II PU MID-TERM EXAMINATION - OCT 2025

SUB - BIOLOGY (36) Max Marks - 70.

PART - A

I 1. b. -196°C

2. d. commelina

3 a seminal plasma and sperms.

4 a spermatogonia - 46, secondary spermatocytes - 23, spermatids - 23

5 d. Statement 1 is true and 2 is false

6 c. Progestasert, LNG-20 1each.

7 c 50%

8 c three

9 b 32, 32, 16

10 a Both statements are correct.

11 b A-20%, G-30%, T-20%, C-30%

12 d A-ii, B-iii, C-iv, D-i

13 c S. L. Miller

14 a Saltation

15 c. Macrosporum.

II 16 Artificial hybridisation

17 Chorionic villi

18 X-body 1each.

19 Mendelian characters.

20 INTERFERONS

PART - B

21. 1) Exine - sporopollenin 1

2) Intine - cellulose and pectin 1

22 1) Human chorionic gonadotrophin - hCG

2) human placental lactogen - hPL ½each

3) Estrogens

4) Progestogens.

23 a) Corpus luteum 1
b) corpus luteum transforms into corpus albicans 1

24 Linkage - Physical association of genes on a chromosome. 1
Recombination - generation of non-parental combinations 1

25 Capping - addition of methyl guanosine triphosphate to 5' end of hnRNA. 1
Tailing - addition of adenylate residues at 3' end of hnRNA 1

26 Evolution of different species in a given geographical area starting from a point and literally radiating to other areas of geography. 1
Ex Darwin's finches, Australian marsupials Placental mammals. 1

27. Antibody molecule diagram - 4 labellings ½ each

PART - C

28 * Signals for parturition originate from the fully developed fetus and placenta induce mild uterine contractions is called foetal ejection reflex. 1
* This triggers release of oxytocin from the maternal pituitary.
* Oxytocin acts on the uterine muscle and causes stronger uterine contractions, which in turn stimulates further secretion of oxytocin. 1
* It results in stronger and stronger contractions. 1
* This leads to expulsion of baby out of the uterus through the birth canal.

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

treatment if diagnosed with infection.

30 Parents — homozygous Tall × homozygous dwarf

Genotypes — TT × tt

Gametes — T, t

F_1 — Tt

All Tall plants

F_1 selfing — Tall × Tall

Tt × Tt

Gametes — (T) (t) × (T) (t)

F_2 generation

♂ / ♀	T	t
T	TT Tall	Tt Tall
t	Tt Tall	tt dwarf

Phenotypic ratio – Tall : dwarf
3 : 1

Genotypic ratio – TT : Tt : tt
1 : 2 : 1.

31. i) It is made up of two polynucleotide chains, back-bone is constituted by sugar-phosphate ½ each

ii) Two chains have anti-parallel polarity. One chain has 5'→3' and other has 3'→5'

iii) Bases in two strands are paired by hydrogen bonds forming base pairs. A=T, G≡C. Purine always comes opposite to pyrimidine. This generates uniform distance between the two helix.

iv) The two chains are coiled in a right-handed fashion. Pitch of helix is 3.4nm, 10 bp in each turn, distance between bp is 0.34nm.

v) The plane of one base pair stacks over the other in double helix. In addition to H-bonds this confers stability.

32. Stabilisation - More individuals acquire mean character value 1

Directional - More individuals acquire value other than the mean character value. 1

Disruptive - More individuals acquire peripheral character value at both ends of distribution curve 1

33 1) Physical barriers - Skin - prevents entry of the micro-organisms. Mucus coating of the epithelium lining the respiratory, gastro-intestinal and urinogenital tracts help in trapping microbes

2) Physiological barriers - Acid in stomach, Salira in mouth, tears from eyes - all prevent microbial growth any 3 1 each

3) Cellular barriers - Leukocytes like PMNL ✱ neutrophils, monocytes, natural killer cells, macrophages can phagocytose and destroy microbes

4) Cytokine barriers - Virus infected cells secrete proteins called interferons which protect non-infected cells from further viral infection.

34. Allergy - The exaggerated response of the immune system to the antigens present in the environment. 1

Symptoms - sneezing, watery eyes, running nose, difficulty in breathing. 1

Chemicals - Histamine and serotonin from mast cells are released during allergy. 1

PART-D

V 35. Diagram- T.S of young anther } 10 labellings ½ each
Enlarged view of microsporangium.

Invitro fertilisation - Embryotransfer

36. a) IVF-ET - Ova from the wife/donor and sperms from the husband/donor are collected and induced to form zygote under simulated conditions in the laboratory. The zygote or early embryos (8 blastomeres) are then transferred into the fallopian tube.

b) ZIFT - Zygote intra fallopian transfer 1 each.
Embryos with more than 8 blastomeres are transferred into the uterus to complete its further development.

c) GIFT - Gamete intra fallopian transfer.
Transfer of an ovum collected from a donor into the fallopian tube of another female who cannot produce ovum, but can provide suitable environment for fertilisation and further development.

d) ICSI - Intra cytoplasmic sperm injection
A sperm is directly injected into the ovum.

e) AI - Artificial insemination
The semen collected either from the husband or a healthy donor is artificially introduced into the vagina or into the uterus.

37 a) Haemophilia : 2
- Sex-linked recessive disorder
- transmission from unaffected carrier female to some of the male progeny.
- A part of the cascade of proteins involved in the clotting of the blood is affected.
- A simple cut will result in non-stop bleeding
- Female becoming haemophilic is rare because mother has to be carrier & father haemophilic

b) Klinefelter's syndrome - 3

* presence of additional copy of X chromosome.
- karyotype; 44+XXY = 47.
- Individual has overall masculine development however the development of breast - gynaecomastia is also expressed.
- Individuals are sterile.

38 (a) VNTR - Variable number of tandem repeats. 1

(b) blood, hair-follicle, skin, bone, saliva, sperm etc 1

(c) i) isolation of DNA
ii) digestion of DNA by restriction endonuclease. 3
iii) separation of DNA fragments by electrophoresis
iv) transferring of separated DNA fragments to synthetic membranes such as nitrocellulose/nylon.
v) hybridisation using labelled VNTR probe
vi) detection of hybridised DNA fragments by autoradiography.

39

1) Dryopithecus	15mya	hairy, walked like gorillas & chimpanzees.
2) Ramapithecus		man-like, East African grasslands.
3) Australopithecus		stone weapons, East African grasslands.
4) Homo habilis		no meat, 650-800cc
5) Homo erectus		900cc, ate meat,
6) Neanderthal man		1400cc, East-Central Asia.
7) Homo sapiens.		Africa, distinct races, etc.

40. • Plasmodium enters the human body as sporozoites through the bite of infected female Anopheles mosquito. 5m
• Parasites initially multiply within liver cells and then attack RBC resulting in their rupture.
• Ruptured RBC release a toxic substance - haemozoin which is responsible for the chill and high fever recurring every 3-4 days.
• When a female Anopheles mosquito bites an infected person, these parasites enter the mosquitos body and undergo further development.
• Parasites multiply and form sporozoites and are stored in their salivary glands.
• When these mosquitoes bite a human, sporozoites enter his/her body and the cycle continues.

41 Explain.

a) 1) XX - XY 1m each
2) XX - XO
3) ZZ - ZW.

b) Single gene exhibiting multiple phenotypic 1
expression. 1
Ex: Phenylketonuria.

Contd

42) human female reproductive system - diagram ½ each
10 labellers 5m.

43 Lactose is the substrate for the enzyme beta-galactosidase and it regulates switching on and off of the operon.

In the absense of inducer-

- Regulator gene produces repressor protein
- repressor protein binds to the operator gene of operon and prevents RNA polymerase from transcribing the operon. 2½

On the presence of inducer

- the repressor is inactivated by the interaction with the inducer.
- this allows RNA polymerase access to the promoter and transcription takes place. 2½
- z, y, a → lac mRNA → β galactosidase, permease and transacetylase respectively.

44 a) Albuminous seeds: retain a part of endosperm. Ex wheat, barley etc
Ex-albuminous seeds: No residual endosperm. Ex Pea, groundnut 2

b) Formation of seeds without fertilisation. Ex species of Asteraceae and grasses.. 2

c) Phoenix dactylifera. 1

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