CUET (UG)

Biology Sample Paper - 9

Solved

Time Allowed: 45 minutes **Maximum Marks: 200**

General Instructions:

1. The test is of 45 Minutes duration.
2. The test contains 50 questions out of which 40 questions need to be attempted.
3. Marking Scheme of the test:

a. Correct answer or the most appropriate answer: Five marks (+5).
b. Any incorrectly marked option will be given minus one mark (-1).
c. Unanswered/Marked for Review will be given zero mark (0).

Attempt any 40 questions

1. In embryogenesis process, cell division increases the number of cells while cell differentiation help in: **[5]**

a) Formation of new features
b) Modification of existing characters
c) Formation of specialized tissue and organs
d) Increase in size

2. Choose the option that gives the correct number of pollen grains that will be formed after 325 microspore mother cells undergo microsporogenesis. **[5]**

a) 650
b) 975
c) 325
d) 1300

3. What is common between vegetative propagation and apomixes: **[5]**

a) Both are applicable to only dicots
b) Both produce progeny identical to parents
c) Both bypass the flowering plants
d) Both occurs throughout the year

4. Pollen grains are formed inside the: **[5]**

a) petals
b) Ovary
c) Stigma
d) Anther

5. Self-pollination is the transfer of pollen from the anther to the stigma of: **[5]**

a) Different flower of same plant
b) Same flower

c) Same or genetically similar flower of same or another plant

d) Same or different flower of the same plant

6. The phenomenon involved in the formation of female gametophyte is known as: **[5]**

a) Hydrolysis

b) Megasporogenesis

c) Multisporogenesis

d) Microsporogenesis

7. Which of the following plant contain unisexual flower: **[5]**

a) Rose

b) Papaya

c) Hibiscus

d) Lotus

8. Monozygotic twins are produced when: **[5]**

a) There is no cleavage

b) Incomplete cleavage of the zygote

c) The first cleavage of the zygote is followed by separation into two

d) Two ova are fertilized simultaneously

9. In sperm, mitochondria occurs in **[5]**

a) Middle piece

b) Acrosome

c) Head

d) Tail

10. During which month of pregnancy the first movement of fetus is observed: **[5]**

a) Fourth month

b) Fifth month

c) Sixth month

d) Third month

11. Two hormones that regulate the menstrual cycle are: **[5]**

a) FSH and estrogen

b) Estrogens and ostrogen

c) Estrogens and progesterone

d) FSH and ostrogen

12. Which of the following birth control measure can be considered as the safest? **[5]**

a) Termination of unwanted pregnancy

b) The rhythm method

c) The use of physical barriers

d) Sterilization techniques

13. Choose the correct statement regarding the ZIFT procedure: **[5]**

a) Ova collected from a female donor are transferred to the fallopian tube to facilitate zygote formation.

b) Ova collected from a female donor and transferred to the uterus.

c) Zygote is collected from a female donor and transferred to the fallopian tube.

d) Zygote is collected from a female donor and transferred to the uterus.

14. Which condition among the following is lethal? **[5]**

a) 2n + 1

b) 2n - 2

c) 2n + 2

d) 2n – 1

15. Mother and father of a person with O blood group have A and B blood group, respectively. What would be the genotype of both mother and father? **[5]**

a) Mother is homozygous for A blood group and father is heterozygous for B

b) Mother is heterozygous for A blood group and father is homozygous for B

c) Both mother and father are homozygous for A and B blood group, respectively

d) Both mother and father are heterozygous for A and B blood group, respectively

16. Mendel's Law of independent assortment holds good for genes situated on the: **[5]**

a) non-homologous chromosomes

b) homologous chromosomes

c) same chromosome

d) extra nuclear genetic element

17. Which of the following is not a Mendelian disorder? **[5]**

a) Hemophilia

b) Down's syndrome

c) Thalassemia

d) Colour blindness

18. DNA fingerprinting is the basis of paternity testing in case of dispute because: **[5]**

a) Polymorphisms are same in all females.

b) Polymorphisms are same in all male.

c) Polymorphisms are inheritable from parents to children.

d) Polymorphs change from generation to generation.

19. E. coli cells with a mutated Z gene of the lac operon cannot grow in medium containing only lactose as the source of energy because: **[5]**

a) They cannot synthesize functional beta galactosidase.

b) In the presence of glucose, E.coli cells do not utilize lactose.

c) They cannot transport lactose from the medium into the cell.

d) The lac operon is constitutively active in these cells.

20. PCR and Restriction Fragment Length Polymorphism are the methods for **[5]**

a) Genetic fingerprinting

b) DNA sequencing

c) Study of enzymes

d) Genetic transformation

21. The most accepted line of descent in human evolution is: **[5]**

a) Australopithecus → Ramapithecus → Homo erectus → Homo habilis → Homo sapiens

b) Ramapithecus → Homo habilis → Homo erectus → Homo sapiens

c) Australopithecus → Ramapithecus → Homo sapiens → Homo habilis

d) Homo erectus → Homo habilis → Homo sapiens

22. Tendrils in plants are an example of **[5]**

a) Adaptive radiation

b) Convergent evolution

c) Co-evolution

d) Divergent evolution

23. The tendency of population to remain in genetic equilibrium may be disturbed by: **[5]**

a) Lack of mutations

b) Lack of random mating

c) Random mating

d) Lack of migration

24. The virus that causes AIDS affects the most is **[5]**

a) B cells

b) Cytoxic T cells

c) The membrane of lymph nodes

d) Helper T cells

25. Antivenom against snake poison contains: **[5]**

a) Enzymes

b) Antibodies

c) Antigens

d) Antigen-antibody complexes

26. Which of the following infectious disease cannot be controlled by antibiotics? **[5]**

a) Whooping cough
b) Diphtheria
c) Common cold
d) Pneumonia

27. The principle of vaccination is based on the property of: **[5]**

i. Specificity
ii. Diversity
iii. Memory
iv. Discrimination between **self** and **non-self**

a) only iii
b) ii and iii
c) iv and i
d) i and ii

28. The maintenance of hives of honeybees for the production of honey is: **[5]**

a) Bee-culture
b) Monoculture
c) Polyculture
d) Apiculture

29. Which one of the following statements is/are correct for the greatest benefit of shoot tip (meristem) culture is? **[5]**

a. Production of virus-free plants.
b. Development of somaclonal variations.
c. Development of transgenic plants.
d. Large callus formation.

a) only statement ‘d’
b) Only statement ‘c’
c) Only statement ‘a’
d) Only statement ‘b’

30. Continued close inbreeding: **[5]**

a) Development of new variety
b) Increased fertility and productivity
c) Development of impure line
d) Reduce fertility and productivity

31. Cyanobacteria serves as important biofertilizers in the fields of: **[5]**

a) Wheat
b) Rice
c) Maize
d) Sugarcane

32. Baculoviruses are pathogens that: **[5]**

a) Attacks birds and snail

b) Attack insects and other arthropods

c) Promote insects and arthropods

d) Kills useful insects in the field

33. Treatment of wastewater is done by heterotrophic microbes: **[5]**

a) Naturally present in portable water

b) Naturally present in sewage

c) Artificially generated in laboratory

d) Artificially added in sewage water

34. Who among the following was awarded the Nobel Prize for the development of PCR technique? **[5]**

a) Hargovind Khurana

b) Kary Mullis

c) Arthur Kornberg

d) Herbert Boyer

35. The separation and purification of recombinant protein product is called as: **[5]**

a) Tissue culture

b) Extraction

c) Downstream processing

d) Hybridisation

36. Introduction of an alien DNA into a plant host cell is achieved by making them: **[5]**

a) Using lysozymes and chitinase

b) Using microinjections

c) Using gene gun

d) Competent with bivalent ions

37. The Indian parliament has cleared second amendment of the Indian Patents Bills to: **[1]**

a) All of these.

b) Take issues related to patent terms, emergency provisions and research.

c) To prevent patent of turmeric and neem.

d) Protecting patent of Basmati rice by multinational companies.

38. The current interest in the manipulation of microbes, plants, and animals have raised: **[1]**

a) Individual ethical issues

b) Unimportant ethical questions

c) Serious ethical questions

d) Serious biological questions

39. Mediterranean orchid Ophrysensures pollination by **[5]**

a) Brood parasitism
b) Sexual deceit and co-evolution
c) Co-evolution, sexual deceit and pseudo-copulation
d) Pseudocopulation only

40. In Competition, the superior competitor eliminates the inferior one, this statement is called: **[5]**

a) Allen's rule
b) Darwinian fitness
c) Living ability
d) Gause's principle

41. Salt concentration (Salinity) of the sea measured in parts per thousand is: **[5]**

a) 30 – 35
b) 0 – 5
c) 30 – 70
d) 10 – 15

42. The amount of energy flow in an ecosystem generally: **[5]**

a) Decreases at each higher trophic level
b) Remains same at each trophic level
c) Is different in different food chains
d) Increase at each higher trophic level

43. Climax community is in a state of: **[5]**

a) Equilibrium
b) Disorder
c) Constant change
d) Non-equilibrium

44. Which of the following is not a producer? **[5]**

a) Agaricus
b) Spirogyra
c) Nostoc
d) Volvox

45. What is common to Lantana, Eichhornia, and African catfish? **[5]**

a) All the species are neither threatened nor indigenous species of India.
b) All are mammals found in India.
c) All are endangered species of India.
d) All are keystone species.

46. It is observed that the species diversity decreases as we: **[5]**

a) move away from the equator to the poles

b) move from deserts to rain-forests

c) move along the equator

d) move towards the equator from poles

47. Which of the following forests is known as the lungs of the planet Earth? **[5]**

a) Tundra forest

b) Taiga forest

c) Rain forests of North East India

d) Amazon rain forest

48. Electrostatic precipitator is employed to remove: **[5]**

a) Aerosol pollutants

b) Electronic particles

c) Gaseous pollutants

d) Particulate matter

49. Catalytic converters are fitted into automobiles to reduce emission of harmful gases. Catalytic converters change unburnt hydrocarbons into: **[5]**

a) carbon dioxide and water

b) methane

c) carbon monoxide

d) carbon dioxide and methane

50. Which of the following is a not a green house gas? **[5]**

a) CH_4

b) CFC's

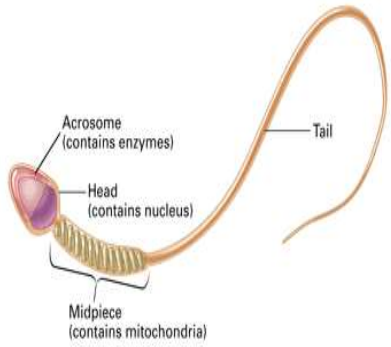
c) O_2

d) CO_2

Solutions

1. **(c)** Formation of specialized tissue and organs
   Explanation: The zygote divides mitotically to produce a number of cells. These cells arrange into different layers and specialised into different tissues to form organs by the process of differentiation.
2. **(d)** 1300
   Explanation: Each microspore mother cell yields 4 pollen grains in a single meiosis. Thus it provides 1300 pollen grains as a result of 325 meiotic divisions in microspore mother cell.
3. **(b)** Both produce progeny identical to parents
   Explanation: Both vegetative propagation and apomixes are types of asexual reproduction that does not involve the fusion of gametes. So, new progeny produced is identical to parents.
4. **(d)** Anther
   Explanation: Pollen grains are formed inside the anther. Stamen contains filament and anther. Inside the anther, the microsporogenesis process takes place to produce haploid pollen grains that form male gametes.
5. **(d)** Same or different flower of the same plant
   Explanation: The transfer of pollen grain from the anther to the stigma of the same flower or different flower of the same plant is called self-pollination. It can be seen in the case of autogamy where the pollen is transferred from anther to the stigma of the same flower. While in the case of geitonogamy it is the transfer of the pollen from the anther of one flower is to the stigma of another flower of the same plant.
6. **(b)** Megasporogenesis
   Explanation: The process of formation of female gametophyte inside the ovary by meiotic and mitotic division is called megasporogenesis.
7. **(b)** Papaya
   Explanation: The flower which contains either male or female reproductive part is called unisexual flower. Papaya plants produce either male or female flowers in separate plants.
8. **(c)** The first cleavage of the zygote is followed by separation into two
   Explanation: Monozygotic twins are produced when the first cleavage of the zygote is followed by separation into two parts that develop independently into two babies.
9. **(a)** Middle piece
   Explanation: Human sperm or spermatozoon (plural spermatozoa) is about 60 micrometer

long. It is divided into : head, neck, mid piece, tail and end piece.



- The head contains acrosome (contain enzymes) and nucleus.
- Midpiece contains mitochondria. They provide energy for motility.
- Tail is essential for swim. Sperms swim to go to egg for fertilization.

10. **(b)** Fifth month
Explanation: The movement of the fetus is observed on the fifth month of pregnancy. In the first month, the heart is formed. In second month limbs and digits are formed. At the end of three months, all major organs and genital organs are formed.

11. **(c)** Estrogens and progesterone
Explanation: The two sex hormones estrogen and progesterone control the menstrual cycle. The level of estrogen hormone increases rapidly during ovulation and progesterone level increases during the secretory phase.

12. **(d)** Sterilization techniques
Explanation: A number of birth control measures are used to prevent unwanted pregnancy. The sterilization technique is considered as the safest way. Condom prevents unwanted pregnancy as well as sexually transmitted diseases.

13. **(c)** Zygote is collected from a female donor and transferred to the fallopian tube.
Explanation: The zygote or early embryos (with up to 8 blastomeres) could then be transferred into the fallopian tube (ZIFT–zygote intrafallopian transfer) and embryos with more than 8 blastomeres, into the uterus (IUT – intrauterine transfer), to complete its further development.

14. **(b)** 2n - 2
Explanation: 2n is a diploid normal condition. The organisms carrying two chromosomes less than normal (2n-2) is lethal for the organism.

15. **(d)** Both mother and father are heterozygous for A and B blood group, respectively
Explanation: To have a child with blood group O, both parents should have to contribute allele i. And if parents have blood groups A and B then they must have been heterozygous for their blood groups.

16. **(a)** non-homologous chromosomes
Explanation: The result of Mendel's law of inheritance shows that the alleles of two traits

do not show any type of linkage and this can be possible if they are present on different or non-homologous chromosomes. If alleles of two traits will be present on the same or homologous chromosomes than they will show some degree of recombination and the result will deviate from result of Mendel's law of inheritance.

17. **(b)** Down's syndrome
Explanation: Mendelian disorders are mainly determined by alteration or mutation in a single gene. These disorders are transmitted to the offspring on the same line as principles of inheritance. Down's syndrome is due to the presence of an additional copy of chromosome number 21.

18. **(c)** Polymorphisms are inheritable from parents to children.
Explanation: Polymorphism is variation at genetic level which occurs due to mutation. Polymorphisms are inheritable from parent to children without any changes so DNA fingerprinting is the basis of paternity testing.

19. **(a)** They cannot synthesize functional beta galactosidase.
Explanation: Bacterium E.coli with a mutated z gene of the lac operon cannot grow in medium containing only lactose as the source of energy because E.coli cannot synthesize functional beta-galactosidase essential for cell wall formation.

20. **(a)** Genetic fingerprinting
Explanation: The main types of Genetic (DNA) fingerprinting methods in use at this time are:
    - **Restriction fragment length polymorphism (RFLP)** analyzes the length of the strands of the DNA molecules with repeating base pair patterns. The drawback with this system is that it requires a considerable amount of DNA in order to be used.
    - **The polymerase chain reaction (PCR)** was developed by Karry Mullis of the Cetus Corporation in 1983 for use in research laboratories for establishing hereditary authentication. The drawback was that it was not as discriminating as the RFLP.
    - **Amplified fragment length polymorphism (AmpFLP)** came into vogue in the '90s and is still popular in the smaller countries involved in the process of DNA fingerprinting.
    - **The short tandem repeat (STR)** methodology for extracting DNA is the system most widely used form of DNA fingerprinting.

21. **(b)** Ramapithecus → Homo habilis → Homo erectus → Homo sapiens
Explanation: The most common descent of human evolution is Ramapithecus → Homo habilis → Homo erectus → Homo sapiens.

22. **(d)** Divergent evolution
Explanation: Divergent evolution

23. **(b)** Lack of random mating
Explanation: The tendency of population to remain in genetic equilibrium may be disturbed by a lack of random mating due to ethics and geographical or other barriers.

24.

(c) The membrane of lymph nodes

Explanation: Lymphadenopathy-associated virus (LAV) a former name for HIV is the virus that causes AIDS. It is membrane of lymph nodes. Lymph node get affected and destroy the defense mechanism of human body.

25.

(b) Antibodies

Explanation: In cases of snakebites, the injection which is given to the patients, contains preformed antibodies against the snake venom.

26.

(c) Common cold

Explanation: Common cold is an infectious disease caused by a virus. It cannot be controlled by antibiotics as antibiotics are not effective against viral disease.

27. **(a)** only iii

Explanation: The principle of vaccination is based on the property of the memory of the immune system. The basic theory of immunization is that the body begins to produce antibodies against it upon administration of the vaccine so that the individual is safe from disease. The body recalls the development of infectious agents and memory cells that can develop antibodies immediately upon further exposure to the infectious agents.

28.

(d) Apiculture

Explanation: The maintenance of beehives of honey bees for the production of honey is called apiculture. Apiculture can be practiced in any area having pasture of herbs and flowering plants.

29.

(c) Only statement 'a'

Explanation: The greatest benefit of shoot tip (meristem) culture is the production of virus-free plants. Shoot meristem is free from virus even in infected plants, so, explant used from shoot tip is used to generate virus-free plants.

30.

(d) Reduce fertility and productivity

Explanation: Continued close breeding leads to reduced fertility and productivity. Close breeding for successive times causes pure line establishment.

31.

(b) Rice

Explanation: Rice fields contain water all the time. In this water, Cyanobacteria grows easily that have the ability to fix atmospheric nitrogen into nitrates and nitrites that increase fertility.

32.

(b) Attack insects and other arthropods

Explanation: Baculoviruses are pathogens that attack insects and other arthropods. The majority of baculoviruses used as biological control agents fall under the genus Nucleopolyhydro virus.

33.

(b) Naturally present in sewage

Explanation: Treatment of wastewater is done by heterotrophic microbes naturally present in sewage released from municipal wastewaters. Sewage contains a number of harmful pathogens causing numerous diseases.

34.

(b) Kary Mullis

Explanation: PCR (Polymerase Chain Reaction) technique was developed by Kary Mullis in 1985, and for this, he received Nobel Prize for chemistry in 1993.

35.

(c) Downstream processing

Explanation: Downstream processing is the separation and purification of the recombinant protein products. Downstream processing and quality control testing vary for different products.

36.

(c) Using gene gun

Explanation: Using gene gun

37.

(b) Take issues related to patent terms, emergency provisions and research.

Explanation: The Patent (Second) Amendment Bill The Patent (Second Amendment) Bill 2000 has been proposed by the Government to bridge the conflict between the TRIPS and the Patent Act, 1970. Thus, it will be wise to deal with the important amendments proposed by Bill of 2000. Further, the need for any further amendment will also be discussed herein. The discussion will be restricted to those amendments, which have relevance to TRIPS. The proposed amendment provides for changes in the -

- Scope of patentable inventions.
- Grant of new rights.
- Extension of the term of protection.
- Provision for reversal of the burden of proof in case of process patent infringement.
- Condition for compulsory licenses.

38.

(c) Serious ethical questions

Explanation: The current interest in the manipulation of microbes, plants, and animals has raised serious ethical questions due to the involvement of multinational companies and other organizations in exploiting bio-resources of other countries.

39.

(c) Co-evolution, sexual deceit and pseudo-copulation

Explanation: Mediterranean orchid Ophrys ensures pollination by co-evolution, sexual deceit, and pseudo-copulation. One petal of flower bears an uncanny resemblance to female of bee in size, colour, and markings.

40.

(d) Gause's principle

Explanation: In competition, a superior competitor eliminates the inferior one. This

statement is called Gause's competitive exclusion principle. Two closely related competing for the same resources cannot co-exist indefinitely and inferior will be eliminated.

41. **(a)** 30 – 35
    Explanation: The salt concentration (measured as salinity in parts per thousand), is less than 5 in inland waters, 30-35 in the sea, and >100 in some hypersaline lagoons.
42. **(a)** Decreases at each higher trophic level
    Explanation: Energy decreases as it moves up trophic levels because energy is lost as metabolic heat when the organisms from one trophic level are consumed by organisms from the next level.
    Trophic level transfer efficiency (TLTE) measures the amount of energy that is transferred between trophic levels.
43. **(a)** Equilibrium
    Explanation: An important characteristic of all communities is that their composition and structure constantly change in response to the changing environmental conditions. This change is orderly and sequential, parallel with the changes in the physical environment. These changes lead finally to a community that is in near equilibrium with the environment and that is called a climax community.
44. **(a)** Agaricus
    Explanation: Agaricus is a fungus which grows on dead and decaying material.
45. **(a)** All the species are neither threatened nor indigenous species of India.
    Explanation: African catfish (*Clarias gariepinus*), Lantana, and water hyacinth (Eichhornia) all are exotic species that are invasive weed species that came from other countries in India.
46. **(a)** move away from the equator to the poles
    Explanation: move away from the equator to the poles
47. **(d)** Amazon rain forest
    Explanation: The Amazon rain forest (it is so huge that it is called the 'lungs of the planet') harbouring probably millions of species is being cut and cleared for cultivating soya beans or for conversion to grasslands for raising beef cattle.
48. **(d)** Particulate matter
    Explanation: Electrostatic precipitator, also called electrostatic air cleaner, a device that uses an electric charge to remove certain impurities either solid particles or liquid droplets from the air or other gases in smokestacks and other fuels.
    The precipitator functions by applying energy only to the particulate matter being collected, without significantly impeding the flow of gases.
49. **(a)** carbon dioxide and water
    Explanation: As the exhaust passes through the catalytic converter, unburnt hydrocarbons are converted into carbon dioxide and water, and carbon monoxide and nitric oxide are changed to carbon dioxide, and nitrogen gas, respectively.
50. **(c)** O_2
    Explanation: Greenhouse gas is a gas in an atmosphere that absorbs and emits radiation

within the thermal infrared range. This process is the fundamental cause of the greenhouse effect.

Many greenhouse gases occur naturally in the atmosphere, such as carbon dioxide, methane, water vapor, and nitrous oxide, while others are synthetic. Those that are man-made include the chlorofluorocarbons (CFCs), hydrofluorocarbons (HFCs), and Perfluorocarbons (PFCs), as well as sulfur hexafluoride (SF_6). Oxygen is not a greenhouse gas.