CLASS -XII

POST MID TERM EXAMINATION (2024-25)

SUBJECT-BIOLOGY(CODE-044)

SET- B1

Time-3 hours M M: 70

General Instructions:

(i)All questions are compulsory.
(ii) The question paper has five sections and 33 questions.
(iii) Section–A has 16 questions of 1 mark each; Section–B has 5 questions of 2 marks each; Section– C has 7 questions of 3 marks each; Section– D has 2 case-based questions of 4 marks each; and Section–E has 3 questions of 5 marks each.
(iv) There is no overall choice. However, internal choices have been provided in some questions. A student has to attempt only one of the alternatives in such questions.
(v) Wherever necessary, neat and properly labelled diagrams should be drawn.

SECTION A

Q. No. 1 to 12 are multiple choice questions. Only one of the choices is correct. Select and write the correct choice as well as the answer to these questions.

Q.1 Figure (i) and Figure (ii) given below are showing two stages of megasporogenesis in a typical angiosperm plant. 1

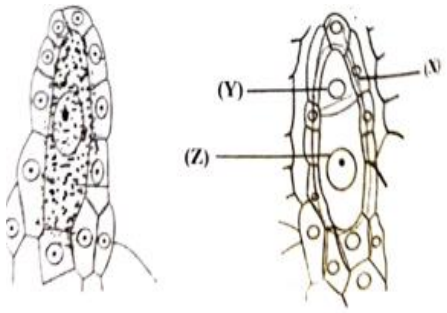


Fig. (*i*) Fig. (*ii*)

Choose the option showing the correct ploidy of X, Y and Z in the table given below:

	X	**Y**	**Z**
a.	2n	n	2n
b.	2n	n	n
c.	2n	3n	n
d.	3n	2n	n

Q.2 The main objective of production of pest resistant GM crops is to 1

a. Encourage eco-friendly weedicides
b. Reduce pesticide accumulation in food chain
c. Eliminate pests from the field with the use of manual labour
d. Retain maximum nutritional content in the crop that would be otherwise consumed by pest

Q.3 Match Colum I with Column II and select the correct option. 1

Column I	**Column II**
A. Acrosome	1.Motility of sperm towards the egg
B. Head	2.Power house of the sperm; contains a number of Mitochondria
C. Tail	3.Contains the genetic material
D. Middle Piece	4.Contains enzymes to dissolve the egg envelopes.

a.A-3, B-4, C-1, D-2
b. A-4, B-3, C-1, D-2
c. A-4, B-3, C-2, D-1
d. A-3, B-4, C-2, D-1

Q.4 A natural method of contraception, periodic abstinence is 1
a. Abstaining from coitus from day 1 to 5 of the menstrual cycle.
b. Abstaining from coitus from day 17 to 22 of the menstrual cycle.
c. Abstaining from coitus from day 10 to 17 of the menstrual cycle.
d. Abstaining from coitus from day 5 to 10 of the menstrual cycle.

Q.5 Which of the following statements indicates parallelism in genes and chromosomes? 1
(i) They occur in pairs
(ii) They segregate during gamete formation
(iii) They show linkage
(iv) Independent pairs segregate independently
a. (i) and (iii)
b. (ii) and (iii)
c. (i), (ii) and (iii)
d. (i), (ii) and (iv)

Q.6 Which institutes have actively participated in the development of technology for biogas production? 1
IARI, IIT, IISC, KVIM, KVIC.
a. IIT and KVIM
b. IISC and KVIC
c. KVIC and IARI
d. IARI and KVIM

Q.7 *Apis mellifera* are killer bees possessing toxic bee venom. Identify the treatment and the type of immunity developed from the given table to treat a person against the venom of this bee. 1

	REMEDY	IMMUNITY
a.	Inactivated proteins	Active
b.	Proteins of the venom	Passive
c.	Preformed antibodies	Passive
d.	Dead micro-organisms	Active

Q.8 Adaptive radiation leads to which of the following? 1

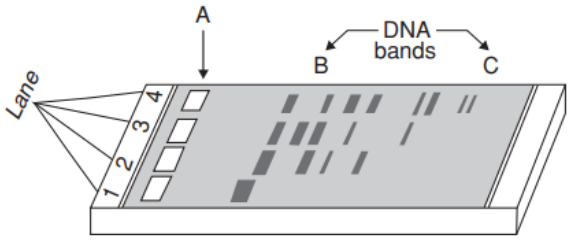
a. Increased competition among species

b. Decreased speciation rates

c. Limited morphological diversity among species

d. Rapid divergence of traits among populations inhabiting a given geographical area.

Q.9 In which of the following lanes, DNA is undigested by restriction endonuclease in this diagram? 1



a. Lane 1

b. Lane 2

c. Lane 3

d. Lane 4

Q.10 Which of the following vector is used for introducing a functional ADA gene in the gene therapy given for ADA deficiency? 1

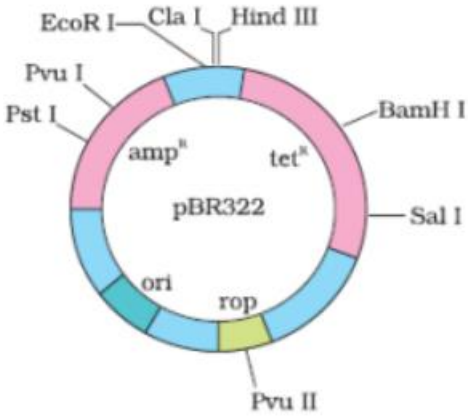
a. pBR322

b. Ti plamid

c. Bacteriophage

d. Retrovirus

Q.11 The figure given below shows the structure of a plasmid. 1



A foreign DNA was ligated at BamHI site. The transformants were then grown in a medium containing antibiotics tetracycline and ampicillin. Choose the correct observation for the growth of bacterial colonies from the given table.

	Medium with Tetracycline	Medium with Ampicillin
a.	Growth	No Growth
b.	No Growth	Growth
c.	No Growth	No Growth
d.	Growth	Growth

Q.12 In 'EcoRI' 'co' stands for 1

a. Genus

b. Species

c. Strain

d. Restriction enzyme

Q.13 Question No. 13 to 16 consist of two statements – Assertion (A) and Reason (R). Answer these questions selecting the appropriate option given below: 1

a. Both A and R are true and R is the correct explanation of A.

b. Both A and R are true and R is not the correct explanation of A.

c. A is true but R is false.

d. A is False but R is true.

Assertion: Total number is not an easily adoptable measure for population size.
Reason: If the population is huge and counting is impossible and time consuming.

Q.14 **Assertion:** In paddy field, cyanobacteria serves as an important biofertilizer. 1
Reason: Cyanobacteria can absorb phosphorus from soil.

Q.15 **Assertion:** Modern day lifestyle has resulted in lowering of immunity and more sensitivity to allergens. 1
Reason: The substances to which allergic response is produced are called allergens

Q.16 **Assertion:** ELISA is based on the principle of antigen-antibody interaction. 1
Reason: Infection by pathogen can be detected by the presence of antigens or detecting antibodies synthesized against the pathogen.

SECTION B (2 Marks Questions)

Q.17 **Attempt either option A or B.** 2

A. In bacteria, how are all three steps of transcription catalyzed by a single RNA polymerase?

OR

B. Recall the experiment done by Frederick Griffith, Avery, Macleod annd McCarty, where DNA was speculated to be the genetic material. If RNA, instead of DNA was the genetic material, would the heat killed strain of *Streptococcus* have transformed the R-strain into virulent strain? Explain your answer

Q.18 **Attempt either option A or B.** 2

A. During an excavation assignment, scientists collected pollen grains of a plant preserved in deeper layers of soil. Analyze the properties of pollen grains which help in fossilization.

OR

B. Gynoecium of a flower may be apocarpous or syncarpous. Explain with the help of an example each.

Q.19 Explain the fate of inner cell mass in a human embryo immediately after implantation. 2

Q.20 With the help of a Punnett square, find the percentage of heterozygous individuals in a F2 population in a cross involving a true breeding pea plant with green pods and a true breeding pea plant with yellow pods respectively. 2

Q.21 **Attempt either option A or B.** 2

A. cryIAb is introduced in a plant to control infestation by a particular insect.
(a) Name the resultant plant after successful insertion of the gene desired.
(b) Summarise the action of the gene introduced.

OR

B. How did an American Company, Eli Lily use the knowledge of rDNA technology to produce human insulin?

SECTION C (3 Marks questions)

Q.22 (a) Sickle cell anaemia in humans is a result of point mutation. Explain. 3
(b) Write the genotypes of both the parents who have produced a sickle cell anaemic offspring.

Q.23 **Set up:** An area with different species of plants. A colour tracer is added to the pollen of species A. 3
Observation: The pollen from species A reaches the flowers of species A as well as species B. However, pollination occurs only with the flower of the species A.
(a) Name and explain the phenomenon underlying this observation.
(b) How can a farmer prevent any more pollen grains from landing on the stigma of flowers of the same species after she has artificially pollinated the flowers?

Q.24 Shown below are some details pertaining to an oral contraceptive pill. Carefully study them and answer the questions that follow. 3

(a) Name ANY TWO reproductive processes blocked by the oral pill shown below.
(b) A patient X took the pills as instructed for one month. Why is there a gap of 7

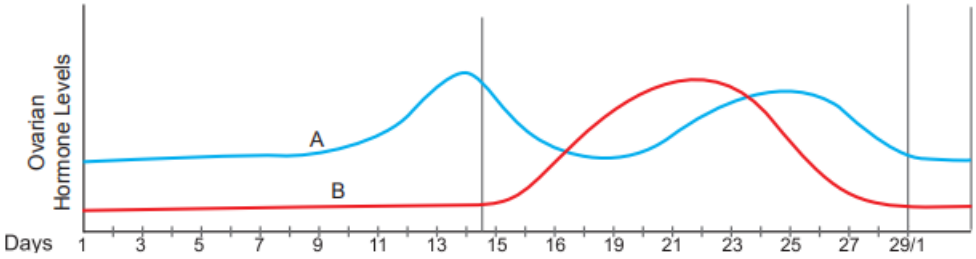
days after 21st day indicated on the pack?
(c) Patient X suspects that her partner is suffering from hepatitis-B. In such a situation:
(i) Would you recommend her to use oral pills shown above as the ONLY contraceptive? Support your answer with a reason.
(ii) What is an alternative contraceptive that can be suggested to patient X and her partner?

Q.25 Explain the changes hnRNA undergoes during its processing to form mRNA. 3

Q.26 (a) How is activated sludge produced during sewage treatment? 3
(b) Explain how this sludge is used in biogas production.

Q.27 Diagrammatically represent the experimental set up that proved Oparin - Haldane hypothesis. 3

Q.28 The graph given below shows the variation in the levels of ovarian hormones during various phases of menstrual cycle: 3



(a) Identify 'A' and 'B'.
(b) Specify the source of the hormone marked in the diagram.
(c) Reason out why A peaks before B.

SECTION D (CASE BASED:4 Marks questions)

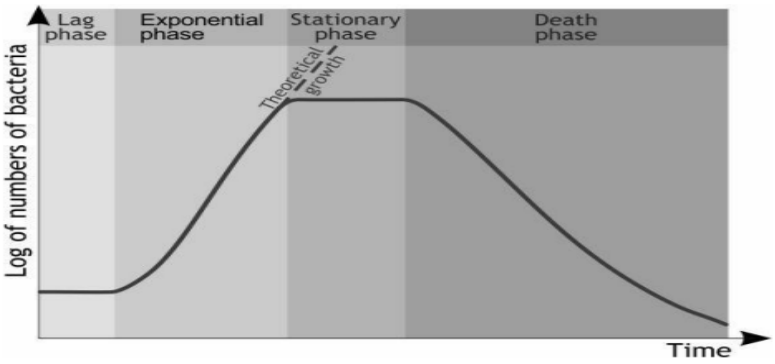
Each question has 3 subparts with internal choice in one subpart.

Q.29 Read the following and answer the questions given below: 4
When we conserve and protect the whole ecosystem, its biodiversity at all levels is protected – we save the entire forest to save the tiger. This approach is called in situ (on site) conservation. However,when there are situations where an animal or plant is endangered or threatened (organisms facing a very high risk of extinction in the wild in the near future) and needs urgent measures to save it from extinction, ex situ (off site) conservation is the desirable approach.
(a) Specify two major characteristic feature of biodiversity hotspots ?
(b) What is common to the techniques (i) in vitro fertilisation, (ii) Cryopreservation and(iii) Tissue culture?
Attempt either subpart (c) or (d).
(c) List any four techniques where the principle of ex-situ conservation of biodiversity has been employed.

OR

(d)Assess the effects of loss of biodiversity in a region. Mention any four such effects.

Q.30 The large-scale production of an organism is generally done in a bio-processor unit/Bioreactor. Given below is the growth curve of a bacteria that is being used for the production of a recombinant molecule. Maintaining sterile conditions is of utmost importance in a bio-processor unit/Bioreactor. Study the graph and answer the questions given below: 4



(a) In which phase are the cells likely to be producing a larger concentration of the recombinant molecule? Why?

(b) In cases where the culture in the bio-processor unit reaches the death phase, identify ONE strategy that can help revive the bio-processing to restart production of the recombinant molecule.

Attempt either subpart (c) or (d).

(c) Name the most commonly used Bioreactor/Bio-processor unit and enlist any of its three important features.

OR

(d) What is the significance of a curved base and a stirrer in a bioreactor?

SECTION E(5 MARKS QUESTIONS)

Q.31 **Attempt either option A or B.** 5

A. (a) Name the two growth models that represent population growth and draw the respective growth curves they represent.

(b) State the basis for the difference in the shape of these curves.

(c) Which one of the growth models represents the growth of bacterial colonies in a growth medium? Give reason in support of your answer.

OR 5

B.Describe the process of decomposition of detritus under the following heads: Fragmentation; leaching; catabolism; humification and mineralisation.

Q.32 **Attempt either option A or B.** 5

A. Define Innate Immunity. Describe the different types of barriers of innate immunity.

OR

B. a) Write the specific name of the genus *Plasmodium* that causes one of the most serious types of diseases in humans. Name the disease. 5

(b) Describe the events in the life cycle of *Plasmodium* which take place in the female *Anopheles* mosquito.

(c) Explain what happens in the RBCs of the humans when *Plasmodium* gains entry into them. How does the human body get affected?

Q.33 **Attempt either option A or B.** 5

A. (a) How do the observations made during moth collection in pre- and post-industrialized era in England support evolution by Natural Selection?

(b) Name and explain the phenomenon that is well represented by Darwin's finches other than natural selection.

OR

B.Study the schematic representation of the genes involved in the lac operon given below and answer the questions that follow: 5

(a) The active site of enzyme permease present in the cell membrane of a bacterium has been blocked by an inhibitor, how will it affect the lac operon?

(b) The protein produced by the i gene has become abnormal due to unknown reasons. Explain its impact on lactose metabolism stating the reason.

(c) If the nutrient medium for the bacteria contains only galactose; will operon be expressed? Justify your answer.