

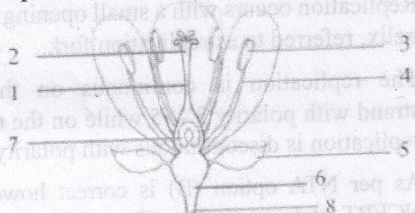
CUET Biology Solved Paper-2022

Held on 18 August 2022

- The protein formed by the encoded gene expression in a heterologous host is called:
 - Structural protein
 - Recombinant protein
 - Transposone
 - Prohormone
- A kind of population interaction in which one species benefits and the other is neither harmed nor benefited?
 - Commensalism
 - Ammensalism
 - Mutualism
 - Parasitism
- Fruit which develop only from the ovary are called-
 - False fruits
 - Parthenocarpic fruits
 - True fruits
 - Apomictic fruits
- Algal blooms do not cause-
 - Imbalance in ecosystem dynamics
 - Deterioration of the water quality and fish mortality
 - Reduction in BOD
 - Increase in organic matters in water body
- Observe the given figure and name the step used in Recombinant DNA Technology



- Selecting
 - Scrolling
 - Spiraling
 - Spooling
- Perisperm differs from endosperm is that it is-
 - Haploid having reserve food
 - Polyploid having reserve food
 - Triploid having no reserve food
 - Diploid having no reserve food
 - Identify and name the two parts in a flower which are most important units of sexual reproduction?



- 1 - Style, 3 - stamen
- 4 - filament, 6 - thalamus
- 3 - Anther, 7 - ovary
- 2 - Stigma, 5 - sepals

- Density of population tells us about-
 - total number of individuals of a species
 - total area occupied by a species
 - number of individuals present per unit space in a given time
 - population growth in a particular time span
- Select the hormones produced in women only during pregnancy
 - Estrogen
 - Human chronic gonadotroph
 - Progesterone
 - Human placental lactogen
 - Relaxin

Choose the correct answer from the options given below:

- B and D only
 - B and E only
 - A, B and C only
 - B, D and E only
- Which of the following is not an example of terrestrial ecosystem?
 - Wetland
 - Grassland
 - Forest
 - Desert
 - Transfer of an ovum collected from a donor into fallopian tube is called _____ method.
 - ZIFT
 - ICST
 - GIFT
 - IVF

- Given below are two statements: one is labelled as Assertion A and the other is labelled as Reason R.

Assertion (A): Leydig cells synthesise and secrete male testicular hormones called androgens.

Reason (R): Androgens, stimulate the process of spermatogenesis.

In the light of the above statements, choose the most appropriate answer from the options given below:

- Both A and R are correct and R is the correct explanation of A
 - Both A and R are correct are R is NOT the correct explanation of A
 - A is correct but R is not correct
 - A is not correct but R is correct
- The inactive protoxin gets converted into an active form due to the _____.
 - Alkaline pH of insect's gut
 - Temperature and acidic pH of gut
 - Exposure to light
 - Exposure to light and acidic pH of gut

14. Which of the following gets embedded in the endometrium during implantation?

- (a) Zygote (b) Morula
(c) Blastocyst (d) Embryo

15. Introduction of which one of the following organism's species did cause decline or extinction of indigenous species?

- (a) Eicchornia Crassipes
(b) Nile Perch
(c) Clarias gariepinus
(d) Steller's Sea cow

16. Match List I with List II

- | LIST I | LIST II |
|-----------------|--|
| A. Progestasert | I. once a week pill |
| B. Saheli | II. hormone releasing IUD |
| C. Lippe's Loop | III. Non-medicated IUD |
| D. Periodic | IV. Natural method of birth abstinence control |

Choose the correct answer from the options given below:

- (a) A - II, B - III, C - I, D - IV
(b) A - I, B - II, C - IV, D - III
(c) A - II, B - I, C - III, D - IV
(d) A - II, B - IV, C - I, D - III

17. The vital link that ensures continuity of species between organisms of one generation and the next generation is

- (a) Male gamete (b) Female gamete
(c) Zygote (d) Syngamy

18. In case of COVID positive patients, presence of corona virus is suspected only when the pathogen has produced a disease symptom. But when the symptoms of the disease has not appeared, the corona virus in the body can be detected by-

- (a) Enzyme linked immuno-sorbent Assay (ELISA) only
(b) Recombinant DNA technology only
(c) Reverse transcriptase Polymerase Chain Reaction (RT-PCR)
(d) Widal Test

19. *Bacillus thuringiensis* is a biocontrol agent against

- (a) Nematode
(b) Fungal pathogen
(c) Insect pests
(d) Bacterial pathogen

20. Arrange the following events in the female reproductive cycle in their natural sequence.

- A. Ovulation
B. Growth of corpus luteum
C. Sudden increase in level of LH
D. Secretion of FSH
E. Growth of ovarian follicle and oogenesis

Choose the correct answer from the options given below:

- (a) E - D - A - B - C
(b) D - E - C - A - B
(c) E - C - A - D - B
(d) D - A - C - E - B

21. Which of the following methods are commonly used in DNA fingerprinting?

- (a) Genetic transformation
(b) PCR and RFLP
(c) Bioprospecting
(d) Molecular diagnosis

22. Which layer of microsporangium is nutritive in function?

- (a) Epidermis (b) Endothecium
(c) Middle Layers (d) Tapetum

23. Match List I with List II

- | LIST I | LIST II |
|-------------------------------|---|
| A. Catalytic converter | I. Particulate matter |
| B. Incinerators | II. Organic waste |
| C. Electrostatic precipitator | III. Hospital Waste |
| D. Sewage treatment plant | IV. Carbon monoxide and nitrogen oxides |

Choose the correct answer from the options given below:

- (a) A - III, B - II, C - IV, D - I
(b) A - IV, B - III, C - I, D - II
(c) A - II, B - III, C - I, D - IV
(d) A - I, B - II, C - IV, D - III

24. During gene therapy, which vector is used to introduce functional ADA cDNA into lymphocyte

- (a) Plasmid (b) Bacteriophage
(c) pBR322 (d) Retrovirus

25. The animals that feed on herbivores like insects, birds and mammals in terrestrial ecosystem, are called _____

- (a) Saprotrophs
(b) Primary consumers
(c) Secondary carnivores
(d) Primary carnivores

26. Recombinant Proteins are expressed in

- (a) Cloning vector
(b) Heterology Host
(c) Homologous chromosomes
(d) Promotor

27. The chemical carcinogens present in tobacco smoke is the major cause of

- (a) AIDS
(b) Lung Cancer
(c) Allergy
(d) Pneumonia

28. Match the features that are required to facilitate cloning of alien DNA into a vector

List I
(Features to facilitate)
List II
(Cloning Vector)

- | | |
|---|---|
| A. Origin of replication I. Agrobacterium (ori) | II. tumefaciens |
| B. Selectable Marker | III. Recognition site commonly used for restriction enzymes |
| C. Cloning sites | IV. Helps in identifying and eliminating non-transformants |
| D. Vectors for cloning genes in plants | V. Sequence from where replication starts |

Choose the correct answer from the options given below

- (a) A-IV, B-III, C-II, D-I
(b) A-I, B-II, C-III, D-IV
(c) A-II, B-III, C-IV, D-I
(d) A-III, B-I, C-II, D-IV

29. Which of the following is effect of steroid in males?

- (a) Premature baldness
(b) Deepening of voice
(c) Excessive hair growth on face and body
(d) Enlargement of clitoris

30. Which of the following cells produce antibodies?

- (a) Monocytes (b) PMNL neutrophils
(c) T-lymphocytes (d) B-lymphocytes

31. Nutrient cycles are of two types:

- (a) Gaseous and solid
(b) Liquid and sedimentary
(c) Gaseous and sedimentary
(d) Aquatic and Gaseous

32. Technology of biogas production in India was developed due to the efforts of

- A. GEAC B. ICAR
C. IARI D. IRRI
E. KVIC

Choose the correct answer from the options given below:

- (a) A and B only (b) C and D only
(c) B and D only (d) C and E only

33. The bacterium responsible for breakdown of cellulose in a biogas plant is

- (a) Acetobacter aceti (b) Lactobacillus
(c) Clostridium (d) Methanobacterium

34. With reference to processing of hn RNA, which of the following statements is/are INCORRECT?

- A. Introns are removed and exons are joined directly splicing.
B. Capping and Tailing occurs at 5' end and 3' end respectively.
C. Addition of 200-300 adenylated residues means capping.

- D. Addition of guanosine triphosphate takes place at 5' end.

- E. Processing take place in the nucleus and converts hn RNA into functional RNA.

Choose the correct answer from the options given below

- (a) B only (b) C only
(c) B and C only (d) B and D only

35. Match List I with List II.

- | | |
|---------------------------------------|--|
| List I
(Name of scientists) | List II
(Discovery) |
| A. Alec Jeffreys | I. Lac Operon |
| B. Francois Jacob | II. Deciphering of genet and Jac-que Monod |
| C. Marshall Nirenberg | III. Semiconservative replication of DNA |
| D. Meselson Stahl | IV. DNA Fingerprint |

Choose the correct answer from the options given below:

- (a) A-IV, B-I, C-II, D-III
(b) A-I, B-III, C-IV, D-II
(c) A-II, B-III, C-I, D-IV
(d) A-IV, B-II, C-III, D-I

36. The pyramid of biomass in sea is generally inverted because:

- (a) Sunlight is filtered through sea water leading to less photosynthesis
(b) Of the high salt content of sea water
(c) The biomass of phytoplankton far exceeds that of fishes
(d) The biomass of fishes far exceeds that of phytoplankton

37. One of the following is NOT a characteristic/criteria of genetic materials, identify it:

- (a) Genetic material should be able to generate its replica
(b) Genetic material should be stable chemically and structurally
(c) It should not provide the scope for mutations
(d) It should be able to express itself in the form of Mendelian characters.

38. Adenine pairs with Thymine through how many hydrogens bonds?

- (a) 2 (b) 3
(c) 4 (d) 5

39. A pure breeding garden pea plant was crossed with a pure dwarf plant. The plant produced 400 seeds.

The seeds were sown to produce plants. The phenotype of the plants in next generation will be

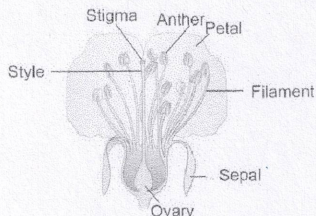
- (a) All tall
(b) All dwarf
(c) 300 tall and 100 dwarf plants
(d) All plants of intermediate height

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40. If in a pond there were 150 carps found last year and through reproduction 450 new carps are added in the pond, what will be the birth rate here?
- 4 offsprings per carp per year
 - 3 offsprings per carp per year
 - 2 offsprings per carp per year
 - 1 offspring per carp per year
41. When the life appear on the earth after its formation?
- After 200 million years
 - After 300 million years
 - After 500 million years
 - After 250 million years
42. According to the early Greek thinkers, the unit of life which were transferred to different planets were-
- Spores
 - Water
 - Oxygen
 - Methane
43. Louis Pasteur by careful experimentation demonstrated that life comes from-
- Killed yeast
 - Rotting matter
 - Other plants
 - Pre-existing life
44. Oparin and Haldane proposed the theory that the first form of life could have come from-
- Non-living organic molecules
 - Inorganic molecules
 - UV rays
 - CO₂ and water
45. The theory of Chemical evolution was studied and tested in laboratory by-
- Charles Darwin
 - S.L. Miller
 - Louis Pasteur
 - Haldane
46. The explant used in tissue culture must show _____
- Encystation
 - Sporulation
 - Dioecy
 - Totipotency
47. Virus free plants of banana are developed by using _____
- Protoplasts
 - Meristem
 - Cotyledon
 - Leaf
48. Pomato is developed by _____ technique.
- Micropropagation
 - Mutation breeding
 - Biofortification
 - Somatic hybridization
49. In tissue culture, the nutrient medium usually contains _____ as a carbon source.
- Sucrose
 - Maltose
 - Carbon dioxide
 - Calcium carbonate
50. Protoplasts are obtained by digestion of _____ of the cells
- Nuclei
 - Plasma membranes
 - Cell walls
 - Proteins

Hints & Explanations

- (b) Option (B) is the correct answer as any protein encoding gene is expressed in a heterologous host is called recombinant protein.
Option (A) is incorrect as structural proteins are the most abundant class of proteins in nature and form structural elements.
Option (C) is incorrect as transposons are repetitive DNA sequences that have the capacity to move from one location to another in genome.
Option (D) is incorrect as prohormones are the precursors of hormones.
- (a) Commensalism is a type of population interaction where one species benefits and the other remains unaffected. It can also be denoted by (+, 0)
- (c) True fruits are developed only from ovary while in false fruits, parts other than ovary also contributes.
- (c) Algal blooms are formed by overproduction of algae in nutrient-rich or eutrophicated water-bodies. They can cause harmful effects on aquatic species by increasing organic matter and thus BOD of water body increases too.
- (d) Option (D) is the correct answer as the given figure represents the process of spooling which is a method of extraction of substance like DNA in the form of a spool over a glass rod.
- (d*) Perisperm is remnant of nucellus and thus is diploid. Endosperm is triploid nutritious tissues
Both endosperm and perisperm store reserve food.
- (c) In the question, most important units of sexual reproduction are asked which are Anther and ovary. So correct option is (C).



- (c) Pollution density generally measured as number of individuals of species present in unit space in a given time.
Percent cover or biomass can also be used for measuring population density
- (d) Option (D) is the correct answer as, hCG (human chorionic gonadotropin), hpL (human placental lactogen) and relaxin are produced in humans only during pregnancy.
Estrogen and progesterone are also secreted in a non-pregnant woman.
- (a) Wetland is an aquatic ecosystem. Rest all are examples of terrestrial ecosystems.

- (c) Option (C) is the correct answer as:
GIFT is the method of transfer of ovum collected from a donor into the fallopian tube of another female who cannot produce one, but can provide suitable environment for fertilisation.
Option (A) is not the correct answer as ZIFT stands for the transfer of zygote (upto 8 blastomeres) into the fallopian tube.
Option (B) is not the correct answer as ICSI is the method of injecting the sperms directly into the ovum *in-vitro*.
Option (D) is not the answer as IVF stands for *in-vitro* fertilisation.
- (a) Option (A) is the correct answer as at the age of puberty due to significant increase in the secretion of gonadotropin releasing hormone there is an increase in the secretion of gonadotropins *i.e.*, LH and FSH. LH acts on the Leydig cells and stimulates synthesis and secretion of androgens.
- (a) Option (A) is the answer as the Bt toxin protein exist as inactive protoxins but once an insect ingests the inactive toxin, it is converted into an active form of toxin due to alkaline pH of the gut which solubilise the crystals.
- (c) Option (C) is the answer as the blastocyst gets embedded in the endometrium of the uterus.
Option (A) is not the answer as zygote is single – celled and it divides mitotically to develop into morula (8-16 celled).
Option (B) is not the answer as morula continues to divide and transforms into blastocyst.
Option (D) is not the answer as embryo with 8 blastomeres is called morula.
- (D*) The correct option given by NTA is option (D) but as per NCERT it should be option (B).
The Nile perch introduced into Lake Victoria led eventually to the extinction of ecologically unique assemblage of more than 200 species of cichlid fish in the lake.
Clarias gariepinus, African catfish pose threat to the indigenous catfish in our rivers.
Eichhornia cause environmental damage and pose threat to our native species.
Stellar's sea cow got extinct due to overexploitation by humans.
- (c) Option (C) is correct answer because
 - Progestasert is a hormone-releasing IUD.
 - Saheli is a 'once a week' pill.
 - Lippe's loop is a non-medicated IUD.
 - Periodic abstinence or rhythm method is a natural method of contraception in which couples abstain sexual intercourse from day 10 to 17 of a 28 days menstrual cycle.

17. (c) The vital link that ensures continuity of species between organisms of one generation and the next generation is the zygote.
The process of fusion of gamete is called syngamy and it results in formation of diploid zygote.
Gametes are reproductive cells of a sexually reproducing organisms.
18. (c) Option (C) is the correct answer because in RT-PCR, RNA of retrovirus is reverse transcribed with the help of enzyme reverse transcriptase. DNA formed is amplified with the help of PCR. So a minute quantity of corona virus can be detected with the help of RT-PCR.
ELISA is based on antigen – antibody reaction.
Widal test is a diagnostic test for typhoid.
19. (c) *Bacillus thuringiensis* is a biocontrol agent against insect pests.
It is introduced in the field crop in order to control butterfly caterpillars (larva)
20. (b) Option (B) is the correct answer because the correct sequence of the events in the female reproductive cycle is :
D – Secretion of FSH
E – FSH leads to the growth of ovarian follicles into a fully mature Graafian follicle
C – During the mid of menstrual cycle, there is sudden increase in the level of LH (LH surge)
A – LH surge leads to ovulation
B – It is followed by luteal phase in which the remaining parts of the Graafian follicle transform as the corpus luteum.
21. (b) PCR and RFLP are used in DNA fingerprinting to increase the sensitivity of the technique.
Bioprospecting is defined as exploring molecular, genetic and species level diversity for products of economic importance.
Molecular diagnosis is referred to as detection of genomic variant.
22. (d) Tapetum is innermost wall layer of microsporangium and it provides nourishment to developing pollen grains, Outer three wall layers, epidermis, endothecium and middle layers perform the function of protection and help in dehiscence of anther to release pollen.
23. (b) When exhaust passes through catalytic converter then carbon monoxide and nitrogen oxide are converted to carbon dioxide and nitrogen gas.
The use of incinerator is crucial for disposal of hospital waste.
Electrostatic precipitator can remove over 99% of particulate matter.
In sewage treatment plant biodegradation of organic matter occurs by microorganisms.
24. (d) Option (D) is correct answer because disarmed retrovirus is used as a vector to introduce functional ADA cDNA into the lymphocytes, which are subsequently returned to the patient.
Plasmids are extra chromosomal double stranded circular DNA present in most of the bacteria.
Bacteriophages are viruses which infect bacteria.
pBR322 is a plasmid vector of *E. coli*.
25. (d) The animals that feed on herbivores are called primary carnivores. These are also called secondary consumers. Herbivores are primary consumers.
Secondary carnivores feed on primary carnivores.
Saprotrophs are decomposers. They act over the dead organic matter.
26. (b) Option (B) is the correct answer because recombinant proteins are expressed in heterologous host. The hosts which have foreign gene are called heterologous hosts.
Option (C) is not the answer because chromosomes which are similar and present together are called homologous chromosomes.
Option (A) is not the answer because cloning vectors are used in genetic engineering for gene transformation.
Option (D) is not the answer because promoter is a type of gene which is helpful in protein synthesis.
27. (b) Option (B) is the correct answer as the chemical carcinogens present in tobacco smoke have been identified as a major cause of lung cancer.
Option (A) is not the answer as AIDS is caused by HIV. It is a sexually transmitted disease.
Option (C) is not the answer as allergy is defined as the exaggerated response of the immune system towards certain antigens present in the environment.
Option (D) is not the answer pneumonia is a bacterial disease of respiratory tract.
28. (a) Option (A) is the correct answer because
 - Origin of the replication (ori) is the sequence from where the replication starts.
 - Selectable markers in vector help in identifying and eliminating non-transformants and selectively permitting the growth of the transformants.
 - Cloning sites are the recognition sites commonly used for restriction enzymes.
 - *Agrobacterium tumefaciens* is used as a cloning vector for plants. It is called as natural genetic engineer of plants.
29. (a) Option (A) is the correct answer because the side effects of the use of anabolic steroids in males include premature baldness, increased aggressiveness, breast enlargement, etc.
The side-effects of the use of anabolic steroids in females include masculinisation, deepening of voice, excessive hair growth on face and body, enlargement of clitoris and abnormal menstrual cycles.
30. (d) Option (D) is the correct answer because the B-lymphocytes produce an army of proteins in response to pathogens into our blood to fight with them. These proteins are called antibodies.
The T-cells themselves do not secrete antibodies but help B cells to produce them.
Neutrophils and monocytes are phagocytic cells included under cellular barriers of innate immunity.
31. (c) Nutrient cycles are of two types:
 - (i) Gaseous cycle – Biogeochemical is non-mineral. Exchange of nutrients occur in gaseous or vapour form. Reservoir pool is atmosphere or hydrosphere. e.g. Nitrogen, Carbon, Oxygen and Hydrogen cycle.

- (ii) Sedimentary cycle – Biogeochemical is mineral. Reservoir pool is earth's crust or lithosphere.
e.g. Sulphur and Phosphorus cycle.
32. (d) The technology of biogas production was developed in India mainly due to the efforts of Indian Agricultural Research Institute (IARI) and Khadi and Village Industries Commission (KVIC)
33. (d) Certain bacteria, which grow anaerobically on cellulosic material, produce large amount of methane along with CO_2 and H_2 . These bacteria are collectively called Methanogens, and one such common bacterium is Methanobacterium.
34. (b) During processing of hn RNA,
(i) Splicing occurs which is removal of introns and joining of exons in a defined order.
(ii) Methyl guanosine triphosphate is added at 5' end of hn RNA. This is called capping.
(iii) Tailing occurs by the addition of adenylate residues of about 200 – 300 at 3' end of hn RNA.
(iv) The fully processed hn RNA is called mRNA and it is transported out of the nucleus for translation.
35. (a)
• The technique of DNA fingerprinting was developed by Alec Jeffreys.
• Jacob and Monod proposed the model of gene regulation, known as Operon model, in bacteria.
• Nirenberg and Matthaei used a synthetic poly U RNA and deciphered the genetic code by translating this as polyphenylalanine.
• Meselson and Stahl proved the semi-conservative model of DNA replication in *E. coli*
36. (d) In sea ecosystem, pyramid of biomass is generally inverted, because the biomass of fishes far exceeds the biomass of producers (phytoplanktons) and primary consumers (zooplanktons), due to their large size and longer life span.
37. (c) A molecule that can act as genetic material must fulfil the following criteria:
(i) It should be chemically and structurally stable.
(ii) It should be able to generate its replica
(iii) It should provide scope for slow mutation that are required for evolution.
(iv) It should be able to express itself in the form of Mendelian characters.
38. (a) Adenine forms two hydrogen bonds with thymine from opposite strand in a DNA molecule.
Similarly, guanine is bonded with cytosine with three hydrogen bonds.
39. (a) Tallness and dwarfness in pea plants are dominant and recessive traits respectively. The cross can be represented as follows:
All are tall.
40. (b) Given: -
Number of individuals last year (N) = 150
Number of individuals added in one year (ΔN) = 450
Time period (ΔT) = 1 year
- $$\text{Birth rate} = \frac{\Delta N}{N \Delta t} = \frac{450}{150 \times 1}$$
- = 3 offsprings per carp per year
41. (c) Option (C) is the correct answer because life appeared 500 million years after the formation of earth, i.e., almost four billion years ago.
42. (a) Option (A) is the correct answer because according to the early Greek thinkers, the unit of life called spores were transformed to different planets including earth. It is still a favourite idea of some astronomers.
43. (d) Option (D) is the correct answer because Louis Pasteur by careful experimentation demonstrated that life comes from pre-existing life.
Theory of spontaneous generation stated that living organisms arise from decaying and rotting matter. This was experimentally disproved by Louis Pasteur.
44. (a) Option (A) is the correct answer because Oparin and Haldane proposed that the first forms of life could have come from pre-existing non-living molecules (e.g. RNA, protein etc.) and that formation of life was preceded by chemical evolution.
45. (b) Option (B) is the correct answer because based on the hypothesis proposed by Oparin and Haldane, S.L. Miller provided an experimental evidence of the chemical evolution in 1953 in a laboratory set-up.
Louis Pasteur dismissed the theory of spontaneous generation once and for all.
46. (d) The capacity to generate a whole plant from any cell/explant is called totipotency.
Therefore, the explant used in tissue culture must show totipotency.
Formation of cyst in unfavourable conditions by unicellular organisms is called encystation.
Sporulation is the production of spores by the organisms such as fungi.
Having male and female sex organs in different individuals is called dioecy.
47. (b) Pathogen free clones of plants can be obtained through meristem culture because meristem is free of virus due to high concentration of auxins and rapid rate of cell division.
48. (d) Pomato was developed by somatic hybridization (protoplast fusion) of two different genera tomato and potato. It is intergeneric somatic hybrid. The method of producing thousands of plants through tissue culture is called micropropagation.
Biofortification is breeding of crops for higher level of nutrients.
Mutation breeding can make crops resistant against diseases.
49. (a) In tissue culture, the nutrient medium usually contains sucrose as carbon source.
50. (c) For protoplast fusion, the two cells of desired plants are first treated with enzymes pectinase and cellulase. These enzymes dissolve the cell wall and as a result naked protoplasts are produced.