COMMON PRE-BOARD EXAMINATION 2023-24

Subject: BIOLOGY (044)

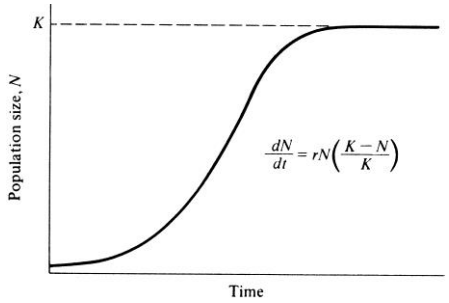
Class XII

MARKING SCHEME

	SECTION A	
1.	(C)	[1]
2.	(C)	[1]
3.	(D)	[1]
4.	(A)	[1]
5.	(B)	[1]
6.	(C)	[1]
7.	(D)	[1]
8.	(B)	[1]
9.	(C)	[1]
10.	(C)	[1]
11.	(B)	[1]
12.	(D)	[1]
13.	(C)	[1]
14.	(B)	[1]
15.	(C)	[1]
16.	(D)	[1]
	SECTION B	
17.	Geitonogamous flowers – pollen transferred to stigma of another flower of same plant (1) Functionally – cross pollination occurs, through agents (½ m) Genetically – autogamy, as it is the same plant (½ m)	[2]
18.	A – DNA, B – H1 Histone, C – Histone octamer (½ m * 3 = 1 ½ m) C consists of 2 subunits each of H2A, H2B, H3, H4 histone proteins (½ m)	[2]
19.	(a) rop – codes for proteins involved in regulating DNA replication, ori – replication originates (½ + ½) (b) The plasmid will not be able to self- replicate (½)	[2]
20.	Heteroprophic microbes & aerobic microbes as flocs used – (i) use organic matter in effluent, reduce BOD (1) (ii) other kinds of bacteria grow anaerobically – digest the flocs (bacteria and fungi) and organic content - release mixture of gases – Carbondioxide, methane – used as fuel (1)	[2]
21.	(a) To know the role of biotic and abiotic factors on increase or decrease in population (b) 20/100=0.2/ frog/year in pond (c) pug marks, fecal pellets, percentage cover(any 2)	[2]

	OR (a) 'A' - Fishes 'B' Mammals, 'C' Birds, 'D' Amphibia (½ m * 4 = 2 m)	
	SECTION C	
22.	She will perform a test cross - mate the unknown genotype with homozygous recessive - white guinea pig (1) Interpret results: In offsprings , if any white pig arise – shows black guinea pig was heterozygous, not pure (½) If all offspring are black – then it is homozygous, pure black (½) (b) Klinefelter syndrome, XXY (½ + ½)	[3]
23.	(a) Endometrium, Myometrium, Perimetrium (¼ * 3 = ¾) (b) Endometrium undergoes cyclical changes during menstrual cycle (¼) (c) Follicular phase – secretion of gonadotropins (LH & FSH) and estrogen Middle of cycle – rapid secretion of LH & FSH, leads to LH surge – hence ovulation **Luteal phase – graafian follicle changes to corpus luteum – produce progesterone**, maintains pregnancy, if fertilization occurred (1) **If no pregnancy – corpus luteum degenerates- drop in progesterone – uterine lining breaks down** (1)	[3]
24.	(a) Cause of Infertility in males- low sperm count, low sperm mobility, genetic abnormality In females – ovulation disorders, physical problems of reproductive system, congenital, psychological (any 2 for each – ¼ * 4 = 1m) (b) artificial insemination(AI) – sperms collected and injected into female reproductive system Intra cytoplasmic sperm injection(ICSI) – sperm directly injected into fertile ovum Intra uterine insemination (IUI) - inject sperms into uterus (any 2, 1 * 2 = 2m)	[3]
25.	(a) Plasmodium undergoes multiple fission – occurs in the liver cells and erythrocytes of human host. (b) parasites reproduce asexually in the RBCs, burst the cells, release more parasites to infect more cells. the rupture of red blood cells releases a toxin called hemozoin - which causes the patient to experience a condition known as the chills, high fever	[3]
26.	(a) EcoRI (½) (b) 5´ –G AATTC – 3´ 3´ –CTTAA G – 5´ (½) (c) termed stick ends , form hydrogen bonds with complementary cut parts (1) (d) restriction endonuclease - phosphodiester linkage (1)	[3]
27.	(a) One petal of its flower bears an uncanny resemblance to the female of the bee in size, colour and markings. (½) The male bee is attracted to what it perceives as a female, 'pseudocopulates' with the flower, and during that process is dusted with pollen from the flower. (½) When this same bee 'pseudocopulates' with another flower, it transfers pollen to it and thus, pollinates the flower. (½) (b) The female Monarch lays eggs over the distasteful leaves and the larvae feed upon the distasteful leaves Hence, the adult monarch butterfly also become distasteful to its predators. (1) (c) Rauwolfia vomitoria, Reserpine (½ + ½)	[3]

28. A population growing in a habitat - limited resources [3]
show initially a lag phase, followed by phases of acceleration and deceleration and finally an asymptote
when the population density reaches the carrying capacity. A plot of N in relation to time (t) results in a sigmoid curve.
This type of population growth is called Verhulst-Pearl Logistic Growth



Curve –
described by the following equation:

dN/dt = rN(K-N) K
Where N = Population density at time t
r = Intrinsic rate of natural increase
K = Carrying capacity

OR

Ex situ is desirable – organism is protected outside the natural habitat, special care is taken
Cryopreservation- gametes stored at -96 degree

	In situ Conservation	Ex situ Conservation
(i)	(i) It is conservation and protection of biodiversity in its natural habitat.	It is conservation of selected rare plants and animals in places outside their natural
(ii)	(ii) Ecologically unique and biodiversity-rich regions are legally protected as biosphere reserves, national parks and sanctuaries.	Zoological parks, botanical gardens and wildlife safari parks serve this purpose. habitat.

SECTION D

29. (a) sex linked recessive disorder (1) [4]
(b) it is an X – linked disorder (1)
(c) genotype of 4 - XX_h , 5 - X_hY respectively. (1)
Member 12 – female, XX_h

Gametes	X	Y
X	XX (normal girl)	XY (normal boy)
X_h	XX_h(normal but carrier girl)	X_hY (haemophilic boy)

The probability that her child will be haemophilic boy – 25% or ¼ or 0.25 (1)

OR

Member 14 – a female, she is a carrier - XX_h (1)

Gametes	X	Y
X	XX (normal girl)	XY (normal boy)
X_h	XX_h(normal but carrier girl)	X_hY (haemophilic boy)

The probability that her child will be haemophilic boy – 25% or ¼ or 0.25 (1)

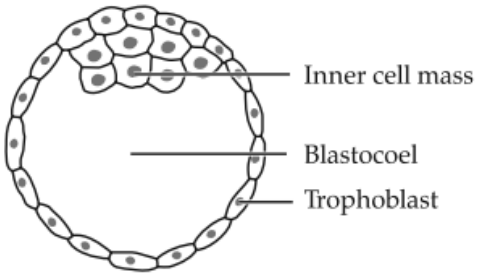
30. (a) chicken pox – natural active immunity, diphtheria – artificial active immunity (1) [4]
(b) to boost the immune response – to elicit anamnestic response to increase antibody production after second encounter (1)
(c) to protect her from immediate infection. Passive immunization (1+1)

OR

Priya – it helped to develop secondary immune response, a type of artificial active immunization, body develops antibodies with greater intensity and develops memory (1)
Her friend – it helped develop passive immunization, a type of artificial passive immunization, preformed antibodies are administered (1)

SECTION E

31. (a) Diagram with labeling (½ *4 =2m) [5]



The trophoblast layer of the blastocyst gets attached to the cells of the endometrium and the inner cell mass gives rise the embryo. (1m)
(b) Placenta produces several hormones like HCG,HPL oestrogens and progesterone that are essential to maintain pregnancy.This way placenta acts as endocrine tissue. (2m)

OR

(i) A – suspensor, B – Radicle, C – Plumule, D – Cotyledon (2m)
(ii) zygote develops into embryo at micropylar end, divides mitotically gives rise to proembryo,
then to globular stage, later forms heart-shaped embryo. Finally forms mature embryo. (1/2 * 2=1m)
(iii) wheat and castor (½ + ½)
endospermic seeds are those with thin and membranous cotyledons, are large with stored food, also called as albuminous seeds. (1m)

32. [5]

Point of discussion	βThalassemia	Sickle cell anemia
(a) definition	Inherited disorder, that affects production of hemoglobin	Inherited disorder, that alters structure of hemoglobin

	chains	molecule	
(b) inheritance pattern	Autosomal recessive	Autosomal recessive	
(c) mutation	Point mutation, in hemoglobin β gene, found on chromosome no. 11. One or both β chains can be affected	Point mutation, in hemoglobin β gene, found on chromosome no. 11, both β chains affected	
(d) cause	To little β chains are produced, so altered hemoglobin in RBCs, so less RBC production	Altered structure of β chain, 6^{th} position glutamic acid is substituted with valine amino acid. Hemoglobin molecule becomes stick and form fibres and alter shape of RBC to sickle shape	
(e) symptoms	Weakness, fatigue, slow growth, anemia	Fatigue, paleness, joint pain, delayed growth	

(Each point ½ m *10 = 5m)

OR

(i) Transcriptional level (formation of primary transcript), processing level (regulation of splicing), transport of mRNA from nucleus to the cytoplasm, translational level. (1*3 = 3m)
(ii) Regulator gene (i) Codes for the repressor of the lac operon
promoter (p) is binding site for RNA Polymerase and operator gene
(o) It is binding site for repressor. (1 ½)
(iii) z, y, a genes called as – structural genes, they encode for proteins(enzymes) that regulate lactose metabolism (¼ + ¼)

33. (a) (i) Enzymes replacement therapy (in which functional ADA is injected) [5]
(ii) Bone marrow transplantation
(iii) Gene therapy / Culturing the lymphocytes followed by introduction of functional ADA cDNA into it & returning it into the patient's body (Any two – 2m)
(b) ERT is not a permanent cure so periodic injections of ADA enzyme are required. (1m)
(c) The Bt toxin protein exists as inactive protoxins but once an insect ingests the inactive toxin is converted into an active form due to the alkaline pH of the gut which solubilise the crystals. Therefore, it does not kill the bacteria. (1m)
(d) cry I Ac / cry II Ab (1m)

OR

i) Identification of DNA with desirable Genes
ii) Cutting the gene of interest and vector with the same restriction enzymes
iii) create complimentary ends
iv) Ligase added to make the recombinant DNA
v) Insertion of Recombinant DNA into host cell:- Recipient cells after making them competent to receive takes up DNA in its surrounding.
vi) Recombinant DNA is introduced into suitable host cell by vector – based or vector – less method. (Correct steps ½ * 6 = 3m)
step wise illustrative Diagram 2m

BLUE PRINT & WEIGHTAGE

	MCQ+R&A	2M	3M	CBQ 4M	5M	Total
VI Reproduction (16)	3 + 1 (4M)	1 (2M)	2 (6M)	-	1 (5M)	8 (17)
VII Genetics and Evolution (20)	2+2 (4M)	1 (2M)	1 (3M)	1 (4M)	1 (5M)	8 (18M)
VIII Biology and Human Welfare (12)	3 (3M)	1 (2M)	1 (3M)	1 (4M)	-	6 (12M)
IX Biotechnology and its Applications (12)	3 (3M)	1 (2M)	1 (3M)	-	1 (5M)	6 (13M)
X Ecology and Environment (10)	2 (2M)	1 (2M)	2 (6M)	-	-	5 (10M)
Total	16 (16M)	5 (5M)	7 (21M)	2 (8M)	3 (15M)	33 (70M)