BIOLOGY (Theory) (outside) **57/1**

Marking Scheme

SECTION – A

Q.1 Give one example of an animal which exhibits oestrous cycle. 1

Ans.1. (any non primate mammal)-cow/dog/cat/dear/tiger/sheep // (any primate mammal)-Monkeys/apes/humans (any one) 1

Q.**2 State one reason why breast-feeding the baby acts as a natural contraceptive for the mother.** 1

Ans.2 Breast-feeding prevents ovulation during lactation/absence of menstruation 1

Q.3 Identify the correct statement: 1

(a) Female of many birds has a pair of dissimilar ZW chromosomes, while the males possess a pair of similar ZZ chromosomes.

(b) Female of many birds has a pair of similar ZW chromosomes, while the males possess a pair of dissimilar ZZ chromosomes.

Ans.3. a 1

Q.4 What will happen if DNA replication is not followed by cell division in a eukaryotic cell? 1

Ans. Results in polyploidy/ chromosomal abnormality 1

Q.5 State one reason for adding blue-green algae to the agricultural soil. 1

5. To increase fertility of soil /to fix N2-/enhances N2 content 1

Q.6 Name the material used as matrix in gel-electrophoresis and mention its role. 1

6. Agarose gel / seaweed; sieving effect to separate DNA fragments ½+½

Q.7 Write the level of biodiversity represented by a mangrove. Give another example falling in the same level. 1

Ans. Ecological; Estuaries/desert/rain forest/coral reef/ wetland / alpine meadows (anyone) ½+½

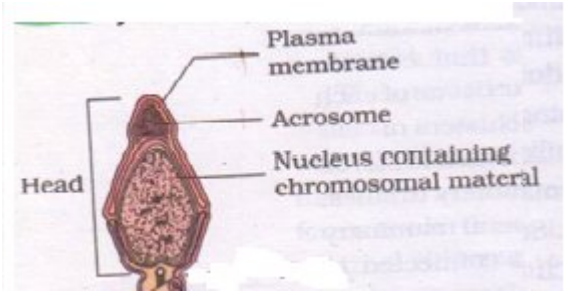
Q.8 Name the two gases contributing maximum to the green house effect. 1

Ans. 8. CO_2 & CH_4 ½+½

SECTION – B

Q.9 Draw and label the parts of the head region only of a human sperm. 2

Ans.9. Plasma membrane, Acrosome; Nucleus;



½ X 3labels+½ diagram=2

Q.10 What is amniocentesis? How is it misused? 2

Ans.10. Test of the amniotic fluid surrounding the developing embryo, to study the chromosomal pattern (for an abnormality); to know the foetal sex / female foeticide ½+½+1=2

Q.11 Rearrange the following in increasing order of evolution: 2

Gnetales; Ferns; Zosterophyllum; Ginkgo

11. Zosterophyllum, fern, Gingo, Gnetals ½ X 4=2

Q.12 Differentiate between active and passive immunity. **2**

OR

Differentiate between out breeding and out crossing.

12. **Active immunity**- When a host is exposed to antigens, which may be in terms of dead or living microbes/proteins; antibodies are produced in the host body
Passive Immunity- When ready made antibodies are directly given to protect the body against foreign agent /antigen protein 1+1=2

OR

Out breeding- breeding of unrelated animals between same breeds, no common ancestors /between different breeds/cross breeding/different species/ interspecific hybridisation
Out crossing-Mating within same breed, no common ancestors for 4-6 generations 1+1=2

Q.13 Name two groups of organisms which constitute 'flocs' .Write their influence on level of BOD during biological treatment of sewage.

13 Aerobic bacteria; fungi; they consume organic matter of effluents; use O2/ reduce BOD

Q.14. Why is making cells competent essential for biotechnology experiments ? List any two ways by which this can be achieved.

Ans. .-Enable host cells/bacteria to take up DNA/ r-DNA
-Bacterial cell treated with (divalent cation) Ca^{++} + heat (42^0C) +r-DNA on ice / /microinjection/gene gun/ vector disarmed pathogen 1+1=2

Q.15. Human insulin when synthesized in the body needs to be processed before it can act. Explain giving reasons. 2

Ans.15. Insulin synthesized as pro-hormone (pro-insulin),which has extra stretch-C peptide along with A and B polypeptide. C peptide has to be removed, for insulin to be processed. ½ X 4=2

Q.16. Write any two ways how genetically modified plants are found to be useful. 2

Ans.16. Tolerant to abiotic stresses/reduced reliance on chemical pesticide/reduced post harvest losses/increased efficiency of mineral usage/enhanced nutritional value (Any two) 1x2=2

Q.17 Provide two reasons that make the count of prokaryotic species difficult. 2

Ans.17. Conventional taxonomic methods (Morphological) not suitable; difficult to culture in lab. 1x2=2

Q.18 Explain how does the inflow of large amount of nutrients like phosphates and nitrates into the water body drastically affects the aquatic life there. Name the phenomenon responsible. 2

Ans. 18.Promote algal growth; (algae consume O2 of water) water deficient in dissolve O2, mortality of fish: Eutrophication ½ X 4=2

SECTION – C

Q.19. (a) How is apomixes different from parthenocarpy? **3**

(b)Describe any two modes by which apomictic seeds can be produced.

19. a) **Parthenocarpy**-fruits develop without fertilization/fruits are without seeds.
Apomixis-Development of seeds without fertilization/ asexual reproduction that mimics sexual reproduction / diploid egg cell formed without meiotic division
b) diploid egg cell formed without meiotic division, nucellar cells 1+1+½+½=3

Q.20 Why is haemophilia rare in human females ? Mention a clinical symptom for the disease. 3
20. Sex linked mendelian disorder; females(homozygous recessive) do not live upto reproduction age; uncontrolled bleeding; 1+1+1=3

Q.21 a) What are the transcriptional products of RNA polymerase III ? **3**

(b)Differentiate between 'Capping' and 'Tailing'.
(c) Expand hnRNA.

Ans. a) tRNA,5srRNA,snRNA
b) Capping-addition of $^{m}G_{ppp}$ / ^{m}GTP . Tailing-Poly A tail/200-300 adenylate residues
c) Heterogenous nuclear RNA

Q.22. Giving three reasons , write how Hardy – Weinberg equilibrium can be affected. 3
22. Gene flow-/ Gene migration- changes gene frequency(gain or loss)
Genetic drift-By chance change in frequency
Recombination - mixing causes change in frequency –
Mutation-heritable changes
Natural selection- Speciation (any three)

Q. 23. Do you support 'Dope' test being conducted on sportspersons participating in a prestigious athletic meet ? Give three reasons in support of your answer. 3

23. Yes, it helps to diagnose unnatural enhanced performance, unethical (Cheating)or any other appropriate points

1+1+1=3

Q.24. Suggest and describe a technique through which a virus-free healthy plant can be obtained from a diseased sugarcane plant. 3

Ans. 24. Apical/axillary meristem; remove meristem; grow in vitro 1x3=3

Q.25. How are Baculoviruses and Bacillus thuringiensis used as bio-control agents ? Why are they preferred over readily available chemical pesticides ? 3

Ans..**baculo virus**-used as species specific/narrow spectrum//insecticidal application

Bacillus thurengiensis-available in sachets as dried spores which are mixed with water and sprayed

(any one difference)

No negative impacts on plants, mammals/birds/fish/non target insects 1+1+½+½=3

Q. 26. Draw a schematic diagram of the E. coli cloning vector pBR322 and mark the following in it : 3

(a) ori

(b) rop

(c) ampicillin resistance gene

(d) tetracycline resistance gene

(e) restriction site BamHI

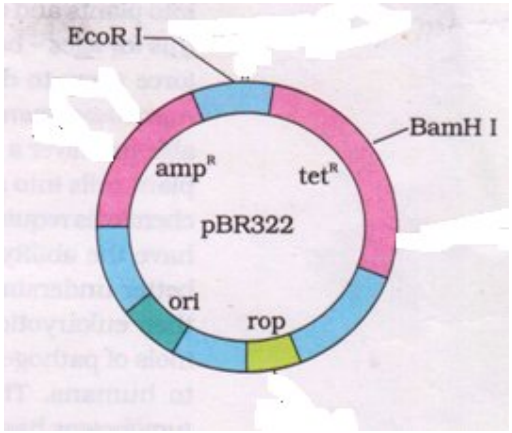
(f) restriction site EcoRI

OR

(a) Draw schematic diagrams of segments of a vector and a foreign DNA with the sequence of nucleotides recognized by EcoRI.

(b) Draw the vector DNA segment and foreign DNA segments after the action of EcoRI and label the sticky ends produced.

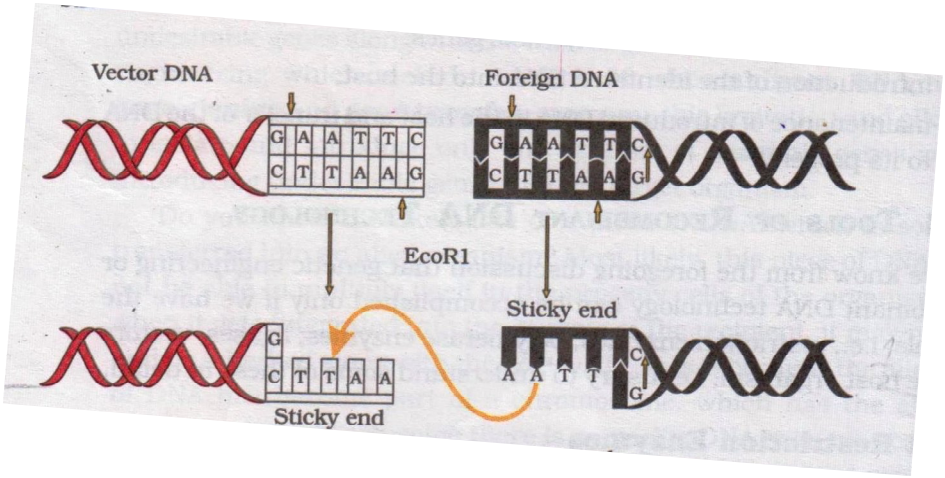
Ans.26 (a)



½ X 6=3

OR

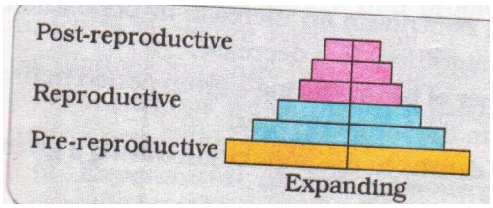
26. (b)



Vector DNA,Foreign DNA,Sticky ends,Arrow for joining,Correct sequence,Correct position for cutting
½ X 6=3

Q.27. Draw and explain expanding age pyramids of human population. Why is it so called ? 3

Ans.27.



expanding age pyramids of human population explains that population is growing, because pre reproductive age is more in number (½ X3labels)+ ½ diagram+½ explanation+½ reason=3

SECTION – D

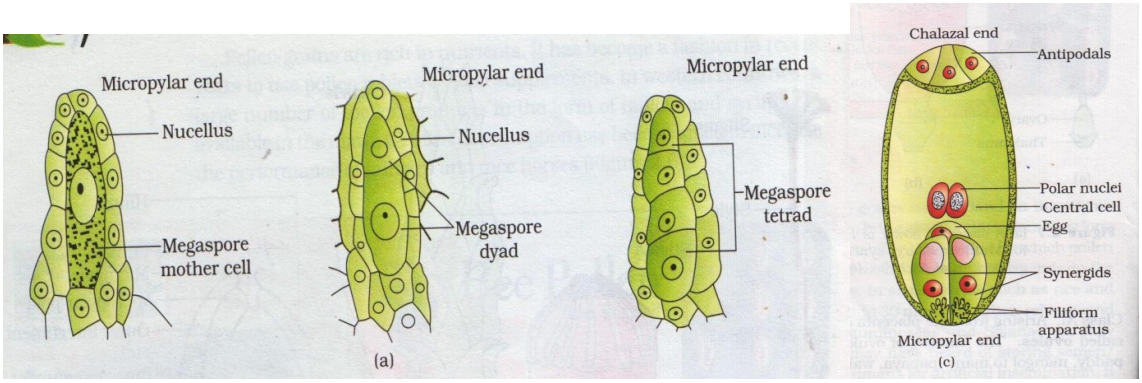
Q. 28. (a) Describe the formation of mature female gametophyte within an ovule in angiosperms. 5

(b) Describe the structure of cell(s) that guides(s) the pollen tube to enter the embryo-sac.

OR

Explain the different phases of menstrual cycle and correlate the phases with the different levels of ovarian hormones in human females.

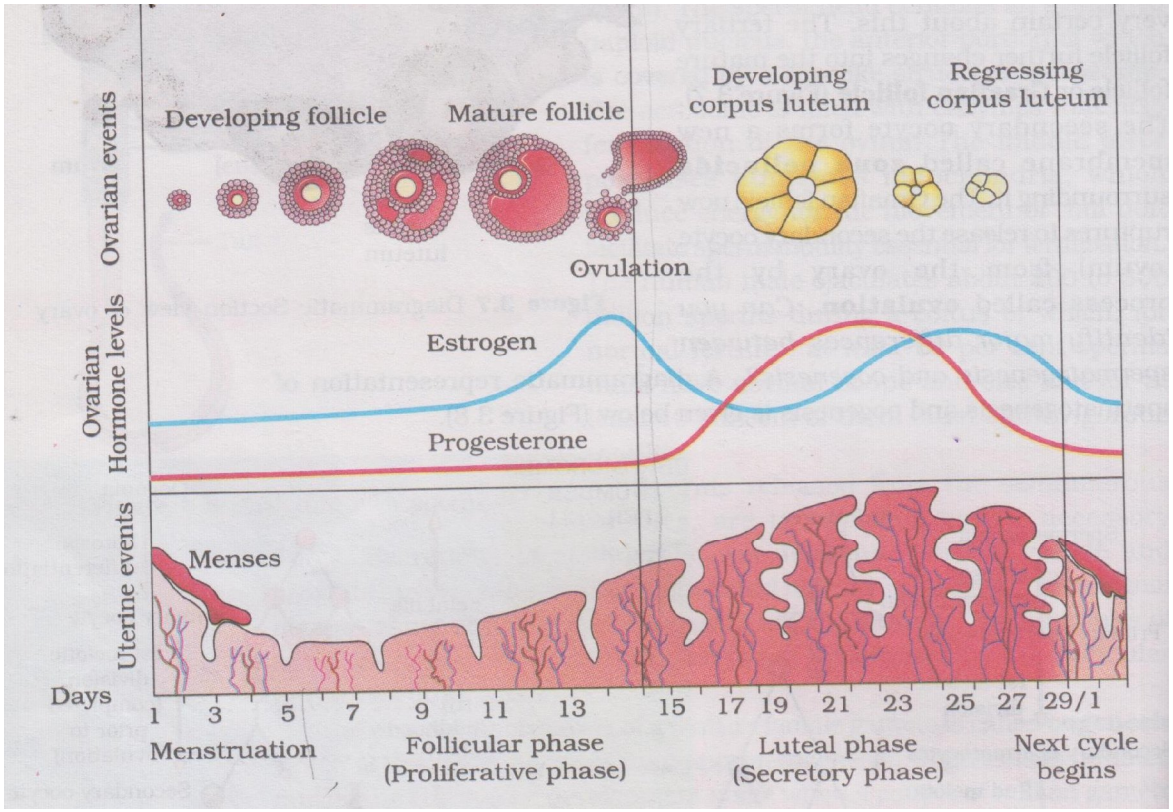
Ans. 28.a)



1/2 1/2 1/2 (1/2 x 5= 2 ½)

b) Synergids, have thick wall/ filiform apparatus (1)

OR



Menstruation , Follicular/proliferative phase, Luteal/secretory phase along with parallel changes in ovary and uterus 1x3=3

Ovarian hormones 1+1=2

Q.29. Work out a monohybrid cross upto f2 generation between two pea plants and two Antirrhinum plants both having contrasting traits with respect to colour of flower. Comment on the pattern of inheritance in the crosses carried above. 5

OR

Describe the process of transcription in a bacterium.

Ans.29. Any trait pea plant Red White

(Tall) (dwraf) parent RR X rr ½

Parents TT X tt ½ R r

Gamets T t

Selfing F1 Tt X Tt ½

(Progency)

F2 TT Tt Tt tt

Phenotypic ratio 3 : 1 ½

(Tall) (dwraf)

Genotypic ratio (TT) : 2(Tt) :: 1(tt) ½

Pattern – Dominut/recessive ½

Selfs F1 Rr X Rr

(progency)

RR Rr Rr rr

(Red) (Pink) (Pink) (White)

pheuotypi ratio- 1 : 2 : 1 ½

(Red) (Pink) (white)

Genotypic- 1 : 2 : 1 ½

(RR) (Rr) (rr)

Incomlpete dominance ½

OR

Explanation

Initiation- RNA polymerase binds to promoter and initiates transcription. 1

Elongation- RNA polymerase also facilitates opening of the helix and continues elongation. 1

Termination – once RNA polymerase reaches the terminator region, the nascent RNA falls off and also the RNA polymerase 1

(Name & function)RNA polymerase- 1

Initiation factor (Sigma) ½

Termination factor (rho) ½

30. (a) Name the population growth pattern the equation {dN / dt =rN} represents. What does "r" represent in the equation ? Write its importance in population growth. 5

(b) Explain the principle of carrying capacity by using population Verhulst-Pearl logistic growth curve.

OR

(a) With suitable examples, explain the energy flow through different trophic levels. What does each bar in this pyramid represent ?

(b) Write any two limitations of ecological pyramids.

Ans. 30. Exponential/geometric 1

a) r = Intrinsic rate of natural increase,
importance – higher the 'r' higher the population growth/any biotic or abiotic factor on population growth 1

b) Given habitat has enough resource to support a maximum possible number beyond which no- further growth is possible. This is carrying capacity K asymptote- is K 1+1

OR

a) P.NO 249- In an ideal energy pyramid the primary producers convert only 1% of the energy in the sunlight available to them. the subsequent trophic levels pass on 10% of the energy received from previous trophic level to the next trophic level.
each bar /level in the pyramid represent the amount of energy transferred to the next trophic level.

b) (i) did not take into account the same species belonging to 2 trophic levels.
(ii) assumes simple food chain and not food web
(iii) Saprophyte are not considered (any two)