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SECOND PRE-BOARD EXAMINATION 2020-21

Class: XII BIOLOGY (044) Theory

Time: 3 Hours

Maximum Marks: 70

General Instructions:-

- (i) All questions are compulsory.
- (ii) The question paper has **four** sections: **Section A, Section B, Section C and Section D**. There are **33** questions in the question paper.
- (iii) Section–A has 14 questions of 1 mark each and 02 case-based questions of 4 Marks each. Section–B has 9 questions of 2 marks each. Section–C has 5 questions of 3 marks each and Section–D 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 (Q1 to Q14 =1 MARK EACH)

1. Why cattle do not browse on '*Calotropis*'?

OR

A pond has 400 frogs, 40 more were born in a year. Calculate the birth rate of the population.

2. How is repetitive/satellite DNA separated from bulk genomic DNA for various genetic experiments?

3. How does pollination take place in maize and water lily?

OR

Mention the function of tassels of corn cob.

4. Calculate the length of the DNA of bacteriophage lambda that has 48502 base pairs.

5. A Snapdragon plant with violet flowers was crossed with another such plant with white flowers. The F1 progeny obtained had pink flowers. Explain, in brief, the inheritance pattern seen in offspring's of F1 generation?

6. Differentiate between monocistronic transcription unit and polycistronic transcription unit.

OR

Write the central dogma of molecular biology.

7. Predict the effect if, the codon AUG coding for an amino acid Methionine at the 1st position of A-peptide chain of insulin, is mutated to AAG.

8. State a method of cellular defence which works in all eukaryotic organisms.

9. What causes the swelling of the lower limbs in patient suffering from Filariasis?

10. What information is derived by health worker when they measure BOD of a water body?

11. **ASSERTION (A):** *Azolla pinnata* is used as a bio fertiliser in Rice cultivation.

REASON (R): *Azolla* performs nitrogen fixation with the help of symbiotic Bacterium *Bacillus* species

- (a) Both A and R are true, and R is the correct explanation of A.
- (b) Both A and R are true, but R is not the correct explanation of A.
- (c) A is true but R is false.
- (d) Both A and R are false.

OR

ASSERTION (A): Leguminous plants can grow well in Nitrogen deficient soil.

REASON (R): They need little nitrogen.

- (a) Both A and R are true, and R is the correct explanation of A.
- (b) Both A and R are true, but R is not the correct explanation of A.
- (c) A is true but R is false.
- (d) Both A and R are false.

12. **ASSERTION (A):** *E. coli* having pBR322 with DNA insert at BamHI site cannot grow in medium containing Tetracycline.

REASON (R): Recognition site for Bam HI is present in tetR region of pBR322.

- (a) Both A and R are true, and R is the correct explanation of A.
- (b) Both A and R are true, but R is not the correct explanation of A.
- (c) A is true but R is false.
- (d) Both A and R are false.

13. **ASSERTION (A):** Female gametophyte in Angiosperm is 7-celled and 8-nucleate.

REASON (R): Double fertilisation occurs in Angiosperm.

- (a) Both A and R are true, and R is the correct explanation of A.
- (b) Both A and R are true, but R is not the correct explanation of A.
- (c) A is true but R is false.
- (d) Both A and R are false.

14. ASSERTION (A): Alcohol consumption during pregnancy is not desirable.

REASON (R): Alcohol causes physical and mental defects in the offspring called Foetal alcohol syndrome (FAS).

- (a) Both A and R are true, and R is the correct explanation of A.
- (b) Both A and R are true, but R is not the correct explanation of A.
- (c) A is true but R is false.
- (d) Both A and R are false.

15. Read the following and answer **any four** questions from 15 (i) to 15 (v) given below:
(1x4 marks)

Water Pollution

In older sections of Atlanta there are combined sewer systems that are sewers that are designed to collect rainwater run-off, domestic sewage, and industrial wastewater in the same pipe. These overflows, called combined sewer overflows (CSOs) contain not only storm water but also untreated human and industrial wastes, toxic materials, and debris. They are major water pollution concern for the approximately 772 cities in the U.S. that have combined sewer systems. The City of Atlanta is spending about \$3 billion dollars to put in separate storm and waste systems in the metro Atlanta area.

(i) If wastewater is not properly treated, then the environment and human health can be negatively impacted. These impacts can include the diseases like-

- A. Cholera
- B. Pneumonia
- C. Filariasis
- D. Beri-Beri

(ii) The domestic Sewage is different from industrial waste water because it doesn't contain-

- A. Decaying organic matter and debris
- B. Bacteria, viruses and disease-causing pathogens
- C. Metals, such as Mercury, Lead, Cadmium, Chromium and Arsenic
- D. Chemicals in personal care products

(iii) Excessive nutrients, such as Phosphorus and Nitrogen (including Ammonia) in waste water can cause-

- A. Over-fertilization of receiving waters
- B. Reduce available oxygen
- C. Threats to aquatic life
- D. All of these

(iv) Waste water Treatment plants reduce pollutants in waste water by reducing the-

- A. Biochemical Oxygen Demand (BOD)
- B. Dissolved Oxygen Content (DO)
- C. Chemical Oxygen Demand (COD)

D. Aquatic animals

(v) Which one is not a Source of waste water –?

- A. Street run-off
- B. Water used in toilets
- C. Water from industries
- D. Water from underground sources

16. Read the following and answer **any four** questions from 16 (i) to 16 (v) given below:
(1x4marks)

CORONA VIRUSES

Corona viruses (CoV) are a large family of viruses that cause illness ranging from the common cold to more severe diseases such as Middle East Respiratory Syndrome (MERS-CoV) and Severe Acute Respiratory Syndrome (SARS-CoV). A novel corona virus (nCoV) is a new strain that has not been previously identified in humans. Coronaviruses are zoonotic, meaning they are transmitted between animals and people. Detailed investigations found that SARS-CoV was transmitted from Civet Cats to humans and MERS-CoV from Dromedary Camels to humans. Several known Coronaviruses are circulating in animals that have not yet infected humans. Common signs of infection include respiratory symptoms, fever, and cough, shortness of breath and breathing difficulties. In more severe cases, infection can cause pneumonia, severe acute respiratory syndrome, kidney failure and even death. Standard recommendations to prevent infection spread include regular hand washing, covering mouth and nose when coughing and sneezing, thoroughly cooking meat and eggs. Avoid close contact with anyone showing symptoms of respiratory illness such as coughing and sneezing etc.

(i) Name the family of the virus to which new Corona virus belongs.

- A. MERS-CoV
- B. SARS-CoV
- C. N-CoV
- D. CoV

(ii) Which part or organ system of human body is affected by Corona virus?

- A. Nervous system
- B. Muscular & skeletal system
- C. Respiratory system
- D. Digestive system

(iii) Symptoms of Corona virus infection resembles to which viral infection in humans?

- A. Chikungunya
- B. Common cold
- C. Herpes
- D. Hepatitis

(iv) What are the precautions that need to be taken to protect from the Corona virus?

- A. Cover your nose and mouth when sneezing & wear mask securely when outside.
- B. Add more garlic into your diet.
- C. Visit your doctor for antibiotics treatment
- D. Wash your feet after every hour.

(v) Name the molecule which forms genome of Corona virus.

- A. RNA
- B. ds-RNA
- C. DNA
- D. Both DNA & RNA

SECTION B (Q17 to Q25 = 2 MARKS EACH)

17. Can you think of a situation where we deliberately want to make a species extinct? How would you justify it?

OR

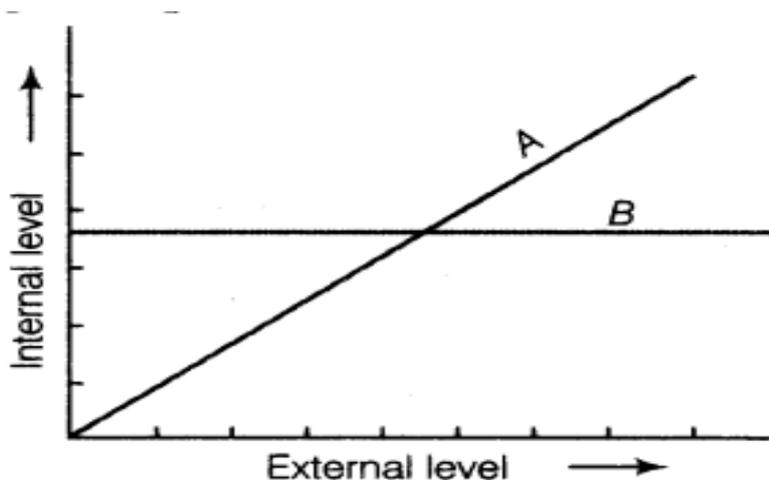
With the help of two examples, enumerate defence mechanisms evolved by prey species to lessen the impact of predation.

18. Why it is essential to have selectable marker in a cloning vector? Cloning vector should ideally have one recognition site for the commonly used endonuclease. Justify.

19. a) Patients who have undergone myocardial infarction are given clot buster. Mention the clot buster administered and its microbial source.

b) A person recuperating from illness is advised to have curd regularly. Why?

20. The following graph represents the organismic response to certain environmental condition (e.g. Temperature)



(i) Which one of these A or B depicts Conformers?

(ii) What does the other line of graph depict?

(iii) How do these organisms differ from each other with reference to Homeostasis?

21. Can an unfertilized, apomictic embryo sac give rise to a diploid embryo? If yes how?

OR

The plant *Yucca* and moth cannot complete their life cycle without each other. Why?

22. With the help of an example differentiate between incomplete dominance and co-dominance.

23. What can be the disorders caused by the following type of aneuploidy –

A. 47 chromosomes with an extra copy of 21st chromosome

B. 47 chromosomes with an extra copy of X chromosome

24. What is the inheritance pattern observed in the size of starch grains and seed shape of *Pisum sativum*? Work out the monohybrid cross showing the above traits. How does this pattern of inheritance deviate from that of Mendelian law of dominance?

OR

In Peas, tallness is dominant over dwarfness, and red colour of flowers is dominant over the white colour. When a tall plant bearing red flowers was pollinated with a dwarf plant bearing white flowers, the different phenotypic groups were obtained in the progeny in numbers mentioned against them:

Tall,Red=138

Tall,White=132

Dwarf,Red=136

Dwarf,White= 128

Mention the genotypes of the two parents and of the four offspring types

25. List any four outbreeding devices that flowering plants have developed and explain how they help to encourage cross-pollination.

SECTION C (Q 26 to Q 30 = 3 MARKS EACH)

26. (a) Represent diagrammatically the Age -pyramid for human population of present day India.

(b) How does an Age -pyramid for human population at a given point of time help the policy – makers in planning for future?

OR

Differentiate between the following: (One difference for each)

- a. Mutualism and Competition
- b. Commensalism and Amensalism
- c. Hibernation and Diapause

27. Why must a cell be made competent in biotechnology experiments. Explain two methods by which a host cell is made competent to take the foreign DNA.

OR

Explain the action of the restriction endonuclease EcoRI.

28. Explain the following assisted reproductive technologies:

- (i) IVF
- (ii) ZIFT
- (iii) GIFT

29. What is the basic principle of vaccination? How do vaccines prevent microbial infections? Name the organism from which Hepatitis B vaccine is produced.

30. Why t-RNA is called as an adaptor molecule? Draw a neat and labelled diagram of Initiator t-RNA.

OR

Explain inducible type of transcriptional level, regulation of gene in brief with diagrams.

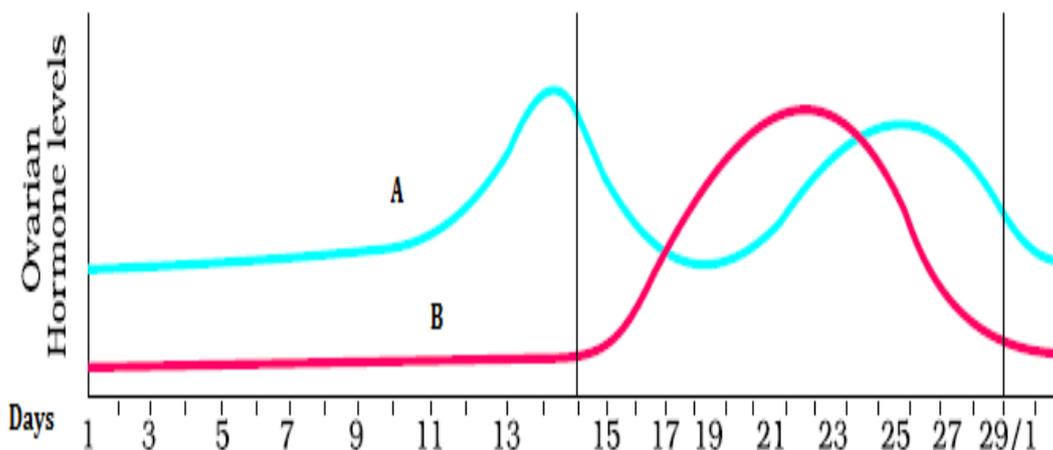
SECTION D (Q31 to Q33 = 5 MARKS EACH)

31. What is meant by RNA interference (RNAi)? Describe in correct sequence the use of this phenomenon to produce Nematode – resistant tobacco plant.

OR

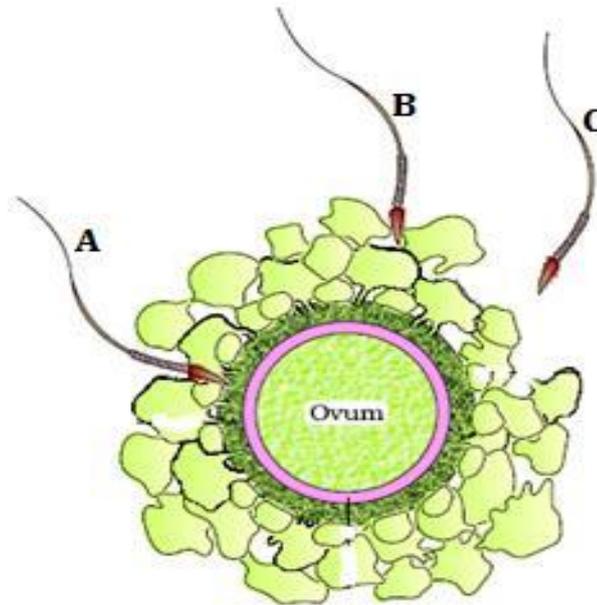
- a. Represent by means of flow chart the steps involved in the process of recombinant DNA technology
- b. What is meant by insertional inactivation?

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



- (a) Identify A and B
- (b) Specify the source of the hormone marked in the diagram.
- (c) Reason out why A peaks before B.
- (d) Compare the role of A and B
- (e) Under which condition will the level of B continue to remain high on the 28th day

OR



(a) Compare the fate of sperms A, B & C shown in the diagram.

(b) What is the role of zona pellucida in this process?

(c) Analyse the changes occurring in the ovum during the process.

(d) Mention what helps in the entry of sperm into the ovum.

(e) Name the region of female reproductive system where the event represented in the diagram takes place.

33. Explain the process of protein synthesis from processed m-RNA.

OR

a. Describe the series of experiments of F. Griffith and comment on the significance of the result obtained

b. State the contribution of Macleod, McCarty and Avery.
