EDUMATE

XII

Zoology

Government of Kerala

DEPARTMENT OF EDUCATION

State Council of Educational Research and Training (SCERT), Kerala
2017

Prepared by:
State Council of Educational
Research & Training (SCERT)
Poojappura, Thiruvananthapuram -12,
Kerala. E-mail:scertkerala@gmail.com

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Foreword

As part of the comprehensive revision of curriculum from pre-primary to the Higher Secondary sector, new textbooks have been developed for Std. XI and Std XII during the years 2014 -15 and 2015-16 respectively. Evaluation activities should go hand in hand with the new curriculum. Real learning takes place by constructing knowledge through various learning processes.

In a constructive classroom, learners have opportunities to engage in a number of activities in which a range of attributes can be developed. The same activities provide the learner with scope for assessing development of these attributes. Hence there has been a shift from assessing only the products of learning to the process of learning. Anyhow it is to be noted that term end assessment is a part of continuous and comprehensive evaluation.

The main objective of this book is to help the learners to face the public examination with confidence. In this context, questions from all chapters of each subject of Std. XII have been developed along with the scoring indicators. Hope that this question bank titled "Edumate" will be helpful to learners as well as teachers. Your comments and suggestions are welcome and will assist us in improving the content of this book.

Wish you all the best.

Dr. J. Prasad
Director

Contents

Units

1

HUMAN REPRODUCTION

Learning outcome

- Identifies and explains the structure of male reproductive system.

Q.1 Identify the hormone produced by testis.
(a. Thyroxine b. Estrogen c. Progesterone d. Testosterone)

(1 Score)

Learning outcome

- Identifies and explains the structure of male reproductive system.

Q.2 Normally, scrotum has a temperature below body temperature. Give the significance.

(1 Score)

Learning outcome

- Identifies and explains the structure of male reproductive system.

Q.3 Cowper's gland is an accessory reproductive gland .Name two other glands associated with male reproductive system

(1 Score)

Learning outcome

- Identifies and explains the structure of male reproductive system.

Q.4 Germinal epithelium lining seminiferous tubules of testis contains Sertoli cells and germ cells. Give the functional difference between Sertoli cells and germ cells.

(2 Scores)

Learning outcome

- Identifies and explains the structure of male reproductive system.

Q.5 You come across two boys, one with normal level of testosterone and the other with low level of the hormone. Will you be able to distinguish between them by comparing their external features? Explain.

(1 Scores)

Learning outcome

- Identifies and explains the structure of female gonads and their associated parts.

Q.6 'Hymen is not a reliable indicator for virginity'. Do you agree with the statement? Give reasons.

(1 Score)

Learning outcome

- Identifies and explains the structure of female gonads and their associated parts.

Q.7 During coitus semen is deposited in the vagina. Give the path of sperm movement in female reproductive tract.

(2 Scores)

Learning outcome

- Identifies and explains the structure of female gonads and their associated parts.

Q.8 Milk is secreted in the alveoli of mammary glands. Make a flow chart of the movement of milk from the alveoli to the buccal cavity of new born during breast feeding.

(2 Scores)

Learning outcome:

- Explains and compares the process of spermiogenesis and oogenesis .

Q.9 Find out the first cell which is formed as haploid during spermatogenesis.

(a. Spermatogonia b. Primary spermatocyte
c. Secondary spermatocyte d. Sperm)

(1 Score)

Learning outcome

- Identifies and explains the structure of male reproductive system.
- Identifies and explains the structure of female gonads and their associated parts.

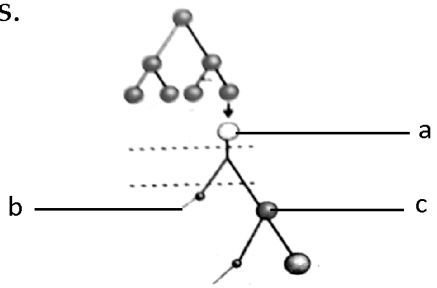
Q.10 Gametogenesis is classified as spermatogenesis and oogenesis. Differentiate between spermatogenesis and oogenesis.

(2 Scores)

Learning outcome

- Identifies and explains the structure of female gonads and their associated parts.

Q.11 Analyse the process of gametogenesis given below. Answer the following questions.



(I) Identify and name the type of gametogenesis illustrated.

(II) Identify cell 'b' & cell 'c' and explain their fate.

(III) Compare the chromosome numbers of cell 'a' & cell 'c'.

(3 Scores)

Learning Outcome

- Appraises the natural phenomenon of fertilisation and implantation.

Q.12 The urine sample of a lady contains HCG. As a biology student, what conclusion can you draw from the result?

(1 Score)

Learning outcome

- Appraises the natural phenomenon of menstrual cycle.
- Identifies and explains the importance of gametes in fertilization.
- Infers the future of fertilized ovum.
- Appraises the natural phenomenon of fertilisation and implantation.
- Identifies explains and analyse the events during pregnancy and embryonic development.
- Compares the role of hormones during pregnancy.

Q.13 Fertilization is the fusion of male and female gamete, which takes place in the fallopian tube.

(a) Discuss and point out the changes that occurs in the ovary after fertilization.

(b) Describe the changes that occurs in the uterus, if the ovum is not fertilized. (3 Scores)

Learning outcome

- Identifies the importance of colostrum.

Q.14 Milk is produced in mammary glands towards the end of pregnancy.

(a) Name the first milk produced after parturition.

(b) Evaluate the advantages of getting first milk to a new born baby.

(3 Scores)

Learning outcome

- Identifies and explains the structure of male reproductive system.

Q.15 In testes, the newly formed sperms are temporarily stored in.....

(a. Rete testis b. Seminiferous tubule c. Epididymis d. Vas deferens)

(1 Score)

Learning Outcome

- Identifies and explains major phases of menstrual cycle.

Q.16 Write the roles of pituitary hormones in uterine and ovarian cycles in females.

(2 Scores)

Learning outcome

- Identifies and explains major phases of menstrual cycle.

Q.17 The graph shows the level of ovarian hormones in a normally menstruating woman during follicular phase.

(I) Name 'a' and 'b'.

(II) Mention the role of pituitary hormones in maintaining this condition.

(III) Reconstruct the hormonal graph for luteal phase.

(3 Scores)

Learning outcome

- Appraises the natural phenomenon of fertilisation and implantation.

Q.18 Illustrate the sequential order of stages of human development from the following.

(morula, gametogenesis, cleavage, fertilization, blasulation, implantation, organogenesis, gastrulation)

(3 Scores)

Learning outcome

- Explains the process of parturition.

Q.19 Parturition starts with foetal ejection reflex. Define foetal ejection reflex.

(1 Score)

Learning Outcome

- Explains the process of parturition.

Q.20 A hormone injection is needed to overcome delay in delivery. Name the hormonal injection given to enhance parturition.

(1 Score)

Learning outcome

- Explains the process of parturition.

Q.21 Human Chorionic Gonadotropin (HCG) is a hormone produced during pregnancy. Identify two other hormones produced during pregnancy.

(1 Score)

Learning Outcome

- Appraises the natural phenomenon of fertilisation and implantation.

Q.22 "The trophoblast layer gets attached to the endometrium and the inner cell mass get differentiated into embryo." Identify the scientific term for the attachment of blastocyst to the endometrial lining of the uterus.

(1 Score)

Learning Outcome

- Explains the process of parturition.

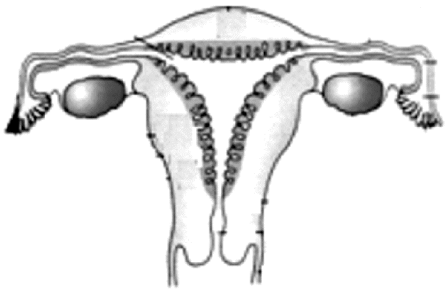
Q.23 Foetal ejection reflex is initiated by a pituitary hormone, which is called child birth hormone. Mention the name of child birth hormone.

(1 Score)

Learning Outcome

- Identifies and explains the structure of female gonads and their associated parts.

Q.24 Identify and label the parts where the following events occur.



(a) Fertilization.
(b) Implantation.

(2 Scores)

Learning Outcome

- Identifies and explains the structure of male reproductive system.

Q.25 Testosterone is secreted by.....
(a. Sertoli cells b. Leydig cells
c. Follicle cells d. Seminiferous tissue)

(1 Score)

Learning Outcome

Identifies and explains the structure of female gonads and their associated parts.

Q.26 Ovulation normally takes place at the middle of menstrual cycle. Name the part of the oviduct that collects ovum from the ovary.

(1 Score)

Learning Outcome

- Explains and compares the process of spermiogenesis and oogenesis .

Q.27 Match the column A with column B and column C.

	Column A	**Column B**	**Column C**
1	HCG	Corpus luteum	Helps in parturition
2	Oxytocin	Placenta	Helps in maintaining pregnancy
3	Progesterone	Hypothalamus	Indicate pregnancy

(3 Scores)

Learning Outcome

- Identifies and explains the structure of female gonads and their associated parts.

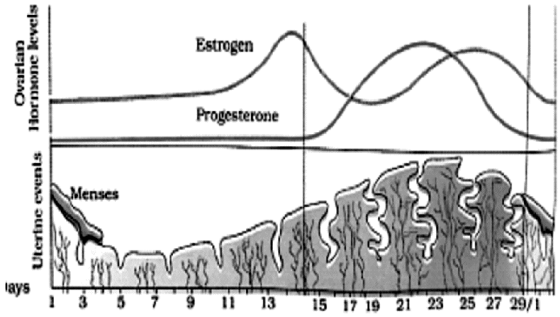
Q.28 Internal lining of fallopian tube is made up of ciliated epithelium. Justify the role of ciliated epithelium in oviduct.

(1 Score)

Learning Outcome

- Identifies and explains major phases of menstrual cycle.

Q.29 Analyse the following graph and answer the following questions.



(a) Reconstruct the graph with FSH and LH

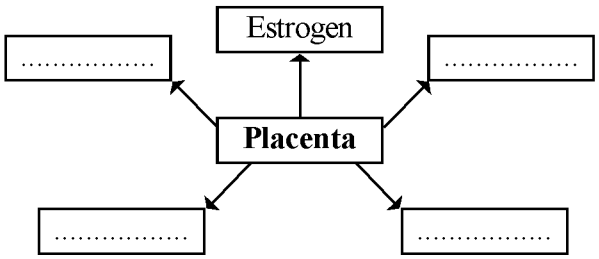
(b) Briefly explain the influence of FSH and LH in the production of ovarian hormones.

(3 Score)

Learning Outcome

- Compares the role of hormones during pregnancy.

Q.30 Placenta is a physiological connection between mother and foetus. Placenta is also an endocrine gland. Complete the given illustration with the hormones produced by the placenta.



(2 Scores)

Learning outcome

- Identifies and explains the structure of male reproductive system.
- Identifies and explains the structure of female gonads and their associated parts.

Q.31 Arrange the following terms in two columns with suitable headings.
(Seminiferous tubule, Uterus, vas deferens, Cervix, vagina, Epididymis)

(3 Scores)

Learning Outcome

- Identifies and explains the structure of male reproductive system.

Q.32 Acrosome is a cap like structure found in the head of sperm. Write its function.

(1 Score)

Learning outcome

- Identifies and explains the structure of female gonads and their associated parts.

Q.33 Select the correct path of sperm movement in the male reproductive system.

(a) Seminiferous tubule, Vasa efferentia, Vas deferens, Epididymis, Urethra, Rete testis

(b) Rete testis, Epididymis, Vasa efferentia, Vas deferens, Seminiferous tubule, Urethra

(c) Seminiferous tubule, Rete testis, Vasa efferentia, Epididymis, Vas deferens, Urethra

(d) Seminiferous tubule, Vas deferens, Epididymis, Rete testis, Urethra, Vasa efferentia

(1 Score)

Learning Outcome

- Identifies and explains the structure of female gonads and their associated parts.

Q.34 Read the statements and choose the correct option.

A: The endometrium undergoes cyclical changes during menstrual cycle.

B: Perimetrium exhibits strong contractions during delivery of the baby.

C: Myometrium is outer glandular layer which produce hormones.

(a) Statement 'A' alone is correct .

(b) Statements 'A' and 'B' are correct.

(c) Statements 'A' and 'C' are correct

(d) Statement 'C' alone correct

(1 Score)

2

REPRODUCTIVE HEALTH

Learning Outcome

- Identifies and explains the importance of sex education and reproductive health.
- Compares, assesses and recommends the importance of Assisted Reproductive Technologies (ART) to overcome infertility.

Q.1 Reproductive health awareness class is conducted by Souhrida club of your school.

Discuss about the values and knowledge gained through sex education organised by the education department.

(2 Scores)

Learning Outcome

- Identifies compares and explains different types of contraceptive devices.
- Evaluates the rate of reliability in birth control by natural, temporary and permanent methods.

Q.2 Match Column A with Column B and Column C.

	Column A	**Column B**	**Column C**
1	Coitus interruptus	Oral Contraceptive pills	Suppress spem motility
2	Copper T	Natural birth control method	Estrogen- progestron combination
3	Mala-D	IUD	withdrawal of penis before ejaculation

(3 Scores)

Learning Outcome

- dentifies the importance of amniocentesis as a pre-natal diagnosis.

Q.3 Amniocentesis is a pre-natal diagnostic test. Now a days it is widely misused as a test for determining the sex of the foetus. The misuse of the test for foetal sex determination is legally banned today. As a plus two biology student give your comments on the issue. (2 Scores)

Learning Outcome

- Identifies compares and explains different types of contraceptive devices.
- Evaluates the rate of reliability in birth control by natural, temporary and permanent methods.

Q.4 Name two barrier methods used in contraception.

(1 Score)

Learning Outcome

- Identifies compares and explains different types of contraceptive devices.
- Evaluates the rate of reliability in birth control by natural, temporary and permanent methods.

Q.5 Progestasert is a hormone releasing IUD. Identify another hormone releasing IUD

(1 Score)

Learning Outcome

- Identifies compares and explains different types of contraceptive devices.
- Evaluates the rate of reliability in birth control by natural, temporary and permanent methods.

Q.6 The permanent methods of contraception are more effective in contraception than any temporary methods.

(a) Identify two permanent methods of contraception.

(b) Mention the demerits of permanent method.

(2 Scores)

Learning Outcome:

- Judges the medical necessity and social consequences of MTP

Q.7 Government of India legalised MTP in 1971 with some strict conditions to avoid its misuse.

(a) Define MTP.

(b Suggest the possibilities to legally perform MTP.

(3 Scores)

Learning Outcome

- Explains the reasons of transmission and prevention of STDs.

Q.8 Genital herpes is a non-curable STD even if detected earlier. Name two other non-curable STDs.

(1 Score)

Learning Outcome

- Explains the reasons of transmission and prevention of STDs.

Q.9 Diseases or infections which are transmitted through sexual intercourse are collectively called STDs.

(a) Suggest two methods to prevent STD.

(b) Name two examples for STD.

(3 Scores)

Learning Outcome

- Identifies the reasons of infertility.
- Compares, assesses and recommends the importance of Assisted Reproductive Technologies (ART) to overcome infertility.

Q.10 Certain techniques are used to assist infertile couples to produce children.

(a) Name the technique used to assist infertile couples.

(b) Give two examples for this type of technique which is used to address male infertility.

(2 Scores)

Learning Outcome

- Compares, assesses and recommends the importance of Assisted Reproductive Technologies (ART) to overcome infertility.

Q.11 *In vitro* fertilization (IVF) is followed by .....

(a. ICSI b. GIFT c. ET d. AI)

(1 Score)

Learning Outcome

- Compares, assesses and recommends the importance of Assisted Reproductive Technologies (ART) to overcome infertility.

Q.12 Identify the method in which sperm is directly injected into the ovum for the formation of embryo.

(a.AI b.IUT c.ICSI d.ET) (1 Score)

Learning Outcome

- Identifies compares and explains different types of contraceptive devices.
- Judges the medical necessity and social consequences of MTP
- Identifies the reasons of infertility.
- Compares, assesses and recommends the importance of Assisted Reproductive Technologies (ART) to overcome infertility.

Q.13 Identify the relationship between first and second word, find out the fourth one.

(a) Termination of pregnancy: MTP :::: Insemination into uterus : .....

(b) LNG 20: Hormone releasing IUD :::: Lippes loop: .....

(1 Score)

Learning Outcome

- Compares, assesses and recommends the importance of Assisted Reproductive Technologies (ART) to overcome infertility.

Q.14 A female cannot produce ovum, but can provide suitable environment for fertilization and further development. Suggest the ART which is more suitable for the lady.

(1 Score)

Learning Outcome

- Compares, assesses and recommends the importance of Assisted Reproductive Technologies (ART) to overcome infertility.

Q.15 After IVF, the embryo is transferred either to fallopian tube or to uterus. Name the ET method used when the embryo has not reached eight celled stage.

(1 Score)

Learning Outcome

- Judges the medical necessity and social consequences of MTP

Q.16 On clinical examination, it is found that a pregnant lady carrying a defective foetus.

(a) Suggest a technique used to get rid of the defective foetus.

(b) Name any one demerit found associated with the suggested technique. (2 Scores)

Learning Outcome

- Identifies and explains the importance of sex education and reproductive health.

Q.17 In India, reproductive health care has been improving because of new and effective policies taken up by the health department. Name two programmes launched by Govt. of India to attain reproductive health among the people. (2 Scores)

Learning Outcome

- Identifies and explains the importance of sex education and reproductive health.

Q.18 Population explosion is a major problem facing India.

(a) Justify the statement with reasons.

(b) Suggest any two relevant measures to control over population.

(3 Scores)

Learning Outcome

- Explains the reasons of transmission and prevention of STDs.

Q.19 AIDS can be transmitted through sexual contact.

(a) Expand AIDS.

(b) Suggest any two other methods by which humans could be affected with AIDS.

(3 Scores)

Learning Outcome

- Identifies compares and explains different types of contraceptive devices.
- Evaluates the rate of reliability in birth control by natural, temporary and permanent methods.

Q.20 CuT is a contraceptive device.

(a) Suggest the contraceptive action of Cu T.

(b) Name two hormone releasing IUDs.

(2 scores)

Learning Outcome

- Evaluates the rate of reliability in birth control by natural, temporary and permanent methods.

Q.21 Read the statements and choose the correct option. Justify your answer.

A: Progesterone alone is used in female contraceptives like implants and injections.

B: Sterilization blocks gamete union and thereby prevents conception.

C: Implantation occurs in the fallopian tube

(a) Statement 'A' alone correct.

(b) Statement 'B' and 'C' are correct.

(c) Statement 'B' alone correct.

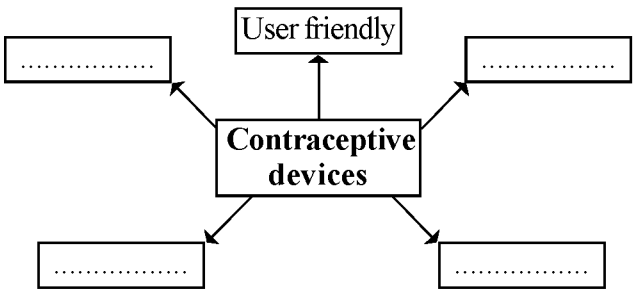
(d) Statement 'A' and 'C' are correct.

(1 Score)

Learning Outcome

- Evaluates the rate of reliability in birth control by natural, temporary and permanent methods.

Q.22 Contraceptive methods are used to block unwanted pregnancies.The qualities of an ideal contraceptive are:



(2 Scores)

3

Principles of inheritance and variation

Learning outcomes

- Explains the hybridisation experiments in pea plants.

Q.1 A cluster of contrasting traits selected and studied by Mendel is given. Categorise them into dominant and recessive traits.

White flower, Green pod,
Axial flower, Yellow pod, Wrinkled seeds,
Violet flower, Terminal flower, Round seeds

(2 Score)

Learning outcomes

- Formulates ratio of F1 and F2 in Monohybrid cross.
- Designs different types of hybridisation experiments.

Q.2 In a hybridization experiment between tall pea plants and dwarf pea plants, a student observed 100% dominant parental traits in F1 generation and 75% dominant, 25% recessive parental traits are observed in F2 generation.

A) Identify the type of cross.

B) Represent F2generation using Punnet square.

(3 Score)

Learning outcomes

- Differentiates Mendelian inheritance and other type of inheritance.

Q.3 'Incomplete dominance is an exception to the principle of dominance'

A) Do you agree with statement? Justify?

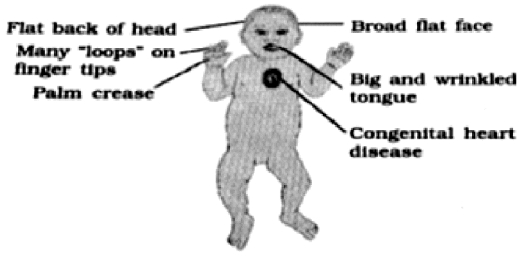
B) Explain the principle of dominance.

(2 Score)

Learning outcomes

- Explains and differentiates Mendelian and chromosomal disorders.

Q.4 A representative figure of an individual affected with a chromosomal / genetic disorder is given.



A) Identify the disorder?

B) Write the genetic reason of this disease?

(2 Score)

Learning outcomes

- Explains types of sex determination in human and other animals.
- Explains and differentiates Mendelian and chromosomal disorders.

Q.5 Select the correctly matched pair/pairs from the following.

A) Langdon Down - 21stTrisomy

B) Sutton and Bovery - Principle of inheritance

C) Henking -X-body(X –chromosome)

D) Morgan - Mutation

(1 Score)

Learning outcome

- Differentiates Mendelian inheritance and other type of inheritance.

Q.6 ABO blood group is considered as an example of multiple allelism and Co dominance. Explain?

(3 Score)

Learning outcome

- Explains and differentiates Mendelian and chromosomal disorders.

Q.7 Character of a genetic disorder is given below.

'Presence of an additional X chromosome making chromosome number 47 (44 autosomes + XXY)'

Identify the disorder and write another one character of this disease?

(2 Score)

Learning outcome

- Explains types of sex determination in human and other animals.

Q.8 Compare the chromosomal mechanism of sex determination of the following animals.

A) *Drosophila* B) Grasshopper

(2 Score)

Learning outcome

- Explains types of sex determination in human and other animals.

Q.9 'In human being father is responsible for the sex of child'. Based on the knowledge of chromosomal mechanism of sex determination, substantiate this statement?

(3 Score)

Learning out comes

- Differentiates Mendelian inheritance and other type of inheritance.

Q.10 In Snapdragon F1 progeny shows pink coloured flowers when a cross is made between red flowered and white flowered plants.

A) What is the genetic reason of this phenomenon?

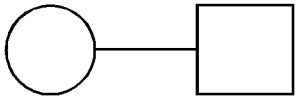
B) Find out the phenotypic ratio of F2 generation of the same cross.

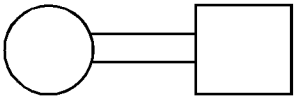
(2Score)

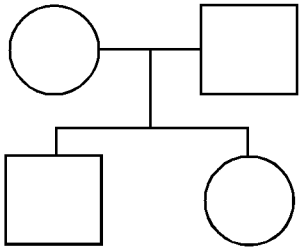
Learning out come

- Assesses pedigree of human disorders.

Q.11 What do you understand by the following symbols of Pedigree analysis?

A) 

B) 

C) 

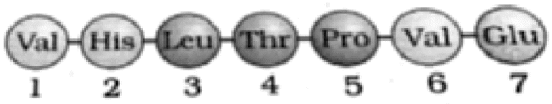
(2 Score)

Learning out come

- Differentiates Mendelian inheritance and other type of inheritance.

Q.12 The amino acid composition of a portion of beta polypeptide chain of haemoglobin is given.

I



II

A) Identify the beta chain of sickle cell anaemia patient?

B) Write the difference between the Beta chain of normal haemoglobin and the Beta chain of sickle cell anaemia haemoglobin?

(2 Score)

Learning out comes

- Differentiates Mendelian inheritance and other type of inheritance.

Q.13 Blood groups of father, mother and their two children are given below. Work out the genotypes of each blood group

Father -**AB** group Mother - **O** group

Daughter -**A** group Son -**B** group

(2 Score)

Learning out comes

- Explains the hybridisation experiments in pea plants.
- Designs different types of hybridisation experiments.

Q.14 What is test cross? Design a test cross of the following characters/ traits of pea plant.

A) Tall X Dwarf

B) Violet flower X White

(3 Score)

Learning out comes

- Explains the hybridisation experiments in pea plants.
- Differentiates Mendelian inheritance and other type of inheritance.

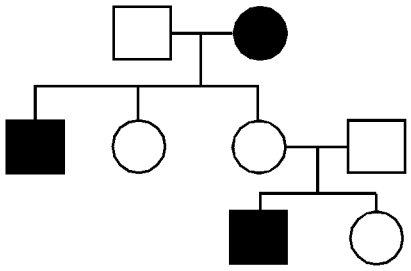
Q.15 Differentiate between Homozygous and heterozygous condition with an example.

(2 Score)

Learning outcome

- Assesses pedigree of human disorders.

Q.16 Observe the following pedigree chart



A) What is the indication of symbols ◯ and □.

B) Some symbols are shaded or darkened why?

C) Write the significance of pedigree chart?

(2 Score)

Learning outcome

- Explains and differentiates Mendelian and chromosomal disorders.

Q.17 Categorize following diseases into a sex linked recessive disorder and autosome linked recessive disorders. Write the characters of each?

A) Haemophilia B) Phenyl ketonuria

(2 Score)

Learning outcome

- Formulates ratio of F1 and F2 in Dihybrid cross.

Q.18 In a pea plant the gene for yellow seed colour (YY) is dominant to green (*yy*) and round seed (RR) is dominant to wrinkled (rr). With the help of Punnet square, find out the offspring of F2 generation of the following cross.

Yellow Round seeds X Green wrinkled seeds

(Homozygous for both characters)

(3 Score)

Learning outcome

- Explains and differentiates Mendelian and chromosomal disorders.

Q.19 'Down's syndrome and Turner's syndrome are the examples of aneuploidy'. Substantiate.

(3 Score)

Learning outcomes

- Formulates ratio of F1 and F2 in Dihybrid cross.
- Explains and differentiates Mendelian and chromosomal disorders.

Q.20 Select the correct statement or statements from the following.

A) Gain of additional chrosome(s) is called aneuploidy.

B) The affected individual of Turner's and Klinfelter's syndrome are fertile.

C) Increase in the whole set of chromosome in an organism is called polyploidy.

D) Expected F2 generation ratio of two genes which do not segregate independently is 9:3:3:1.

(1 Score)

Learning out comes

- Differentiates Mendelian inheritance and other type of inheritance.

Q.21 Compare incomplete dominance and co dominance with suitable examples?

(3 Score)

Learning out comes

- Differentiates Mendelian inheritance and other type of inheritance.

Q.22 Analyse the following statements.

A) Deletions and insertions of base pair of DNA causes Frame shift mutation

B) Chemical and physical factors that induce mutation are referred as polyploidy

Identify the wrong statement and rectify the mistake.

(2 Score)

Learning out comes

- Explains types of sex determination in human and other animals.

Q.23 Is it possible for:

A) A woman to inherit X chromosome from her father?

B) A man to inherit X chromosome from his father?

(2 Score)

Learning out come

- Formulates ratio of F1 and F2 in Dihybrid cross.

Q.24 Considering the independent assortment of all the factors how many types of gametes does a **RrYy** (round yellow seeds of pea plants) individuals produce? What are they?

(2 Score)

Learning out come

- Designs different types of hybridisation experiments using 2 characters.

Q.25 Name the scientists who proposed chromosomal theory of inheritance?

(1 Score)

4

MOLECULAR BASIS OF INHERITANCE

Learning Outcomes

- Explains and constructs the structure of Nucleosome and DNA

Q.1 In DNA molecule a nitrogenous base bonded with pentose sugar molecule through a ..... Bond

(Score 1)

Learning Outcomes

- Identifies the importance of DNA as a genetic material.

Q.2 Histone proteins are ..... charged molecule

(Score 1)

Learning Outcomes

- Identifies the importance of DNA as a genetic material.

Q.3 Histone octamer bind to DNA to form .....

(Score 1)

Learning Outcomes

- Identifies the importance of DNA as a genetic material.

Q.4 The chromosomes are seen on which stage of the cell cycle

(Score 1)

Learning Outcomes

- Identifies the importance of DNA as a genetic material.

Q.5 The virus which infects the bacteria are called .....

(Score 1)

Learning Outcomes

- Identifies the importance of DNA as a genetic material.

Q.6 Pick the genetic material in human beings (RNA, mRNA , tRNA , DNA)

(Score 1)

Learning Outcomes

- Constructs the models of DNA replication.

Q.7 The DNA synthesis in leading strand is

a) Continuous. b) not as single strand

c) discontinuous d) as Okazaki fragments

(Score1)

Learning Outcomes

- Constructs the models of DNA replication.

Q.8 Expand the following

mRNA = messenger RNA

tRNA = ...

rRNA = Ribosomal RNA

hnRNA = ... (Score 1)

Learning Outcomes:

- Constructs model showing process of translation.

Q.9 Pick the initiation codon from the triplets codons given below

AAA, UGA, AUG, GUA (Score 1)

Learning Outcomes

- Constructs model showing process of translation.

Q.10 From the following triplet codes find out the stop codon

(GAU, UCU, UAG, UGG) (Score1)

Learning Outcomes

- Explains and constructs the structure of Nucleosome and DNA

Q.11 Chromatin is a lengthy molecule. How is it compactly packed in nucleus?

(Score 2)

Learning Outcomes

- Differentiates DNA and RNA as a genetic material.

Q.12 In a classroom discussion your classmate says that the RNA is more stable than DNA. Do you agree with it? Explain the advantage of DNA over RNA

(Score 2)

Learning Outcomes

- Identifies the importance of DNA as a genetic material.

Q.13 Explain the transforming principle and its experiment (Score 3)

Learning Outcomes

- Identifies and explains the features of RNA.

Q.14 Explain RNA world theory

(Score 2)

Learning Outcomes

- Identifies and explains transcription unit.

Q.15 The transcriptional process took place in one direction and only one strand act as a template strand for the m RNA synthesis. Why? Explain? (Score 2)

Learning Outcomes

- Constructs models of transcription unit.

Q.16 Write the process involved in transcription (Score 3)

Learning Outcomes

- Explains translation.

Q.17 Name the process involved in the synthesis of protein from mRNA. Explain the process (Score 3)

Learning Outcomes

- Explains the process of gene regulation and expression in prokaryotes.

Q.18 A) Explain the Operon model for gene regulation .

B) Write the components of Lac operon and specify the function each component.

(Score 3)

Learning Outcomes

- Explains Human Genome Project.

Q.19 (a) Mention any four goals of Human Genome Project

(b) Name two methodologies involved in it.

(Score 3)

Learning Outcomes

- Explains the process of gene regulation and expression in prokaryotes.

Q.20 The regulation of gene expression happened at various levels in eukaryotes. Point out the levels of gene expression.

(Score 2)

Learning Outcomes

- Explains the importance of DNA finger printing.

Q.21 Complete the flow chart of the steps involved in DNA finger printing

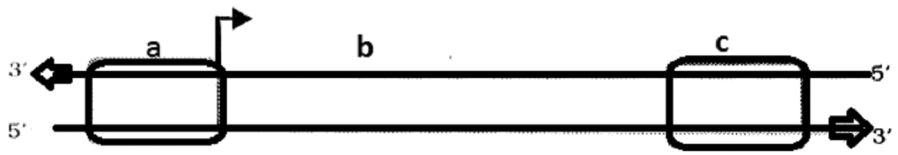
1	Isolation of DNA
2	**A**
3	Separation of DNA fragments by electrophoresis
4	**B**
5	**C**
6	Detection of hybridised DNA fragments by autoradiography

(Score 3)

Learning Outcomes

- Identifies and explains transcription unit.

Q.22 Identify the figure and answer the following.



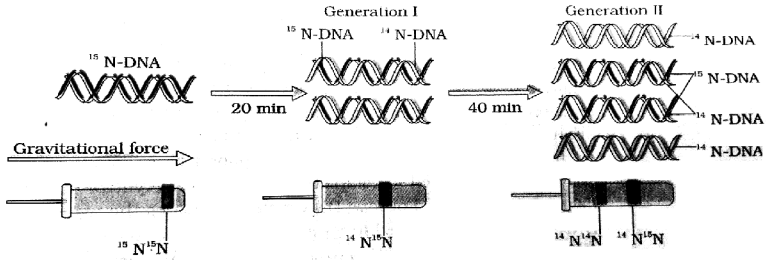
Name a,b and c

(Score 3)

Learning Out Comes

- Identifies and explains the mode of replication in DNA.

Q.23 Identify figure and answer the following.



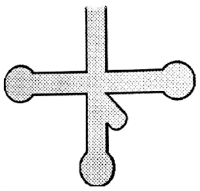
a. Name the experiment

b. Briefly explain this experiments (Score 3)

_Learning Out Comes

- Explains and constructs the structure of Nucleosome and DNA

Q.24 Observe the figure and answer the following.



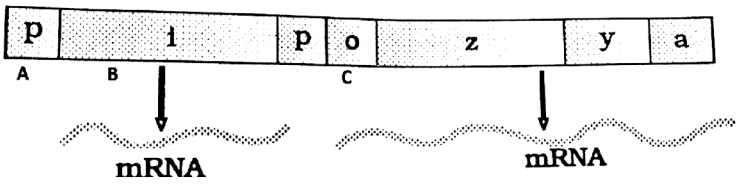
a. Name the biomolecule

b. Explain the function of this molecule (Score 2)

Learning Out Comes

- Explains the process of gene regulation and expression in prokaryotes.

Q.25 Observe the figure and complete table 1 with name of gene and table 2 with enzymes produced by structural gene.



Label	Name of Gene
A	
B	
C	

Structural Genes	Enzymes
z	
y	
a	

(Score 3)

5

EVOLUTION

Learning Outcomes

- Identifies compares and judges various views on the origin of earth and life.

Q.1 In a class seminar, Varun says that some scientists believe that the life originated from the spores reached on earth from outer space. Name this theory of origin of life?

(Score 1)

Learning Outcomes

- Identifies compares and analyses morphological, anatomical and paleontological evidences on evolution.

Q.2 Arrange the following in to two categories under the heading Analogous organ and homologous organ.

Eyes in Human beings and octopus.

Flippers of penguin and dolphin.

Vertebrate hearts.

Thorns and tendrils.

Wings of butterfly and birds

Forelimb of vertebrates

Analogous Organ	Homologous Organ

(Score 3)

Learning Outcomes

- Identifies the role of adaptive radiation in evolution.

Q.3 More than one adaptive radiation appeared to have occurred in an isolated geographical area is called as .....

(Score 1)

Learning Outcomes

- Analyses and justify evolution of Darwin's finches, Australian marsupials and certain other placental mammals of Australia.

Q.4 'Darwin finches are the example of adaptive radiation'. Justify .

(Score 2)

Learning Outcomes

- Identifies stages in the evolution of man.

Q.5 Briefly describe about the evolution of Man.

(Score 3)

Learning Outcomes

- Designs and constructs the experimental setup of chemical origin of life.
- Analyses and justifies chemical origin as the most favorable view on evolution

Q.6 Explain Oparin and Haldane Hypothesis.

(Score 3)

Learning Outcomes

Designs and constructs the experimental setup of chemical origin of life.

Q.7 Match the following

A	B	C
Evolution by anthropogenic action	Darwin finches	Human and octopus Eyes
Adaptive radiation	Industrial melanism	Brain of Vertebrates
Convergent Evolution	Homologous Organ	Peppered Moth
Divergent evolution	Analogous Organ	Galapagos Island

(Score 3)

Learning Outcomes

- Analyses and justifies Hardy Weinberg principle.
- Identifies and compares factors affecting Hardy Weinberg equilibrium.

Q.8 a. Explain Hardey- Weinberg equilibrium?

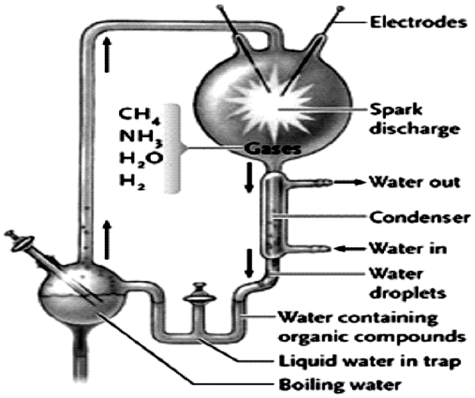
b. Mention the factors affecting Hardey- Weinberg equilibrium.

Score(3)

Learning Outcomes

- Designs and constructs the experimental setup of chemical origin of life.

Q.9 Identify the Experimental set up in Evolution and answer the following.



a. Name the Experiment

b. Explain the significance of the given experimental setup.

(Score 3)

6

HUMAN HEALTH AND DISEASE

Learning Out Comes

- Differentiates various types of diseases and their pathogens.

Q.1 Complete the table.

Disease	Causative organism
Typhoid	
Common cold	
	Plasmodium
	Ascaris

(Score 2)

Learning Out Comes

- Judges and concludes the importance of vaccination and immunisation.

Q.2 One your classmate is suspected to be having typhoid and you advise him to consult a doctor and to do the confirmation test. Name the medical confirmation test.

(Score 1)

Learning Out Comes

- Judges and concludes the mode of transmission of diseases.

Q.3 Amoeboid dysentery is caused by a protozoan parasite. Name the parasite.

(Score 1)

Learning Out Comes

- Differentiates various types of diseases and their pathogens.

Q.4 Identify the disease from the symptoms given below table.

Symptoms	Disease
High pain, headache, stomach pain, constipation and loss of appetite	
Nasal congestion and discharge, sore throat, cough, hoarseness and tiredness	
Fever ,chill, cough, headache, nail & lips develop bluish tint	
Abdominal pain and cramp, stool with blood and excess mucus	

(Score 2)

Learning Out Comes

- Judges and concludes the mode of transmission of diseases.

Q.5 Identify the odd one

a. Malaria
b. Elephantiasis
c. Typhoid
d. Dengue (Score 1)

Learning Out Comes

- Differentiates various types of immunity.

Q.6 WBC, PMNL monocytes and natural killer cells are the examples of

a. Physical Barriers
b. Physiological barrier
c. Cellular barrier
d. Cytokine barriers (Score 1)

Learning Out Comes

- Differentiates various types of immunity.

Q.7 When the immune system attacks our own cells, the process is called …….....

a. Innate immunity
b. Acquired immunity
c. Autoimmunity
d. Humoral immunity (Score 1)

Learning Out Comes

- Identifies and explains the causes and control measures of aids.

Q.8 AIDS is caused by HIV. Which type of virus is HIV?

a. Adenovirus
b. Retrovirus
c. Bacteriophage
d. Rhinovirus (Score 1)

Learning Out Comes

- Differentiates various types of immunity.

Q.9 Mother's colostrum contains Ig G. What type of immunity it confers to the infants?

a. Passive immunity
b. Active immunity
c. Cell mediate immunity
d. Innate immunity (Score 1)

Learning Out Comes

- Identifies and explains the causes and symptoms of cancer.

Q.11 Elaborate the diagnostic methods used for early detection of cancer.

(Score 2)

Learning Out Comes

- Identifies and explains the causes and control measures of aids.

Q.12 You meet an HIV patient. He is unaware about the transmission method of HIV. What precautions will you suggest him so that HIV cannot be spread to others?

(Score 2)

Learning Out Comes

- Identifies and explains the causes and symptoms of cancer.

Q.13 Write the difference between malignant tumor and benign tumor?

(Score 2)

Learning Out Comes

- Recommends the various diagnostic techniques and treatment of cancer.

Q.14 Briefly explain the methods used to treat cancer.

(Score 2)

Learning Out Comes

- Categorizes and compares useful and abusable drugs.

Q.15 Complete the table

Drugs	Source Plant	Affected organ
Opioids		
	Cannabis sativa	
	Erythroxylum cocca	

(Score 3)

7

MICROBES IN HUMAN WELFARE

Learning Outcome

- Describes and concludes the importance of microbes as biocontrol agents.

Q.1. Match column A with column B and column C.

	Column A	Column B	Column C
1	Monascus purpureus	Streptokinase	Immunosuppressant
2	Trichoderma polysporum	Statin	Clot buster
3	Streptococcus	Cyclosporine A	Cholesterol lowering agent

(Scores)

Learning Outcome

- Identifies and describes the importance of various microbes in household products such as curd, cheese, toddy etc.

Q.2 Milk is converted to curd by the action of microorganisms.

(a) Name the microorganism that convert milk to curd.

(b) Explain the superior nutritional quality of curd over milk.

(2 Scores)

Learning Outcome

- Appraises the role of microbes in production of antibiotics and bio-active molecules.

Q.3 Ramu likes fresh juices than bottled juices.

(a) As a plus two biology student, give your opinion about this habit.

(b) Why bottled juices are clearer than fresh juices? Critically evaluate its harmful effects.

(2 Scores)

Learning Outcome

- Identifies and describes the importance of various microbes in household products such as curd, cheese, toddy etc.

Q.4 Swiss cheese contains large holes.

(a) Describe the formation of large holes in cheese.

(b) Name the end product of the process mentioned (2 Scores)

Learning Outcome

- Explains and concludes the importance of microbes as biofertilisers and compares it with chemical fertilisers.

Q.5 Over use of chemical fertilizers harmfully affect the environment and human survival. Make discussion points to reduce the use of chemical fertilizers

(2 Scores)

Learning Outcome

- Constructs an improvised model of biogas plant.

Q.6 Your local self-government is newly introducing a project on waste management and installing Biogas plants at all homes .As a plus two biology student ,briefly explain the working of biogas plant .

(3 Scores)

Learning Outcome

- Explains and concludes the importance of microbes as biofertilisers and compares it with chemical fertilisers.

Q.7 Farmers cultivate pea plant as an intermediate crop in the paddy fields. After harvesting they remove all parts of the pea plant from their crop land.

(a) Do you think the action of removing all parts of the pea plantfrom the field is a good agricultural practice?

(b) Justify your answer. (2 Scores)

Learning Outcome

- Identifies and explains the importance of various microbes in industrial products.

Q.8 ..... is called brewer's yeast ,which is used for fermenting malted cereals and fruit juices to produce ethanol.

(a. *Saccharomyces cerevisiae* b. *Clostridium butylicum*

c. *Trichoderma polysporum* d. *Penciliumnotatum*)

(1 Score)

Learning Outcome

- Constructs an improvised model of sewage treatment plant.

Q.9 Many pathogenic microbes and large amounts of organic matter are found in sewage.

(a) During sewage treatment primary sludge is produced. Define Primary sludge

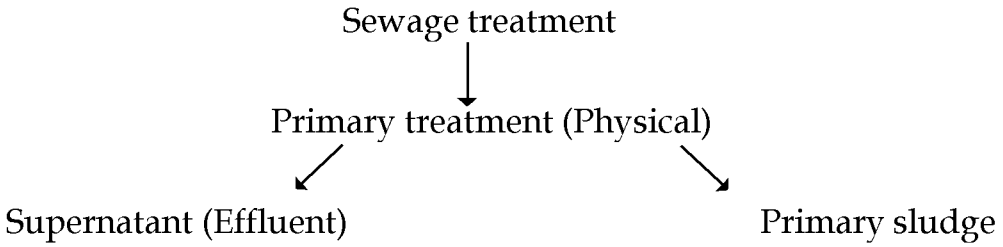
(b) Compare it with activated sludge.

(2 scores)

Learning Outcome

- Constructs an improvised model of sewage treatment plant.

Q.10 A part of the flow chart showing sewage treatment is given below. Complete it with other steps involved in sewage treatment.



(3 Scores)

Learning Outcome

- Constructs an improvised model of biogas plant.

Q.11 Biogas is a terminology that we hear in our day to day life. Name the gases produced in biogas plant.

(1 score)

Learning Outcome

- Constructs an improvised model of sewage treatment plant.

Q.12 The untreated sewage when discharged directly into rivers cause aquatic pollution and spread various diseases. Suggest suitable remedies to overcome the problem. Give emphasis on Ganga action plan and Yamuna action plan

(3 Scores)

Learning Outcome

- Identifies and describes the importance of various microbes in household products such as curd, cheese, toddy etc.

Q.13 Read the statements and choose the correct option. Justify your answer.

A : Large holes in Swiss cheese are due to the production of large amount of CO_2 by bacterial action.

B : LAB (Lactic acid bacteria) grows in stomach for milk coagulation.

C : Cyanobacteria are heterotrophic microbe which can fix atmospheric Nitrogen.

(a) Statement 'A' alone correct.

(b) Statements 'A' and 'B' are correct.

(c) Statements 'A' and 'C' are correct.

(d) Statement 'C' alone correct.

(1 Score)

Learning Outcome

- Constructs an improvised model of sewage treatment plant.

Q.14 "BOD is commonly calculated as an index of water pollution."

(a) Do you agree with the statement? Why?

(b) Expand BOD.

(2 Scores)

Learning Outcome

- Identifies, explains and appraises the importance of microbes in production of biogas.
- Constructs an improvised model of biogas plant.

Q.15 Expand the terms given below.

(a) KVIC

(b) IARI (1 Score)

Learning Outcome

- Appraises the role of microbes in production of antibiotics and bio-active molecules.

Q.16 Today we cannot imagine a world without antibiotics.

(a) Define antibiotics ?

(b) Name the first antibiotic to be discovered.

(2 Scores)

8

Biodiversity and conservation

Learning outcome

- Compares and differentiates levels of biodiversity.

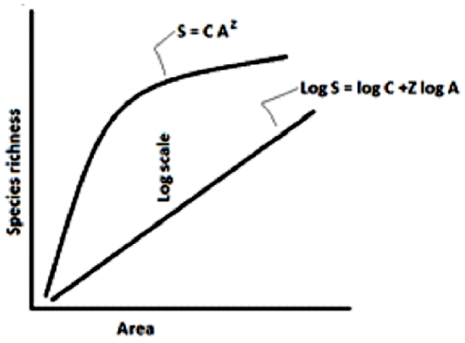
Q.1 Write the three components of Biodiversity. Select the component which deals with ecosystem levels of biodiversity?

(2 Score)

Learning outcome

- Analyses the graphical representation of species - area relationship.
- Assesses the significance of "z" value in species - area relationship.

Q.2 Observe the given graph.



A) What does the above graph represent?

B) What does S and A indicate?

C) Write the significance of 'Z' and 'Z value'?

(3 Score)

Learning outcome

- Assesses and appraises importance of species diversity to ecosystem.

Q.3 "We can develop a proper perspective through an analogy 'The rivet popper hypothesis' regarding the importance of species diversity to the ecosystem". Substantiate?

(2 Score)

Learning outcome

- Identifies 'evil quartets' as the cause of biodiversity loss.
- Analyses the effects of biodiversity loss.

Q.4 'Evil Quartet' is a sobriquet used to describe the cause of biodiversity loss.

A) What are the evil quartets of biodiversity loss?

B) Write two ill effects of biodiversity loss?

(3 Score)

Learning outcome

- Identifies 'evil quartets' as the cause of biodiversity loss.

Q.5 Howdo the following factors affect biodiversity? Answer with suitable examples.

A) Alien species invasion

B) Co extinction

C) Over exploitation

(3 Score)

Learning outcome

- Hypothesizes the reasons for greater biodiversity of tropics.

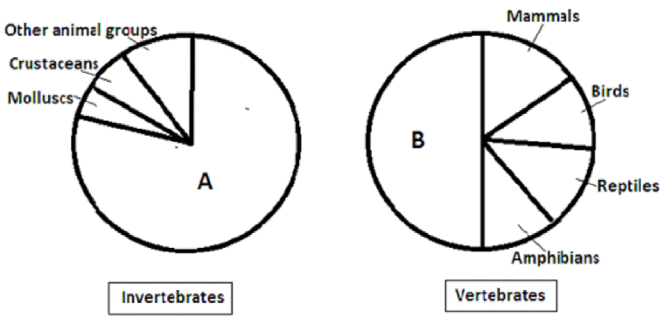
Q.6 'Amazon forests are called the lungs of the planet' Why?

(1 score)

Learning outcome

- Estimates and compares global and Indian biodiversity.
- Appraises earth's rich biodiversity which is vital for the very survival of mankind.

Q.7 The following pie diagram represents global biodiversity of invertebrates and vertebrates. Complete the graph by giving suitable group of animals to the missing sectors A and B



(1 Score)

Learning outcome

- Judges and appraises India as one of the 12 mega diversity countries of the world.
- Identifies and compares various strategies for conserving biodiversity.

Q.8 'India is one of the 12 Mega Biodiversity countries of the world'. Justify?
(2 score)

Learning outcome

- Identifies and compares various strategies for conserving biodiversity.

Q.9 A) What type of approach /strategy will you suggest to protect threatened and endangered species which needs urgent measures to save it from extinction?

B) Which type of approach /strategy is essential to protect all levels of biodiversity? (2 Score)

Learning outcome

- Identifies and compares various strategies for conserving biodiversity.
- Appraises various plans, designs and rules for conserving biodiversity.

Q.10 'Gametes of threatened species can be preserved in a viable and fertile condition for a long time'

A) Identify the preservation technique used?

B) Why is it considered as an *Ex- situ* conservation approach?
(2 Score)

Learning outcome

- Analyses the graphical representation of species - area relationship.

Q.11 Write the significance of seed banks in biodiversity conservation?
(1 score)

Learning outcome

- Appraises earth's rich biodiversity which is vital for the very survival of mankind.
- Justifies the need of biodiversity conservation.
- Identifies and compares various strategies for conserving biodiversity.
- Appraises various plans, designs and rules for conserving biodiversity.

Q.12 **Act responsible – Save wild life- Protect Biodiversity**

It is a slogan seen in front of a national park

A) Substantiate the relevance of above slogan in the present scenario?

B) Suggest two strategies to be implemented to protect biodiversity?
(3 Score)

Learning outcome

- Justifies the need of biodiversity conservation.

Q.13 Narrow utilitarian, broad utilitarian and ethical arguments are the three major arguments / reasons for conserving biodiversity. Briefly explain the basis of these three arguments?

(3 Score)

Learning outcome

- Identifies and compares various strategies for conserving biodiversity.

Q.14 What are hot spots in biodiversity? Why endemism is considered an important criteria for identifying hot spots?

(2 Score)

Learning outcome

- Appraises earth's rich biodiversity which is vital for the very survival of mankind.
- Appraises various plans, designs and rules for conserving biodiversity.

Q.15 'Biodiversity knows no political boundaries and its conservation is there for a collective responsibility of all nations' Do you agree with this statement? Justify your answer?

(3 score)

Learning outcome

- Identifies 'evil quartets' as the cause of biodiversity loss.
- Analyses the effects of biodiversity loss.

Q.16 'Man destroys biodiversity when his need turns greed 'with an example substantiate this statement?

(2 score)

Learning outcome

- Identifies and compares various strategies for conserving biodiversity.
- Appraises various plans, designs and rules for conserving biodiversity.

Q.17 Compare in situ and ex situ conservation strategies with examples?

(3 Score)

Learning outcome

- Identifies the role of latitudinal gradients in the patterns of biodiversity.
- Hypothesizes the reasons for greater biodiversity of tropics.

Q.18 What are the factors responsible for the greater biodiversity in tropical regions?

(3 Score)

Learning outcome

- Identifies and compares various strategies for conserving biodiversity.
- Appraises various plans, designs and rules for conserving biodiversity.

Q.19 Categorize the following into ex-situ and in-situ conservation strategies.

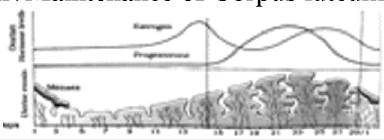
Seed banks, Tissue culture, sacred grooves, national parks, zoological parks, biosphere reserve, botanical garden, sanctuaries.

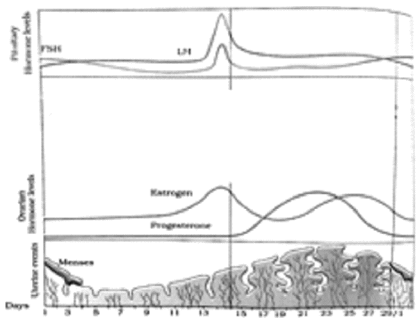
(2 Score)

SCORING INDICATORS

Chapter - 1

HUMAN REPRODUCTION

Qn.No.	Value Points	Split Score	Total Score	Time
1	Testosterone	1	1	1 minute
2	Lower temperatures promote spermatogenesis	1	1	1 minute
3	Seminal vesicle and Prostate gland	½ x 2=1	1	1 minute
4	Sertoli cells : Nourishment of developing sperms Germ cells : Produce spermatozoa	1 x 2 = 2	2	2 minutes
5	Inadequate secretion of Testosterone	1	1	1 minute
6	Yes. Hymen is a soft, delicate membrane and can be ruptured easily by sudden fall, strenuous exercises, stretching(sports), cycling, etc.	1	1	2 minutes
7	Vagina → uterus → fallopian tube	2	2	2minutes
8	Alveoli → mammary tubule → mammary duct → mammary ampulla	2	2	2 minutes
9	Secondary spermatocytes	1	1	1 minutes
10	Production of sperm in Testes -Spermatogenesis Production of ovum in ovary -Oogenesis	1 x 2 = 2	2	2 minutes
11	(I) Oogenesis (II) (c) Secondary oocyte develops into ovum (b) Polar body degenerates. (II) Cell 'a' has 46 chromosomes, and cell 'c' has 23 chromosomes	1 1 1 1	3	3 minutes
12	The woman is pregnant	1	1	1 minutes
13	(a) Ruptured follicle transforms into corpus luteum. Progesteron hormone released. (b) Endometrialial lining of the uterus degenerates and new uterine cycle begins.	1½ 1½	3	4 Minutes
14	(a) Colostrum (b) It is through the colostrum that the newborne gets maternal antibodies essential to develop immunity during early stages.	1 2	3	4 Minutes
15	Epididymis	1	1	1 minute
16	FSH: promote oogenesis /influence estrogen synthesis LH: Ovulation /Maintenance of Corpus luteum	1 1	2	3 minutes
17	I) (a) Estrogen (b) Progesteron II) FSH: Influence spermatogenesis and oogenesis /influence estrogen hormone LH: Ovulation /Maintenance of Corpus luteum III) 	1 1 1	3	4 minutes

18	Gametogenesis → Fertilization →Cleavage → Morula → Blastulation → Implantation → Gastrulation → Organogenesis			3	3	4 minutes
19	Parturition signals originate from fully developed foetus which initiates uterine contractions leading to child birth.			1	1	2 minutes
20	Oxy tocin . Induce stronger uterine muscle contractions leading to quicker expulsion of the baby.			1	1	2 minutes
21	HPL and Relaxin			1	1	1 minute
22	Implantation			1	1	1 minute
23	Oxytocin			1	1	1 minute
24	(a) Ampullary isthmus region of fallopian tube (b) Endometrium			1 1	2	2 minutes
25	Leydig's cell			1	1	1 minute
26	Fimbriae			1	1	1 minute
27	HCG	placenta	indicate pregnancy	6 x ½ =3	3	3 minutes
	Oxytocin	hypothalamus	Helps in parturition			
	Progesterone	Corpus luteum	Helps in Maintaining Pregnancy			
28	Helps the movement of non motile ovum			1	1	1 minute
29	 (b) FSH : oogenesis/estrogen production LH : : Ovulation /Maintenance of Corpus luteum/ Menstruation			2 ½ ½	3	4 minutes
30	Progesterone ,HCG ,HPL, Relaxin			½ x 4=2	2	2 minutes
31	Male reproductive system :Seminiferous tubule,Vas deferens, Epididymis Female reproductive system :Vagina,cervix,uterus			½ x 6=3	3	3 minutes
32	Breaking of egg membranes with enzymes during fertilization			1	1	1 minutes
33	Ans 'C'			1	1	1 minutes
34	Ans 'A'			1	1	1 minutes

SCORING INDICATORS

Chapter - 2

REPRDUCTIVE HEALTH

Qn.No.	Value Points			Split Score	Total Score	Time
1	Awareness about STD/Reproductive organs and function / MTP/Equality of sexes /bad habits, etc.			2	2	2 minutes
2	Coitus interruptus	Natural method	Withdrawal of penis before ejaculation	½ x 6=3	3	3 minutes
	Copper T	IUD	Suppress sperm motility			
	Mala-D	Oral Contraceptive pills	Estrogen-Progesterone combination			
3	Primary objective is prenatal diagnosis of Genetic disorders. However, used widely for foetal Sex determination leading to female foeticide.			2	2	2 minutes
4	Condom (male/female) / Cervical cap /Diaphragm			1	1	1 minutes
5	LNG 20			1	1	1 minutes
6	(a) Vasectomy/Tubectomy (b) Irreversible/Invasive technique / require hospitatalisation/ recanalization is complicated and may not be successful.			1 1	2	2 minutes
7	(a) Medical termination of pregnancy (b) In conditions of poor maternal health. To avoid unintended pregnancies. unprotected sex /failure of contraceptives/ rapes may lead to unintended pregnancies.			1 2	3	3 minutes
8	Hepatitis-B , AIDS			1	1	1 minutes
9	(a) Avoid sex with unknown persons/multiple persons/use condoms/if doubt go to a qualified doctor for early detection. (b) Gonorrhoea, Syphilis, Genital herpes, Chlamydiasis, Genital wart, Trichomoniasis, Hepatitis -B, AIDS			2 1	3	3 minutes
10	(a) IVF & ET (Test tube baby), AI, ZIFT, GIFT, IUT, IUI, ICSI (b) AI, IUI.			1 1	2	2 minutes
11	ET			1	1	1 minutes
12	ICSI			1	1	1 minute
13	(a) IUI (b) Non medicated IUD			½ ½	1	1 minute
14	GIFT			1	1	1 minute
15	ZIFT			1	1	1 minute

16	(a).MTP (Medical termination of pregnancy. (b). Medical Termination of Pregnancy (MTP) is a procedure that is carried out under anaesthesia & increases the risk for the procedure. Patient can have lot of bleeding during & after the procedure. There are high chances of patient having recurrent abortions. /may be negatively used to kill female foeticide	1 1 1	2	2 minutes
17	Family planning Reproductive & child health care programmes(RCH)	1 1	2	2 minutes
18	(a) population explosion is the major single cause behind Poverty /Epidemics/loss of shelter and cloths / increase competition/waste management problem/ pollution/ lack of social amenities. (b) Family planning method Natural method/IUD /use of contraceptives / Raising of marriageable age/ Incentives given to small families.	2 1	3	3 minutes
19	(a) Acquired Immuno Deficiency Syndrome (b) Blood transfution, Infected mother to foetus/intravenous drug injection	1 2 1	3	3 minutes
20	(a) Prevent sperm motility./Phagocytosis of sperm/prevent fertilizing capacity of sperm. (b) Progestasert , LNG 20	1 1	2	2 minutes
21	ANS .'C'	1	1	1 minute
22	User friendly ,low cost, easily available, reversible, less side effects, Do not interfere sexual act or sexual drive	½ x 4 =2	2	2 minutes

SCORING INDICATORS

Chapter - 3

Principle of inheritance and variation

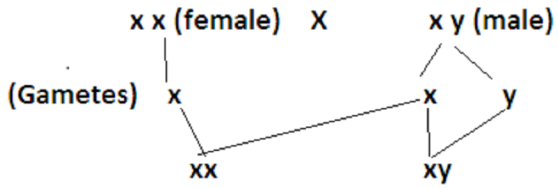
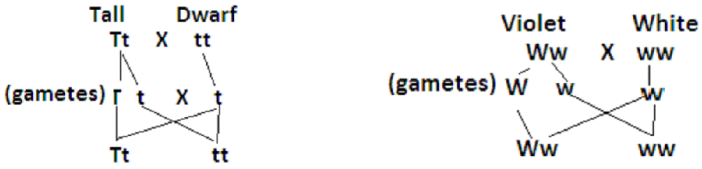
<table>
<tr><th>Qn.No.</th><th>Value Points</th><th>Split Score</th><th>Total Score</th><th>Time</th></tr>
<tr><td>1</td><td><table><tr><td>Dominant</td><td>Recessive</td></tr><tr><td>Violet flower</td><td>White flower</td></tr><tr><td>Green pod</td><td>Yellow pod</td></tr><tr><td>Axial flower</td><td>Terminal flower</td></tr><tr><td>Round seeds</td><td>Wrinkled seeds</td></tr></table></td><td>1+1</td><td>2</td><td>3</td></tr>
<tr><td>2</td><td>A)Monohybrid cross
B)<table><tr><td></td><td>T</td><td>t</td></tr><tr><td>T</td><td>TT -Tall</td><td>Tt- Tall</td></tr><tr><td>t</td><td>Tt- Tall</td><td>Tt- Dwarf</td></tr></table></td><td>½

2½</td><td>3</td><td>4</td></tr>
<tr><td>3</td><td>A) Yes, in incomplete dominance intermediate character appears and neither character is completely dominant over the other.
B) In law of dominance, in a heterozygous pair of factors one member of the pair dominates (dominant) the other (recessive)</td><td>1

1</td><td>2</td><td>3</td></tr>
<tr><td>4</td><td>A) Down's syndrome
B) 21st trisomy</td><td>1
1</td><td>2</td><td>3</td></tr>
<tr><td>5</td><td>A and C</td><td>1</td><td>1</td><td>3</td></tr>
<tr><td>6</td><td>• ABO blood group is controlled by more than two alleles - I^A, I^B& i. A group-I^AI^A, I^A i, B group -I^BI^B, I^B i , AB group- I^A I^B, O group- ii
• In AB blood group both IA& IB alleles behave as dominant genes, producing both A & B antigens.</td><td>2

1</td><td>3</td><td>4</td></tr>
<tr><td>7</td><td>-Klinfelters syndrome, Gynacomastia/sterility / or any other feature</td><td>1x2</td><td>2</td><td>3</td></tr>
<tr><td>8</td><td>A) XX (female) and XY (male)- Male heterogamety- Male has two sex chromosomes X and Y. Half the sperms with X chromosome and the other Half with a Y chromosome.
B) XX (female) and XO (male)- Male heterogamety- Male has one Sex chromosome, only X chromosome. Half the sperms with X chromosome and the other half without an X chromosome.</td><td>1

1</td><td>2</td><td>3</td></tr>
<tr><td></td><td></td><td></td><td></td><td></td></tr>
</table>

9	-Sex determination mechanism is XX(female) and XY male -Female is homogametic- Produce one type of gametes, Gametes with X chromosomes only. Male is heterogametic- Produce two type of gametes -Sperms with X and Sperms Y chromosomes  			
10	A) Incomplete dominance B) 1(Red): 2(Pink): 1(White)	1 1	2	3
11	A) Mating B) Mating between relatives C) Parents above and children (two) below, one son and one daughter	½ ½ 1	2	3
12	A) I chain B) Substitution of glutamic acid by valine at the sixth position of beta chain of Hbs peptide	1 1	2	3
13	Father-IA IB, Mother-i i, Son - IBi, daughter IA i	½ x 4	2	3
14	Crossing of F1 progeny with recessive parent A) Tt x tt , Offsprings50% Tt & 50% tt B) Ww x ww, offsprings50% - Ww &50% ww  	1 1+1	2	4
15	• Alleles of a gene are similar in homozygous / homozygotes, Eg;-TT For tall, tt for dwarf • Alleles of a gene are dissimilar in heterozygote/heterozygous. Eg:- Tt heterozygous tall	1 1	2	3
16	A) ◯ Female, □ - Male B) Affected individuals C) Pedigree charts are important for examining genetics in a family. It can be used to track certain traits in family members through two or more generations of a family	½ ½ 1	2	3
17	A) Sex linked recessive, absence of blood clotting due to the lack of a protein B) Autosome linked recessive, absence of enzymes that convert phenyl alanine to tyrosine	1 1	2	3
18	Refer F2 generation table of dihybrid cross in the text book, Phenotypic ratio: 9:3:3:1	3	3	5

19	Loss or gain of chromosome(s) is called aneuploidy (not as a whole set) Down's syndrome is 21st trisomy- total number of chromosome is 47 gain of one chromosomes In Turners syndrome one X chromosome is lost which results in 44 autosomes and one sex chromosomes		1 1 1	3	4
20	A and C are correct		½ +½	1	3
21	**Incomplete dominance**	**Co dominance**	½ x 6	3	4
	Eg :- Flower color in 4 'O' clock plant/ any other Eg	AB blood group in man/ any other examples			
	Both dominant and recessive characters are present	Only dominant characters are seen			
	Dominant character fails to suppress recessive character & Presence of intermediate character	No such suppression. Both dominant characters appear at a time			
22	B is wrong Chemical or physical factors that induce mutation are referred as mutagens /an increase in the whole set of chromosome is called polyploidy		1 1	2	3 1
23	A) Yes. Father give X to female and Y to male offspring B) No. Father give X to female and Y to male offspring.		1 1	2	3
24	04 types , YR, Yr, yR, yr		1+1	2	2
25	Walter Sutton and Theodore Bovery		1	1	1

SCORING INDICATORS

Chapter - 4

MOLECULAR BASIS OF INHERITANCE

Qn.No.	Value Points	Split Score	Total Score	Time
1	Phosphodiester bond	1	1	1
2	Positively Charged	1	1	1
3	Nucleosomes	1	1	1
4	Metaphase	1	1	1
5	Bacteriophage	1	1	1
6	DNA	1	1	1
7	Continuous	1	1	1
8	tRNA=transfer RNA hnRNA= hetero nuclear RNA	½ x 2	1	1
9	AUG	1	1	1
10	UAG	1	1	1
11	Nucleosome Histone octamer	1 1	2	4
12	No. DNA is more stable While DNA contains deoxyribose, RNA contains ribose (in deoxyribose there is no hydroxyl group attached to the pentose ring in the 2' position). These hydroxyl groups make RNA less stable than DNA because it is more prone to hydrolysis. DNA have 1. Replication 2. Chemically and structurally stable 3. Mutated 4. Obey Mendelian Characters	½ X 4	2	4
13	mouse + live S strain = mouse died mouse + live R strain = mouse alive mouse + heat killed S strain =mouse alive mouse + heatkilled S strain along with R strain = mouse died (certain factors from heat killed S strain transforms non virulent R strain to S strain ie,transfer of genetic material)	3	3	5
14	RNA first genetic material(metabolism,translation,splicing evolved around RNA). RNA as enzyme: RNA catalyse some bio chemical reactions. hence is reactive and unstable.	1 1	2	4
15	RNA coding from template sequence RNA code a particular protein	1 1	2	4
16	Initiation Elongation termination	1 1 1	3	5

<table>
<tr><td>17</td><td>Activation of amino acid(charging of tRNA)
Attachment of amino acid P site and A site,peptide bond formation
Detachment from E site</td><td>1
1
1</td><td>3</td><td>5</td></tr>
<tr><td>18</td><td>Operon : a polycystronic structural gene is regulated by a common promoter and regulatory gene
Lac Operon: Structural gene (z,y,a),operator,promoter ,repressor genes enzymes and their actions:? galactosidase, permease, trans acetylase</td><td>1
2</td><td>3</td><td>5</td></tr>
<tr><td>19</td><td>(a) Identify20000-25000 genes in human DNA., determine 3 billion base pairs,store information as data base,improve tool for data analysis,transfer related technologies to other sectors such as industries,address ELSI.
(b) Expressed Sequence Tag
Sequence Annotation</td><td>2
1</td><td>3</td><td>5</td></tr>
<tr><td>20</td><td>Transcriptional level
Processing level
Transporting mRNA
Translational level</td><td>½ x 4</td><td>2</td><td>4</td></tr>
<tr><td>21</td><td>a. Digestion of DNA by restriction endonuclease
b. Blotting of separated DNA fragments to synthetic membranes (nitrocellulose)
c. Hybridisation using VNTR probe</td><td>1
1
1</td><td>3</td><td>4</td></tr>
<tr><td>22</td><td>a. Promoter
b. Structural Gene
c. Terminator</td><td>1
1
1</td><td>3</td><td>3</td></tr>
<tr><td>23</td><td>A. Meselson and Stahll Experiment
B. Tagged with Heavy and Light Nitrogen/ Centrifugation DNA /Hybrids .(semi conservative mode of replication)</td><td>1
2</td><td>3</td><td>5</td></tr>
<tr><td>24</td><td>A. tRNA
B. Activation and transport of amino acid to the Ribosome</td><td>1
1</td><td>2</td><td>4</td></tr>
<tr><td>25</td><td>
<table>
<tr><th>Label</th><th>Name</th></tr>
<tr><td>A</td><td>Promoter gene</td></tr>
<tr><td>B</td><td>Repressor gene</td></tr>
<tr><td>C</td><td>Structural gene</td></tr>
</table>
<table>
<tr><th>Structural Genes</th><th>Enzymes</th></tr>
<tr><td>Z</td><td>β galactosidase</td></tr>
<tr><td>y</td><td>permease</td></tr>
<tr><td>A</td><td>transacetylase</td></tr>
</table>
</td><td>½+½+½
=1 ½

½+½+½
=1 ½</td><td>3</td><td>5</td></tr>
</table>

SCORING INDICATORS

Chapter - 5

EVOLUTION

<table>
<tr><th>Qn.No.</th><th>Value Points</th><th>Split Score</th><th>Total Score</th><th>Time</th></tr>
<tr><td>1</td><td>Theory of panspermia</td><td>1</td><td>1</td><td>1</td></tr>
<tr><td>2</td><td><table><tr><th>Analogous Organ</th><th>Homologous Organ</th></tr><tr><td>Eyes of Human and eyes of octopus</td><td>Vertebrate heart</td></tr><tr><td>Flippers of penguin and dolphin</td><td>Thorns and tendrils</td></tr><tr><td>Wing of butterfly and birds</td><td>Forelimbs of vertebrates</td></tr></table></td><td>1 x 3</td><td>3</td><td>3</td></tr>
<tr><td>3</td><td>Convergent evolution</td><td>1</td><td>1</td><td>1</td></tr>
<tr><td>4</td><td>The beak modifications in finches occurred due to difference in food gathering and feeding habitats of different islands</td><td>2</td><td>2</td><td>2</td></tr>
<tr><td>5</td><td>Dryopithicus, Ramapithicus, Ausralopithecines,
Homo habilus,
Homo erectus
Neanderthal man
Homo sapiens</td><td>½ x 6</td><td>3</td><td>5</td></tr>
<tr><td>6</td><td>According to Oparin and Haldane, the life could have originated from pre-existing non-living organic molecules.</td><td>1 ½
1 ½</td><td>3</td><td>6</td></tr>
<tr><td>7</td><td><table><tr><th>A</th><th>B</th><th>C</th></tr><tr><td>Evolution by anthropogenic Action</td><td>Industrial melanism</td><td>Peppered Moth</td></tr><tr><td>Adaptive radiation</td><td>Darwin finches</td><td>Galapagos Island</td></tr><tr><td>Convergent Evolution</td><td>Analogous Organ</td><td>Human & Octopus eyes</td></tr><tr><td>Divergent evolution</td><td>Homologous Organ</td><td>Brain of vertebrates</td></tr></table></td><td>3</td><td>3</td><td>5</td></tr>
<tr><td>8</td><td>a) Allele frequencies in a population are stable and constant from generation to generation. (p2+2pq+q2=1), p ,q are individual frequencies of alleles.
b) the factors are gene migration, genetic drift, mutation, genetic recombination and natural selection</td><td>2
1</td><td>3
.</td><td>5</td></tr>
<tr><td>9</td><td>a. Urey and Miller experiment
b. Theory of chemical evolution (Brief explanation)</td><td>1
2</td><td>3</td><td>5</td></tr>
</table>

SCORING INDICATORS

Chapter - 6

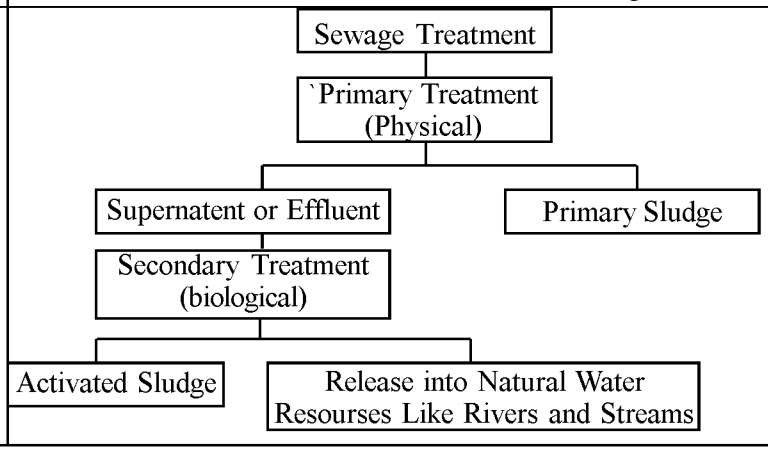
HUMAN HEALTH AND DISEASE

<table>
<tr><th>Qn.No.</th><th>Value Points</th><th>Split Score</th><th>Total Score</th><th>Time</th></tr>
<tr><td>1</td><td><table><tr><td>Typhoid</td><td>Salmonella typhi</td></tr><tr><td>Common cold</td><td>Rhino virus</td></tr><tr><td>Malaria</td><td>Plasmodium</td></tr><tr><td>Ascariasis</td><td>Ascaris</td></tr></table></td><td>½ x 4</td><td>2</td><td>2</td></tr>
<tr><td>2</td><td>Widal test</td><td>1 x 1</td><td>1</td><td>1</td></tr>
<tr><td>3</td><td>Entamoebahistolytica</td><td>1 x1</td><td>1</td><td>1</td></tr>
<tr><td>4</td><td><table><tr><th>Symptoms</th><th>Disease</th></tr><tr><td>High pain, headache, stomach pain, constipation and loss of appetite</td><td>Typhoid</td></tr><tr><td>Nasal congestion and discharge, sore throat, cough, hoarseness and tiredness</td><td>Common cold</td></tr><tr><td>Fever ,chill, cough, headache, nail &lips are turned out to be blue</td><td>Pneumonia</td></tr><tr><td>Abdominal pain and cramp, stool with blood and excess mucus</td><td>Amoebiasis</td></tr></table></td><td>½ x 4</td><td>2</td><td>4</td></tr>
<tr><td>5</td><td>Typhoid; all others are vector born diseases</td><td>1 x 1</td><td>1</td><td>1</td></tr>
<tr><td>6</td><td>Cellular barrier</td><td>1 x 1</td><td>1</td><td>1</td></tr>
<tr><td>7</td><td>Autoimmunity</td><td>1 x 1</td><td>1</td><td>1</td></tr>
<tr><td>8</td><td>Retrovirus</td><td>1 x 1</td><td>1</td><td>1</td></tr>
<tr><td>9</td><td>Passive immunity</td><td>1 x 1</td><td>1</td><td>1</td></tr>
<tr><td>10</td><td>X ray, CT Scan and MRI Scan, Specific antibody against cancer cell, identification of cancer genes</td><td>2x 1</td><td>2</td><td>4</td></tr>
<tr><td>11</td><td>Use disposable needles, use of condoms, safe blood transfusion, safe sex, controlling drug use</td><td>2 x 1</td><td>2</td><td>4</td></tr>
<tr><td>12</td><td>Benign tumors normally confined to their original location and do not spread to the other parts of the body , Malignant tumors it is mass of proliferating cells invading and damaging surrounding normal cells quickly dividing and have property called metastasis</td><td>2 x 1</td><td>2</td><td>4</td></tr>
<tr><td>13</td><td>Surgery, radiation therapy , chemo therapy , immunotherapy</td><td>2 x 1</td><td>2</td><td>4</td></tr>
<tr><td>14</td><td><table><tr><td>Drugs</td><td>Source Plant</td><td>Affected organ</td></tr><tr><td>Opioids</td><td>Papaversomniferum</td><td>CNS, GIT</td></tr><tr><td>Cannabionoids</td><td>Cannabis sativa</td><td>CNS</td></tr><tr><td>Erythroxylum coca</td><td>Erythroxylumcocca</td><td>CNS</td></tr></table></td><td>½ x 6</td><td>3</td><td>5</td></tr>
</table>

SCORING INDICATORS

Chapter - 7

MICROBES IN HUMAN WELFARE

Qn.No.	Value Points			Split Score	Total Score	Time
1	Monascus purpureas	Statin	Cholesterol lowering agent	½ x6 = 3	3	3 min
	Trichoderma polysporum	Cyclosporine A	Immuno suppresant			
	Streptococcus	Streptokinase	Clot buster			
2	(a) LAB (Lactic Acid Bacteria) (b) Increasing Vit. B12 Check disease causing microbes in stomach			1 1	2	2 min
3	(a) It is not good for health. It contains large number of preservatives and other chemicals. (b) Use of Pectinase and Protease make clear solutions			1 1	2	2 min
4	(a) Production of large amount of CO2 by abacterium named Propionibacterium sharmanii during fermentation (b) CO2			2	2	2 min
5	Organic farming and use of biofertilizers			2	2	3 min
6	Concrete Tank/Bio waste dumping/Floating cover/slurry /rising of gas /microbial action /biogas for cooking or lighting			3	3	4 min
7	(a) No. It is not a reasonable practice (b) Nitrogen fixing bacteria/Root nodule is inevitable for nitrogen fixing, green manure and nitrogen fixing bacteria are removed from the field.			2	2	2 min
8	Saccharomyces cereviseae			1	1	1 min
9	(a) All solids that settle during primary treatment are called primary sludge. (b) During secondary treatment the effluent is passed into a settling tank where the bacterial 'flocs' are allowed to sediment. This sediment is called activated sludge.			1 1	2	2 min
10				3	3	3 min

11	Methane, CO_2, H_2	1	1	1 min
12	Sewage treatment inevitable/Release of water /lower pollution/ environmental pollution/increase number of sewage treatment plants/Reduce water borne diseases/ construct larger sewage treatment plants / Timely sewage treatment /Conserve the rivers	3	3	3 min
13	Ans (a)	1	1	1 min
14	(a) Yes. BOD test measures the rate of uptake of oxygen by micro organisms in a sample of water. Indirectly BOD is the measure of the organic matter present in water. (b) Biological Oxygen Demand	1 1	2	2 min
15	KVIC : Khadi and Village Industries Commission IARI : Indian Agricultural Research Institute	½ ½	1	1 min
16	Antibiotics are chemical substances, which are produced by some microbes and can kill or retard the growth of other disease causing microbes Penicillin	1 1	2	2 min

SCORING INDICATORS

Chapter - 8

Biodiversity and conservation

Qn.No.	Value Points	Split Score	Total Score	Time
1	Genetic diversity, Species diversity, Ecological diversity. Ecological diversity	½ x 3=1½ ½	2	2
2	A) Species area relationship B) S = Species richness, A= area C) Z is the slop of the line(regression coefficient) Slop of the line related to species richness	1 ½ + ½ ½ ½	3	4
3	Analogy rivet popper hypothesis, used by Paul Ehrlich, indicates the importance of each species to the ecosystem. In a plane (ecosystem) all parts are joined together using thousands of rivets (species). The extinction of a species affects the normal functioning of ecosystem, like removal of rivets of a plane. Damage of more number of speciesaffects the ecosystem dangerously.	2	2	3
4	A) Habitat loss and fragmentation, Over-exploitation, Alien species invasion and Co-extinction. B) a) decline in plant production b) lowered resistance to environment c) increased variability in certain ecological processes (Any two)	½ x 4=2 ½ x 2=1	3	4
5	A) Alien species turn invasive and cause decline or extinction of indigenous species. Any one example. B) When a species become extinct the plants and animals associated with it in an obligatory way also become extinct. Any one example. C) It happen when need turns greed and over utilization of natural resources in an irrecoverable way. Any one example.	½ + ½ ½ + ½ ½ + ½	3	4
6	Amazon rain forest is huge and harbor millions of species and it is estimated to produce, through photosynthesis, 20% of the total oxygen in the earth's atmosphere (1 score)	1	1	2
7	A) Insects B) Fishes	½ x 2= 1	1	2
8	India has approximately 8.1% of global species diversity, probably has more than 100000 species of plants and 300000 animal species , India has western Ghats, Indo Burma and Himalaya as hot spots.	2	2	3
9	A) Ex-situ. B) In-situ	1 x 2= 2	2	2
10	A) Cryopreservation B) In ex-situ approach threatened animals /plants /gametes/ seeds are taken from their natural habitat and placed in special condition.	1 1	2	3

11	Seeds of different genetic strains of commercially important plants and other plants can be kept for a long period	1	1	2
12	A) Reasonable answer specifying the need, use and ecosystem service of biodiversity or broadly utilitarian, narrowly utilitarian and ethical arguments (Four Points) B) In-situ and Ex-situ	½ x 4=2 ½ x 2= 1	3	4
13	**Narrowly utilitarian:** for conserving biodiversity are obvious: human derive countless direct economic benefits from nature like food ,industrial products, medicinal and other importance **Broadly utilitarian:** says biodiversity plays a major role in ecosystem services that nature provides **Ethical arguments :** for conserving biodiversity for spiritual, moral, philosophical values and intrinsic value of a species, pass on our biological legacy in good order to future generation	1 1 1	3	4
14	**Hot spots** are the regions with high levels of species richness and high degree of endemism **Endemism** is the number of species confirmed to a particular region and not found anywhere else. High degree of endemism means species richness is more and are found anywhere else and should be protected to prevent extinction.	1 1	2	3
15	**Protection** of biosphere is a collective responsibility. **Points of:-** the need, use and ecosystem service of biodiversity or broadly utilitarian, narrowly utilitarian and ethical arguments, **Points of :-** Historic convention Biological diversity- The earth submit 1	1 1 1	3	4
16	Over exploitation of nature and natural resources leads to a) decline in plant production b) lowered resistance to environment c) increased variability in certain ecological problems Eg;- Stellers cow/ passenger pigeon/ or any other reasonable example	½ +½+½ ½	2	2
17	In-situ:- Protect the whole ecosystem, its biodiversity at all levels, eg:-biosphere reserve , national park, sanctuaries etc (only one) Ex-situ:- an approach /strategy to protect threatened and endangered species which needs urgent measures to save it from extinction Eg:-zoo, botanical garden, seed bank etc, (only one)	1 ½ 1 ½	3	4
18	Tropics have remained undisturbed for millions of years and had a long evolutionary time for species diversification Constant and predictable tropical environments promote niche speciation and greater diversity. More solar energy in tropics contributes higher productivity and indirectly to greater diversity.	1 1 1	3	4
19	Ex-situ:-Sacred groves, National park, Biosphere reserve, Sanctuaries In-situ:-Tissue culture, Zoological park, seed banks, Botanical garden	1 1	2	3