BOARD MOCK TEST PAPERS SOLUTIONS

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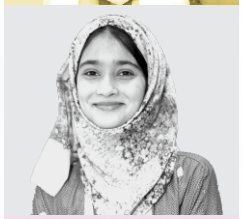
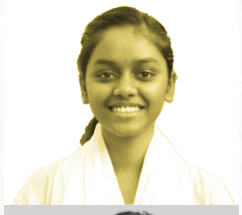
MADHYA PRADESH



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STANDOUT

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18 TIMES ALL INDIA RANK-1
IN JEE & PRE-MEDICAL ENTRANCE EXAMS IN LAST 13 YEARS FROM CLASSROOM

Standing (L-R): Ayush Goel (NEET 2013), Lokesh Agarwal (AIPMT 2010), Het Sanjay Shah (NEET 2016), Nishita Purohit (AIIMS 2017), Kavya Chopra (JEE MAIN 2021), Pulkit Goyal (JEE MAIN 2021), Siddhant Mukherjee (JEE MAIN 2021), Guramrit Singh (JEE MAIN 2021), Aman Bansal (IIT-JEE 2016), Anshul Verma (JEE MAIN 2021), Chitraang Murdia (IIT-JEE 2014)

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Class-XII

(ACADEMIC SESSION 2022-2023)

TARGET: BOARD EXAMINATION

SUBJECTS : **Biology**

BIOLOGY SOLUTION

SECTION – A

1. **(D)** (i) and (iii) **[1]**

2. **(A)** (i) and (iv) **[1]**

3. **(B)** 5' (upstream) end and 3' (downstream) end, respectively of the conding strand. **[1]**

4. **(B)** DNase inhibited transformation. **[1]**

5. **(C)** HIV selectively infects and kills B-lymphocytes. **[1]**

6. **(D)** All of the above **[1]**

7. **(D)** (ii) and (iv) **[1]**

8. **(A)** it will not be able to confer ampicillin resistance to the host. **[1]**

9. **(B)** no two species can occupy the same niche indefinitely for the same limiting resources. **[1]**

10. **(A)** pre-reproductive individuals are more than the reproductive individuals. **[1]**

11. **(C)** (i) - Lichens, (ii) - Stratification, (iii) - Cow, (iv) - Lion **[1]**

12. **(B)** (i) Broadly utilitarian, (ii) Narrowly utilitarian, (iii) Ethical. **[1]**

13. **(A)** Both A and R are true and R is the correct explanation of A. **[1]**

14. **(A)** Both A and R are true and R is the correct explanation of A. **[1]**

15. **(D)** A is false but R is true. **[1]**

16. **(A)** Both A and R are true and R is the correct explanation of A. **[1]**

SECTION – B

17. (a) Blastocyst

(b) (A) is trophoblast. The trophoblast layer gets attached to endometrium and later forms extra-embryonic membrane namely chrionic villi. **[1 + 1 = 2]**

18. Colour blind is a X linked recessive disorder. Male have higher chances of getting affected in comparison to females because male have only one X with Y chromosome and female have XX chromosome, thus for a female to get affected by colour blindness, she has to have the mutate gene on both the X chromosome while male can be affected, if they carry it on the single X chromosome. It can be concluded that females have very less probability of getting this disease as compare to male. Female will be colour blind only when either both parents are affected or male affected and female is carrier, while males can be colour blind even if female is carrier and male is normal. **[1+1 = 2]**

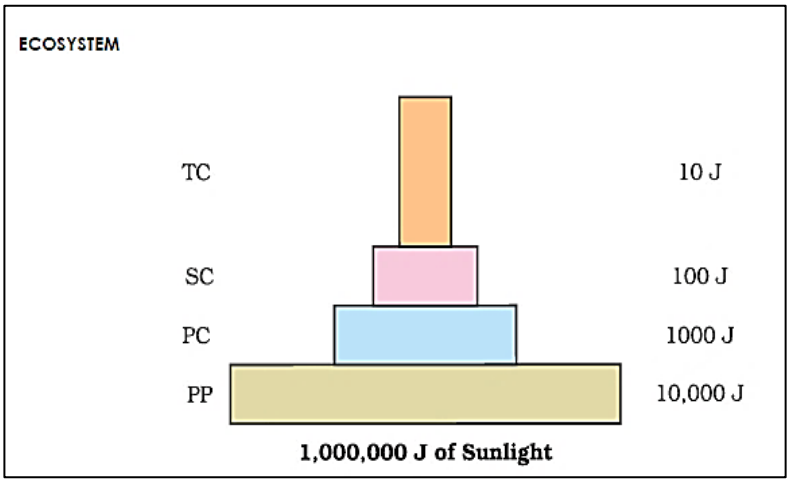
19. Morphine and heroin are obtained from *Papaver somniferum*; morphine is obtained from the latex of the plant and heroin is obtained by acetylation of morphine.

- Morphine is an effective sedative and painkiller.
- Heroin is a depressant and slow down body functions. **[½ × 4 = 2]**

20.(a) A — GAATTC B — GAATTC
CTTAAG CTTAAG
C — EcoRI D — DNA Ligase

(b) Both A & B DNA sequence are palinderome which are recognised by EcoRI and cuts between G & A makes the sticky end which are complementary to each other and formed recombinant DNA by joning of the H-bond. **[1 + 1 = 2]**

21. (a) The relationship between producers and consumers in an ecosystem can be represented in the form of pyramids, in terms of flow of energy. It is always upright because energy is always lost as heat at each step and as it follow10% law.



(b) First trophic level – 10,000 J
Third trophic level – 100 J **[1+1 = 2]**

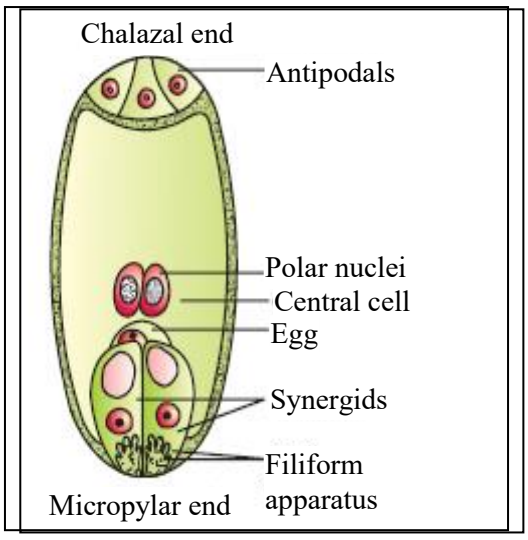
OR

Human beings can be placed at three trophic level in a food chain, if human being is vegetarian than included in primary consumer (herbivore) while in case of non-vegetarian this is secondary consumer (carnivore), in case both they are omnivore and placed at top consumer. **[2]**

SECTION – C

22. (a) (i) A – Scutellum, (ii) D – Epiblast
(b) Hypocotyle, it terminates into radicle.
(c) The part which are not found in dicots embryo are.
B – is coleoptile, it is the foliaceous sheath that covers the plumules in the embryo of cereals.
G – is coleorhiza, it is an undifferentiated sheath that covers the radicle and root cap in the embryo of cereals. **[1×3 = 3]**

23. (a)



(b) One meiosis and three mitosis. The megaspore mother cell undergoes meiosis formed megaspore tetrad. Three cells from megaspore tetrad are degenerated remain is functional megaspore which divided by mitosis three times makes mature female gametophyte.

(c) There are 7 cells and 8 nucleus is a mature female gametophyte. **[1 × 3 = 3]**

24. (a) (i) If both strands act a template, they would code for RNA molecule with different sequences (Remember complementarity does not mean identical), and in turn, if they code

for proteins, the sequence of amino acids in the proteins would be different. Hence, one segment of the DNA would be coding for two different proteins, and this would complicate the genetic information transfer machinery.

(ii) The two RNA molecules if produced simultaneously would be complementary to each other, hence would form a double stranded RNA. This would prevent RNA from being translated into protein.

(b) With the coding strand. **[2 + 1 = 3]**

25. The essence of Darwinian theory about evolution is natural selection. The rate of appearance of new forms is linked to the life cycle or the life span. Microbes that divide fast have the ability to multiply and become millions of individuals within hours.

- A colony of bacteria (say A) growing on a given medium has builtin variation in terms of ability to utilise a feed component. A change in the medium composition would bring out only that part of the population (say B) that can survive under the new conditions. In due course of time this variant population outgrows the others and appears as new species.
- This would happen within days. For the same thing to happen in a fish or fowl would take million of years as life spans of these animals are in years. Here we say that fitness of B is better than that of A under the new conditions. **[3]**

26. (a) A part of the life cycle of the parasite occurs in the body of female Anopheles mosquito, these mosquitoes act as vectors and transmit the disease-causing organism form patient to healthy individuals.

(b) Fertilization; it occur in the stomach wall of mosquito.

(c) Salivary glands. Sprorozoites are the cells released from it. **[1+1+1 = 3]**

OR

(a) All normal cells have cellular oncogenes (c-onc) or proto- oncogenes. When these genes are activated under certain conditions by carcinogens, they could lead to oncogenic transformation of the normal cells.

(b) Cancer causing viruses, i.e., oncogenic viruses, have viral oncogenes.
Cellular oncogenes, also called proto-oncogenes are present in the normal cells of the our body. **[1 + 2 = 3]**

27. (a) A – Ampicillin resistant gene- amp^R, B – Tetracycline resistant gene- tet^R C – rop, D – ori

(b) We should used EcoRI, because the given palindrome sequence as recognized by this enzyme.

(c) C – Codes for the protein involved in the replication of the plasmid. **[1 × 3 = 3]**

28. (a) It differ from previous episodes due to rate if its extinction .The current species extinction rate are estimated near 100 to 1000 more faster than in the pre-human time.

(b) Human activities.

(c) Reforestation, Sustainable utilization of resources, Ex-situ and In-situ conservation of biodiversity. **[1 × 3 = 3]**

(SECTION – D

29. (a) When the males produce two different types of gametes, (i) either with or without X-chromosome or (ii) some gametes with X-chromosome and some with Y-chromosome. Such types of sex determination mechanism is designated to be the example of male heterogamety.

E.g., Both A (Human) and B (Drosophila) cases are type of male heterogamety method of sex determination.

(b) The egg is responsible for the sex of chicks because the female is heterogametic which formed two different type of gametes with sex chromosome (Z and W) while male formed only one type of gametes (Z).The combination of (W) from female with (Z) of male formed the female progeny.

(c) This is not correct to blame women for giving birth to daughter. The male sperm contain either X or Y chromosome whereas the female egg contain only X chromosome. At the time of fertilization, sperm with Y chromosome combine with egg containing X chromosome formed which would be male .Thus scientifically sex of the baby is determined by the father and not by the mother as blamed in our society.

OR

(c) During spermatogenesis among males, two types of gametes are produced, 50 per cent of the total sperm produced carry the X-chromosome and the rest 50 per cent has Y-chromosome besides the autosomes. Females, however produce only one type of ovum with an X-chromosome. There is an equal probability of fertilisation of the ovum with the sperm carrying either X or Y chromosome. In case the ovum fertilises with a sperm carrying X-chromosome the zygote develops into a female (XX) and the fertilisation of ovum with Y-chromosome carrying sperm results into a male (XY) offspring. **[1 + 1 + 2 = 4]**

30. (a) The diagnostic test for AIDS is Enzyme Linked Immuno-Sorbent Assay (ELISA).

(b) Qualified doctors guides students and their parents about transmission HIV. It does not transmit through touching, hand shaking, playing and taking food and water with infected person.

(c) The way of transmission of HIV- infection.

(i) Sexual contact with infected person.

(ii) By transfusion of contaminated blood and blood products.

(iii) By sharing infected needles as in the case of intravenous drug abusers.

(iv) From infected mother to her child through placenta.

OR

(c) The programmes has started by WHO to prevent the spreading of HIV infection.

(i) Making blood (from blood banks) safe from HIV.

(ii) Ensuring the use of only disposable needles and syringes in public and private hospitals and clinics.

(iii) Free distribution of condoms.

(iv) Controlling drug abuse.

(v) Advocating safe a sex.

(vi) Promoting regular check-ups for HIV in susceptible populations, are some such steps taken up. **[1 + 1 + 2 = 4]**

SECTION – E

31. (a) A-Sperm, B- Cells of corona radiate, C-Previtelline space, D-Zona Pellucida.

(b) Induce completion of meiotic division of the secondary oocyte, formation of second

polar body and a haploid ovum.

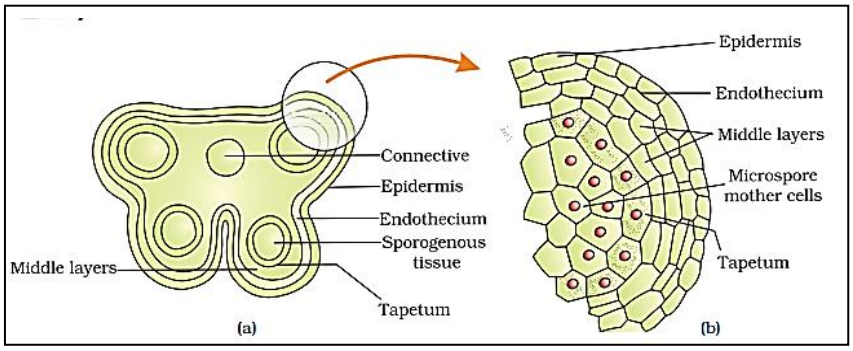
(c) It ensures the entry of only one sperm into ovum.

(d) Enzymes of acrosome.

(e) Ampulla of the fallopian tube. **[5 × 1 = 5]**

OR

(a)



(b) (i) Tapetum provides nutrition to the MMC or PMC.
(ii) It nourishes the developing pollen grains.
(iii) Secretion of enzyme and hormone.
(iv) Secretion of sporopollenin.
(v) Formation of ubisch bodies.
(vi)Secretion of pollenkitt substances. **[1 + 2 + 2 = 5]**

32. (a) In eukaryotes, the chromosomal organization is much more complex.

- There is a set of positively charged, basic proteins called histones.
- There are five subunits if histone H1, H2A,H2B,H3 and H4 .Except H1 remaining four subunits in double numbers are organized to form a unit of eight molecules called as histone octamer.
- Histones are rich in the basic amino acid residues lysines and arginines. Both the amino acid residues carry positive charges in their side chains.
- 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. Nucleosomes constitute the repeating unit of a structure in nucleus called chromatin, thread-like stained (coloured) bodies seen in nucleus. The nucleosomes in chromatin are seen as 'beads-on-string' structure when viewed under electron microscope.
- Further supercoiling form a looped structure called the chromatin fibre. There chromatin fibres further coil and condense at metaphase stage of cell division to form chromosome.

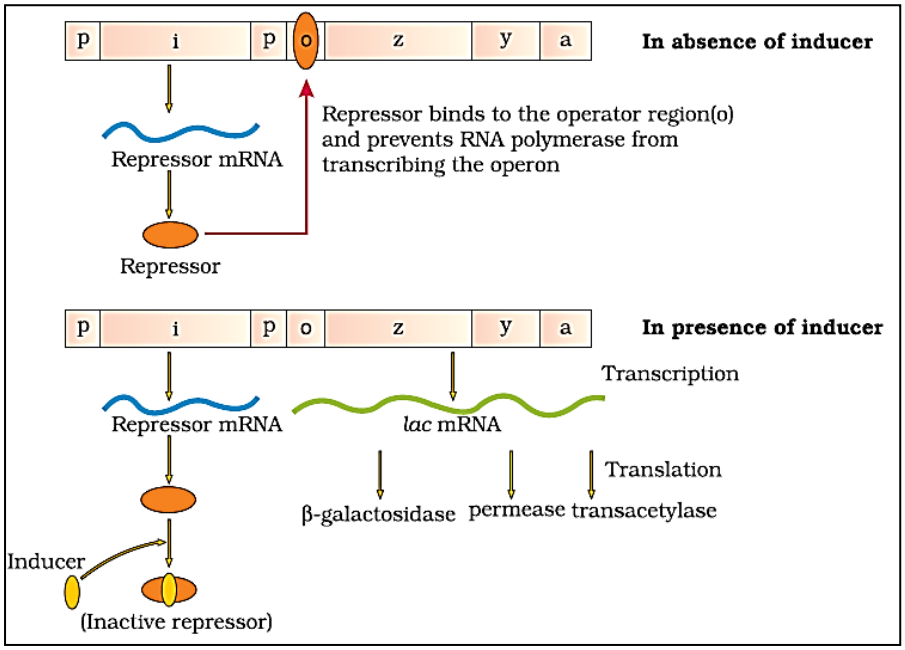
(b) In a typical nucleus, some region of chromatin are loosely packed (and stains light), trascriptionally active and do not contain repetitive DNA sequence is referred to as euchromatin.
The chromatin that is more densely packed, stains dark, trascriptionally active and contain repetitive DNA sequence are called as heterochromatin.

(c) The packaging of chromatin at higher level required the presence of non–histone chromosomal protein. **[2+2+1=5]**

OR

(a) The repressor of the Lac-operon is synthesised (all-the-time – constitutively) from the i gene. The repressor protein binds to the operator region of the operon in absence of the inducer, and prevents RNA polymerase from transcribing the operon.

(b) In the presence of an inducer, (lactose) the repressor is inactivated by interaction with. The inducer, This allows RNA polymerase access to the promoter and transcription proceeds .



[2 + 3 = 5]

33. (a) Tumour inducing

(b) It is transferred DNA.

(c) When the harmful Ti gene remove from the plasmid, now this plasmid is known as disarmed Ti plasmid.

(d) It is because it has the natural ability to integrates its plasmid genes into the plant genomes. It can deliver a piece of T-DNA in the plant genome.

(e) (i) High transformation efficiency (ii) Transgenic crops obtained have better fertility percentage (iii) Relatively large length DNA segment can be transferred. **[5 × 1 = 5]**

OR

(a) The Bt toxin protein exist as inactive protoxins in bacteria.

(b) (i) Lepidopterans - Tobacoo budworm, Army worm, Cotton bollworm.

(ii) Coleopterans - Beetles

(iii) Dipterans - Flies, Mosquitoes.

(c) It is converted into an active form of toxin due to the alkaline pH of the gut of insects which solubilise the crystals.

(d) It control the cotton bollworms.

(e) *Bacillus thuringiensis* produces insecticidal toxin. Bt toxin gene has been cloned from the bacteria and been expressed in plants to provide resistance to insects without the need for insecticides; in effect created a bio-pesticides. **[5 × 1 = 5]**