



Code Number:

A

Aakash

Medical | IIT-JEE | Foundations

Corp. Office: Aakash Educational Services Limited, 3rd Floor, Incuspaze Campus- 2, Plot No. 13,
Sector- 18, Udyog Vihar, Gurugram, Haryana - 122015

Time: 3 hrs.

Mock Test Paper for Class-XII

Max. Marks: 70

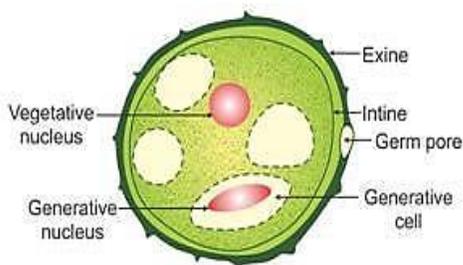
BIOLOGY

Answers & Solutions

1. Answer (a)
2. Answer (c)
3. Answer (a)
4. Answer (d)
5. Answer (d)
6. Answer (b)
7. Answer (c)
8. Answer (a)
9. Answer (b)
10. Answer (a)
11. Answer (c)
12. Answer (c)
13. Answer (c)
14. Answer (d)
15. Answer (b)
16. Colostrum
17. Ovulation
18. Amoebiasis
19. Nostoc
20. Richness



21.



22. (1) In vitro fertilisation & embryo transfer

(2) Zygote intra fallopian transfer

(3) Gamete intra fallopian transfer

(4) Intra uterine transfer

(5) Intra cytoplasmic sperm injection

(6) Artificial insemination

(7) Intra-uterine insemination

23. In Mendel's dihybrid crosses with pea plants (e.g., seed color and shape), the genes for the traits he studied were located on different chromosomes or far apart on the same chromosome. The generation of recombinants is primarily due to the independent assortment of chromosomes during meiosis.

In Morgan's experiments with *Drosophila melanogaster* (fruit flies), he studied genes located on the **same chromosome** (sex-linked genes), Morgan hybridised yellow-bodied, white-eyed females to brown-bodied, red-eyed males. two genes did not segregate independently of each other.

24. (1) Expressed Sequence Tags (ESTs)

(2) Sequence Annotation

25. Zosterophyllum, Herbaceous lycopods and Arborescent lycopods.

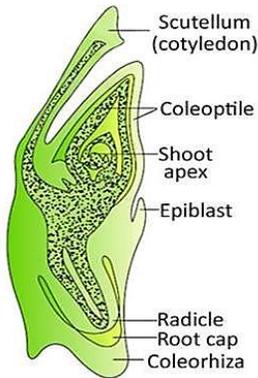
26. (1) It basically involve physical removal of particles – large and small – from the sewage through filtration and sedimentation.

(2) These are removed in stages; initially, floating debris is removed by sequential filtration. Then the grit (soil and small pebbles) are removed by sedimentation.

27.

SI	In situ Conservation	Ex situ conservation
1	Conservation of species in their natural habitat	Conservation of threatened animals and plants outside their natural habitat
2	It helps in recovering populations in the surroundings where they have developed their distinct features.	It helps n recovering population of preventing their extinction under simulated conditions that closely resemble their natural habitats.
3	e.g., National Parks, biosphere reserves, wildlife sanctuaries	e.g., Botanical gardens, Zoological parks, Aquaria, Arboreta, Seed/pollen banks, gene banks, etc.,

28.



29. The reproductive cycle in the female primates (e.g. monkeys, apes and human beings) is called menstrual cycle.

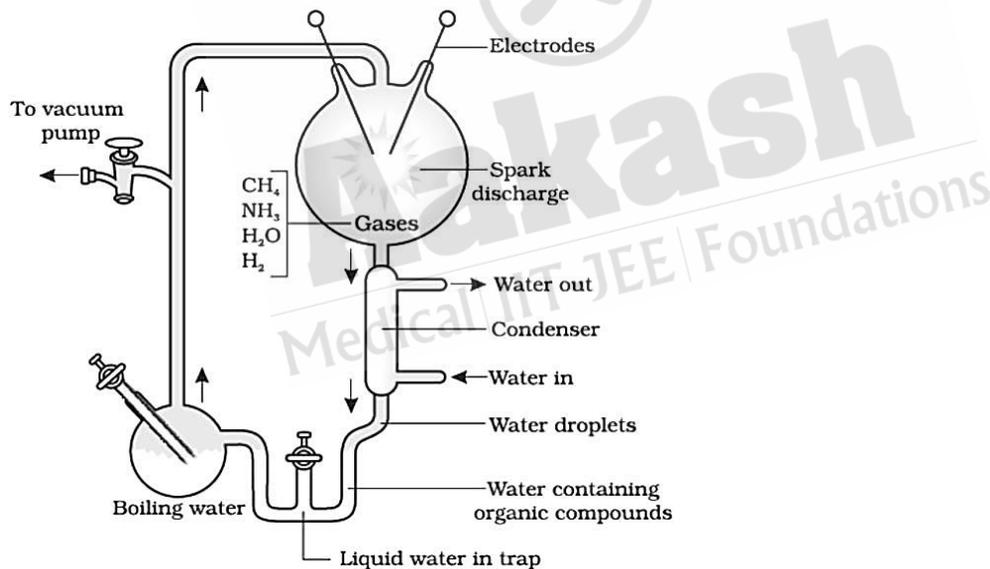
Or

In human females, menstruation is repeated at an average interval of about 28/29 days, and the cycle of events starting from one menstruation till the next one is called the menstrual cycle.

Pituitary – FSH & LH, ovarian hormone – Estrogen & Progesterone

30. (1) Avoid sex with unknown partners/multiple partners.
 (2) Always try to use condoms during coitus.
 (3) In case of doubt, one should go to a qualified doctor for early detection and get complete treatment if diagnosed with infection.

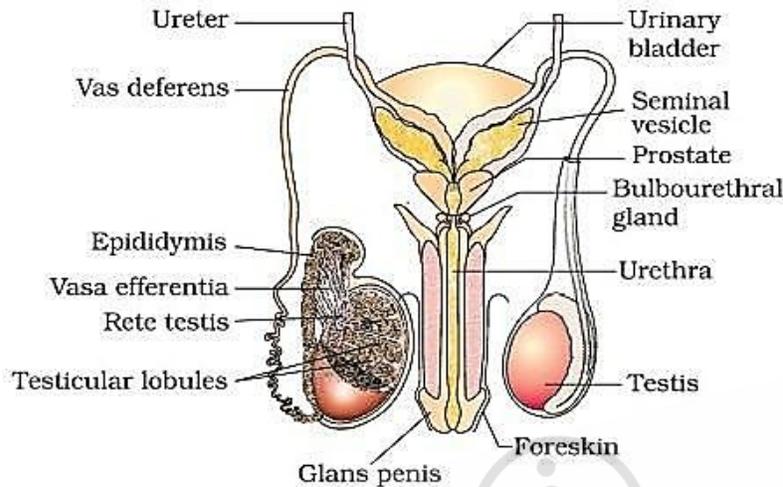
31.



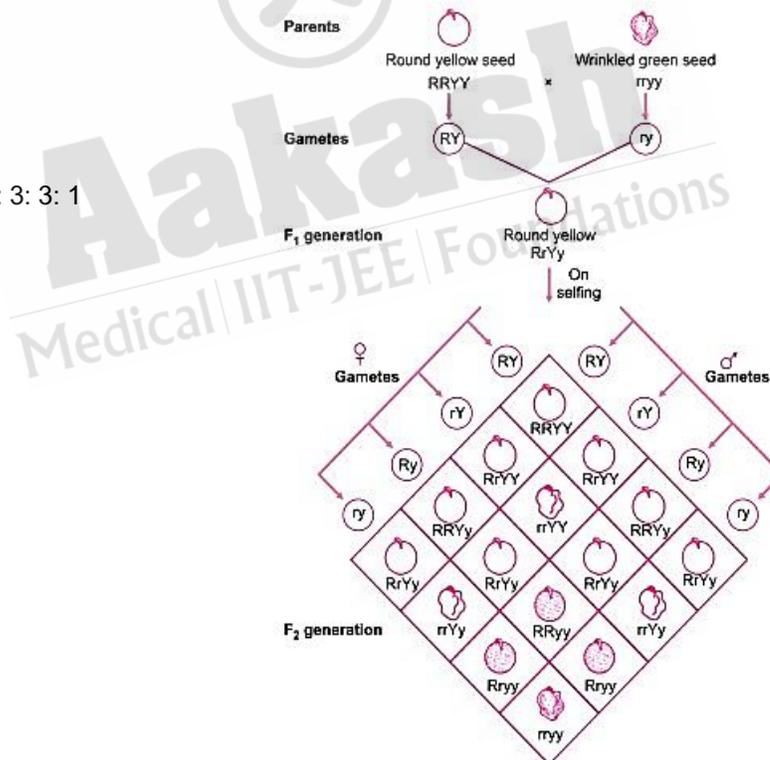
32. (a) Filariasis - *Wuchereria bancrofti* and *Wuchereria malayi*
 (b) Ringworm - Fungi [*Microsporum*, *Trichophyton* and *Epidermophyton*].
 (c) Malaria – *Plasmodium* (*P. vivax*, *P. malaria* and *P. falciparum*)
33. (a) Streptokinase – used as a 'clot buster' for removing clots from the blood vessels of patients who have undergone myocardial infarction leading to heart attack.
 (b) Cyclosporin-A – is used as an immunosuppressive agent in organ-transplant patients
 (c) Statins – blood-cholesterol lowering agents.
34. The important steps of decomposition that operate simultaneously on the detritus are fragmentation, leaching, catabolism.

- (1) Detritivores (e.g., earthworm) break down detritus into smaller particles. This process is called fragmentation.
- (2) By the process of leaching, water soluble inorganic nutrients go down into the soil horizon and get precipitated as unavailable salts.
- (3) Bacterial and fungal enzymes degrade detritus into simpler inorganic substances. This process is called as catabolism.

35.



36. Round Yellow – 9
 Round green - 3
 Wrinkled yellow - 3
 Wrinkled green - 1
 Phenotypic ratio is 9 : 3 : 3 : 1



37. In prokaryotes, such as, *E. coli*, though they do not have a defined nucleus, the DNA is not scattered throughout the cell.

DNA (being negatively charged) is held with some proteins (that have positive charges) in a region termed as 'nucleoid'. The DNA in nucleoid is organised in large loops held by proteins.

In **eukaryotes**, this organisation is much more complex. There is a set of positively charged, basic proteins called

histones.

- 1) A protein acquires charge depending upon the abundance of amino acid residues with charged side chains. Histones are rich in the basic amino acid residues lysine and arginine.
- 2) Both the amino acid residues carry positive charges in their side chains. Histones are organised to form a unit of eight molecules called histone octamer.
- 3) The negatively charged DNA is wrapped around the positively charged histone octamer to form a structure called nucleosome. A typical nucleosome contains 200 bp of DNA helix.
- 4) Nucleosomes constitute the repeating unit of a structure in nucleus called chromatin, threadlike stained (coloured) bodies seen in nucleus.
- 5) The nucleosomes in chromatin are seen as 'beads-on-string' structure when viewed under electron microscope (EM). The beads-on-string structure in chromatin is packaged to form chromatin fibers that are further coiled and condensed at metaphase stage of cell division to form chromosomes.
- 6) The packaging of chromatin at higher level requires additional set of proteins that collectively are referred to as Non-histone Chromosomal (NHC) proteins.

38. (a)

	Innate immunity	Acquired immunity
1	It is non-specific type of defence, that is present at the time of birth.	Acquired immunity, on the other hand is pathogen specific.
2	It is not characterised by memory.	It is characterised by memory.
3	Innate immunity can remain throughout an individual's life.	Acquired immunity can be either short-lived or long-lived, depending on the type of immune response generated.
4	Innate immunity relies on physical, physiological, and cellular barriers.	Acquired immunity relies on memory cells formed by B and T lymphocytes, which provide a targeted response upon re-exposure to the same pathogen.

(b) B lymphocytes and T lymphocytes.

- (c) (i) Antigens
(ii) Each antibody molecule has four peptide chains, two small called light chains and two longer called heavy chains. Hence, an antibody is represented as H_2L_2 .

39. (a) (1) 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.
(2) 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°C (heat shock), and then putting them back on ice. This enables the bacteria to take up the recombinant DNA.
- (b) (i) PvuI, PstI, and BamHI.
(ii) There are 8 cloning sites [ClaI, HindIII, EcoRI, PvuI, PstI, BamHI, Sall, and PvuII].

40. GM plants have been useful in many ways. Genetic modification has:

- (1) made crops more tolerant to abiotic stresses (cold, drought, salt, heat).
- (2) reduced reliance on chemical pesticides (pest-resistant crops).
- (3) helped to reduce post harvest losses.
- (4) increased efficiency of mineral usage by plants (this prevents early exhaustion of fertility of soil).
- (5) enhanced nutritional value of food, e.g., golden rice, i.e., Vitamin 'A' enriched rice.

In addition to these uses, GM has been used to create tailor-made plants to supply alternative resources to industries, in the form of starches, fuels and pharmaceuticals.

41. (a) $N_{t+1} = -N_{(t)} + [(B+I) - (D+E)]$
- (b) Factors responsible for fluctuating population density are
1. Natality 2. Mortality 3. Immigration 4. Emigration
- (1) Natality - Number of births in a given period in the population. It increases population density.
 - (2) Mortality - Number of deaths in the population during a given period. It decreases population density.
 - (3) Immigration - permanent entry of additional individuals into the existing population of a region from outside in a given time. It increases the size of population.
 - (4) Emigration - permanent outward movement of individuals of existing population to another area in a given period of time. It decreases the size of population.

42. (a)

Character	Mature Male gametophyte	Mature female gametophyte
i) Number of cells present in	three cells (vc and 2 mg)	Seven cells
ii) Number of gametes present in	2 (sperm)	1 (egg cell)
iii) Type of cell division involved in the development of	Meiosis followed by mitosis	Meiosis followed by mitosis (Free nuclear division)
iv) Ploidy of the cells of	Haploid (n)	Haploid (n) — except central cell which becomes diploid (2n) after fusion of two polar nuclei

- (b) (1) seeds have better adaptive strategies for dispersal to new habitats and help the species to colonise in other areas.
- (2) As they have sufficient food reserves, young seedlings are nourished until they are capable of photosynthesis on their own.
- (3) The hard seed coat provides protection to the young embryo.
- (4) Being products of sexual reproduction, they generate new genetic combinations leading to variations.
43. (a) Autosomal dominant – \blacksquare = Aa or AA
- (b) Autosomal recessive – \circ = aa
- (c) Sex – linked dominant – \square = Male: $X^a Y$
- (d) Sex – linked recessive – $\blacksquare \bullet$ = Female: $X^a X^a$, Male: $X^a Y$
44. (a) RNA polymerase alone cannot start transcription; because, it needs the sigma factor for promoter recognition.
- (b) In eukaryotes, transcription occurs in the nucleus, where DNA is located, and the primary transcript (hnRNA) undergoes processing
- The mature mRNA is then transported to the cytoplasm for translation by ribosomes.
- (c) RNA polymerase III