसा करना एक प्राकृतिक गर्भनिरोधक होता है, एक कारण बताइए । *1*

State one reason why breast-feeding the baby acts as a natural contraceptive for the mother.

5. सही कथन को पहचान कर लिखिए :

(a) टिड्डे के नरों में दो प्रकार के लिंग क्रोमोसोम X तथा Y होते हैं ।

(b) टिड्डे के नरों में XO प्रकार के लिंग-निर्धारक होते हैं । *1*

Identify and write the correct statement :

(a) In Grasshopper males two sex chromosomes are X and Y type.

(b) In Grasshopper males there exist XO type of sex-determinants.

6. यदि किसी सुकेंद्रकी कोशिका में DNA प्रतिकृति होने के बाद कोशिका विभाजन नहीं होता है, तो क्या होगा ? *1*

What will happen if DNA replication is not followed by cell division in a eukaryotic cell ?

7. हरित गृह प्रभाव में सर्वाधिक योगदान देने वाली दो गैसों के नाम लिखिए । *1*

Name the two gases contributing maximum to the green house effect.

8. मैंग्रोव (कच्छ) द्वारा प्रतिदर्शित जैवविविधता का स्तर क्या होता है, लिखिए । इसी स्तर में आने वाला कोई एक और उदाहरण दीजिए । *1*

Write the level of biodiversity represented by a mangrove. Give another example falling in the same level.

खण्ड B

SECTION B

9. "किसी अलवण जल पिंड में पोषकों के भरते जाने से मछलियों का मरना तीव्र हो जाता है ।" दो कारण बताइए । पोषकों के भरते जाने से इस जल पिंड का BOD स्तर किस प्रकार प्रभावित होगा ? *2*

'Fish mortality increases with influx of nutrients in a fresh-water body.' Write two reasons. How will the influx of nutrients affect the BOD level of this water body ?

10. ऐसे दो कारण बताइए जिनके द्वारा प्राक्केंद्रकी प्रजातियों की गणना कठिन हो जाती है । *2*

Provide two reasons that make the count of prokaryotic species difficult.

11. उस रोग का नाम लिखिए जिसका सबसे पहली बार जीन उपचार किया गया । उस रोग के होने का कारण क्या होता है तथा रोगी पर उसका क्या प्रभाव होता है ? *2*

Name the disease that was first to get the gene therapy treatment. Write the cause of the disease and the effect it has on the patient.

12. किन्हीं दो ढंगों का उल्लेख कीजिए जो आनुवंशिकत: रूपांतरित जीवों का उपयोगी होना दर्शाते हों । *2*

Write any two ways how genetically modified plants are found to be useful.

13. मानव शुक्राणु के केवल शीर्ष क्षेत्र का आरेख बनाइए और उसके भागों का नामांकन कीजिए । *2*

Draw and label the parts of the head region only of a human sperm.

14. "अंत:कोशिकाद्रव्य शुक्राणु इंजेक्शन" तथा "युग्मक अंत:फ़ैलोपी स्थानांतरण" दो सहायतित जनन प्रौद्योगिकियाँ हैं । ये एक-दूसरे से किस प्रकार भिन्न होती हैं ? *2*

"Intra-cytoplasmic sperm injection" and "gamete intrafallopian transfer" are two assisted reproductive technologies. How is one different from the other ?

15. एक ऐसे संवर्धन माध्यम में जिसमें शर्करा के स्रोत के रूप में लैक्टोज़ है *E. coli* में *lac* ओपैरॉन किस प्रकार कार्य करेगा ? *2*

How would *lac* operon operate in *E. coli* growing in a culture medium where lactose is present as source of sugar ?

16. सक्रिय प्रतिरक्षा तथा परोक्ष प्रतिरक्षा में विभेद कीजिए । *2*

अथवा

बहि:प्रजनन तथा बहि:संकरण में अन्तर बताइए ।

Differentiate between active and passive immunity.

OR

Differentiate between outbreeding and outcrossing.

17. ऐसे दो जीवधारी समूहों के नाम लिखिए जो 'ऊर्ण' (फ़्लॉक्स) बनाते हैं । वाहित मल के जैविकीय उपचार के दौरान BOD के स्तर पर उनका क्या प्रभाव पड़ता है, लिखिए । *2*

Name two groups of organisms which constitute 'flocs'. Write their influence on the level of BOD during biological treatment of sewage.

18. जैवप्रौद्योगिकी प्रयोगों के लिए कोशिकाओं को समर्थ बनाना क्यों अनिवार्य है ? कोई दो विधियाँ गिनाइए जिनके द्वारा ऐसा किया जा सकता है । *2*

Why is making cells competent essential for biotechnology experiments ? List any two ways by which this can be achieved.

खण्ड C

SECTION C

19. (a) RNA *पौलीमरेज़ III* के ट्रांसक्रिप्शन (अनुलेखन) उत्पाद क्या-क्या होते हैं ?

(b) "आच्छादन (कैपिंग)" तथा "पुच्छायन (टेलिंग)" में विभेदन कीजिए ।

(c) *hnRNA* को पूरा-पूरा लिखिए । *3*

(a) What are the transcriptional products of RNA *polymerase III* ?

(b) Differentiate between 'Capping' and 'Tailing'.

(c) Expand *hnRNA*.

20. तीन कारण बताते हुए लिखिए कि हार्डी-वीनबर्ग साम्य किस प्रकार प्रभावित किया जा सकता है । *3*

Giving three reasons, write how Hardy-Weinberg equilibrium can be affected.

21. क्या आप इस बात का समर्थन करते हैं कि प्रतिष्ठित खेल प्रतियोगिता में भाग लेने वाले खिलाड़ीयों का "डोप" परीक्षण किया जाना चाहिए ? अपने उत्तर के समर्थन में तीन कारण बताइए । *3*

Do you support 'Dope' test being conducted on sportspersons participating in a prestigious athletic meet ? Give three reasons in support of your answer.

22. किसी एक ऐसी तकनीक का सुझाव दीजिए एवं उसका वर्णन कीजिए जिसके द्वारा किसी रोगग्रस्त गन्ना पौधे से एक वायरस-मुक्त स्वस्थ पौधा प्राप्त किया जा सकता है । *3*

Suggest and describe a technique through which a virus-free healthy plant can be obtained from a diseased sugarcane plant.

23. निम्नलिखित में विभेद कीजिए :

(a) परनिषेचन तथा सजातपुष्पीपरागण

(b) अंडप्रजक तथा सजीवप्रजक जंतु

(c) अनिषेकजनन तथा अनिषेकफलन *3*

Differentiate between :

(a) Xenogamy and Geitonogamy

(b) Oviparous and Viviparous organisms

(c) Parthogenesis and Parthenocarpy

24. एक उपयुक्त उदाहरण देते हुए उस विशेषक की वंशागति के विषय में समझाइए जिसमें किसी विशेषक के दो भिन्न ऐलील (विकल्पी) संतान के भीतर एक साथ प्रकट होते हैं । इस प्रकार के वंशागति प्रतिरूप का नाम लिखिए । *3*

Explain with the help of a suitable example the inheritance of a trait where two different dominant alleles of a trait express themselves simultaneously in the progeny. Name this kind of inheritance pattern.

25. *E. coli* क्लोनिंग वाहक pBR322 का एक योजना आरेख बनाइए और उसमें निम्नलिखित का नामांकन कीजिए : *3*

(a) ori

(b) rop

(c) ऐम्पिसिलिन प्रतिरोध जीन

(d) टेट्रासाइक्लिन प्रतिरोध जीन

(e) प्रतिबंधन स्थल BamHI

(f) प्रतिबंधन स्थल EcoRI

अथवा

(a) EcoRI द्वारा पहचाने जाने वाले न्यूक्लिओटाइडों के अनुक्रम वाले एक वाहक तथा एक विजातीय DNA के खण्डों का आरेख बनाइए ।

(b) EcoRI की क्रिया के उपरांत बने वाहक DNA खण्ड तथा विजातीय DNA खण्ड के आरेख बनाइए तथा चिपचिपे सिरों का नामांकन कीजिए ।

Draw a schematic diagram of the *E. coli* cloning vector pBR322 and mark the following in it :

(a) ori

(b) rop

(c) ampicillin resistance gene

(d) tetracycline resistance gene

(e) restriction site BamHI

(f) restriction site EcoRI

OR

(a) Draw schematic diagrams of segments of a vector and a foreign DNA with the sequence of nucleotides recognised by EcoRI.

(b) Draw the vector DNA segment and foreign DNA segments after the action of EcoRI and label the sticky ends produced.

26. मानव जनसंख्या में प्रसारशील आयु पिरामिड का आरेख बनाइए और उसके विषय में समझाइए । उसे इस प्रकार क्यों कहा जाता है ? *3*

Draw and explain expanding age pyramids of human population. Why is it so called ?

27. बैकुलोवायरसों तथा *बेसिलस थुरिंजिऐंसिस* को जैव-नियंत्रण साधनों के रूप में किस प्रकार इस्तेमाल किया जाता है ? सहज उपलब्ध रासायनिक पीड़कनाशियों की बजाए उन्हीं को क्यों पसंद किया जाता है ? *3*

How are Baculoviruses and *Bacillus thuringiensis* used as bio-control agents ? Why are they preferred over readily available chemical pesticides ?

खण्ड D

SECTION D

28. (a) उस समष्टि वृद्धि प्रतिरूप का नाम लिखिए जिसका निरूपण इस समीकरण द्वारा होता है $\left\{\frac{dN}{dt} = rN\right\}$.

इस समीकरण में "r" क्या दर्शाता है ? समष्टि वृद्धि में इसका महत्त्व बताइए ।

(b) जनसंख्या वेरहल्स्ट-पर्ल संभारी वृद्धि वक्र का उपयोग करते हुए वहन क्षमता का सिद्धांत समझाइए । *5*

अथवा

(a) उपयुक्त उदाहरण देते हुए समझाइए कि विभिन्न पोषण स्तरों से ऊर्जा का प्रवाह किस प्रकार होता है । इस पिरामिड में प्रत्येक छड़ किसका प्रतिदर्श करती है ?

(b) पारिस्थितिकी पिरामिडों की कोई दो परिसीमाएँ लिखिए ।

(a) Name the population growth pattern the equation $\left\{\frac{dN}{dt} = rN\right\}$ represents. What does "r" represent in the equation ? Write its importance in population growth.

(b) Explain the principle of carrying capacity by using population Verhulst-Pearl logistic growth curve.

OR

(a) With suitable examples, explain the energy flow through different trophic levels. What does each bar in this pyramid represent ?

(b) Write any two limitations of ecological pyramids.

29. (a) किसी ऐसे आवृतबीजी के स्त्रीकेसर की अनुदैर्घ्य काट का आरेख बनाइए, जिसमें परागनली बीजाण्ड के बीजाण्डद्वार तक बढ़ गई दिखाई गई हो । इसमें निम्नलिखित भागों का नामांकन कीजिए : (i) वर्तिकाग्र, (ii) भ्रूण कोष, (iii) परागनली, (iv) अण्डद्वार ।

(b) वर्तिकाग्र पर संगत पराग कण के आ पहुँचने पर, निषेचन होने तक उसमें क्या-क्या घटनाएँ होती हैं, समझाइए । *5*

अथवा

(a) मानव अण्डाशय की एक ऐसी अनुप्रस्थ काट का आरेख बनाइए जिसमें कॉर्पस लुटियम बनने तक विभिन्न पुटिकाओं का क्रमिक परिवर्धन दिखाया गया हो ।

(b) इन घटनाओं के दौरान अनुरूपी अण्डाशयी तथा पिट्यूटरी हॉर्मोनों के स्तरों पर टिप्पणी कीजिए ।

(a) Draw a longitudinal section of a pistil of an angiosperm showing the growth of the pollen tube up to the micropyle of the ovule. Label (i) stigma, (ii) embryo sac (iii) pollen tube (iv) micropyle.

(b) Explain the events that occur, upto fertilisation, when the compatible pollen grain lands on the stigma.

OR

(a) Draw a transverse section of a human ovary showing the sequential development of different follicles up to the corpus luteum.

(b) Comment on the corresponding ovarian and pituitary hormone levels during these events.

30. एक ऐसे एकसंकर संकरण का F_2 पीढ़ी तक के संकरण का हिसाब लगाइए जो दो मटर-पौधों के बीच तथा दो ऐंटीराइनम पौधों के बीच उनके फूलों के रंग (विपर्यसी विशेषक) के संदर्भ में हो रहा हो । किए गए इन संकरणों में वंशागति के प्ररूप पर टिप्पणी कीजिए । *5*

अथवा

किसी बैक्टीरियम के भीतर होने वाली ट्रांसक्रिप्शन (अनुलेखन) की प्रक्रिया का वर्णन कीजिए ।

Work out a monohybrid cross upto F_2 generation between two pea plants and two *Antirrhinum* plants both having contrasting traits with respect to colour of flower. Comment on the pattern of inheritance in the crosses carried above.

OR

Describe the process of transcription in a bacterium.

BIOLOGY (Theory)

SECTION A 57/3

1. Name the material used as matrix in gel-electrophoresis and mention its role.

Ans. Agarose gel / seaweed; sieving effect to separate DNA fragments ½+½

2. State one reason for adding blue-green algae to the agricultural soil.

Ans. To increase fertility of soil /to fix N2-/enhance N2- content 1

3. Give one example each of a fungus which reproduces by:

(a) Budding

(b) Conidia

Ans. a)yeast b) *Penicillium* ½ + !/2

4. State one reason for adding blue-green algae to the agricultural soil.

Ans. To increase fertility of soil /to fix N2/enhances N2 content 1

5. Identify and write the correct statement:

(a) In Grasshopper males two chromosomes are X and Y type.

(b) **In grasshopper males there exist XO type of sex –determinants**.

Ans. (a)

6. What will happen if DNA replication is not followed by cell division in a eukaryotic cell?

Ans. Results in polyploidy/ chromosomal abnormality 1

7. Name the two gases contributing maximum to the green house effect.

Ans. CO_2 & CH_4 ½+½

8. **Write the level of biodiversity represented by a mangrove. Give another example falling in the same level**.

Ans. Ecological; Estuaries/desert/rain forest/coral reef/ wetland / alpine meadows (anyone) ½+½

SECTION B

9. Fish mortality increases with influx of nutrients in a fresh –water body write two reasons. How will the influx of nutrients affect the BOD level of this water body?

Ans. Algal bloom/deprive water of dissolved oxygen/cause increase in BOD level (1+1)

10. **Provide two reasons that make the count of prokaryotic species difficult**.

Ans. Conventional taxonomic methods (Morphological) not suitable; difficult to culture in lab. (1x2=2)

11. Name the disease that was first to get the gene therapy treatment. Write the cause of the disease and the effect it has on the patient.

Ans. Adenosine deaminase deficiency 1

Deletion of gene for the enzyme adenosine deaminase ½

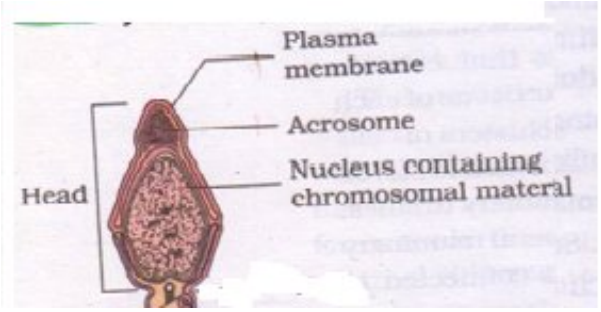
Crucial for immune system to function ½

12. Write any two ways how genetically modified plants are found to be useful.

Ans Tolerant to abiotic stresses/reduced reliance on chemical pesticide/reduced post harvest losses/increased efficiency of mineral usage/enhanced nutritional value (Any two) (1x2=2)

13. **Draw and label the parts of the head region only of a human sperm**.

Ans. Plasma membrane, Acrosome; Nucleus;



(½ x 3labels+½ diagram=2)

14. "Intra- cytoplasm sperm injection" and "gamete intrafallopian transfix" are two assisted reproductive technologies. How is one different form the other?

Ans. ICSI-sperm is directly injected into the ovum 1

GIFT-Transfer of ovum collected from a donor into the fallopian tube of another female who cannot produce but can provide suitable environment for fertilization 1

15. How would *lac* operon operate in E.coli growing in a culture medium where lactose is present as source of sugar?

Ans. Lactose(Inducer) binds to repressor,/repressor does not bind to operator/z,y,a-transcribe (*lac* mRNA)Translation (□- galactosidase/permease/transacetylase) (½ x 4=2)

16. **Differentiate between active and passive immunity**.

OR

Differentiate between outbreeding and outcrossing.

Ans. Active immunity- When a host is exposed to antigens, which may be in terms of dead or living microbes/proteins; antibodies are produced in the host body

Passive Immunity- When ready made antibodies are directly given to protect the body against foreign agent /antigen/ protein 1+1=2

OR

Out breeding- breeding of unrelated animals between same breeds, no common ancestors /between different breeds/cross breeding/different species/ interspecific hybridisation

Out crossing-Mating within same breed, no common ancestors for 4-6 generations (1+1=2)

17. Name two groups of organisms which constitute 'flocs' .Write their influence on level of BOD during biological treatment of sewage.

Ans. Aerobic bacteria; fungi; they consume organic matter of effluents; use O2/ reduce BOD 2

18. **Why is making cells competent essential for biotechnology experiments ? List any two ways by which this can be achieved**.

Ans. .-Enable host cells/bacteria to take up DNA/ r-DNA

- Bacterial cell treated with (divalent cation) Ca^{++} + heat (42^0C) +r-DNA on ice / /microinjection/gene gun/ vector disarmed pathogen 1+1=2

SECTION – C

19. a) What are the transcriptional products of RNA polymerase III ? **3**

(b)Differentiate between 'Capping' and 'Tailing'.

(c) Expand hnRNA.

Ans. a) tRNA,5srRNA,snRNA

b) Capping-addition of $^{m}G_{ppp}$ / ^{m}GTP . Tailing-Poly A tail/200-300 adenylate residues

c) Heterogenous nuclear RNA

20. **Giving three reasons , write how Hardy – Weinberg equilibrium can be affected**. 3

Ans Gene flow-/ Gene migration- changes gene frequency(gain or loss)

Genetic drift-By chance change in frequency

Recombination - mixing causes change in frequency –

Mutation-heritable changes

Natural selection- Speciation (any three)

21. **Do you support 'Dope' test being conducted on sportspersons participating in a prestigious athletic meet ?**
Give three reasons in support of your answer.

Ans. Yes, it helps to diagnose unnatural enhanced performance, unethical (Cheating)or any other appropriate points. 1+1+1=3

22. Suggest and describe a technique through which a virus-free healthy plant can be obtained from a diseased
sugarcane plant.
Ans. Apical/axillary meristem; remove meristem; grow *in vitro* 1x3=3

23. Differentiate between

(a)Xenogeny and Geitonogamy

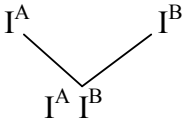
(b)Oviparous and Viviparous organisms

c)Pathogenesis and Parthenocarpy

Ans. a) Xenogamy- transfer of pollen grains from anther to stigma of a different plant-brings genetically different pollen grains
Geitonogamy- Transfer of pollen grains from the anther to the stigma of another flower of same plant ½+½=1
b) oviparous- Anmials that lay eggs
viviparous- Animals giving birth to young ones ½+½=1 c)
Parthenogenesis- female gamete undergoes development to form new organism without fertilization.
Parthenocarpy- fruits which develop without fertilization ½+½=1

24. Explain with the help of a suitable example the inheritance of a trait where two different dominant alleles of a trait express themselves simultaneously in the progeny. Name this kind of inheritance pattern. 3

Name- Co-dominance 1
$I^A I^B$ = Blood group AB ½
Both alleles dominant
$I^A I^A$ x $I^B I^B$ ½



½

½

25. Draw a schematic diagram of the E. coli cloning vector pBR322 and mark the following in it : 3

(a) ori

(b) rop

(c) ampicillin resistance gene

(d) tetracycline resistance gene

(e) restriction site BamHI

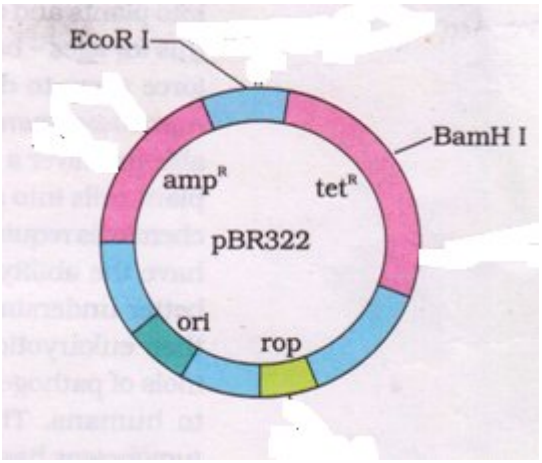
(f) restriction site EcoRI

OR

Draw schematic diagrams of segments of a vector and a foreign DNA with the sequence of nucleotides recognized by EcoRI.

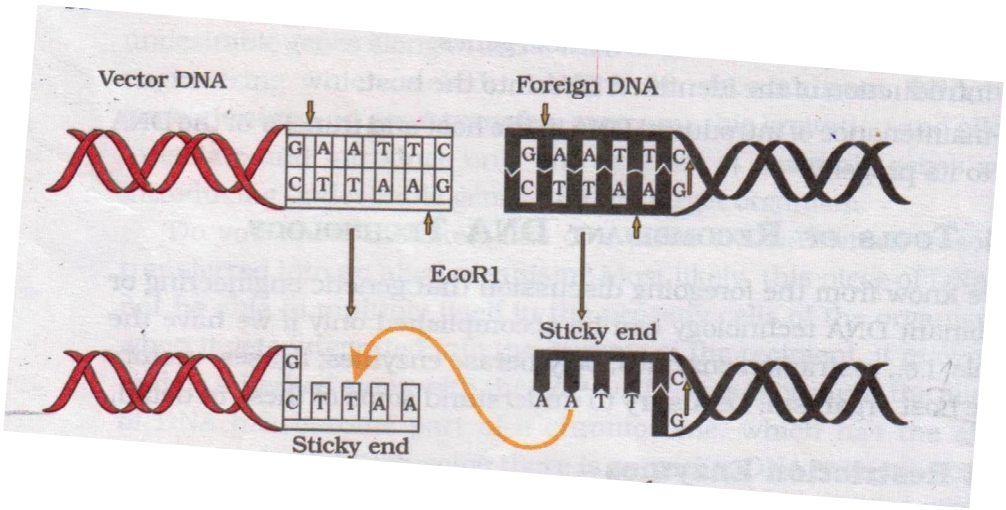
Draw the vector DNA segment and foreign DNA segments after the action of EcoRI and label the sticky ends produced.

Ans. (a)



½ X 6=3

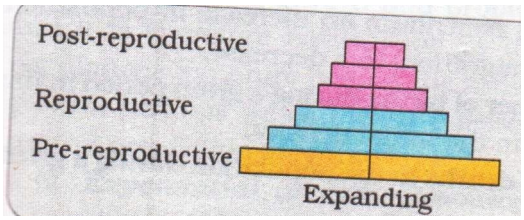
OR



Vector DNA, Foreign DNA, Sticky ends, Arrow for joining, Correct sequence, Correct position for cutting
½ X 6=3

26. **Draw and explain expanding age pyramids of human population. Why is it so called ?**

Ans.



expanding age pyramids of human population explains that population is growing, because pre reproductive age is more in number (½ x 3 labels+ ½ diagram+½ explanation+½ reason=3)

27. **How are Baculoviruses and *Bacillus thuringiensis* used as bio-control agents? Why are they preferred over readily available chemical pesticides?**

Ans. **Baculovirus**-used as species specific/narrow spectrum//insecticidal application

Bacillus thurengiensis-available in sachets as dried spores which are mixed with water and sprayed

(any one difference)

No negative impacts on plants, mammals/birds/fish/non target insects (1+1+½+½=3)

SECTION D

28. (a) **Name the population growth pattern the equation {dN / dt =rN} represents. What does "r" represent in the equation ? Write its importance in population growth.** 5

(b) **Explain the principle of carrying capacity by using population Verhulst-Pearl logistic growth curve.**

OR

(a) With suitable examples, explain the energy flow through different trophic levels. What does each bar in this pyramid represent ?

(b) Write any two limitations of ecological pyramids.

Ans. Exponential/geometric 1

a) r = Intrinsic rate of natural increase,

importance – higher the 'r' higher the population growth/any biotic or abiotic factor on population growth 1

b) Given habitat has enough resource to support a maximum possible number beyond which no- further growth is possible. This is carrying capacity K asymptote 1+1

OR

a) In an ideal energy pyramid the primary producers convert only 1% of the energy in the sunlight available to them. the subsequent trophic levels pass on 10% of the energy received from previous trophic level to the next trophic level.
each bar /level in the pyramid represent the amount of energy transferred to the next trophic level.

b) (i) did not take into account the same species belonging to 2 trophic levels.
(ii) assumes simple food chain and not food web
(iii) Saprophyte are not considered (any two)

29. (**a) Draw a longitudinal section of a pistil of an angiosperm showing the growth of the pollen tube up to the micropyle of the ovule.**

Label (i) stigma (ii) embryo sac (iii) pollen tube (iv) micropyle.

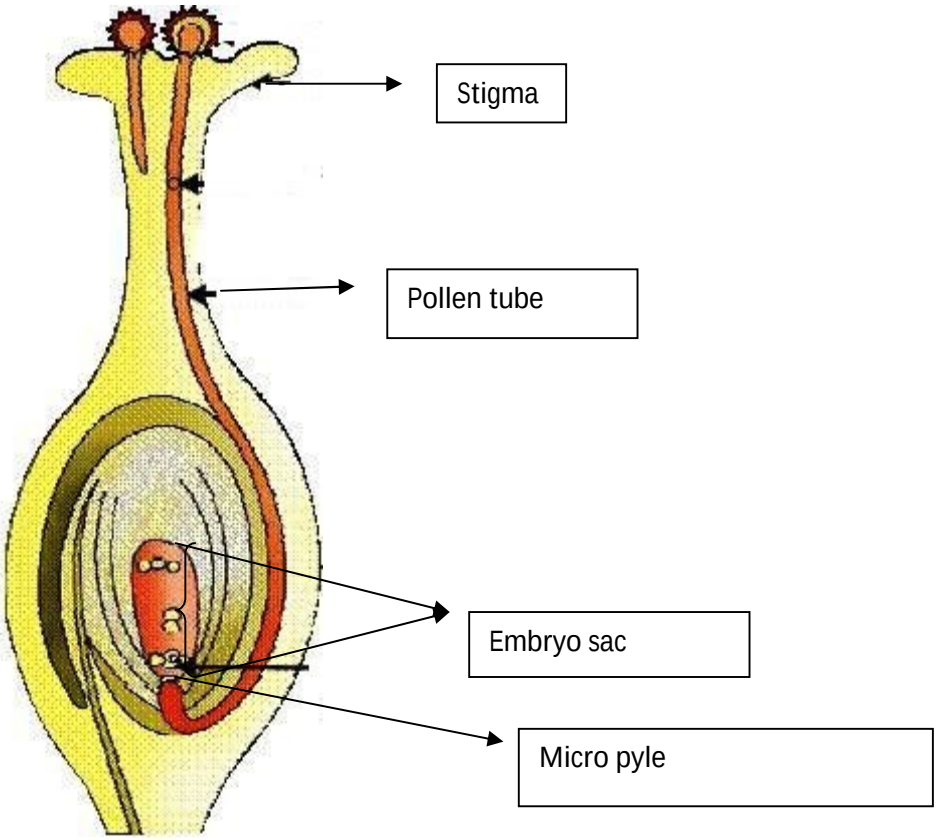
(b) Explain the events that occur up to fertilization, when the compatible pollen grain lands on the stigma.

OR

a) Draw a transverse section of a human ovary showing the sequential development of different follicles up to the corpus luteum.

b) comment on the corresponding ovarian and pituitary hormone levels during these events

Ans a)



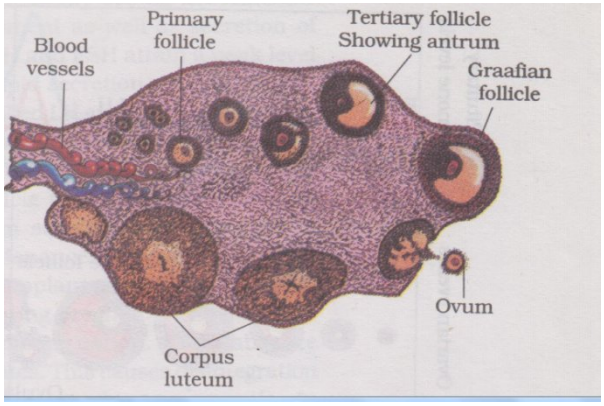
(½x4=2)

(b) Pistil accepts the pollen and pollen grain germinates on the stigma to produce a pollen tube which passes through one of the germ pores, content of the pollen grain move into the pollen tube and pollen tube grows through the tissues of the stigma and style to reach to ovary, the generative cell in the pollen grain divides and form two male gametes, pollen tube enters the ovule through micropyle and then enters one of the

synergids through filliform apparatus, two male gametes from pollen tube released in to the cytoplasm of synergids, one of the male gametes moves towards the egg cell and fuses with its nucleus (½x6=3)

OR

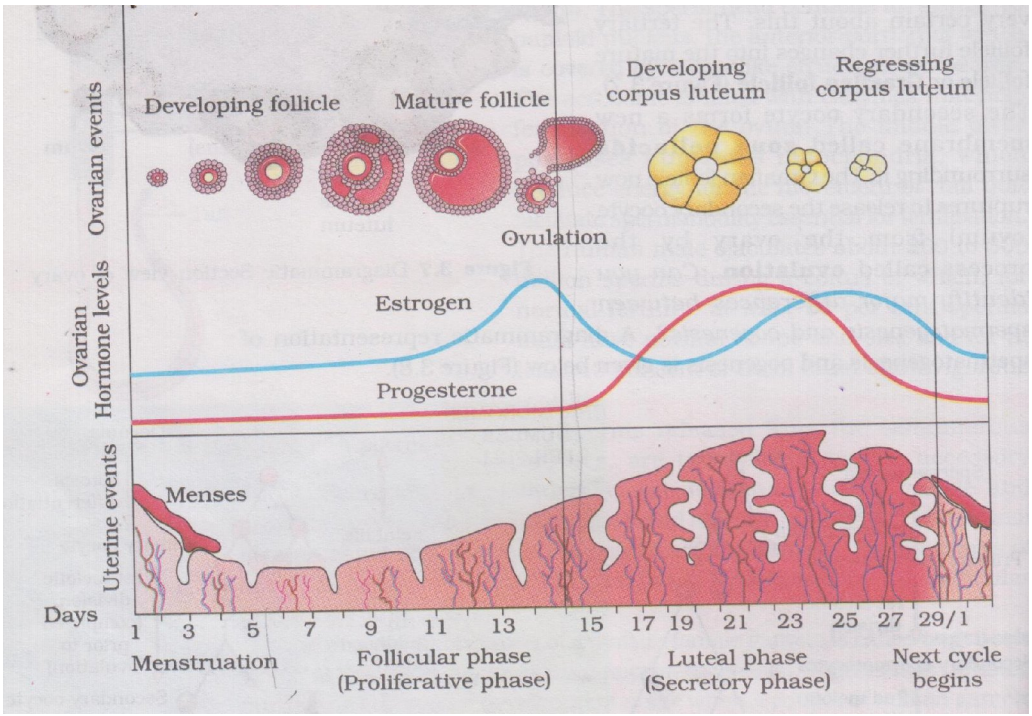
(a)



any four correct labels (½x4=2)

(b)

The secretion of gonadotropins increases gradually during the follicular phase ,stimulates follicular development as well as secretion of estrogens by the growing follicles. Both LH and FSH attain a peak level in the middle of cycle. Rapid secretion of LH, induces rupture of Graffian follicle ,and there by the release of ovum.// explained with diagram. ½x6=3..



Menstruation , Follicular/proliferative phase, Luteal/ secretory phase along with parallel changes in ovary and uterus (1+1+1=3)

30. **Work out a monohybrid cross up to F2 generation between two pea plants and two *Antirrhinum* plants both having contrasting traits with respect to colour of flower. Comment on the pattern of inheritance in the crosses carried above. 5**

OR

Describe the process of transcription in a bacterium.

Ans Any trait pea plant

(Tall) (dwarf)

Parents TT x tt ½

Gametes T t

Selfing F1 Tt x Tt ½

(Progeny)

F2 TT Tt Tt tt

Phenotypic ratio 3 : 1 ½

(Tall) (dwraf)

Genotypic ratio 1 (TT) : 2(Tt) : 1(tt) ½

Pattern – Dominant/recessive ½

Red White

parent RR x rr ½

R r

Selfing F1 Rr X Rr

(progeny)

RR Rr Rr rr

(Red) (Pink) (Pink) (White)

phenotypic ratio- 1 : 2 : 1 ½

(Red) (Pink) (white)

Genotypic- 1 : 2 : 1 ½

(RR) (Rr) (rr)

Incomplete dominance ½

OR

Explanation

Initiation- RNA polymerase binds to promoter and initiates transcription. 1

Elongation- RNA polymerase also facilitates opening of the helix and continues elongation. 1

Termination – once RNA polymerase reaches the terminator region, the nascent RNA falls off and also the RNA polymerase 1

(Name & function)RNA polymerase- 1

Initiation factor (Sigma) ½

Termination factor (rho) ½