CUET (UG)

Biology Sample Paper - 6

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. Which of the following organism produce gemmules as an asexual reproductive structure? **[5]**

a) Hydra
b) Sponges
c) Penicillium
d) Chlamydomonas

2. Asexual reproduction is common in: **[5]**

a) Monera and Animalia
b) Protists and Monerans
c) Plantae and Animalia
d) Protists and Plantae

3. Anther is _____. **[5]**

a) Diploid
b) Quadpolide
c) Triploid
d) Haploid

4. In a typical complete, bisexual and hypogynous flower the arrangement of floral whorls on the thalamus from the outermost to the innermost is: **[5]**

a) Calyx, corolla, androecium, and gynoecium
b) Gynoecium, androecium, corolla, and calyx
c) Androecium, gynoecium, corolla, and calyx
d) Calyx, corolla, gynoecium, and androecium

5. The embryo sac is present inside: **[5]**

a) Embryo
b) Seed

c) Ovule
d) Endosperm

6. Continued self-pollination results in inbreeding depression as they: **[5]**

a) Help in evolution
b) Produce pure line
c) New genes are accumulated
d) Mutation is established

7. A pollen grain of a large number of species can be stored in: **[5]**

a) Liquid sulphur dioxide
b) Liquid nitrogen
c) Liquid carbon dioxide
d) Liquid oxygen

8. Insemination involves: **[5]**

a) The fusion of male and female gamete
b) Release of seminal fluid at the end of copulation
c) Passage of semen into the prostate gland
d) Mixing of seminal fluid with sperm

9. The membranous cover of the ovum at ovulation is: **[5]**

a) Chorion
b) Zona pellucida
c) Corona radiata
d) Zona radiata

10. A sperm cell moving from the lumen of the seminiferous tubule to the exterior of the body passes through all of the following structures except the: **[5]**

a) Vas deferens
b) Epididymis
c) Seminal vesicle
d) Urethra

11. Which of the following hormones are active during the ovulatory phase of menstrual cycle in a normal human female? **[5]**

a) FSH and LH
b) LH and Estrogen
c) FSH and Estrogen
d) Estrogen and Progesterone

12. Which of the following procedure is not correctly matched? **[5]**

a) GIFT- Gamete intrafallopian transfer
b) ICSI- Intra cytoplasmic sperm injection

c) ZIFT- Zygote inters fertilization transfer.

d) IUI- Intra uterine insemination

13. The method of directly injecting a sperm into ovum in Assisted Reproductive Technology is called: **[5]**

a) ZIFT

b) ICSI

c) GIFT

d) ET

14. Which genetic disorder is caused due to the presence of an additional copy of X-chromosome resulting in a karyotype of 47, XXY. **[5]**

a) Down's Syndrome

b) Anemia

c) Turner's Syndrome

d) Klinefelter's Syndrome

15. ZZ/ZW type of sex determination is seen in: **[5]**

a) Cockroach

b) Platypus

c) Peacock

d) Snails

16. Mendel's "factors" that remain stable over generation to generation is now called as: **[5]**

a) Chromosomes

b) DNA

c) Traits

d) Genes

17. In human males, some recessive genes express their effect because: **[5]**

a) Only two sex chromosome

b) Only one Y-chromosome

c) Single genome

d) Only one X-chromosome

18. If Meselson and Stahl's experiment is continued for four generations in bacteria, the ratio of N^{15}/N^{15}: N^{15}/N^{14}: N^{14}/N^{14} containing DNA in the fourth generation would be: **[5]**

a) 1:1:0

b) 0:1:3

c) 0:1:7

d) 1:4:0

19. A woman whose blood group is unknown marries a man with blood group **B**. The first child born to the couple has blood group **O** whereas their second child born after four years has blood group **AB**. The possible blood group of the woman and its genotype on the basis of ABO blood grouping is: **[5]**

a) Blood group B, I^BI^O

b) Blood group A, I^AI^O

c) Blood group AB, I^AI^B

d) Blood group O, I^OI^O

20. The sequence of structural gene in lac operon concept is: **[5]**

a) lac Z, lac Y, lac A

b) lac Y, lac Z, lac A

c) lac A, lac Z, lac Y

d) lac A, lac Y, lac Z

21. Evolution of modern man is most interesting and appears parallel evolution of: **[5]**

a) Body height and weight

b) Human brain and language

c) Human brain and height

d) Height and body hairs

22. In nature, the process by which different organisms evolve similar traits is called: **[5]**

a) Divergent evolution

b) Genetic drift

c) Artificial selection

d) Convergent evolution

23. Which one of the following was not present during the Mesozoic Era of the geological time scale? **[5]**

a) Bryophytes

b) Ginkgos

c) Ferns

d) Horsetails

24. The sporozoites that cause infection when a female Anopheles mosquito bites a person, are formed in: **[5]**

a) RBCs of mosquito

b) salivary glands of mosquito

c) liver of the person

d) gut of mosquito

25. The incubation period of Hepatitis 'B' virus is: **[5]**

a) 30-180 days

b) 15-20 days

c) One week

d) 42-56 days

26. AIDS day is: **[5]**

a) June 1

b) December 1

c) May 1

d) December 20

27. Use of drug and alcohol by a youngster is motivated by: **[5]**

a. Need for adventure and excitement.

b. Experimentation.

c. Relaxation from problems.

a) Only 'b' and 'c' is correct

b) All statements are wrong

c) Only 'a' and 'c' is correct

d) Only 'a' and 'b' is correct

28. For converting an inferior local breed into the superior breed, cross-breeding with the same types of the superior bull is required for: **[5]**

a) 4-5 generations

b) 2-3 generations

c) 1-2 generations

d) 6-7 generations

29. Bagging is done to: **[5]**

a) Avoid cross-pollination

b) Avoid self-pollination

c) Prevent contamination from unwanted pollen

d) Achieve the desired pollination

30. Hybrid vigour is mostly due to: **[5]**

a) Homozygosity of pure characters

b) Heterozygosity

c) The superiority of all the genes

d) Mixing up of cytoplasm

31. Which one of the following is used as biological insecticide? **[5]**

a) Caterpillar

b) Mazra Poka

c) Silkmoth

d) Tiger beetle

32. The technology of biogas production was developed in India mainly due to the efforts of: **[5]**

a) Pusa Agriculture

b) ICRI and KVIC

c) IARI and KVIC

d) ISRO

33. The residue left after methane production from cattle dung is: **[5]**

a) Buried in landfills

b) Used in civil construction

c) Burnt

d) Used as manure

34. Agarose gel is used for electrophoresis because: **[5]**

a) It is inert

b) It is a polysaccharide

c) It is cheap

d) It is easily extractable

35. Which one of the following nucleotide sequence in DNA is recognised by ECoRI **[5]**

a) $5'G \overset{\downarrow}{-} A-A-T-T-C-3'$
$3'C-T-T-A-A \underset{\uparrow}{-} G-5'$

b) $5'G-A-A-T \overset{\downarrow}{-} T-C-3'$
$3'C-T \underset{\uparrow}{-} T-A-A-G-5'$

c) $5'G-A \overset{\downarrow}{-} A-T-T-C-3'$
$3'C-T-T-A \underset{\uparrow}{-} A-G-5'$

d) $5'G-A-A \overset{\downarrow}{-} T-T-C-3'$
$3'C-T-T \underset{\uparrow}{-} A-A-G-5'$

36. Significance of 'heat shock' method in bacterial transformation is to facilitate: **[5]**

a) Expression of the antibiotic resistance gene.

b) Binding of DNA to the cell wall.

c) Uptake of DNA through transient pores in the bacterial cell wall.

d) Uptake of DNA through membrane transport proteins.

37. Rosie's milk is enriched nutritionally as it has: **[1]**

a) Beta lactalbumin

b) Human gene alpha lactalbumin

c) lactose

d) Vitamin A

38. The first transgenic cow is: **[1]**

a) Rosie

b) Rama

c) Anandi

d) Nandi

39. Antagonistic interactions will include: **[5]**

a) Neutralism

b) Symbiosis

c) Predation and parasitism

d) Commensalism

40. Lichens are association of: **[5]**

a) Alga and bacterium

b) Algae (Cyanobacteria) and fungus

c) Fungus and alga

d) Fungus and virus

41. What would be the percent growth or birth rate per individual per hour if a population of 50 Paramoecium present in a pool increases to 150 after an hour? **[5]**

a) 100%
b) 50%
c) 150%
d) 200%

42. The metabolic process which causes a reduction in gross primary production: **[5]**

a) Excretion
b) Respiration
c) Transportation
d) Digestion

43. A tree providing food to several herbivores and parasitic organisms will represent: **[5]**

a) An upright pyramid of number
b) An inverted pyramid of biomass
c) None of these
d) An inverted pyramid of number

44. Among the following bio-geo-chemical cycles which one does not have losses due to respiration? **[5]**

a) Phosphorus
b) Nitrogen
c) Sulphur
d) All of these

45. Which of the following is not the importance of biosphere reserves? **[5]**

a) Monitoring of development and conservation programme
b) Conservation of genetic resources, species and ecosystem
c) Restoring extinct species of plants and animals
d) Restoration of degraded ecosystems and habitats

46. Hot spots are places where: **[5]**

a) High degree of habital loss
b) All of these
c) High degree of endemism
d) High degree of species richness

47. The active chemical drug reserpine is obtained from: **[5]**

a) Atropa
b) Datura
c) Rauwolfia
d) Papaver

48. The polluting strength of sewage is usually characterized by its: **[5]**

a) Ozone content

b) Nitrogen content

c) Eutrophication

d) BOD

49. Chipko movement originated in **[5]**

a) Panchmari in M.P

b) Silent valley of H.P.

c) Kangra valley of H.P.

d) Tehri Garwal of U.P.

50. Reserpine is obtained from **[5]**

a) Taxus brevifolia

b) Catheranthus roseus

c) Cinchona officinalis

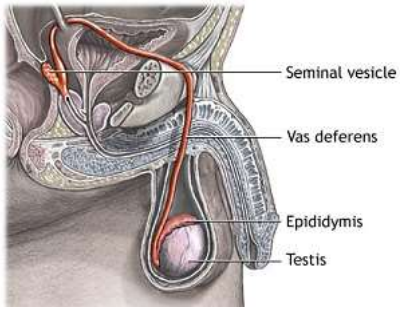
d) Rauwolfia vomitoria

Solutions

1. **(b)** Sponges
   Explanation: Gemmules are an asexual reproductive structure produced by sponges. Chlamydomonas produce zoospores, hydra produce buds and Penicillium produces conidia.
2. **(b)** Protists and Monerans
   Explanation: Asexual reproduction is common in Protists and Monera. Both these kinds include organisms having a single-celled body. Binary and multiple fissions are generally followed for the asexual mode of reproduction.
3. **(a)** Diploid
   Explanation: Anthers are produced from diploid cells without undergoing to meiosis cell division so, anther are diploid. Pollens grains are produced inside the anther by meiosis division to produce haploid gametes.
4. **(a)** Calyx, corolla, androecium, and gynoecium
   Explanation: In a typical bisexual flower, the arrangement of floral whorls on the thalamus from the outermost to the innermost is always as calyx, corolla, androecium, and gynoecium.
5. **(c)** Ovule
   Explanation: The embryo sac is located inside the ovule that acts as female gametes. Egg fertilization and subsequent embryo development occur inside the embryo sac. The endosperm is triploid and provides nutrition to embryo.
6. **(b)** Produce pure line
   Explanation: Self-pollination involves the transfer of pollen grain from the anther to the stigma of the same flower. The two fusing gametes are genetically similar to each other as they are produced by the same plant. Continued self – pollination results in pure line and breeding depression.
7. **(b)** Liquid nitrogen
   Explanation: Pollen grain consists of hard covering of exine but their viability may be lost with time. For Hybridization, pollen grains are collected and stored in liquid nitrogen below -196^{0}Celsius temperature.
8. **(b)** Release of seminal fluid at the end of copulation
   Explanation: Transfer of male gametes into the female genital tract is called insemination. Semen contains glucose, protein along with sperms. Insemination occurs during coitus.
9. **(c)** Corona radiata
   Explanation: The outermost membranous cover of the ovum at ovulation is corona

radiata formed by follicular cells. Inner to corona radiata is zona pellucida, which is made up of three different glycoproteins secreted by the ovum itself.

10. **(c)** Seminal vesicle
Explanation: The testes are where sperm are manufactured in the scrotum. The epididymis is a tortuously coiled structure topping the testis, and it receives immature sperm from the testis and stores it several days. When ejaculation occurs, sperm is forcefully expelled from the tail of the epididymis into the deferent duct. Sperm then travels through the deferent duct through up the spermatic cord into the pelvic cavity, over the ureter to the prostate behind the bladder. Here, the vas deferens joins with the seminal vesicle to form the ejaculatory duct, which passes through the prostate and empties into the urethra.



11. **(a)** FSH and LH
Explanation: The ovulatory phase begins with a surge in luteinizing hormone and follicle-stimulating hormone levels. Luteinizing hormone stimulates egg release (ovulation), which usually occurs 16 to 32 hours after the surge begins.

12. **(c)** ZIFT- Zygote inters fertilization transfer.
Explanation: ZIFT- Zygote intrafallopian transfer is part of the test-tube baby program in which in vitro fertilized zygote is transferred to a fallopian tube for implantation and further growth of foetus.

13. **(b)** ICSI
Explanation: Intracytoplasmic sperm injection (ICSI) is a specialized procedure to form an embryo in the laboratory in which a sperm is directly injected into the ovum.

14. **(d)** Klinefelter’s Syndrome
Explanation: Klinefelter’s Syndrome is a genetic disorder that has overall masculine development due to the presence of an extra X sex chromosome. Such individuals are sterile.

15. **(c)** Peacock
Explanation: ZZ/ZW type of sex determination is seen in all birds. In birds females are heterogamous.

16. **(d)** Genes
Explanation: Mendel’s factors that remain stable over generation to generation are called genes. Genes are the structural and functional unit of inheritance.

17.

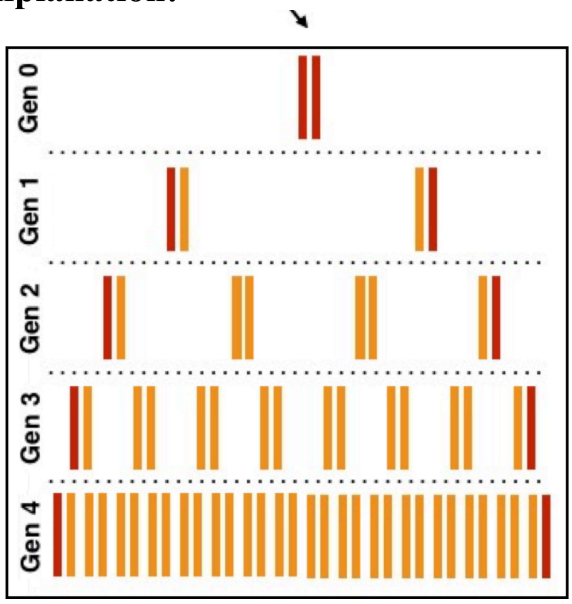
(d) Only one X-chromosome

Explanation: Recessive genes are expressed only in case of homozygous condition but sex chromosomes of males do not have opposite alleles on Y-chromosome. So, the recessive gene located on X-chromosome get expressed in males.

18.

(c) 0:1:7

Explanation:



Red line- N^{15} containing strand

Yellow line- N^{14} containing strand

In 4^{th} generation;

$N^{15}N^{15}$ DNA molecule=0

$N^{15}N^{14}$ DNA molecule=2

$N^{14}N^{14}$ DNA molecules=14

Hence the ratio is 0:1:7.

19.

(b) Blood group A, I^AI^O

Explanation: Blood group A, I^AI^O

20. **(a)** lac Z, lac Y, lac A

Explanation: In the lac operon concept, the sequence of arrangement of the structural gene is as lac Z, lac Y, and lac A. The z gene codes for beta-galactosidase. The y gene code for permease and a gene encodes a transacetylase.

21.

(b) Human brain and language

Explanation: Among the stories of the evolution of individual species, the story of the evolution of modern man is most interesting and appears to parallel the evolution of the human brain and language. Homo habilis has brain size 650cc-800cc which evolved to 1400cc in Homo sapiens.

22.
(d) Convergent evolution
Explanation: Convergent evolution is the process whereby organisms not closely related (not monophyletic), independently evolve similar traits as a result of having to adapt to similar environments or ecological niches.
Analogous organs are an example of convergent evolution.

23. **(a)** Bryophytes
Explanation: Bryophytes is not present during Mesozoic Era of geographical time scale.

24.
(b) salivary glands of mosquito
Explanation: The parasites multiply within them to form sporozoites that are stored in their salivary glands.

25. **(a)** 30-180 days
Explanation: The incubation period is the time elapsed between exposure to a pathogenic organism, a chemical, or radiation, and when symptoms and signs are first apparent.
The incubation period of the hepatitis B virus is 75 days on average but can vary from 30 to 180 days. The virus may be detected within 30 to 60 days after infection and can persist and develop into chronic hepatitis B.

26.
(b) December 1
Explanation: World AIDS Day, designated on 1 December every year since 1988, is dedicated to raising awareness of the AIDS pandemic caused by the spread of HIV infection, and mourning those who have died of the disease.

27.
(d) Only ‘a’ and ‘b’ is correct
Explanation: The use of drugs and alcohol by youngsters is motivated by a need for adventure, excitement, and experimentation. Drugs and alcohols never provide relaxation from any kind of problem.

28.
(d) 6-7 generations
Explanation: Local inferior breed of cow is changed into a superior breed by Hybridization methods. In this method superior bull is required to breed for 6-7 generations to get desired traits.

29.
(c) Prevent contamination from unwanted pollen
Explanation: Bagging is the method of covering emasculated flowers to prevent contamination from unwanted pollen. Butter paper or similar other substance is used to cover the flower.

30.
(b) Heterozygosity
Explanation: Hybrid vigour is mostly due to heterozygosity of traits. The hybrid contains a genome from both the parents that make them more vigorous.

31.
(d) Tiger beetle

Explanation: Tiger beetle is used as biological insecticides in organic farming practices due to its aggressive predatory habits and running speed.

32. **(c)** IARI and KVIC
Explanation: Cattle dung is used for the production of biogas, commonly called gobar gas. The technology of biogas production from cow dung was developed in India mainly due to the efforts of the Indian Agricultural Research Institute (IARI) and Khadi and Village Industries Commission (KVIC).

33. **(d)** Used as manure
Explanation: The spent slurry is removed through another outlet and may be used as manure.

34. **(a)** It is inert
Explanation: The most common gel used for electrophoresis in agarose gel. Agarose gel is inert hence does not react with DNA or Protein. Agarose is a natural polymer obtained from seaweeds.

35. **(a)**
$$\begin{array}{l} 5'G \overset{\downarrow}{-} A - A - T - T - C - 3' \\ 3'C - T - T - A - A - \underset{\uparrow}{G} - 5' \end{array}$$

Explanation:
$$\begin{array}{l} 5'G \overset{\downarrow}{-} A - A - T - T - C - 3' \\ 3'C - T - T - A - A - \underset{\uparrow}{G} - 5' \end{array}$$

36. **(c)** Uptake of DNA through transient pores in the bacterial cell wall.
Explanation: In order to force bacteria to take up the plasmid, the bacterial cells must first be made 'competent' to take up DNA. This is done by treating them with a specific concentration of a divalent cation, such as calcium, which increases the efficiency with which DNA enters the bacterium through pores in its cell wall. Recombinant DNA can then be forced into such cells by incubating the cells with recombinant DNA on ice, followed by placing them briefly at 42^0C (heat shock) and then putting them back on ice. This enables the bacteria to take up the recombinant DNA.

37. **(b)** Human gene alpha lactalbumin
Explanation: The first transgenic cow Rosie produced human protein-enriched milk. The milk contained Alpha-lactalbumin which was nutritionally more balanced than normal cow milk for babies.

38. **(a)** Rosie
Explanation: In 1997, the first transgenic cow, named Rosie, with the human alpha-lactalbumin gene was produced. The milk of transgenic cow contained about 2.4 grams of human protein per litre of milk and was found to be more nutritionally balanced for human babies than that of natural cow milk.

39. **(c)** Predation and parasitism

Explanation: Antagonistic interaction will include predation and parasitism in which one species is benefited and other is harmed.

40.

(c) Fungus and alga

Explanation: Lichen represents an intimate relationship between a fungus and photosynthetic algae.

41.

(d) 200%

Explanation: Birth rate= $\frac{No.\ of\ new\ paramecium}{Initial\ no.\ of\ paramecium} \times 100 = \frac{100}{50} \times 100$=200%

42.

(b) Respiration

Explanation: Respiration causes a reduction in the gross primary productivity of an ecosystem.

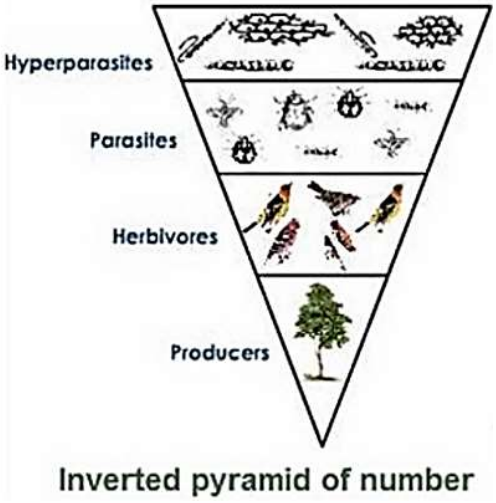
Gross primary productivity – Respiration = Net primary productivity.

43.

(d) An inverted pyramid of number

Explanation:

Inverted Pyramid of Number is a type of ecological pyramid seen in the parasitic food chain where one primary producer supports numerous parasites that support more hyperparasites.



44.

(d) All of these

Explanation: Respiration is a process in which organic substances (mainly carbon, hydrogen, and oxygen-containing molecules) are broken down into simple ones in the presence or absence of oxygen. Thus respiration only affects carbon oxygen and hydrogen cycles.

45.

(c) Restoring extinct species of plants and animals

Explanation: Importance of Biosphere Reserve:

i. **Conservation:** Biosphere reserves conserve genetic resources, species, ecosystems, and landscapes without uprooting inhabitants.

ii. **Development:** Sustainable economic, cultural, social, and ecological developments are ensured.
iii. **Restoration**: Biosphere reserve helps to rebuild any damage caused to ecosystems and habitats.
iv. **Education and Research**: Biosphere reserve provides a lot of scientific information for specific scientific studies and research.

46.

(b) All of these

Explanation: Hot-spot is areas with a high density of biodiversity or megadiversity which are also the most threatened ones.

Hot spots are determined by four factors,

i. Number of species/species diversity.
ii. Degree of endemism.
iii. Degree of a threat to habitat due to its degradation and fragmentation.
iv. Degree of exploitation.

India has two hotspots-North-East Himalayas and the Western Ghats.

47.

(c) Rauwolfia

Explanation: The genetic variation shown by the medicinal plant *Rauwolfia vomitoria* growing in different Himalayan ranges might be in terms of the potency and concentration of the active chemical (reserpine) that the plant produces.

48.

(d) BOD

Explanation: Biochemical oxygen demand (BOD, also called biological oxygen demand) is the amount of dissolved oxygen needed (i.e., demanded) by aerobic biological organisms to break down organic material present in a given water sample at a certain temperature over a specific time period. The BOD value is most commonly expressed in milligrams of oxygen consumed per litre of the sample during 5 days of incubation at 20 °C and is often used as a surrogate of the degree of organic pollution of water.

49.

(d) Tehri Garwal of U.P.

Explanation: Chipko movement originated in Terhi Garwal of Utter Pradesh to protect the forest form contractors. In this movement, women of the village hug the tree to prevent it from cutting.

50.

(d) Rauwolfia vomitoria

Explanation: Reserpine is a naturally occurring drug that has been used for centuries in ancient India. It is extracted from the root of Rauwolfia vomitoria, plants found extensively in Africa. In traditional herbal medicine, the root was brewed as a tea and used in humans to treat hypertension, insanity, snakebite, and cholera.