**CUET (UG)**

**Biology Sample Paper - 8**

**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. Sexual reproduction is a better mode of reproduction because offspring: **[5]**

   a) are identical to one another.
   b) are bigger in size.
   c) have better chances of survival.
   d) faster mode of reproduction.

2. The number of chromosomes in the shoot tip cells of a maize plant is 20. The number of chromosomes in the microspore mother cells of the same plant shall be: **[5]**

   a) 20
   b) 10
   c) 40
   d) 15

3. Select the wrong pair of vegetative propagules from the following pairs. **[5]**

   a) Leaf bud - Bryophyllum
   b) Rhizome - Potato
   c) Eyes - Potato
   d) Rhizome - Ginger

4. Tapetum in pollen grains help in: **[5]**

   a) Provide nourishment to the young microspore mother cell
   b) Help in pollen grain germination
   c) Provide protection to the microspore mother cell
   d) Help in the dispersal of pollen grain

5. In ovule, archesporial cell differentiates from nucleus: **[5]**

   a) At chalazal region
   b) Middle of nucellus

c) Hypodermally in the micropylar region

d) Laterally near endothelium

6. A bilobed dithecous anther had 50 microspore mother cells per microsporangium. How many male gametes this anther can produce: **[5]**

a) 200

b) 400

c) 800

d) 100

7. The outermost and innermost wall layers of microsporangium in an anther are respectively: **[5]**

a) Endothecium and tapetum

b) Epidermis and middle layer

c) Epidermis and endodermis

d) Epidermis and tapetum

8. Several memory ducts join to form wider mammary ampulla which is connected to: **[5]**

a) Alveoli

b) Memory lobes

c) Lactiferous ducts

d) Nipple

9. The mammary glands of female starts producing milk: **[5]**

a) At the end of menopause

b) At the time of puberty

c) At the end of pregnancy

d) Start of pregnancy

10. The release of an egg from the ovary is described as: **[5]**

a) Reproduction

b) Ovulation

c) Insemination

d) Menstruation

11. Cleavage includes the rapid mitotic division of zygote to form a single layered hollow spherical structure called _____. **[5]**

a) Morula

b) Parturition

c) Gastrula

d) Blastula

12. The specialized procedure to form an embryo in a laboratory in which a sperm is directly injected into the ovum is called: **[5]**

a) Zygote intra fallopian transfer

b) Intracytoplasmic sperm injection

c) Intra- uterine insemination

d) Gamete intrafallopian transfer

13. The correct surgical procedure as a contraceptive method is: **[5]**

a) Hysterectomy
b) Vasectomy
c) Ovariectomy
d) Castration

14. It is said that Mendel proposed that the factor controlling any character is discrete and independent. His proposition was based on the: **[5]**

a) results of $F_3$ generation of a cross.
b) observations that the offspring of a cross made between the plants having two contrasting characters shows only one character without any blending.
c) cross pollination of $F_1$ generation with recessive parent
d) self pollination of $F_1$ offsprings

15. Occasionally, a single gene may express more than one effect. The phenomenon is called: **[5]**

a) polygeny
b) pleiotropy
c) multiple allelism
d) mosaicism

16. In human beings, if ovum fertilizes with a sperm carrying X-chromosome the zygote develops into _____. **[5]**

a) Sterile
b) Female
c) Male
d) No fertilization

17. Male heterogamety is present in: **[5]**

a) Birds and Mammals
b) Insects and Birds
c) Mammals and Insects
d) Birds

18. The net electric charge on DNA and histones is: **[5]**

a) zero
b) both negative
c) both positive
d) negative and positive, respectively

19. The technique of DNA fingerprinting has many applications ranging from identifying paternity to finding criminals. The sensitivity of the technique has been increased by the use of _____. **[5]**

a) Sothern blotting
b) Electrophoresis
c) Polymerase chain reaction
d) Variable tendon repeats

20. In rice genome project large insert genomic libraries used as the primary sequencing templates are constructed in **[5]**

a) Bacterial artificial chromosomes (BACs)
b) Yeast mechanical chromosomes (YMCs)
c) Bacterial temporary chromosomes (BTCs)
d) Yeast artificial chromosomes (YACs)

21. Animal husbandry and plant breeding programmes are the examples of: **[5]**

a) Mutation
b) Artificial selection
c) Reverse evolution
d) Natural selection

22. Pre-historic man who gave a proper burial to the dead for the first time was: **[5]**

a) Cro-magnon man
b) Pecking man
c) Neanderthal man
d) Java man

23. Homo sapiens arose in Africa and moved across continents and developed into distinct races during: **[5]**

a) Ice age between 5000-6000 years ago
b) Stone age between 2000-4000 years ago
c) Ice age between 75000-10,000 years ago
d) Stone age between 10,000 years ago

24. Interferons are proteins. In humans they are secreted by: **[5]**

a) Thymus gland
b) Viral infected cells
c) Tonsils
d) B-lymphocytes

25. Which of the following is not a lymphoid tissue? **[5]**

a) Tonsils
b) Pancreas
c) Spleen
d) Thymus

26. The heroine is commonly called smack is chemical: **[5]**

a) Diacetylmorphine
b) Dichlordiethyl acetone
c) Cocaine
d) Diacetylchloride

27. The word Syndrome refers to: **[5]**

a) Deficiency
b) A group of symptoms
c) Retrovirus
d) Disease

28. Evaluation of newly evolved varieties is carried out by: **[5]**

a) ICAR
b) National bureau of plant genetic resources
c) IARI
d) All agricultural universities

29. The class of domesticated fowl or bird used for food or their egg is called: **[5]**

a) Animal husbandry
b) Apiculture
c) Domestication
d) Poultry

30. Gene banks comprise: **[5]**

a) Seed banks, orchards, tissue culture, and cryopreservation
b) Seed banks, tissue culture, and cryopreservation
c) Seed banks and cryopreservation
d) Tissue culture and cryopreservation

31. Agriculture by using only biofertilizers is called: **[5]**

a) Manuring
b) Composting
c) Inorganic farming
d) Organic farming

32. The bioactive molecule used as an immunosuppressive agent during organ transplant is: **[5]**

a) Tetracyclin
b) Streptomycin
c) Statin
d) Cyclosporin-A

33. In which of the following microbes are not used extensively? **[5]**

A. Converting milk into curd.
B. Making cheese of different flavors and tastes.
C. Production of viral drugs.

D. Production of antibiotics.
E. As bio-fertilizers.
F. Production of inorganic fertilizers.

a) Only C and F
b) Only B and C
c) Only C and D
d) Only A and B

34. In Genetic Engineering, to cut DNA at a specific site, the enzyme used is: **[5]**

a) DNA polymerase
b) $\beta$- galactosidase
c) RNA polymerase
d) Restriction enzyme

35. The cloning vector which is used to clone large DNA fragments (> 1000 Kb) is: **[5]**

a) Cosmid
b) Bacteriophage lambda
c) BAC
d) YAC

36. The source organism of Taq polymerase is: **[5]**

a) Bacillus thuringiensis
b) Escherichia coli
c) Agrobacterium tumefaciens
d) Thermus aquaticus

37. Silencing of a gene could be achieved through the use of: **[1]**

a) Both RNAi and antisense RNA
b) RNAi only
c) Antisense RNA only
d) tRNA

38. Gene therapy for the first time was clinically done for: **[1]**

a) Diabetes
b) Rheumatoid fever
c) ADA deficiency
d) Alzheimer's disease

39. Amensalism is an association between two species where: **[5]**

a) One species is harmed and other is not affected.
b) One species is benefitted and other is unaffected.
c) One species is harmed and other is unaffected.
d) Both species are harmed.

40. A population has more young individuals compared to the older individuals. What would be the status of the population after some years? **[5]**

a) It will stabilise
b) It will increase
c) It will first decline and then stabilise
d) It will decline

41. Ecological niche is: **[5]**

a) the surface area of the ocean
b) an ecologically adapted zone
c) formed of all plants and animals living at the bottom of a lake
d) the physical position and functional role of a species within the community

42. Forests controls drought through: **[5]**

a) Increasing rainfall
b) Lot of water plant
c) Retention of water and prevention of soil erosion.
d) Functioning as water shed.

43. Which of the following is an ecosystem service provided by a natural ecosystem? **[5]**

a) Prevention of soil erosion
b) All of these
c) Cycling of nutrients
d) Pollutant absorption and reduction of the threat of global warming

44. The process of mineralisation by micro organisms helps in the release of: **[5]**

a) organic nutrients from humus
b) inorganic nutrients from humus
c) both organic and inorganic nutrients from detritus
d) inorganic nutrients from detritus and formation of humus

45. Which one among the following regions is not a hotspot of biodiversity? **[5]**

a) The Indo-Burma Region
b) The Western Ghats and Sri Lanka
c) The Himalayas
d) Jaintia Hills in Meghalaya

46. _____ is not generally seen in biodiversity hotspots. **[5]**

a) Lesser interspecific competition
b) Endemism
c) Loss of diversity
d) Species richness

47. IUCN (The International Union For Conservation Of Nature And Natural Resources) headquarters is at: **[5]**

a) Gland, Switzerland
b) Paris, France
c) NewYork, USA
d) Vienna, Austria

48. According to the Central Pollution Control Board, the diameter of particles that are responsible for causing great harm to human health is: **[5]**

a) 2.5 micrometer
b) 5.0 micrometer
c) 10.0 micrometer
d) 7.5 micrometer

49. The following represents the different trophic levels of a food chain. Which one has the highest level of DDT deposition in its body? **[5]**

a) Phytoplankton
b) Predatory fish
c) Sea gull
d) Sea crab

50. Acid rain causes **[5]**

a) stone leprosy only
b) marble cancer and farm run-off
c) marble cancer only
d) both marble cancer and stone leprosy

# Solutions

1. **(c)** have better chances of survival.
   **Explanation:** During sexual reproduction male and female gametes are fused together to form a zygote. The gene from two different sources mix together and develop some new features in new progeny. The new traits help the organisms to survive in adverse conditions also.
2. **(a)** 20
   **Explanation:** Meristematic cell (shoot tip cell) and microspore mother cell, both are vegetative cells. Meristematic cells undergo mitotic division to contribute to plant body while microspore mother cells undergo meiotic division to form microspores.
3. **(b)** Rhizome - Potato
   **Explanation:** The wrong pair of vegetative propagules are rhizome-potato. Potato is grown vegetatively by eyes present on underground modified tubers. Vegetative propagation is a mode of asexual reproduction.
4. **(a)** Provide nourishment to the young microspore mother cell
   **Explanation:** Tapetum is the cells surrounding the microspore mother cells. These cells provide nourishment to the young microspore mother cells.
5. **(c)** Hypodermally in the micropylar region
   **Explanation:** In ovule female gamete is formed at micropylar end and three antipodal cells at chalazal end. The two central nuclei are called polar bodies that fuse with one of the male gametes to form endosperm.
6. **(b)** 400
   **Explanation:** Each microspore mother produces 4 pollen grains by reduction division. Bilobed dioecious have four microsporangia. 50 microspore mother cells will produce 50x4=200 pollen grains and 200 pollen grains will give raise to 200x2=400 male gametes
7. **(d)** Epidermis and tapetum
   **Explanation:** A microsporangium is surrounded by four wall layers - the epidermis, endothecium, middle layers, and tapetum. The innermost layer is tapetum and the outermost layer is the epidermis.
8. **(c)** Lactiferous ducts
   **Explanation:** Several memory ducts join to form wider memory ampulla which is connected to lactiferous ducts through which milk is sucked out.
9. **(c)** At the end of pregnancy
   **Explanation:** The mammary gland of female undergo differentiation during the pregnancy and start producing milk towards the end of pregnancy by the process of lactation.

10.

**(b)** Ovulation

**Explanation:** The egg is released from the ovary in the middle of the menstrual cycle. In human beings, one egg is released one month from one ovary. Ovulation is under the control of hormones.

11.

**(d)** Blastula

**Explanation:** A zygote is the product of the fusion of male and female gametes. A large number of cells are formed by the mitotic division that arranges into the layer. The single-layered hollow spherical structure is called a blastula.

12.

**(b)** Intracytoplasmic sperm injection

**Explanation:** Intracytoplasmic sperm injection is a specialized procedure to form an embryo in a laboratory in which a sperm is directly injected into ovum for fertilization to form a zygote.

13.

**(b)** Vasectomy

**Explanation:** Surgical intervention blocks gamete transport and thereby prevent conception. The sterilization procedure in the male is called ‘vasectomy’.

14.

**(b)** observations that the offspring of a cross made between the plants having two contrasting characters shows only one character without any blending.

**Explanation:** When Mendel made a monohybrid cross, he observed in F1 generation that the offspring of the cross made between the plants having two contrasting characters shows only one character without any blending. This led him to conclude that characters are controlled by some discrete units.

15.

**(b)** pleiotropy

**Explanation:** When a gene shows two unrelated phenotypic expressions the phenomenon is known as pleiotropy.

16.

**(b)** Female

**Explanation:** Male produce two kinds of sperms, half carrying X and half-carrying Y sex chromosome besides 22 autosomes. If the ovum is fertilized by sperm carrying X chromosome the sex of the child developed is female.

17.

**(c)** Mammals and Insects

**Explanation:** Male heterogamety is found in both mammals and insects while females are homogametic.

18.

**(d)** negative and positive, respectively

**Explanation:** There is a set of positively charged, basic proteins called histones. The negatively charged DNA is wrapped around the positively charged histone octamer to form a structure called a nucleosome.

19.

**(c)** Polymerase chain reaction

**Explanation:** Polymerase chain reaction (PCR) is a technique used in molecular biology to amplify a single copy or a few copies of a segment of DNA across several orders of magnitude, generating thousands to millions of copies of a particular DNA sequence. This increases the sensitivity of the technique.

20. **(a)** Bacterial artificial chromosomes (BACs)

**Explanation:** Rice genome sequencing is being conducted along the same lines as numerous other large-scale genome sequencing projects.

Large insert genomic libraries, used as the primary sequencing templates, are constructed in bacterial artificial chromosomes (BACs) or P1-derived artificial chromosomes (PACs). The sequencing of the rice genome is being performed mainly from genomic BAC or PAC libraries created from the Nipponbare variety, which was chosen as the common template throughout the IRGSP.

21.

**(b)** Artificial selection

**Explanation:** Animal husbandry and plant breeding programmes are examples of artificial selection. The artificial selection is the modification of species by selective breeding. Animals or plants with desirable characteristics are interbred with the aim of altering the genotype and producing a new strain of the organism for a specific purpose.

22.

**(c)** Neanderthal man

**Explanation:** The Neanderthal man with a brain size of 1400cc lived in the near east and central Asia between 1,00,000-40,000 years back. They used hides to protect their body and buried their dead.

23.

**(c)** Ice age between 75000-10,000 years ago

**Explanation:** Homo sapiens arose in Africa and moved across continents and developed into distinct races. During ice age between 75,000-10,000 years ago, modern Homo sapiens arose. Pre-historic cave art developed about 18,000 years ago. Agriculture came around 10,000 years back and human settlements started.

24.

**(b)** Viral infected cells

**Explanation:** Viral infected cells secret interferon in human.

25.

**(b)** Pancreas

**Explanation:** Pancreas is a mixocrine gland which secretes enzymes as well as hormone.

26. **(a)** Diacetylmorphine

**Explanation:** Heroine or smack is chemically Diacetylmorphine which is a semi-synthetic opioid. It is the 3,6-diacetyl derivative of morphine (hence diacetylmorphine) and is synthesized from it by acetylation. The white, odourless, bitter crystalline form is commonly the hydrochloride salt, diacetylmorphine hydrochloride. It has a high addiction potential.

27.

**(b)** A group of symptoms

**Explanation:** A set of signs and symptoms that appear together and characterize a disease or medical condition. AIDS is an example of a syndrome.

A collection of attitudes or behaviors that go together is often called a syndrome.

28. **(a)** ICAR

**Explanation:** Evaluation of newly evolved varieties is carried out by the Indian council of agricultural research (ICAR) regarding productivity, harmful effect, and effectiveness.

29.

**(d)** Poultry

**Explanation:** Poultry is the class of domesticated fowl or bird used for their meat or their egg. They include chicken, duck, and sometimes turkey and geese.

30. **(a)** Seed banks, orchards, tissue culture, and cryopreservation

**Explanation:** Gene banks comprise Seed banks, orchards, tissue culture, and cryopreservation. Genomes of different plants are preserved for use in genetic programs like plant breeding.

31.

**(d)** Organic farming

**Explanation:** Organic farming is the practice of agriculture in which no chemical substance is used as fertilizers, pesticides, or insecticides. Biofertilizers are used to provide nutrients.

32.

**(d)** Cyclosporin-A

**Explanation:** Cyclosporin-A

33. **(a)** Only C and F

**Explanation:** Microbes are not used in the production of antiviral drugs and the production of inorganic fertilizers. Although, microbes are used in converting milk into curd, antibiotic production, sewage treatment, bread, and cheese industry, etc.

34.

**(d)** Restriction enzyme

**Explanation:** In genetic engineering, restriction enzymes (or restriction endonucleases) are used to cut DNA into smaller fragments at specific nucleotide sequences. Different restriction enzymes recognize and cut different DNA sequences that are joined together using an enzyme ligase.

35.

**(d)** YAC

**Explanation:** Yeast artificial chromosome (YAC) is the vector of choice used to clone a very large DNA fragment (>1000kb) to prepare a genomic library. YAC vector is like a chromosome as it has ARS sequences, centromere sequence, and telomere at the two ends to give stability.

36.

**(d)** Thermus aquaticus

**Explanation:** The source organism of Tag polymerase is Thermus aquaticus

37. **(a)** Both RNAi and antisense RNA
**Explanation:** Both RNAi and antisense RNA can be used for the silencing of specific RNA.

38. **(c)** ADA deficiency
**Explanation:** A four-year-old girl became the first gene therapy patient on September 14, 1990, at the NIH Clinical Center. She has adenosine deaminase (ADA) deficiency, a genetic disease that leaves her defenseless against infections. White blood cells were taken from her, and the normal genes for making adenosine deaminase were inserted into them. The corrected cells were reinjected into her. Dr. W. French Anderson helped develop this landmark clinical trial when he worked at the National Heart, Lung, and Blood Institute.

39. **(c)** One species is harmed and other is unaffected.
**Explanation:** One species is harmed and other species is unaffected.

40. **(b)** It will increase
**Explanation:** The older individuals will die(mortality) soon and younger individuals will reproduce(natality). As the number of younger individuals is more than older one the Natality will be more than mortality and hence population will increase.

41. **(d)** the physical position and functional role of a species within the community
**Explanation:** Each organism has an invariably defined range of conditions that it can tolerate, diversity in the resources it utilizes, and a distinct functional role in the ecological system, all these together comprise its niche.

42. **(c)** Retention of water and prevention of soil erosion.
**Explanation:** The volume of water retained by forests can depend on characteristics such as forest cover area, the length of vegetation growing season, tree composition and tree density, as well as the age and the number of layers of vegetation cover. Water retention by forests affects the amount and timing of the water delivered to streams and groundwater by increasing and maintaining the infiltration and storage capacity of the soil. Forests can soak up excess rainwater, preventing run-offs and damage from flooding. By releasing water in the dry season, forests can also help provide clean water and mitigate the effects of droughts. Drought is due to less rainfall.

43. **(b)** All of these
**Explanation:** The products of ecosystem processes are named as ecosystem services, for example, healthy forest ecosystems purify air and water, mitigate droughts and floods, cycle nutrients, generate fertile soils, provide wildlife habitat, maintain biodiversity, pollinate crops, provide storage site for carbon and also provide aesthetic, cultural, and spiritual values.

44. **(b)** inorganic nutrients from humus

**Explanation:** The humus is further degraded by some microbes and the release of inorganic nutrients occurs by the process known as mineralisation.

45. **(d)** Jaintia Hills in Meghalaya
**Explanation:** The hotspot area includes all the seven districts, i.e. East Garo Hills, West Garo Hills, South Garo Hills, East Khasi Hills, West Khasi Hills, Jaintia Hills and Ri-Bhoi
46. **(a)** Lesser interspecific competition
**Explanation:** Lesser interspecific competition is not generally seen in biodiversity hotspots.
47. **(a)** Gland, Switzerland
**Explanation:** IUCN (The International Union For Conservation Of Nature And Natural Resources) employs approximately 1000 full-time staff in more than 50 countries. Its headquarters are in Gland, Switzerland. IUCN has observer and consultative status at the United Nations and plays a role in the implementation of several international conventions on nature conservation and biodiversity.
48. **(a)** 2.5 micrometer
**Explanation:** According to the Central Pollution Control Board (CPCB), particulate size 2.5 micrometers or less in diameter (PM 2.5) are responsible for causing the greatest harm to human health. These fine particulates can be inhaled deep into the lungs and can cause breathing and respiratory symptoms, irritation, inflammations, and damage to the lungs and premature deaths.
49. **(c)** Sea gull
**Explanation:** Biomagnifications is the increase in the concentration of a compound in the tissue of organism as the compound passes up a food chain usually as a result of food intake. This results from the accumulation of the compound at each trophic level prior to its consumption “by organisms at the next trophic level. Most chlorinated hydrocarbon like DDT shows biomagnifications. Level of concentration of compound increases in higher trophic level as shown in the following chain.
Water $\longrightarrow$ phytoplanktons $\longrightarrow$ zooplanktons $\longrightarrow$ insects $\longrightarrow$ fish $\longrightarrow$ large fish
Higher the trophic level higher will be the accumulation of organic compounds. Hence seagull is likely to have the highest level of DDT deposition in its body.
50. **(d)** both marble cancer and stone leprosy
**Explanation:** Acid rain causes marble cancer and stone leprosy both. The sulphuric acid and nitric acid present in acid rain reacts with calcium carbonate present in marbles and stone to breakdown them.