Question Paper Set Code
C

Subject Code:
119

BIHAR BOARD

INTERMEDIATE EXAMINATION – 2019 (ANNUAL)

Questions & Solutions

SUBJECT : BIOLOGY - (विषय: जीव विज्ञान) – (I.Sc.)

Date: 06 February, 2019 | Time : 3 Hours 15 Min. | Full Marks: 70

दिनांक: 06 फरवरी, 2019 | समय: 3 घंटे 15 मिनट | पूर्णांक: 70

Total No. of Questions (कुल प्रश्नों की संख्या): 59

परीक्षार्थियों के लिये निर्देश –

Instructions for the candidates :

1. Candidates are required to give their answers in their own words as far as practicable.
परीक्षार्थी यथा संभव अपने शब्दों में ही उत्तर दें।

2. Figures in the right hand margin indicate full marks.
दाहिनी ओर हाशिये पर दिये हुए अंक पूर्णांक निर्दिष्ट करते हैं।

3. 15 Minutes of extra time has been allotted for the candidates to read the questions carefully.
इस प्रश्न पत्र को ध्यानपूर्वक पढ़ने के लिए 15 मिनट का अतिरिक्त समय दिया गया है।

4. This questions paper is divided into two section – **Section-A** and **Section-B**
यह प्रश्न–पत्र दो खण्डों में है, **खण्ड – अ** एवं **खण्ड – ब**

5. In Section-A, there are 35 Objective type questions which are compulsory, each carrying 1 mark. Darken the circle with blue/black ball pen against the correct option of **OMR** Answer Sheet provided to you. Do not use Whitener/Liquid/Blade/Nail etc. on OMR Sheet; otherwise the result will be invalid.
खण्ड–अ में 35 वस्तुनिष्ट प्रश्न हैं, सभी प्रश्न अनिवार्य हैं। (प्रत्येक के लिए **1 अंक** निर्धारित है।), इनका उत्तर उपलब्ध कराये गये **OMR –** उत्तर पत्रक में दिये गये सही वृत्त को काले/नीले बॉल पेन से भरें। किसी भी प्रकार के व्हाइटनर/तरल पदार्थ/ब्लेड/नाखून आदि का उत्तर पुस्तिका में प्रयोग करना मना है, अन्यथा परीक्षा परिणाम अमान्य होगा।

6. In Section – B, there are **18 short answer** type questions (each carrying **2 marks**), out of which **any 10** question are to be answered. Apart from this, there are **6 Long Answer** Type questions (Each Carrying **5 marks**), out of which **any 3** questions are to be answered.
खण्ड – ब में **18 लघु उत्तरीय** प्रश्न है। (प्रत्येक के लिए 3 **अंक निर्धारित** हैं), जिनमें से किसी **10** प्रश्नों का उत्तर देना अनिवार्य है। इनके अतिरिक्त, इस खण्ड में **6 दीर्घ उत्तरीय प्रश्न** दिये गये हैं (प्रत्येक के लिए **5 अंक** निर्धारित हैं।) जिनमें से किसी **3 प्रश्नों** का उत्तर देना अनिवार्य है।

7. Use of any electronic appliances is strictly prohibited.
किसी प्रकार के इलेक्ट्रॉनिक उपकरण का प्रयोग पूर्णतया वर्जित है।

SECTION-A (खण्ड-A)

Objective Type Questions (वस्तुनिष्ठ प्रश्न)

Questions No. **1 to 35** have four options, out of which only one is correct. You have to mark, your selected option, on the **OMR – Sheet**
प्रश्न संख्या **1 से 35** तक के प्रत्येक प्रश्न के साथ चार विकल्प दिए गए हैं, जिनमें से एक सही है। अपने द्वारा चुने गए सही विकल्प को **OMR – शीट** पर चिन्हित करें।

Q.1 RNAi is used to control pests on which plant
(A)Tobacco (B) Mango (C) Potato (D) Poppy
आर.एन.ए.आई. (RNAi) का प्रयोग रोगाणुओं को नियंत्रित करने हेतु किस पौधे में किया जाता है?
(A) तम्बाकु (B) आम (C) आलू (D) पॉपी
Ans. (A)

Q.2 Cry IAb controls-
(A) Corn Borer (B) Wheat Rust (C) Cotton insects (D) Maize height insects
क्राई IAb किसे नियंत्रित करता हैं?
(A) कॉर्न छेदक को (B) गेहुँ के रस्ट को (C) कपास के कीटों को (D) मक्का के कीटों को
Ans. (A)

Q.3 For Nitrogen fixation in soil we may use
(A) Cyanobacteria (B) Protozoans (C) Nematodes (D) Wheat plants
मृदा में नाइट्रोजन स्थिरीकरण हेतु हम किसका प्रयोग कर सकते हैं?
(A) नील हरित बैक्टीरिया का (B) प्रोटोजोआ का
(C) नेमाटोड्स का (D) गेहुँ के पौधों का
Ans. (A)

Q.4 Transgenic mice may be used for testing of -
(A) The safety of vaccines (B) Efficiency of fertilizers
(C) Doses of antibiotics (D) All of these
ट्रांसजेनिक मूसों (चूहों) का प्रयो किसके लिए कर सकते हैं?
(A) वैक्सीन की सुरक्षात्मक जाँच हेतु (B) उर्वरक की क्षमता के प्रभाव हेतु
(C) प्रतिजैविक की खुराक हेतु (D) इन सभी हेतु
Ans. (D)

Q.5 Restriction enzymes are known as -
(A) Biological guns (B) Molecular scissors
(C) Plasmid (D) Micro pipette
रेस्ट्रिक्शन एन्जाइम जाने जाते हैं–
(A) जैविक बन्दूक के रूप में (B) आणविक कैंची के रूप में
(C) प्लाज्मिड के रूप में (D) माइक्रो पिपेट के रूप में
Ans. (B)

Q.6 Water holding capacity is one of the qualities of -
(A) Soil (B) Plants (C) Water (D) Animals
जल धारण क्षमता इनमें से किसका गुण हैं?
(A) मृदा का (B) पौधों का (C) जल का (D) जन्तुओं का
Ans. (A)

Q.7 Number of deaths during a limited time period and place of a particular population is known as
(A) Natality (B) Mortality (C) Migratory (D) Integrity

किसी खास समय एवं स्थान में किसी खास आबादी में मृत्यु की संख्या को क्या कहते हैं?

(A) नैटेलिटी (B) मोर्टेलिटी (C) माइग्रेटरी (D) इन्टेग्रिटी

Ans. (B)

Q.8 Lac operon represent-

(A) Inducible gene system (B) Repressible gene system

(C) Housekeeping gene system (D) All of these

लेक ऑपेरॉन किसका प्रतिनिधी है?

(A) अनुदेशी जीन क्रियाविधी का (B) दमनकारी जीन क्रियाविधि का

(C) गृह संचालन जीन संरचना का (D) इन सभी का

Ans. (B)

Q.9 Sickle-cell anemia is related to which type of disease?

(A) Sex linked disease (B) Autosomal linked disease

(C) Deficiency disease (D) Metabolic disease

सिकल कोशिका एनिमिया किस प्रकार का रोग हैं?

(A) लिंग सम्बन्धित रोग (B) ऑटोसोम सम्बन्धित रोग

(C) कमी जनित रोग (D) मेटाबोलिक/कार्यिक/चयापचय सम्बन्धित रोग

Ans. (B)

Q.10 The anterior portion of sperm is covered by a cap like structure known as-

(A) Acrosome (B) Mesosome

(C) Episome (D) Spherosome

परिपक्व शुक्राणु के शीर्ष पर एक टोपीनुमा संरचना पायी जाती हैं, उसे क्या कहते हैं?

(A) एक्रोसोम (B) मेसोसोम

(C) एपीसोम (D) स्फेरोसोम

Ans. (A)

Q.11 Brewery is concerned with-

(A) Saccharomyces (B) Protozoans

(C) Pteridophytes (D) Marsupials

ब्रिवरी का सम्बन्ध किससे हैं?

(A) सेक्रोमाइसिस से (B) प्रोटोजोआ

(C) टरिडोफाइट्स से (D) मारसूपियल्स से

Ans. (A)

Q.12 For induction of alien DNA in host cell we may use-

(A) Gene (B) Micro -pipette (C) Both (A) & (B) (D) None of these

बाहरी डी.एन.ए. को मेजबान कोशिका में लाने हेतु किसका उपयोग कर सकते हैं?

(A) जीन गन (B) माइक्रो–पिपेट (C) दोनों (A) व (B) (D) इनमें से कोई नहीं

Ans. (A)

Q.13 Gynoecium is made up of-

(A) Stigma (B) Style (C) Ovary (D) All of these

स्त्री दल चक्र (पुष्पों में) बना हैं–

(A) स्टिगमा (B) स्टाइल (C) ओवरी (D) उपरोक्त सभी से

Ans. (D)

Q.14 S.L Miller is related to-

(A) Origin & Evolution of life (B) Use and disuse theory of evolution

(C) Neo-Darwinism (D) Neo-Lamarckism

एस. एल, मिलर किससे सम्बन्धित हैं?

(A) जीवन की उत्पत्ति एवं विकास से (B) विकासवाद के उपयोग एवं अनुप्रयोग के सिद्धान्त से

(C) नव–डार्विनवाद से (D) नव लेमार्कवाद से

Ans. (A)

Q.15 Uracil is related to-

(A) RNA (B) DNA (C) Both (A) & (B) (D) None of theses

यूरेसिल किससे सम्बन्धित हैं?

(A) आर.एन.ए. से (B) डी.एन.ए. से (C) दोनों (A) व (B) (D) इनमें से कोई नहीं

Ans. (A)

Q.16 amp^R gene is responsible for developing resistance in-

(A) Pest (B) Insect (C) Antibiotic (D) Drought

$ampR^{जीन}$ किसमें प्रतिरोधक क्षमता विकसित करने हेतु उत्तरदायी है?

(A) रोगाणुओं में (B) कीटों में (C) प्रतिजैविक में (D) सूखा के विरूद्ध

Ans. (B)

Q.17 Organic evolution was preceded by chemical evolution, the champions of this theory are

(A) A.I.Oparin and J.B.S.Haldane (B) Charles Darwin

(C) Arrhenius (D) Baptiste Lamarck

कार्बनिक/जैविक विकास से पूर्व रासायनिक विकास हुआ था, इसकी अवधारणा किसके द्वारा दी गयी हैं?

(A) एन.आई. ओपैरिन तथा जे.बी.एस. हल्डेन द्वारा (B) चार्ल्स डारविन द्वारा

(C) आर्हेनियस द्वारा (D) बाप्टिस्ट लैमार्क द्वारा

Ans. (A)

Q.18 Flowers of Vallisneria spp are-

(A) Anemophilous (B) Entomophilous (C) Hydrophilouse (D) Zoophilous

वैलिसनेरिया के पुष्प हैं–

(A) वायुपरागित (B) कीटपरागित (C) जलपरागित (D) जन्तुपरागित

Ans. (C)

Q.19 Amphibians among plants belong to-

(A) Algae (B) Bryophytes (C) Fungi (D) Pteridophytes

पादपों में एम्पीबियन/उभयस्थानी किससे सम्बन्धित हैं?

(A) शैवाल (B) ब्रायोफाइट्स (C) कवक (D) टेरिडोफाइट्स

Ans. (B)

Q.20 B- lymphocytes are produced in-

(A) Bone marrow (B) Thymus (C) Blood (D) Lymph

B- लिम्फोसाइट का निर्माण कहाँ होता हैं?

(A) अस्थि मज्जा में (B) थाइमस मे (C) रक्त में (D) लिम्फ/लसिका में

Ans. (A)

Q.21 Opium is obtained from-

(A) Papaver somniferum (B) Erytroxylum coca

(C) Cannabis savita (D) Atropa belladonna

अफीम किससे प्राप्त होता है?

(A) पापावर सोमनीफेरम से (B) एरिथ्रोजाइलम कोका से

(C) कैनाबिस सटाइवा से (D) एट्रोपा बेलाडोना से

Ans. (A)

Q.22 Amplification of gene for interest may be done by-
(A) MMR (B) PCR (C) MRI (D) All of these
ऐच्छिक जीन के बहुलीकरण हेतु किसका उपयोग कर सकते हैं?
(A) एम.एम.आर. का (B) पी.सी.आर का (C) एम.आर.आई का (D) इन सभी का

Ans. (B)

Q.23 Gametes are usually-
(A) Haploid (B) Diploid (C) Polyploid (D) Nulliploid
युगमक सामान्यतः किस प्रकार के होते है ?
(A) हैप्लायड (एक गुणक) (B) डिप्लायड (द्विगुणक)
(C) पोलीप्लाइड (बहुगुणक) (D) नलीप्लायड (अगुणक)

Ans. (A)

24 Pisciculture is related culture of-
(A) Aquatic plants (B) Aquatic animals (C) Silk worm (D) Lac worm
पिसी कल्चर (मत्स्य पालन) किससे सम्बन्धित है ?
(A) जलीय पौधों से (B) जलीय जन्तुओं से (C) रेशम के कीट से (D) लाह के कीट से

Ans. (B)

25 The phenotypic ratio for F_2 generation in Incomplete dominance is-
(A) 3:1 (B) 2:2 (C) 1:2:1 (D) None of these
F_2 संतती की बाह्यलक्षणी अनुपात प्रभाविता की स्थिति में क्या होता है ?
(A) 3:1 (B) 2:2 (C) 1:2:1 (D) इनमें से कोई नहीं

Ans. (C)

26 Bio reactors provided optional conditions to produce desired-
(A) Product (B) Organism (C) Medium (D) All of these
जैव रिएक्टर, अनुकूलतम परिस्थिति में क्या निर्माण करता है ?
(A) उत्पादक (B) जीव (C) माध्यम (D) ये सभी

Ans. (A)

27 Taichung is a variety of -
(A) Rice (B) Wheat (C) Maize (D) Sugarcane
ताईचुंग इनमें से किसकी किस्म है ?
(A) धान की (B) गेहूँ की (C) मक्का की (D) ईख की

Ans. (A)

28 Uterus is related to-
(A) Male Reproductive system (B) Female Reproductive system
(C) Plant Reproductive system (D) All of these
गर्भाशय किससे सम्बधित है ?
(A) नर जननतंत्र से (B) मादा/ स्त्री जननतंत्र से
(C) पादप जननतंत्र से (D) इन सभी से

Ans. (B)

29 Which of the following is a wrong pair ?
(A) G ≡C (B) T= A (C) A =U (D) T = U
इनमें से कौनसी गलत जोडी है ?
(A) G ≡C (B) T= A (C) A =U (D) T = U

Ans. (D)

30 Climax community is present in which area?
(A) In equilibrium (B) In transition (C) Baer land (D) None of these
चरम समुदाय किस क्षेत्र में पाया जाता है ?
(A) संतुलित क्षेत्र में (B) संक्रमण क्षेत्र से (C) नग्न भूमि से (D) इनमें से कोई नहीं
Ans. (B)

31 Synthesis of RNA on DNA template is known as-
(A) Translation (B) Transcription (C) Transduction (D) Replication
डी. एन. ए. सांचे पर आर. एन. ए. के निर्माण को क्या कहते है ?
(A) ट्रासलेशन (B) ट्रांसक्रिप्शन (C) ट्रासंडक्शन (D) रेप्लीकशन
Ans. (B)

32 Yeast reproduces by means of-
(A) Budding (B) Fragmentation (C) Pollination (D) All of these
यीस्ट में प्रजनन मुख्यतः किसके माध्यम से होता है ?
(A) मुकुलन (B) विखंडीकरण (C) परागण (D) इन सभी के द्वारा
Ans. (A)

33 Dryopithecus is more similar to -
(A) Ape (B) Gorilla (C) Chimpanzee (D) Man
ड्रायोपिथिकस इनमें से किसके अधिक समान थे ?
(A) एप के (B) गोरिल्ला के (C) चिम्पान्जी के (D) मनुष्य के
Ans. (C)

34 Tuberculosis is transmitted by -
(A) Air (B) Water (C) Insect (D) Contact
क्षय रोग का संक्रमण मुख्यतः किसके द्वारा होता है ?
(A) हवा के द्वारा (B) जल के द्वारा (C) कीटों के द्वारा (D) सम्पर्क द्वारा
Ans. (A)

35 In certain cases for early and accurate detection of disease we may use -
(A) ELISA (B) Culture (C) Chemical (D) Analytical
कुछ रोगों की शीघ्र एंव सही पहचान हेतु हम किसका प्रयोग कर सकते है ?
(A) एलाइजा का (B) कल्चर का (C) रसायनों का (D) विश्लेषणात्मक
Ans. (A)

SECTION-B (खण्ड-B)

Non-Objective type Questions (गैर–वस्तुनिष्ठ प्रश्न)

Short Answer Type Questions (लघु उत्तरीय प्रश्न)

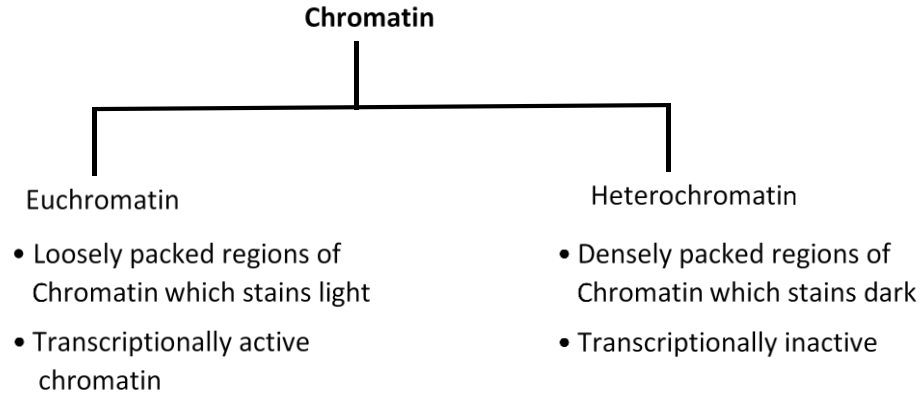
Questions No. **1 to 18** are short answer type. Answer any **10 question**. Each question carries 2 marks Answer should be in maximum 50 words. (10x2=20)
प्रश्न संख्या **1 से 18 लघु** उत्तरीय हैं। किन्ही 10 प्रश्नों के उत्तर दें। प्रत्येक के लिए **2 अंक** निर्धारित हैं। अपना उत्तर अधिकतम 50 शब्दों में दें।

1. Describes the law of segregation with any one example. (2)
किसी एक उदाहरण के साथ पृथक्करण के नियम का वर्णन करें। (2)

Sol. **Law of Segregation :** This law states that the two alleles of a pair segregate or separate during gamete formation such that a gamete receives only one of the two factors. for example heterozygous organism of F1 generation produces two types of gametes i.e. T and t

2. Differentiate between Euchromatin and Heterochromatin. (2)
यूक्रामैटिन एवं हेटरोक्रोमैटिन में अन्तर बतावें। (2)

Sol.



3. What are analogous organs? Give any two examples. (2)
असमजात अंग क्या है ? कोई दो उदाहरण प्रस्तुत करें। (2)

Sol. **Analogous organs** − The pair of organs is not anatomically similar, but performs the same function (e.g., the wings of butterflies and birds). This is called **convergent evolution**

4. Differentiate between Ramapithecus and Dryopithecus. (2)
रामापिथिकस और डायोपिथिकस में अन्तर स्थापित करें । (2)

Sol. Ramapithecus was more man-like while Dryopithecus was more ape-like

5. Describes transcription in brief. (2)
संक्षेप में ट्रान्सक्रिप्शन का वर्णन करें । (2)

Sol. Transcription is the first step in gene expression. It involves copying a gene's DNA sequence to make an RNA molecule. Transcription is performed by enzymes called RNA polymerases, which link nucleotides to form an RNA strand (using a DNA strand as a template).

6. Comment upon Klinefelter syndrome (2)
क्लाइनफेल्टर सिण्ड्रोम पर प्रकाश डालें (2)

Sol. Klinefelter syndrome (sometimes called Klinefelter's, KS or XXY) is where boys and men are born with an extra X chromosome. Chromosomes are packages of genes found in every cell in the body. Two types of chromosome, called the sex chromosomes, determine the genetic sex of a baby.

7. Comment upon G.M.O. (2)
जी.एम.ओ. पर प्रकाश डालें (2)

Sol. A genetically modified organism (GMO) is any organism whose genetic material has been altered using genetic engineering techniques. The exact definition of a genetically modified organism and what constitutes genetic engineering varies, with the most common being an organism altered in a way that "does not occur naturally by mating and/or natural recombination

8. Explain Bio-piracy in brief. (2)
बायो—पाइरसी (जैविक चोरी) का संक्षिप्त प्रस्तुत करें । (2)

Sol. The unethical or unlawful appropriation or commercial exploitation of biological materials (such as medicinal plant extracts) that are native to a particular country or territory without providing fair financial compensation to the people or government of that country or territory

9. What is Amoebiasis ? Name its pathogen and describe the symptoms of the disease. (2)
अमीबियासिस क्या है ? इसके कारक का नाम बतावें एवं इस रोग के लक्षणों का वर्णन करें। (2)

Sol. Entamoeba histolytica is a protozoan parasite in the large intestine of human which causes amoebiasis(amoebic dysentery).
Symptoms of this disease include constipation, abdominal pain and cramps, stools with excess mucous and blood clots.
Houseflies act as mechanical carriers and serve to transmit the parasite from faeces of infected person to food and food products, thereby contaminating them.
Drinking water and food contaminated by the faecal matter are the main source of infection.

10. Describes the ill-effects of alcohol. (2)
शराब /अल्कोहल के दुष्परिणामों का वर्णन करें। (2)

Sol. **Effects of Alcohol/ Drug Abuse**

- Immediate effect − Vandalism, violence, and reckless behaviour
- Drop in academic performance, lack of interest in personal hygiene, rebellious behaviour, and change in eating and sleeping patterns, weight and appetite fluctuations
- Mental, psychological, and financial loss not only to the user, but also to his family
- Those who take drugs intravenously have a high risk of acquiring deadly diseases such as AIDS and hepatitis B.
- Damage to nervous system and liver (cirrhosis) Ultimately, prolonged use of alcohol/drugs leads to coma and death.

11. Comment upon Innate immunity. (2)
अन्तर्जात प्रतिरक्षा पर प्रकाश डालें (2)

Sol. The innate immune system is made of defenses against infection that can be activated immediately once a pathogen attacks. The innate immune system is essentially made up of barriers that aim to keep viruses, bacteria, parasites, and other foreign particles out of your body or limit their ability to spread and move throughout the body.

12. What are adaptations? Explain with example. (2)
अनुकूलन क्या है ? इसका सोदाहरण वर्णन करें। (2)

Sol. Adaptations are certain characteristics that organisms develop in order to survive and reproduce better in their habitat.

- These adaptations can be physiological, behavioural, or morphological.

For example : Desert plants have thick cuticle on their leaf surface and stomata arranged in deep pits to reduce water loss. Their special photosynthetic pathway CAM enables their stomata to remain closed during day time. Their leaves are reduced to spines and photosynthesis is carried out by flattened stems.

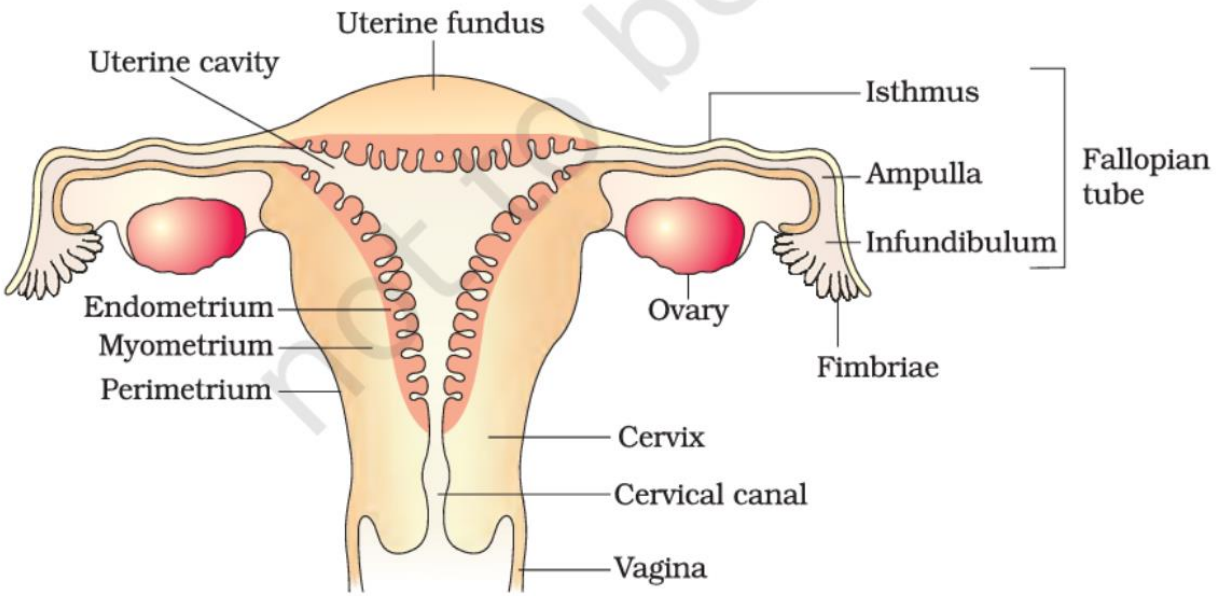
13. What is inbreeding? (2)
अन्तः प्रजनन क्या है ? (2)

Sol. Inbreeding refers to the mating of more closely related individuals within the same breed for 4-6 generations. The breeding strategy is as follows – superior males and superior females of the same breed are identified and mated in pairs. The progeny obtained from such matings are evaluated and superior males and females among them are identified for further mating. A superior female, in the case of cattle, is the cow or buffalo that produces more milk per lactation. On the other hand, a superior male is the bull, which gives rise to superior progeny as compared to those of other males.

14. Draw well labelled diagram of female reproductive system in humans. (2)

मानवों में मादा / स्त्री जनन तंत्र का नामाकिंत चित्र बनावें । (2)

Sol.



15. Comment upon ex-situ conservation. (2)
बाह्य–स्थान संरक्षण पर प्रकाश डालें। (2)

Sol. **Ex** situ conservation means "off-site" conservation. It is the process of protecting an endangered species of plant or animal outside of its natural habitat. For example by removing a part of the population from a threatened habitat and placing it in a new location which may be wild area or within the care of humans.

16. What are allergies? Describes its symptoms in brief. (2)
एलर्जी क्या है ? इसके लक्षणों का सक्षेंप में वर्णन करें। (2)

Sol. The exaggerated response of the immune system to certain antigens present in the environment is called allergy. The substances to which such an immune response is produced are called allergens. The antibodies produced to these are of IgE type. Common examples of allergens are mites in dust, pollens, animal dander, etc. Symptoms of allergic reactions include sneezing, watery eyes, running nose and difficulty in breathing.

17. Comment upon Ethical Issues in context of modern biological advancement. (2)
आधुनिक जैविक विकास के आलोक में नैतिकता के विचार पर प्रकाश डालें। (2)

Sol. Bioethics is the study of the ethical issues emerging from advances in biology and medicine. It is also moral discernment as it relates to medical policy and practice. Issues may include subjects like Abortion, Artificial insemination, Animals. rights etc.

18. Difference between commensalism and Amensalism. (2)
सहभोजिता एंव असहभोजिता में अन्तर बतावें। (2)

Sol. Commensalism: This is the interaction in which one species benefits and the other is neither harmed nor benefited. An orchid growing as an epiphyte on a mango branch, and barnacles growing on the back of a whale benefit while neither the mango tree nor the whale drives any apparent benefit. In commensalism on the other hand one species is harmed whereas the other is unaffected.

दीर्घ उतरीय प्रश्न / Long Answer Type Questions

Question Nos. 19 to 24 are long Answer Type Question carries 5 marks. Answer any 3 questions. Answer should be in maximum 120 words. (3x5=15)

19. What are microbes? Describes their role in human welfare in brief. (5)
सूक्ष्म जीव क्या है ? मानव कल्याण में इनकी भूमिका का संक्षिप्त वर्णन करें । (5)

Sol. A microbe or microorganism is a microscopic organism, which may exist in its single-celled form or in a colony of cells.
Role of microbes in human welfare

(i) Household Applications
Lactic acid bacteria (LAB)
LAB produces acids that coagulate and partially digest milk proteins.
Fermentation- used in
Dosa and idli and Dough making
Cheese making- *Propionibacterium sharmanii* is used in 'Swiss cheese'. 'Roquefort cheese' is ripened by growing fungi

(ii)Industrial applications

- **Fermented beverages**
  Saccharomyces cerevisiae, also called brewer's yeast, is used to prepare wine, beer, whisky, brandy, rum.
- **Antibiotics**
  - Certain microorganisms inhibit the growth of other microorganisms wherever they grow.
  - Penicillin obtained from *Penicillium notatum* by Chain and Florey.

- **Chemicals, enzymes, and bioactive agents**

Microorganism	Substance produced
Fungus *Aspergillus niger*	Citric acid
Bacterium *Acetobacter aceti*	Acetic acid
Bacterium *Clostridium butylicum*	Butyric acid
Bacterium *Lactobacillus*	Lactic acid
Yeast *S.cerevisiae*	Ethanol
Bacterium *Streptococcus*	Streptokinase (used as a clot buster for removing clots from blood vessels of patients with myocardial infarction)
Fungus *Trichoderma polysporum*	Cyclosporin A (used as immune-suppressive agent in organ transplantation)
Yeast *Monascus purpureus*	Statins (lower blood cholesterol levels)

(iii) Microbes in Sewage Treatment

Floc (mesh-like structure of Bacteria and Fungal filaments)are used to decrease the BOD of polluted (waste water)

(iv) Microbes in Production of Biogas

- Methanogens are commonly found in anaerobic sludge (as in sewage treatment) and in the rumen of cattle. In the rumen of cattle, these bacteria help in cellulose digestion.
- Hence, excreta of cattle (*gobar*) are rich in methanogens. Hence methanogens are used to produce Biogas (*gobar gas*)

(v) Microbes as Bio control Agents

- Biological means to eradicate pests can be used.
- *Bacillus thuringiensis* (*Bt*) is used to control butterfly caterpillars.
- Cotton plant with *Bt* gene incorporated is called *Bt*-cotton.
- The fungus *Trichoderma* living in roots of plants acts as a bio control agent against several plant pathogens.
- Baculoviruses, particularly genus *Nucleopolyhedrovirus,*are also used as narrow spectrum insecticidal agents.

(vi) Microbes as bio-fertilizers

- Many bacteria, fungi, and cyanobacteria act as biofertilizers.
- *Rhizobuim*,Mycorrhiza (such as *Glomus)*,Cyanobacteria such as *Nostoc, Anabaena* act as bio-fertilizers.

20. What do you mean by sex? Discuss different types of sex determination in brief. (5)

लिंग क्या है? लिंग निर्धारण के विभिन्न प्रकारों का संक्षिप्त वर्णन करें । (5)

Sol. The differences between male and female sexes are anatomical and physiological. "Sex" tends to relate to biological differences. A sex-determination system is a biological system that determines the development of sexual characteristics in an organism. Most organisms that create their offspring using sexual reproduction have two sexes.

Types

- XO type of sex determination
  - Other than autosomes, at least one X chromosome is present in all insects.
  - Some sperms contain X chromosomes, while some do not.
  - Eggs fertilised by sperms having X chromosomes become females. So, females have two X chromosomes.
  - Eggs fertilised by sperms not having X chromosomes become males. So, males have only one X chromosome.
  - Example of organisms with XO type of sex determination − Insects
- XY type of sex determination
  - Males have X chromosome and its counterpart Y chromosome, which is distinctly smaller. Hence, males are XY.
  - Females have a pair of X chromosomes. Hence, females are XX.
  - Example of organisms with XY type of sex determination − Humans and *Drosophila*
- Male heterogamety − XO and XY types of sex determination are examples of male heterogamety.
  - In XO type, some gametes have X chromosomes, while some gametes are without X chromosomes.
  - In XY type, some gametes have X chromosomes, while some gametes have Y chromosomes.
- Female heterogamety − ZW type of sex determination is an example of female heterogamety.
  - In ZW type, the female has one Z and one W chromosome, while the male has a pair of Z chromosomes.

21. Comment upon cancer in brief. (5)
कैसर पर संक्षिप्त टिप्पणी करें। (5)

Sol. **cancer is uncontrolled division of growth.** The process of development of cancer is called **oncogenic transformation.**

- Normal cells have the property of contact inhibition (stoppage of growth on coming in contact with other cells), but cancer cells lose this property.
- As a result, cancer cells divide continuously to give rise to mass of cells (tumours).
- Tumours are of 2 types − benign and malignant.
- Benign tumours − Remain confined to their original location and do not spread
- Malignant tumours− These exhibit **metastasis** i.e., the cells sloughed from such tumours reach distant sites and wherever they reach, new tumour is formed.
- Malignant tumours actually represent cancer. The cells actively divide, grow, and starve the normal cells of vital nutrients.
- **Causes of cancer**
  - **Carcinogens –** Physical, chemical, and biological agents that cause cancer Example - ionizing radiations (X-rays and gamma rays), non-ionizing radiations (UV)
  - **Oncogenic (cancer-causing) viruses** − They have viral oncogenes (cancer-causing genes).
  - Sometimes normal genes in our body called proto-oncogenes get converted into cellular oncogenes that cause cancer.
- **Diagnosing cancer**
  - Biopsy and histopathological studies

- **Biopsy** − Suspected tissue is cut into thin sections and examined microscopically
- **Radiography**, CT scan (computed tomography), and MRI (Magnetic resonance imaging) are techniques of diagnosing cancers.
- **C T Scan** − 3-D imaging of internals of an organ is generated by X-rays.
- **MRI Scan** − Pathological and physiological changes in a living tissue are detected by using magnetic fields and non-ionising radiations.
- Immunological and molecular biological diagnostic techniques can all be used to detect cancers.
- Identifying certain genes, which make an individual susceptible to cancers, can help to prevent cancers.

- **Treatment of cancer**
  - **Radiotherapy** − Tumour cells are irradiated to death. Also, proper care is taken for protecting surrounding normal tissues.
  - **Chemotherapy** − Drugs specific for particular tumours are used to kill cancer cells. They have side effects such as hair loss, anaemia, etc.

Immunotherapy− Biological response modifiers such as α- interferons are used. They activate the immune system of patient and helps in destroying the tumour

2 2. What is pisciculture ? Mention its role in enrichment of our food. (5)
मतस्य पालन क्या है ? भोजन की गुणवता सुधार में इसकी भुमिका बतावें । (5)

Sol. The cultivation of fishes is called pisciculture.
Fishery is an industry devoted to the catching, processing or selling of fish, shellfish or other aquatic animals. A large number of our population is dependent on fish, fish products and other aquatic animals such as prawn, crab, lobster, edible oyster, etc., for food.
Some of the freshwater fishes which are very common include Catla, Rohu and common carp.
Some of the marine fishes that are eaten include – Hilsa, Sardines, Mackerel and Pomfrets. Find out what fishes are commonly eaten in your area.
Fisheries has an important place in Indian economy. It provides income and employment to millions of fishermen and farmers, particularly in the coastal states. For many, it is the only source of their livelihood. In order to meet the increasing demands on fisheries, different techniques have been employed to increase production. For example, through aquaculture and pisciculture we have been able to increase the production of aquatic plants and animals, both fresh-water and marine.

23. What is sewage? Describes any one method of its treatment in brief. (5)
वाहित मल क्या है ? इनके उपचार की किसी एक विधि का संक्षिप्त विवरण दें। (5)

Sol. Sewage basically consists of human excreta. It may contain many microbes, which may be pathogenic also.

- Sewage disposal is a huge problem. It cannot be directly disposed into rivers and streams. Hence, it has to be treated first in sewage treatment plants (STPs).
- The heterotrophic microbes present in the sewage itself aid in its treatment.

Treatment of sewage includes two stages − primary treatment and secondary treatment.

- **Primary Treatment** − Involves physical removal of particles by filtration and sedimentation
  - Initially, **sequential filtration** is used to remove floating debris.
  - Then, grit (soil + small pebbles) are removed by **sedimentation**. Solids that settle down form the sludge while the supernatant forms the effluent.
  - Effluent is taken for secondary treatment.

- **Secondary Treatment**

- Effluent is passed to aeration tank → Constant agitation → Air pumped → Vigorous growth of bacteria → Floc formation → Consumption of organic matter by bacteria → Decrease in BOD
- BOD is the amount of oxygen required by bacteria to oxidise all the organic matter present in the effluent.
- Naturally, if organic matter decreases → BOD decreases → Pollution decreases
  Floc = Bacteria + Fungal filaments (is a mesh-like structure)
- When BOD and hence pollution is reduced, effluent is passed into a settling tank. Here, flocs settle down and it is known as **Activated Sludge**.

Fate of activated sludge

Small part pumped back to aeration tank where it acts as 'floc' for the next cycle.	Remaining part pumped into anaerobic sludge digesters.

- In anaerobic sludge digesters, anaerobic bacteria act on the activated sludge to produce biogas (CH_4, CO_2, H_2S).
- The effluent from secondary treatment plant is released into water bodies.
- Microbial technology for sewage treatment is so effective that no human technology has been able to beat it till date.