

Core paper-XI, (Molecular Biology)

UNIT-1, PART-I (Each question carry 1 mark)

1. Who discovered nucleic acid?
2. Who proposed double helical structure of DNA?
3. Who is the father of genetic engineering?
4. One gene one enzyme hypothesis was put forth by.....
5. Which radioactive elements were used by Hershey and Chase?
6. How many hydrogen bond present between guanine and cytosine?
7. Who proposed RL mode of DNA replication?
8. The plasmid in bacteria is a circular.....
9. Cytoplasmic male sterility is controlled by.....
10. Wound tumor virus has.....stranded RNA.
11. Who proposed clover leaf model of RNA?
12. At which stage of cell cycle replication occurs?
13. Okazaki fragments are joined by which enzyme?
14. The rate of prokaryotic DNA polymerase was discovered by.....
15. Who discovered theta mode of DNA replication?
16. Who reported that DNA replication is semiconservative?

PART-II, (Each question carry 1.5 mark)

1. Mention two important properties of genetic material.
2. What is the conclusion of Griffith's experiment?
3. What is Chargaff's rules?
4. What is phosphodiester linkage?

5. What is Z- DNA?
6. What is denaturation of DNA?
7. What is the role of DNA topoisomerase?
8. Name the protein association with DNA?
9. What are the chemical composition of chromatin?
10. What is semiconservative DNA replication?
11. What is the role of telomere on ageing?
12. What is purine?
13. What is pyrimidine?
14. What is nucleotide?
15. What is RNA primer?
16. What is mismatch repair?
17. What is cot curves?
18. Define DNA replication.
19. What is m-RNA?
20. What is pyrimidine dimer?

PART-III, (Each question carry 2 mark)

1. Important features of genetic material, 2. Characteristics of DNA
3. Nuclein, 4. z-DNA, 5. B- DNA, 6. Supercoiling of DNA
7. Denaturation of DNA, 8. Function of DNA, 9. Genetic RNA
10. Types of RNA, 11. Heterochromatin, 12. Clover leaf model
13. Cot curve, 14. Semiconservative replication
15. DNA polymerase, 16. Topoisomerases

17. Okazaki fragments, 18. Lagging strand
19. Leading strand, 20. RNA priming, 21. DNA ligase

PART-IV, (Each question carry 6 mark)

1. Describe the salient features of DNA double helix.
2. What are nucleic acid? Describe different types of DNA.
3. Give a brief account of denaturation and re-naturation of DNA.
4. Describe various types of RNA.
5. Give a comparative account of DNA and RNA.
6. Describe DNA replication in prokaryotes.
7. Describe DNA replication in eukaryotes
8. Describe various model of DNA replication.

UNIT-2, PART-I (Each question carry 1 mark)

1. Which molecule acts as a templates for protein synthesis?
2. Who proposed one cistron- one polypeptide hypothesis?
3. Who proposed central dogma of molecular biology?
4. The triplet nature of genetic code was first revealed by.....
5. Which is called initiation codon?
6. AUG code for which amino acid?
7. What is stop codon?
8. Who first explain wobble hypothesis?
9. Apart from AUG , which codon act as start codon in prokaryotes?
10. TATA box was discovered by.....
11. is inhibitor of transcription.

12. A cap of is added as the 5' end of m-RNA.
13. The site of protein synthesis is.....
14. The 50s subunit of prokaryotic ribosome is composed of.....
15. Who discovered m-RNA?
16. What is the life span of m-RNA?
17. What is codon?

PART-II (Each question carry 1.5 mark)

1. What is cistron?
2. What is central dogma of life?
3. What is wobble hypothesis?
4. Define transcription.
5. What is transcription unit?
6. What is promoter?
7. What is prinbow box?
8. What is reverse transcription?
9. What is capping of m-RNA?
10. What is RNA polymerase?
11. What is charging of t-RNA?
12. What is initiation complex?
13. What is genetic code?
14. What is stop codon?
15. What is transcription factor?
16. What is anticodon?

PART-III (Each question carry 2 mark)

1. Transcription unit
2. TATA box
3. Inhibitors of transcription
4. Pribnow box
5. CAAT box
6. Transcription complex
7. Reverse transcription
8. What is palindromic sequence?
9. Eukaryotic RNA polymerase
10. Termination of transcription
11. Structure of ribosomes
12. Polyribosomes
13. Peptidyl transferase
14. Wobble hypothesis
15. Fidelity of protein synthesis
16. Amino acyl t-RNA

PART-IV (Each question carry 6 mark)

1. What is transcription? Description process of initiation of transcription.
2. Describe general mechanism of transcription.
3. Give an account of transcription in prokaryotes
4. Describe transcription in eukaryotes?
5. Describe the structure and function of three RNA

6. Give an account of process of translation in prokaryotes.
7. Describe translation in eukaryotes.
8. What is genetic code? Describe the properties of genetic code.
9. Describe the various steps of protein synthesis.
10. Describe transcription factors and regulation of transcription.

UNIT-3, PART-I (Each question carry 1 mark)

1. Who discovered ribozymes?
2. Who discovered split gene?
3. The t-RNA splicing occurs in.....in eukaryotes
4. Each spliceosome is composed of number of sn-RNA.
5. Group I introns are large ribozymes.
6.protects m-RNA from degradation of by exonuclease.
7. Exon shuffling is a molecular mechanism for the formation of.....
8. Alternative splicing results in a single gene coding for..... proteins.
9. Poly A tail is attached at the.....
10. What is junk DNA?
11. What is split gene?
12. Who first introduced exon shuffling?

PART-II (Each question carry 1.5 mark)

1. What is heterogenous nuclear RNA?
2. What do you mean by split gene?
3. How are the intron removed?
4. Explain spliceosome machinery.

5. Name the types of self splicing introns.
6. What is intron?
7. What is exon?
8. How is the pre-m-RNA processed?
9. What is RNA editing?
10. What are self-splicing ribozymes?
11. List the important steps of t-RNA splicing pathway?
12. What is alternative splicing?
13. What is exon shuffling?
14. What is globin m-RNA?
15. What is spliceosome?

PART-III (Each question carry 2 mark)

1. Split gene, 2. Intron and exons, 3. Self splicing
4. Spliceosome, 5. Lariat intron, 6. Group I intron splicing
7. Alternative splicing, 8. hn-RNA, 9. 5' cap addition
10. Group II intron splicing, 11. Processing of Rrna, 12. Exon shuffling
13. m-RNA transport, 14. Ribozyme, 15. RNA editing
16. Globin m-RNA, 17. Polyadenylation

PART-IV (Each question carry 6 mark)

1. What are split genes? Describe the structure and function of introns and exons.
2. Give an account of spliceosome machinery.
3. Describe various splicing pathway.
4. Describe the process of alternative pathway.

5. Give an account of exon shuffling.
6. Give an account of RNA editing.
7. What is ribozyme? Describe the structure and function of ribozymes.
8. Describe the post transcriptional modification of hn-RNA.

UNIT-4, PART-I (Each question carry 1 mark)

1. DNA is typically methylated by which enzyme?
2. Give an example of repressible operon system.
3. The male house keeping genes are present in which chromosome?
4. The protein ubiquitin has a feature of aprotein.
5. Androgen is ahormone.
6. Insulators block activation by.....
7. Who discovered RNA interference?
8. Who discovered lac operon in E. coli?
9. The posterior pituitary gland secrete.....
10. Who discovered antisense RNA?
11. Who discovered si-RNA?
12. The gene battery model for unit of transcription was proposed by.....

PART-II (Each question carry 1.5 mark)

1. Name four important stages of gene regulation., 2. What is modification of DNA?
3. What do you mean by repressor?, 4. Define micro RNA.
5. What is antisense RNA?, 6. What is the role of RNA?
7. What is DNA methylation?, 8. What do you mean by gene silencing?

9. What is the role of silencer in process of transcription?
10. What is house keeping gene?, 11. What is lac operon?
12. What is trp operon?, 13. What is structural gene?
14. What is heat shock protein?, 15. What is mi-RNA?
16. What is activators?, 17. What is repressor?
18. What is enhancer?, 19. What are silencer element?

PART-III (Each question carry 2 mark)

1. The operon model, 2. trp operon, 3. lac operon, 4. Heat shock proteins,
5. Transcriptional factors, 6. Repressors, 7. Enhancer, 8. Promoter gene,
9. Structural gene, 10. Activator, 11. Silencer, 12. mi-RNA, 13. si-RNA,
14. RNA interference, 15. Regulatory gene, 16. Gene imprinting,
17. Riboswitches, 18. Antisense RNA, 19. Gene silencing, 20. Position effect

PART-IV (Each question carry 6 mark)

1. Give a general account of principles of transcriptional regulation.
2. Give a brief account of operon model for regulation of gene.
3. Describe briefly transcriptional regulation in prokaryotes.
4. Describe the regulation of trp operon in prokaryotes.
5. Give an account of RNA interference.
6. What do you mean by riboswitch? Discuss their role in gene regulation.
7. Describe the role of mi-RNA and si-RNA.
8. Give a brief account of gene silencing in eukaryotes.

CORE –XII ,(GENETICS), UNIT-I , PART –I , (Each question carry 1 mark)

1. Who is the father of Genetics ?
2. Who formulated “The chromosome Theory of Linkage ” ?
3. Name the nuclear enzyme responsible for the breakage of chromatid at chiasmata.
4. Name an insect which shows complete linkage ?
5. How many linkage groups are present in man ?
6. Who proposed copy choice theory explaining the mechanism of crossing over ?
7. Name the scientist who first demonstrated somatic cell hybridization using mouse cells ?
8. What type of linkage it is called when the genes are closely located on chromosome ?

PART –II , (Each question carry 1.5 marks) ,(within 2/3 sentences)

1. State three main features of linkage .
2. Explain briefly coupling and repulsion of linkage .
3. .State three main features of the chromosome theory of linkage .
4. Give two significance of linkage .
5. What is synaptonemal complex ?
6. Define coefficient of coincidence related to crossing over .

PART-III , (Each question carry 2 marks) ,(within 75 words)

1. What is linkage ? Why linkage is an exception to independent assortment ?
2. Define crossing over . Describe the method of meiotic crossing over.
3. Differentiate between linkage and crossing over .

4. Give some applications of somatic cell hybridization .
5. What is recombination frequency ? Explain .
6. How classical theory explains the mechanism of crossing over?

PART-IV , (Each question carry 6 marks) ,(within 500 words)

1. What is somatic cell hybridization ? How can somatic cell hybrids be prepared ?
2. Discuss the molecular mechanism of crossing over .
3. Discuss linkage and crossing over with examples .
4. Explain two and three factor crosses with reference to chromosome mapping .

UNIT-II , PART –I , (Each question carry 1 mark)

1. Name the scientist who first used the term "mutation" ?
2. Name the type of mutation that occur suddenly in nature having unknown origin.
3. Name the ability of a molecule to exist in more than one chemical form.
4. Name the type of mutation when a purine/pyrimidine is replaced by another purine/pyrimidine.
5. Which mutation brings about a change from abnormal phenotype to wild type.
6. Cri-du-chat or cat cry syndrome is caused by deletion of short arm of which chromosome ?
7. What type of polyploidy is observed in *Raphanobrassica* ?
8. Who developed SIB method of mutation detection ?
9. Attached X-method is used to detect sex linked visible mutations in _____ .
10. UV rays produce _____ type of radiations.
11. In deamination type of mutation _____ group is replaced.

12. _____ mutations the normal base triplet or codon is changed.
13. In _____ mutations a change from wild-type to abnormal phenotype occurs.
14. Mongolism or Down's syndrome is an example of _____ in man.
15. Polyploidy is very common in _____ (plants/animals)
16. When mutation occurs in a very small segment of DNA molecule, it is called _____ mutation.

PART –II , (Each question carry 1.5 marks) ,(within 2/3 sentences)

1. Define gene mutation
2. Early work of Seth wright on mutation
3. Distinguish between forward and reverse mutations.
4. What is silent mutation ?
5. Define missense mutation ?
6. Explain paracentric inversion.

PART-III , (Each question carry 2 marks) ,(within 75 words)

1. Differentiate between spontaneous and induced mutation.
2. Describe the role of UV rays in induction of mutation.
3. Explain inversion.
4. What are base analogues, explain with examples.
5. Differentiate between autopolyploidy and allopolyploidy
6. Describe CIB method of detection of mutations.

PART-IV , (Each question carry 6 marks) ,(within 500 words)Which

1. What is mutation ? Explain different kinds of mutations.
- 2.Explain gene mutations with examples.
- 3.Describe different types of chromosomal aberrations in organisms.
- 4.State and explain different types of variations with regard to chromosome number.
- 5.Describe the mode of action of alkalating agents, base analogues and acridine dyes as chemical mutagens.

UNIT-III , PART –I , (Each question carry 1 mark)

- 1.Who proposed Nutrition Theory of sex determination in man?
- 2.Name the American geneticist who suggested X body was involved in sex determination.
- 3.Out of two sex chromosomes (X and Y), Which one is referred to as genetically inactive ?
4. XX female and XO male sex chromosome mechanism is observed in which animal?
- 5.Who proposed Genic Balance Theory of sex determination ?
- 6.Barr bodies are absent in which sex?
- 7.Inheritance of human skin colour is an example of which type of inheritance ?
- 8.Which cytoplasmic particle carry DNA in animal ?
- 9.What type of molecule the cytoplasmic DNA normally possess ?
- 10.Name the scientist who described Kappa particle in Paramecium .
- 11.Baldness in man is an example of _____ influenced inheritance .

- 12.The example of a sex limited character in female is _____ .
- 13.The sex linked disease haemophilia was first studied by _____ .
- 14.Sex limited genes control the _____ characters.
- 15.Free martinism is an example of the role of _____ in sex determination.
- 16.In honeybee males or drones develop from egg by a process called as _____
- 17.Hairy ears (hypertrichosis of ear pinna) in man is an example _____ linkage .

PART –II , (Each question carry 1.5 marks) ,(within 2/3 sentences)

1. Explain ZZ-ZW sex chromosome mechanism.
- 2.What are gynandromorphs in Drosophila ?
- 3.Explain how sex differentiation occurs in Bonellia ?
- 4.Role of holandric genes in sex determination.
- 5.What is polygenic inheritance.
- 6.What is colour-blindness in man ?
- 7.What is maternal effect ?
- 8.What is Kynurenine ?
- 9.What is Kappa particle ?
- 10.Define extra chromosomal inheritance .

PART-III , (Each question carry 2 marks) ,(within 75 words)

- 1.Explain how skin colour inheritance in man exemplify polygenic inheritance?
- 2.Briefly explain Lyon's hypothesis.
- 3.Explain Geneic Balance theory of sex determination in Drosophila.
- 4.Explain sex determination in man.

5.What is XX-XO mechanism observed in grass hopper? Explain.

6.Sigma particle in Drosophila .

7.Mitochondrial mutation in Saccharomyces .

8.Transmission of kappa particles in Paramecium .

PART-IV , (Each question carry 6 marks) ,(within 500 words)

1.Describe different types of chromosomal mechanism of sex determination with examples .

2.Describe sex determination in man and Drosophila .

3.Explain colour blindness in man with examples .

4.Explain Haemophilia with examples .

5.What is cytoplasmic inheritance ? Explain giving examples .

UNIT-IV , PART-I , (Each question carry 1 mark)

1.Give the name of the most widely studied bacterium.

2.What is the name of bacterial wild type.

3.The extrachromosomal genetic material in a plasmid is called as what?

4.The process of bacterial transformation was first observed by a scientist. Name the scientist.

5.Give the full form of Hfr.

6.Who first coined the term F factor in bacteria ?

7.In transduction phenomenon in bacteria, which organism transfer genetic material?

8.Transposable genetic element is a segment of which nucleic acid ?

9. Name the mutator complex which help in the movement of transposable genetic elements.
10. Who coined the term "transposable elements" ?
11. Give the name of the mobile genes in *Drosophila melanogaster* identified by David Hogness and his colleagues in 1975.
12. Name a transposable genetic element that replicates through an RNA intermediate.
13. The nutritional mutants in bacteria are referred to as _____ .
14. Bacterial conjugation or mating is a mode of reproduction.
15. Gene transfer in bacteria produce partial zygotes called
16. F factor or fertility factory in bacteria is a _____ plasmid.
17. In bacteria, recipient cell after absorbing donor DNA is transformed. Such a cell is called _____ .
18. A bacterial cell carrying an integrated F factor is called a _____ .
19. The Insertion sequences (IS-Elements) are the simplest form of transposable elements found in _____ .
20. _____ is a type of mobile elements which can accumulate a cluster of genes (gene cassette) which move as a single unit and have a single promoter.
21. _____ is a transposable genetic element that moves by being first transcribed into RNA copy and then reconverted to DNA.
22. Phage Mu is considered as a _____ agent.
23. Ac-Ds system was discovered in 1950 by _____ .

PART –II , (Each question carry 1.5 marks) ,(within 2/3 sentences)

1. What is bacterial chromosome ?, 2.What is a plasmid ?
- 3.Define conjugation in bacteria., 4.What are mating types in bacterial conjugation ?
- 5.Differentiate between auxotroph and prototroph
- 6.What is competence factor in bacterial transformation ?
- 7.Define transposable genetic elements., 8.What is retrotransposon?
- 9.What is Ac-Ds system?, 10.What is a jumping gene?, 11.What is integrons ?

PART-III , (Each question carry 2 marks) ,(within 75 words)

- 1.Describe Griffith's experiment on transformation.
- 2.What is conjugation ? Explain briefly in bacteria.
- 3.Complementation test in bacteriophage., 4.Explain transduction in bacteria.
- 5.Role of IS elements in conjugation., 6.Conjugation in bacteria
- 7.Transduction in bacteria, 8.Transformation in bacteria
- 9.Explain the role of Ac-Ds elements in maize, 10.P elements in Drosophila.
- 11.Transposons in human., 12.Conjugative transposons.

PART-IV , (Each question carry 6 marks) ,(within 500 words)

- 1.Write an essay on Recombination in bacteria.
- 2.Describe the role of sex factor in bacterial conjugation with particular reference to F and Hfr strains. How do the different Hfr strains differ ?
- 3.Give an account of transposons in bacteria.
- 4.Define transposable genetic elements and explain the different types.

DSE-I,(ANIMAL BEHAVIOUR AND CHRONOBIOLOGY)

UNIT-I ,PART-I , (Each question carry 1 mark)

1. Who coined term "ethology" ?
2. who is regarded as the father of the scientific study of animal behavior ?
- 3.Name the author of the book "Animal Intelligence", a classic book on animal behavior.
4. For which famous experiment Ivan Pavlov was famous for ?
- 5.Name the orienting mechanism involving orientation of an animal at an angle to the direction of stimulation.
- 6.Name the external factors which signal to trigger instiative acts.
- 7.Give the full form of IRM.
- 8.Cuckoos have the habit of laying their eggs in someone else's nest. Name it.
- 9.The scientific study of animal behavior is called _____ .
- 10.Name the author of the famous book "Mental Evolution in Animals".
- 11.Extensive communication system in bees was discovered by _____ .
- 12.Orientating response towards gravity is _____ .
- 13.The inborn behavior is also called as _____ .
- 14.In _____ orientation the role of change of direction increase in proportion to the intensity of stimulation.
- 15.Orientating response towards water current is _____ .
- 16.Sign stimuli are also called _____ .
- 17.Pheromones are chemical releasers which affect individuals of _____ species.
- 18.Scientific study of animal behavior is _____ .

- 19.The theory of imprinting or childhood learning was developed by _____ .
- 20.Orientating response towards electric field is _____ .
- 21.Stereotyped behavior is commonly known as _____ .
- 22.When the speed of locomotion is affected by external stimulation, the kinesis is _____ .

PART-II , (Each question carry 1.5 marks) (within 2/3 Sentences)

- 1.What is brood parasitism ? , 2.What is IRM ?
- 3.What are allomones?, 4.Define Mnemotaxis
- 5.Define tropism, 6.What is socio-biology ?

PART-III , (Each question carry 2 marks) (within 75 words)

- 1.Explain proximate and ultimate behavior.
- 2.Name the four questions raised by Tin Bergen to understand behavior.
- 3.Explain different taxes, 4.What are Kineses ?
- 5.Explain stimulus filtering.
- 6.Name the ethologists who shared the 1973 Nobel Prize for medicine and briefly state their contribution.

PART-IV , (Each question carry 6 marks) (within 500 words)

- 1.Describe different kinds of innate behavior.
- 2.Explain sign stimuli with examples.
- 3.Explain instinct with examples.
- 4.How behavior serves as a basis of animal evolution ?
- 5.Briefly describe the profiles of three Nobel laureates of the year 1973 who worked on animal behavior .

UNIT-II ,PART-I , (Each question carry 1 mark)

1. Who first observed reflex action in the year 1833 ?
2. Name the path through which impulse travels during reflex action.
3. Name the type of reflex arc which has one sensory and one motor nerve fibre.
4. Animal following caravanning.
5. Withdrawal of hand on touching a hot iron is a reflex action, name it.
6. Give the term for the time gap between the application of the stimulus and the observations of its effects.
7. Name the psychologist who devised skinner box to demonstrate operant conditioning.
8. _____ first noticed imprinting Graylag gees.
9. _____ imprinting takes place soon after hatching or birth.
10. The simplest form of learning is _____ .
11. In Menotaxis the stimulus is light, hence it is also termed as _____ reactions.
12. When the speed of locomotion is affected by external stimulation, the kinesis is called _____ .
13. Repeated stimulation of muscle fibre produces _____ .
14. The example of an effector organ is _____ .
15. Imprinting has been commonly observed in _____ .
16. Trial and error learning is also called _____ .
17. Imprinting is well marked during which stage of life cycle .
18. Secretion of saliva on looking at delicious food is an example of _____ .
19. Orientating response towards touch is _____ .

20. In classical conditioning the animal under experiment was a _____ .

21. Thorndike experimented a lot on learning process using a puzzle box and an animal name it.

PART-II , (Each question carry 1.5 marks) (within 2/3 Sentences)

1. Define reflex action.

2. What is conditioned reflexes.

3. Define orientation.

4. What is taxis.

5. Draw a reflex arc.

6. Define habituation

PART-III , (Each question carry 2 marks) (within 75 words)

1. Reflex arc , 2. Summation , 3. Tropotaxis ,

4. Orthokinesis , 5. Orientation 6. Mnemotaxis ,

7. Operant conditioning

PART-IV , (Each question carry 6 marks) (within 500 words)

1. What is reflex ? Explain different types of reflexes.

2. What is orientation ? Explain primary and secondary orientation.

3. What is kinesis? Explain orthokinesis and klinokinesis.

4. What is taxis? Explain tropotaxis, Klinotaxis and mentotaxis.

5. What is imprinting ? Explain different types of imprinting.

6. What is learning? Explain the experiment on conditioned reflex performed by Pavlov.

UNIT-III ,PART-I , (Each question carry 1 mark)

1. Give the scientific name of Indian bee.
2. The bees belong to which order of the class insecta.
3. Name the cells of the comb for rearing young ones.
4. Name the special food given to queen at larval stage.
5. Name the procedure by which old queen is replaced by a new strong queen.
6. Give the term for the helping behavior existing between members of a social group.
7. The mating between young queen and drone high up in the air is called as _____.
8. Colour discrimination experiment in honey bee was performed by _____.
9. If the food is near the hive the forager bee *Apis mellifera* perform _____ dance.
10. The division of labour exhibited by the colonial insects is called _____ polyethism .
11. Royal jelly is secreted from the _____ gland of worker bee.
12. The behavior of the workers is regulated by the queen who emits _____ .
13. *Apis dorsata* is commonly known as _____ .
14. Royal jelly is secreted by the worker bee from the _____ gland .
15. Foraging or food supply behavior is the link between honey bee colony and _____ .
16. Cheaters are the individuals who accept the altruism from others but fail to reciprocate when occasion arises _____ .

17. When the food source is more than 100 meters away from the colony the honey bees perform a type of _____ dance.

18. In asymmetry of sex, one sex invests more in the offspring than the other, name the sex.

19. What kind of selection is observed in female zebra finch (a bird) which prefers males with more colourful beaks and feathers (indicating better health).

20. When two sexes of the same species exhibit different characteristics beyond the differences in their sexual organs, it is termed as what ?

21. Which hypothesis explains female's preference for elaborate males against dull coloured ordinary males.

22. In sea lion males are larger than the females at birth. What kind of dimorphism it is?

23. Mate choice is also known as _____ selection.

24. Ideas on sexual selection was first introduced in 1871 by _____ .

25. Using *Drosophila* as a model _____ presented experimental evidence of mate choice.

26. In birds the parental care are typically _____ type .

27. _____ traits signal good overall quality of the individual.

PART-II , (Each question carry 1.5 marks) (within 2/3 sentences)

1. Define the term sociobiology .

2. Three advantages of socialization .

3. Systematic position of Indian honey bee.

4. Foraging task .

5. Contribution of Karl Von Frish on honey bees.

6. Nuptial flight of honey bee.
7. What is asymmetry of sex.
8. Define sexual dimorphism.
9. Contributions of Prof. Ronald Fisher.
10. What is sexy son hypothesis ?
11. What is male rivalry?

PART-III , (Each question carry 2 marks) (within 75 words)

1. Polyethism, 2. Importance of foraging in honey bee
3. Round dance in honey bee.
4. Learning ability in honey bee.
5. Formation of new hive , 6. Reciprocal altruism .
7. Intra sexual selection , 8. Sexual conflict, 9. Inter sexual selection
10. Fisherian runaway hypothesis , 11. Sexy son hypothesis

PART-IV , (Each question carry 6 marks) (within 500 words)

1. Give an account of society organization in honey bee.
2. Explain in detail foraging behavior in honey bee. Also state its advantage and disadvantages.
3. Write an essay on dance language of honey bee.
4. Write an essay on altruism .
5. Write an essay on sexual dimorphism.
6. What is mate choice? Explain in detail.
7. What is sexual selection ? Explain intra-and inter sexual selection .

UNIT-IV ,PART-I , (Each question carry 1 mark)

- 1.Name the Father of Chronobiology.
- 2.Name the scientist who designed "flower clock".
- 3.Who introduced the concept of Zeitgeber ?
- 4.Name a human body function which oscillate on a 24 hrs. pattern.
- 5.Name the persons whose thinking skills are best in the morning.
- 6.The hormone melatonin is secreted from which endocrine gland ?
- 7.The meaning of the German word zeitgebers is _____ .
- 8.The primary circadian clock is located in _____ in mammals.
- 9.The tidal clocks are present in a group of aquatic animals called _____ .
- 10.Most of organisms showing circalunar periodicity are _____
- 11.Each biological rhythm is composed of repeating units called _____ .
- 12.The melatonin level is high during _____ .
- 13.The earliest account of circadian process was the leaf movements of tamarind tree was given by _____ .
- 14.Outstanding work on biological clock was done by _____ .
- 15.The circadian rhythms are driven by a circadian clock found in _____ .
- 16.The most fascinating response to the lunar rhythms is shown by_____ .
- 17.The biological clock in mammals is present in SCN is located in _____ .

PART-II , (Each question carry 1.5 marks) (within 2/3 sentences)

- 1.What is SCN ?,
- 2.Two importance of biological clock.

3. Biological oscillation.,
4. Father of chronobiology.
5. Morning and evening type people.

PART-III , (Each question carry 2 marks) (within 75 words)

1. Animals exhibiting tidal rhythms.
2. Role of melatonin in regulating behavior of mammals.
3. Biological clock (adaptive significance)
4. Animals showing lunar rhythms.
5. History of chronobiology.
6. Tidal rhythm , 7. Circannual rhythm
8. Lunar rhythm , 9. Melatonin

PART-IV , (Each question carry 6 marks) (within 500 words)

1. What is circadian rhythm ? How circadian rhythm influences the endogenous and exogenous system of animal behavior.
2. What is Biological clock? State its adaptive significance and relevance.

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DSE-II ,IMMUNOLOGY, UNIT-I ,PART-I , (Each question carry 1 mark)

1. Who first invented the technique of vaccination against smallpox?(Edward Jenner)
2. Who first inoculated attenuated strain as vaccine ? (Louis Pasture)
3. Who developed vaccines for chicken cholera, anthrax and rabies ? (Louis Pasture)
4. Who discovered the cell-mediated immunity in invertebrate animals? (Elie Metchnikoff (1882))
5. Who first successfully treated diphtheria by passive immunization? (Emile Roux (1894))
6. Name the sites in our body where little or no immune response takes place, even if a pathogen is present. (The central nervous system and the eye)
7. Which class of lymphocytes is involved in innate immunity?(Natural killer (NK) cells)
8. Which class of WBCs are responsible for adaptive immunity? (Lymphocytes (B cells and T cells))
- 9.Which structure are considered as the first layer of defense ?
- 10.Which vertebrates first evolve adaptive immunity ? (Jawless fishes)
- 11.Why invertebrates lack adaptive immunity?
- 12.Which cells attack intracellular pathogens ?
- 13.Where immune cells browse for antigens ?
- 14.Which type of immunity found in all animals ?

PART-II ,(Answer in 2/3 sentences) (1.5 Marks)

1. Write the four major categories of pathogens.
2. What is the principle behind vaccination?
3. What is antigen? Who coined the term antigen?
4. Compare immunity with resistance.
5. How a pathogen could be attenuated ?
6. What is tolerance? How do we become tolerant to the self-antigens in our own bodies?
7. How is the innate immunity different from adaptive immunity ?
8. Contrast the targets of the humoral immune response with those of the cell-mediated immune response.
9. What are the key events of pathogenesis?
10. List the internal defenses that act as second layer of defense.
11. How bacteria defend themselves against viruses?
12. What are the unique features of adaptive immunity?
13. How bacteria defend themselves against viruses ?
14. How does thymus help us to avoid autoimmune responses ?
15. What is physiological inflammation ?
16. What are the basic stages of inflammation?
17. What is extravasation? Write its steps.
18. What causes pain symptoms of inflammation ?
19. What is opsonization?

PART-III , (Answer within 75 words) (Each 2 marks)

1. Why was Jenner's vaccine superior to previous methods for conferring resistance to smallpox?
2. Write the postulates of side-chain theory.
3. Write the postulates of instructional theory of antibody formation.
4. What is proposition of danger or damage theory of self-tolerance?
5. Variolation , 6. Clonal selection theory , 7. Instructive theory
8. Development of first vaccine to small pox , 9. Selective theory,
10. Differentiate between innate and adaptive immunity .
11. Explain the various types of stem cells .
12. Antigen-presenting cells, 13. B lymphocytes, 14. NK cells, 15. MALT,
16. How thymus differs from other lymphoid organs ?
17. Chronic inflammation .
18. What are the cardinal signs of inflammation and what causes them?
19. What are the basic objectives of inflammation?
20. How chronic inflammation differs from acute inflammation?
21. How phagocytes are mobilized to the site of infection?
22. What determines whether an immune response is acute or chronic ?

PART-IV , (Within 500 words)(Each carry 6 marks)

1. Give an account of historical perspective of immunology.
2. Explain the various theories proposed for lymphocyte specificity.

3. Describe the various cellular components of innate immune system.
4. Compare the functions of CMI and AMI .
5. Describe the various lymphoid and antigen-presenting cells of immune system.
6. Describe granulocytes with their function .
7. How T cell maturation occur in thymus ?
8. Describe the structure and functions of the spleen .
9. What are lymph nodes ? Describe the structure and functions of lymph nodes .
10. What is innate immunity? Give an account on physical and Chemical barriers of innate immunity.
11. Briefly discuss the mucosal immune system of human body.
12. How does skin contributes to the blocking of pathogens entry?
13. Justify the role of mucosal tracts in immunity.
14. Describe the molecules involved in innate immunity.
15. Describe the inflammatory process. Identify the inflammatory chemicals and indicate their specific roles.

UNIT-II ,PART-I , (Each question carry 1 mark)

1. Define antigen.
2. What are the chemical nature of antigen?
3. What is antigenic determinant?
4. What is adjuvant?
5. Why invertebrate lack adaptive immunity?
6. Which vertebrate first evolve adaptive immunity?

7. Antigen is a contraction of
8. The epitope of antigen bound to of antibody.
9. The antigen receptor of B lymphocytes is called.....
10. Who proposed the basic structure of immunoglobulin?
11. Which is the most abundant class of Ig ?
12. Which antibody occurs in both monomer and dimer forms?
13. Which cell secrete antibodies in response to antigen?
14. The first antibody release by in primary response is.....
15. Define antibody affinity.
16. Define antibody avidity.
17. Define cross reactivity.
18. Which is the oldest type of immunoassay?
19. Who first developed RIA?
20. What is full form of ELISA?

PART-II , (Each question carry 1.5 mark)

1. What are the two important properties of complete antigen?
2. Why haptens are incomplete antigens?
3. How many isotopes of immunoglobulins occur in human?
4. Explain how mast cells are involved in allergy?
5. What are the products of papain and pepsin digestion of IgG?
6. What are the binding forces of Ag-Ab complex?
7. What are the defense mechanisms used by antibodies?

8. Define the terms neutralization, flocculation and precipitation?
9. List four serological tests involving agglutination reaction.
10. Explain how mast cells are involved in allergy?
11. Name the commonly used enzymes in ELISA.
12. What are the variants of ELISA?
13. What are the most commonly radioactive labels RIA?

PART-III , (Each question carry 2 mark)

1. Differentiate between antigenicity and immunogenicity.
2. What is the difference between a complete antigen and a hapten?
3. Adjuvants and their effects, 4. Freund's complete and incomplete adjuvants.
5. Haptens, 6. Superantigens, 7. Fragments of immunoglobulins.
8. Hypervariable regions., 9. Structure and function of IgG.
10. Structure and functions of IgA., 11. Structure and function of IgD
12. Structure and function of IgM, 13. Affinity and avidity.
14. Precipitation reaction, 15. Opsonization., 16. RIA, 17. ELISA
18. Western blotting., 19. Immunoprecipitation.
20. Monoclonal antibody.

PART-IV , (Each question carry 6 mark)

1. What is immunogen? Explain different factors influencing immunogenicity?
2. Define antigen, immunogen and epitope. Explain the various properties of B and T cell epitopes.
3. Describe the basic structure and function of IgG.

4. Describe the structure of different classes of immunoglobulins with suitable diagrams.
5. Give an account of antigen- antibody interaction.
6. What is immunoassay? Give an account of RIA,ELISA.
7. What is ELISA? Explain different types of ELISA techniques.
8. What are monoclonal antibodies? Describe the steps of production of monoclonal antibodies.

UNIT-III ,PART-I , (Each question carry 1 mark)

1. What is MHC molecule?
2. Where MHC locus is located?
3. Which cells express class II MHC proteins?
4. Which class of MHC molecule is not membrane bound?
5. Class I MHC molecules are displayed by.....
6. MHC class III genes encode which proteins?
7. What is antigen processing?
8. What is antigen presentation?
9. Which cell express class II MHC proteins?
10. How antigenic proteins are targeted for degradation?
11. Which molecules aid peptide assembly with MHC class I molecules?
12. What is complement?
13. Where complement proteins are synthesized?
14. What is complement cascade?

15. Name the complement fragments that serve as opsonins.
16. Complement proteins constitute Percent of the serum globulins.
17. The enzyme that cleave C3 and C5 are called.....
18. What are cytokines?
19. Which is the largest family of cytokines?
20. Which cytokine mediate early antiviral responses?

PART-II , (Each question carry 1.5 mark)

1. What is ubiquitin?
2. What are molecular chaperones?
3. Where do antigenic peptides associate with the MHC molecule?
4. How non- protein antigens are presented to T cells?
5. What is the role of invariant chain peptides?
6. How classical pathway is initiated?
7. How is lectin pathway initiated?
8. How is alternative pathway of complement activation initiated?
9. Why cytokines are pleiotropic?
10. What is cascade induction of cytokines?
11. Define self-MHC restriction.
12. How class III MHC molecules are different from class I and II?

PART-III, (Each question carry 2 mark)

1. What is the significance of MHC molecules?
2. Draw schematic diagram of class I MHC molecules.

3. Draw schematic diagram of class II MHC molecule.
4. Differentiate between class I and class II MHC molecules.
5. Arrangement of HLA complex.
6. MHC class I molecule.
7. MHC class II molecule, 8. Ubiquitination.
9. Proteasome, 10. Molecular chaperones.
11. Nomenclature of complement components.
12. Function of complement system.
13. Membrane attack complex.
14. Classical pathway, 15. Alternative pathway.
16. Lectin pathway, 17. Interleukins
18. Interferons, 19. TNF, 20. Chemokine

PART-IV, (Each question carry 6 mark)

1. Give an account of structural organization and functions of class I and class II MHC molecules.
2. Describe the exogenous pathway of antigen processing and presentation.
3. Describe the mechanism of endogenous antigen processing and presentation.
4. Give an account of various types of complement activation pathway.
5. Describe the role of complement proteins in the effector phase of humoral immunity.
6. Describe the attributes of cytokines with examples.
7. Explain the properties and function of cytokines.

UNIT-IV ,PART-I , (Each question carry 1 mark)

1. What is hypersensitivity?
2. Who first reported hypersensitivity reactions?
3. Which type of antibodies are responsible for type-I hypersensitivity?
4. Which types of antibodies are responsible for type-II hypersensitivity?
5. IgE mediated hypersensitivities are called.....
6. Cross-linking of IgE receptors on mast cells triggers.....
7. Rh incompatibility is a hypersensitivity.
8. Local anaphylactic reactions are called.....
9. Cell mediated hypersensitivity is called.....
10. What is toxoid vaccine? Give examples.
11. Which is the first licensed vaccine that was generated by reverse vaccinology?
12. Name the recently launched HIV vaccine.
13. Name the most promising malaria vaccine developed by GSK.

PART-II , (Each question carry 1.5 mark)

1. Name the primary mediators of allergies?
2. How are the mast cells get sensitized? , 3. What is anaphylaxis?
4. What is erythroblastosis fetalis?
5. What is atopic allergy?
6. Name some diseases resulting from circulating immune complexes.
7. Explain the various types of recombinant vaccines with examples.
8. Differentiate between prophylactic vaccines and therapeutic vaccines.

9. What is DNA vaccines?

10. What are the three causes of sudden appearance of emerging viruses?

PART-III, (Each question carry 2 mark)

1. Cell and coombs classification, 2. Localized anaphylaxis. 3. Erythroblastosis foetalis,

4. Arthus reaction, 5. Contact dermatitis, 6. Tuberculin reaction, 7. Serum sickness, 8. HBV vaccine

9. Herd immunity, 10. Adjuvant, 11. Multivalent subunit vaccine, 12. Vaccinia vector virus

PART-IV, (Each question carry 6 mark)

1. Describe the mechanism and mediators involved in type I hypersensitivity. Add a systematic anaphylaxis and localized anaphylaxis.

2. Describe the mechanism and types of type II hypersensitivity.

3. Describe the mechanism and different forms of type IV hypersensitivity.

4. What do you mean by DNA vaccines? How vaccines are constructed?

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SEMESTER -6 ,PAPER-13 (CORE-XIII) , (DEVELOPMENT BIOLOGY)

UNIT-I ,PART-I , (Each question carry 1 mark)

1. During its development, one spermatogonium produces how many mature sperm cell .
2. During its development, one oogonium produces how many mature egg cell .
3. Who postulated the 'Theory of Epigenesis'.
4. During ontogenic development of an animal, the entire racial history is repeated".

Who proposed this concept ?

5. Polar bodies develop in which process ?
6. Noncleidic eggs occur in which animal ?
7. Which cell division occur in spermatogenesis ?
8. Oogenesis consists of how many phases .
9. In which process spermatid changes to sperm ?
10. What is the term used for the development of egg without fertilization?
11. Who is regarded as 'Father of Modern embryology'?
12. Mosaic development is regarded as the beginning of experimental embryology. Who is the pioneer of this concept?
13. Based upon yolk content, what type of eggs is found in placental mammals?
14. Where do the spirally arranged mitochondria around an axial filament occur?
15. Which embryonic layer gives rise to development of gonads?

16. Development of an organism involves three major types of cell processes namely cell processes namely cell division, differentiation and ----- .
17. In 1891, the German embryologist ----- put forward the Regulative Theory of Development.
18. Eggs containing large amount of yolk are known as ----- eggs .
19. Egg with peripheral cytoplasm around the yolk is ----- type of egg
20. At the end of first meiotic division, male germ cell differentiates into -----
----- .
21. At the time of fertilization ----- maturation division of the egg nucleus is completed .

PART-II, (Each question carry 1.5 marks) ,(within 2/3 sentences)

1. What is ontogeny?
2. What is Baer's Law?
3. What is Morphogenesis in Developmental Biology?
4. What are cytoplasmic determinants?
5. Define gametogenesis.
6. What is the significance of unequal cytokinesis in oogenesis?
7. What are the basic requirements for fertilization?
8. What is fertilizin-antifertilizin reaction?

PART-III, (Each questions carry 2 marks) (within 75 words)

1. What is theory of Preformation?
2. What is 'Recapitulation Theory'?
3. Briefly describe 'Weismann's germplasm theory'?

4. What do you mean by cell-cell interactions in embryology?
5. Give a brief idea of "Differential Gene Expression" in embryonic development.
6. How many types of eggs are found in chordates on the basis of yolk content?
7. Differentiate between external and internal fertilization.

PART-IV ,(Each question carry 6 marks) , (within 500 words)

1. What is pattern formation? Give its mechanisms.
2. Give a brief account on differentiation and growth in embryonic development.
3. Give an account of spermatogenesis.
4. Give an account of oogenesis.
5. Give an account of egg membranes.
6. Write an essay on types of egg. Add a note on its significance.
7. Give an account of mechanism of fertilization.

UNIT II ,PART –I , (Each question carry 1 mark)

1. In centrolecithal eggs, the cleavage is which type ?
2. Meroblastic cleavage occurs during the development of which animal ?
3. Determinate cleavage is found in which animal ?
4. During cleavage all divisions are what type ?
5. Noncleidic eggs occur in which animal ?
6. What type of eggs are found in birds and reptiles ?
7. During which hour of incubation of Chick embryo, head process development takes place?
8. In which type of cleavage the fate of blastomeres are fixed?

9. Which embryonic process leads to formation of notochord?
10. Which type of cleavage can completely divide the zygote into two?
11. Name an animal group where you find coeloblastula during blastulation?
12. Which structure formed soon after fertilization prevents the entry of other sperms into the egg?
13. Which embryonic structure reduces and obliterates blastocoelic cavity?
14. For which discovery, Spemann was awarded Nobel Prize in 1935?
15. On the basis of distribution of yolk, the insect eggs are what type ?
16. What is the name of blastula in amphibians containing micromeres and macromeres ?
17. Eggs containing large amount of yolk are known as which eggs ?
18. Egg with peripheral cytoplasm around the yolk is -----type of eggs .
19. The entry of a sperm stimulates the egg nucleus to complete its maturation ----
----- division.
20. The egg nucleus of frog is otherwise known as

PART-II, (Each question carry 1.5 marks) ,(within 2/3 sentences)

1. How cleavage differs from mitosis?
2. What is Morula?
3. What are 'Vital dyes'?
4. What is amphimixis?
5. What is the basic difference between determinate and indeterminate cleavage?
6. What is primitive streak?
7. What is the future of epiblast and hypoblast in development of chick?

8. What is the role of dorsal lip of blastopore?
9. Explain the significance of the term 'amniota'.
10. What is convergence and divergence in embryology?

PART-III, (Each question carry 2 marks) ,(within 75 words)

1. Discuss the Cleavage Planes.
2. Differentiate between Radial cleavage and Spiral cleavage.
3. Write different types of blastula with examples.
4. Discuss the first 5 cleavage planes in development of frog.
5. Differentiate between epiblast and hypoblast.
6. Differentiate between Primary and Secondary induction.
7. What are various types of morphogenetic movements?

PART-IV ,(Each question carry 6 marks) ,(within 500 words)

1. What is cleavage? Briefly describe various types of cleavage with examples.
2. What is fate map? What are different markers used for drawing the fate maps?
3. Discuss the gastrulation process in frog. Illustrate with diagrams the change from blastula to gastrula.
4. Give an account on development of chick up to formation of primitive streak.
5. What is embryonic induction? Write the experimental evidences in support of it.
6. What is an organizer? Discuss the types and characteristics of organizers .

UNIT-III ,PART-I , (Each question carry 1 mark)

1. Adrenal medulla develops from which germ layer ?
2. Extra-embryonic membranes of the mammalian embryo are derived from which cell ?
3. Which membrane that gives protection to the embryo from external shocks ?
4. Which foetal membrane that provides the first blood corpuscle for circulation in embryo ?
5. Liver develops from which germ layer ?
6. Which foetal membrane develops villi of human placenta ?
7. Which is the most primitive type of mammalian placenta ?
8. Which foetal membrane surrounds the embryo ?
9. What type of placentation is seen in humans ?
10. Which germ layer gives rise to nervous system?
11. Which type of placenta is found in carnivores based on histology?
12. What is the type of placenta in horse and pig based on nature of contact?
13. What is the common name of placenta?
14. What is the name of the maternal portion of the placenta?
15. The intra-embryonic portion of allantois is retained as what in chick?
116. Maternal blood flow is approximately ml/min at term.
16. Binding of blastocyst to endometrium is known as ----- .
17. The implantation window is prepared after ----- days of ovulation in humans .
18. Scale, hair and nail are formed from ----- layer of embryonic germ layers.

19. Basing on histology -----type of placenta is found in sheep and cows .

20. Which type of placenta is found in camel and giraffe based on nature of contact.

PART-II, (Each question carry 1.5 marks) ,(within 2/3 sentences)

1. What are the functions of amniotic fluid?

2. What are deciduous and non-deciduous placenta?

3. What are the differences between implantation and placentation?

4. What are the differences between cotyledonary and zonary placenta?

5. What are the endocrine functions of human placenta?

6. What is dichorionic placentation?

7. What is the future of epiblast and hypoblast in development of chick?

8. Explain the significance of the term 'amniota'.

PART-III, (Each question carry 2 marks) ,(within 75 words)

1. What is the fate of ectoderm?

2. What is the fate of endoderm?

3. What is the fate of mesoderm?

4. Describe the development of amnion and allantois in chick.

5. Explain the functions of extra embryonic membranes in chick.

6. How are chick and mammalian foetal membranes different?

7. Write a brief note on development of chorionic villi.

PART-IV ,(Each question carry 6 marks) ,(within 500 words)

1. Give an account of formation and fate of germ layers in embryonic development.
2. What are extra-embryonic membranes? Why are they considered as an adaptation to terrestrial mode of life?
3. With suitable diagrams discuss the extra-embryonic membranes in birds and their functions.
4. Classify mammalian placenta on the basis of histology?
5. Describe various functions of placenta.
6. Describe the process of implantation of human embryo .

UNIT-IV ,PART-I , (Each question carry 1 mark)

1. What type of body has a freshly hatched tadpole larva ?
2. Repetitive regeneration can be seen in which animal ?
3. Regeneration of a limb or a tail is an example of ----- .
4. Who discovered regeneration ?
5. Restorative regeneration is common in which animals ?
6. Broken arms are regenerated in which phylum ?
7. Which body parts of Salamander and Axolotl larva regenerates ?
8. Which organ of Mammals can regenerate ?
9. Which is not connected with ageing process ?
10. Which is the branch of science that deals with the ageing process ?
11. By which process, the insects shed their exoskeleton during metamorphosis?
12. What is the name of different larval stages after each moult?

13. Which method of asexual reproduction can be called as a mode of regeneration ?

14. What is the regular process in which the dead and worn-out cells of some organs

are continuously replaced by new cells ?

15. What is the phenomenon of regenerating a limb or a tail called? (Epimorphosis)

16. What can the annelids regenerate? (A few body segments)

17. With advancing age, what happens to collagen protein present in intercellular spaces?

(Impermeable and rigid)

18. What is the branch of medicine that deals with the diseases of elderly? (Geriatrics)

19. What is IVF ? (In Vitro Fertilization)

20. What is ICSI in relation to IVF ? (Intra-cytoplasmic sperm injection)

21. During metamorphosis of tadpole larva, regression of tail and formation of digits

takes place by ----- . (Apoptosis)

22. ----- is the process by which the epidermis, lying immediately beneath the cuticle detaches from the old cuticle. (Apolysis)

23. The insect larva breaks the exoskeleton and emerges out of it, is called ----- . (Eclosion)

24. The adult stage of insect which finally emerges out of pupa is called ----- . (Imago)

25.The repair by cell division in the damaged tissue is called ----- .
(Epimorphosis)

26.During regeneration, modification of an organ to another is known as ----- .
(Morphallaxis)

27.The concept of reduction in cell division potential with advancing age was put forwarded by ----- .

(Hayflick)

28.The approximate chance of giving birth to a baby after IVF for a woman between

age 38 to 40 is (23% to 27%)

PART-II, (Each question carry 1.5 marks) ,(within 2/3 sentences)

1. What is the role of thyroxine in metamorphosis of anuran tadpole?

2. What is physiological regeneration?

3. What is heteromorphosis?

4.What is autotomy?

5.What is blastema?

6.Write the meaning of life span and life expectancy.

7.What is senescence?

8.Define teratogenesis.

9.What is cryopreservation?

PART-III, (Each question carry 2 marks), (within 75 words)

1. Discuss the regressive and progressive changes during amphibian metamorphosis.
2. Explain the mechanism of hormone action in insect metamorphosis.
3. Explain polarity and gradient in regeneration of animals.
4. Explain compensatory regeneration in mammalian liver.
5. What are the factors affecting regeneration?
6. Explain wear and tear theory of ageing.
7. What are telomeres and how do they indicate ageing?
8. What are free radicals and how antioxidants reduce the activity of free radicals?
9. How is glycation theory of ageing different from oxidative damage theory?
10. What are "Six Principles" of Teratology put forwarded by Jim Wilson in 1959?
11. Briefly discuss 5 basic steps of "In Vitro Fertilization".
12. Discuss the characteristics of Stem Cells.
13. Write a brief note on Amniocentesis.

PART-IV ,(Each question carry 6 marks), (within 500 words)

1. Explain different metamorphic changes from tadpole larva to adult frog.
2. What are the different types of metamorphosis in insects ?
3. Discuss different types of regeneration based on cellular mechanism.
4. Discuss the mechanism of regeneration in amphibians?
5. Explain various changes associated with ageing process.

6. Discuss the theories of ageing.
7. What is teratogenesis? Explain the effect of teratogenic agents on embryonic development.
8. Describe the method of in vitro fertilization (IVF).
9. Explain the factors affecting success rate of In Vitro Fertilization.
10. Classify stem cells on the basis of their potency and source.
11. Discuss briefly the technique of stem cell culture of Bone marrow culture.
12. Discuss briefly the technique of stem cell culture of Human umbilical cord culture .
13. Discuss briefly the technique of stem cell culture of) Embryonic stem cell culture .
14. What is amniocentesis? Discuss its procedure and significance.

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CORE-XIV, (PAPER-14),

(EVOLUTIONARY BIOLOGY)

UNIT-I ,PART-I , (Each question carry 1 mark)

1. Name a cell with nucleus.
2. Who proposed the theory of Inheritance of acquired characters ?
3. Who proposed the theory of 'Natural Selection' ?
4. Anybody or traces of body of animal or plants buried and preserved by natural means is known as ----- .
5. Name the type of fossil of organisms which are less than 0.5 mm in size.
6. What is it called when the foot prints or tracks of moving organisms on soft, moist mud hardens into rocks?
7. What is it called when, all organisms have a tendency towards increase in size during evolution ?
8. Chemical evolution is otherwise known as ----- .
9. Formation of primitive life is known as ----- .
10. Nature of primitive life and its evolution is otherwise known as ----- .
11. The synthesis of carbohydrates, polypeptides, fatty acid along with a variety of other complex organic compounds along with water is called as ----- .
12. Cells with distinct nucleus is called ----- .
13. Cells without a well defined nucleus is called as ----- .

PART-II , (Each question carry 1.5 marks) , (within 2/3 sentences)

1. What is "Winter rule" ?
2. What is "Law of Superposition" ?
3. What is "Stratigraphy" ?
4. Which is the eocene horse ?
5. Name the Olegocene horses.
6. What is Igenous rock ?
7. What is heritable variation ?
8. What is meristic variation ?
9. What is Somatic variation ?
10. What is Heteroploidy ?

PART –III ,(Each carry 2 marks) , (Within 75 words)

1. Uranium - Lead Method to calculate the age of the fossils.
2. Potassium - Argon Method of Calculation of the age of fossils.
3. Transitional fossils
4. Continuous variations
5. Blastogenic or Genetic variation
6. Nature of variation
7. Gene mutation or Point mutation
8. Five major mass extinctions.
9. Discuss chemogeny.
10. What is Biogeny ?

- 11.Name the five major extinctions
- 12.What is Neo-Lamarckism ?
- 13.What is Neo-Darwinism ?
- 14.What is role of extinction in evolution ?

PART-IV ,(Each question carry 6 marks), (within 500 words)

- 1.How life originated on earth ?
- 2.Describe Lamarckism in detail. Add a note on Neo-Lamarckism.
- 3.Describe K-T extinction in detail.
- 4.Enumerate Darwinism. Add a note on Neo-Darwinism.
- 5.Describe back ground of extinction.
- 6.Describe RNA world.
- 7.Describe the evolution of horse.
- 8.What is different types of fossils and how the age of fossils are calculated .
- 9.Describe the different types of variation .
- 10.What is mutation ? Describe different types of mutation .

UNIT-II ,PART-I , (Each question carry 1 mark)

- 1.What is called, when it is described as "the number of offspring of an individual or a population is able to produce during a given period of time" ?
- 2.What is it called when the measure of individual deaths in a population and serves as the counterbalance to fecundity' ?
- 3.When "the population of the same species have characteristics that vary from one individual to the next" is called as ----- .

4. -----is the evolutionary strategy that favour the reproductive success of an organism's relatives.
5. Pleiotrophy causes correlated selection called ----- .
6. ----- is the random variation in allele frequencies between generations due to sampling error in finite population.
7. ----- is the change in allele frequencies due to the repeated occurrence of the same mutations.
8. ----- is the movement of alleles from one population to another due to interbreeding between members of two population .
- 9.The number of individuals present in a subjectively desinged geographic range is called as ----- .
10. ----- is the % of individuals born that survive to the reproductive age .

PART-II ,(Each question carry 1.5 marks) , (within 2/3 sentences)

- 1.Population size, 2.Define population
- 3.What is population density, 4.Define "fecundity"
- 5.What is mortality ?, 6.What is genetic drift ?
- 7.What is 'genetic load'?
8. "Inbreeding increases homozygosity". Justify.
- 9.What is 'migration' ?, 10.Kin selection ?
- 11.What is "sexual dimorphism".
- 12.Define genetic drift?

PART –III , (Each question carry 2 marks) , (Within 75 words)

- 1.Age structure
- 2.Mortality
- 3.Evolutionary forces upsetting H.W. equilibrium.
- 4.Mutation
- 5.Differences between evolution and natural selection
- 6.Types of natural selection
- 7.Genetic variation
- 8.Genetic load
- 9.Beneficial mutation
- 10.Sexual selection

PART-IV ,(Each questioncarry 6 marks), (within 500 words)

- 1.Describe H.D. equilibrium with examples .
- 2.Give an account of Hardy –Weinberg law to human population .
- 3.Describe shift in gene frequencies without selection .
- 4.Describe the concept of fitness (natural selection) .
- 5.Write on the derivation of one unit of selection for a dominant allele .
- 6.Describe the role of mutation in evolution .
7. Describe kin selection with examples .

UNIT-III ,PART-I , (Each question carry 1 mark)

- 1.What is the other name of allopatric speciation ?
- 2.A measurable gradient in a single character (or biological trait) of a species across its geographical range is called ----- ,coined by Julian Hurlley.
- 3.The hybrid zones where hybrids are disadvantage, relative to their parental lines are known as " ----- " .
- 4.A ----- is a grouping of humans based on shared physical or social qualities into categories generally viewed as distinct by society.
5. A ----- species is one that exists as discrete populations that are somewhat divergent from one another.
6. A monophyletic group whose range has extended around a geographic barrier to produce a ring shaped distribute is called ----- .
- 7.The population live in the same regions but occupy different habitats is known as ----- .
- 8.Certain hybrids are either highly or partly fertile and they give rise to weak, abnormal or sterile progeny in the 2nd generation known as ----- .
- 9.Some hybrids are sterile due to less developed testes and are called ----- .
- 10.Differences in the breeding season keep the groups separate, making interbreeding improbable and are known as -----.(Seasonal isolation
11. ----- isolation is due to differences in the structure of genital organs.
12. In some species physiological differences leads to ----- isolation.
- 13.When irregular zygote develops and the zygote may die at any stage during development, it is known as ----- .

14. ----- is the property of individuals that prevents interbreeding in population living in same area.
15. In ----- isolation, the potential mates do not meet each other due to differences in habitats, requirements of food, space climate etc.
16. ----- concept treats species as classes of organisms with similar genes .2
(Genetical species)
17. ----- species is one that exists as discrete population, that are divergent from one another . (polytypic)
18. ----- isolation is due to sheer distance . (Spatial)
19. When fertilization takes place, but zygote dies it is called as ----- .
(Zygotic mortality)
20. When a population live in same regions but occupy different habitats it is called ----- isolation. (Oecological)

PART-II ,(Each question carry 1.5 marks) , (within 2/3 sentences)

1. Ethological isolation.
2. Zygote inviability.
3. Cohesion concept.
4. Ring species.
5. Biotic isolation

PART –III , (Each question carry 2 marks) , (Within 75 words)

1. Cladistic species concept.
2. Poly morphic species.
3. Sibling species.
4. Muller's view on reproductive isolation.
5. Parapatric Speciation.

PART-IV ,(Each question carry 6 marks) , (within 500 words)

1. Describe different modes of speciation.
2. Give an account Adaptive radiation with examples.
3. Describe macroevolution with galapogos finches.
4. What is 'Clines'? Describe it with examples.
5. Describe race with examples .

UNIT-IV ,PART-I , (Each question carry 1 mark)

1. Which species of ape man was discovered by Raymond Darf in 1925.
2. The fossil of which species of apeman was discovered from the rocks of middle Miocene and early Pliocene of Africa and Europe ?
3. The fossil of which ape man was discovered by E. Lewis (1930) from the Pliocene rocks of Shivalik Hills of India ?
4. Fossil of which man was discovered by W.C. Pei (1924) near Peking (Modern Beijing of China) ?
5. L.S.B. Leakey and Mary Leakey (1960) discovered the fossil of which man feron Pleistocene rocks of Olduvai Gorge in East Africa ?

- 6.----- (Species of man) appeared about 1.7 million ago in middle Pleistocene.
- 7.The age of language, reading, writing and animal husbandry is known as ----- age.
- 8.The age of tools of stones and bones is known as ----- .
9. The age of agriculture associated with knowledge and use of cloth is known as - ----- .
10. ----- race of human is found in South America.
11. ----- races of man were found in North Africa, Europe, Western Asia, South-east India. (Caucasoids)
12. ----- races of man were found in Australia . (Australoids)
13. ----- race of man was found in South America. (Bush man)
14. ----- races of human were found in Central Pacific islands from New-Zealand to Hawaii. (Polynesian)
15. ----- races of man were found in North-East Asia, Sudan, North and South America . (Mongoloids)

PART-II ,(Each question carry 1.5 marks) , (within 2/3 sentences)

1. Dryopithecus,
- 2.Heidelberg man,
- 3.Peking man,
4. Neander thal man,
5. Homo erectus

PART –III , (Each question carry 2 marks) , (Within 75 words)

- 1.Evolutionary morphological changes of man.
- 2.Characters of Homo habilis., 3.Characters of Cro-Magnon Man.
- 4.Anatomy of Phylogenetic tree.
5. Characters and discovery of Neanderthal man.

PART-IV ,(Each question carry 6 marks), (within 500 words)

- 1.Describe molecular evidences of human Origin.
- 2.What is 'hominid' ? Describe unique hominin characters.
- 3.Describe the phylogeny of primates from Dryopithecus to sapiens.
- 4.Describe the anatomy of a phylogenetic tree.
- 5.How to prepare a phylogenetic tree ?

-----X-----

DSE –III , (FISH AND FISHERIES)

UNIT-I ,PART-I , (Each question carry 1 mark)

1. Sucking Disk of sucker fish is modified ----- fin .
2. Caudal fin in shark is of ----- type.
3. The fin that enables the flight for flying fish is modified ----- fin .
4. The claspers in shark are modified form of ----- fin.
5. Caudal fin in flying fish is of ----- type.
6. The fishing rod like structure in Angler fish is a modified form of -
7. The wing like structure of flying Gurnard is modified ----- fin.
8. Fin type that support mud-skippers on land.
9. Who proposed Gill-arch theory ?
10. ----- body shape reduce water resistance to movement in fishes.
11. ----- locomotion is characteristics of rays and skates.
12. Small fishes use their ----- fin for swimming.
13. Land adapted fish found in mangroove area.
14. Scale type of cartilaginous fish.
15. The fish that exhibit presence of spawning marks on its scales.
16. Scales that do not grow along with the animal.
17. The line of growth on fish scale that determine the age of fish.
18. The most widely adopted and accepted methods in age determination studies of fishes.
19. In ----- swimbladder is modified into lungs.

20. The swim bladder type whose ductus pneumaticus is atrophied is ----- .
21. Swim bladder of lung fish resemble lung of -----.
22. Gas filled organ found in fishes is ----- .
23. In salmonids the maximum amount of gas in swim bladder is ----- .
24. The swim bladder type which retain connection between swim bladder and gut is ----- .
25. The swim bladder develops from ----- .
26. Rudimentary swim bladder during embryonic development is found in ---- .
27. Gas filled organ present in some fishes.
28. The duct that links swim bladder with oesophagus.
29. The sac like structure present between the gut and kidney.
30. The secretory gas gland situated in the swim bladder.
31. Migrating or swimming or drifting against the water current.
32. Migration of fishes from fresh water to sea water and vice-versa.
33. When some individuals migrate while others not, it is called ----- .
34. Fishes that migrate for the sake of feeding is termed as ----- .
35. European Eel exhibits ----- type of migration.
36. Indian shad or Hilsa exhibit ----- type of migration.
37. Atlantic salmon exhibit ----- types of migration.

PART-II ,(Each question carry 1.5 marks) , (within 2/3 sentences)

1. Adipose fin, 2. Biserial fin, 3. Lobe fin, 4. Claspers, 5. Dorsal fin, 6. Ventral fin.
7. Reynold's number, 8. Tripod fish, 9. Locomotion in Shark, 10. Yawing,

11. Pitching, 12. Rolling, 13. Cosmine, 14. Rhomboidal scale, 15. Annuli,
16. Gas composition of swim bladder, 17. Swim bladder as hydrostatic organ,
18. Retemirabile, 19. Gas gland, 20. Amphidromous migration, 21. Shoaling,
22. Feeding migration, 23. Spawning migration, 24. Osmo-regulatory migration,
25. Biological factors influencing fish migration.

PART –III , (Each question carry 2 marks) , (Within 75 words)

1. Unpaired fin, 2. Paired fin, 3. Heterocercal fin, 4. Homocercal fin, 5. Caudal fin,
6. Function of fin , 7. Fin fold theory, 8. Fin spine theory, 9. Gill-arch theory.
10. Dipnoi, 11. Elasmobranchi, 12. Adaptation for locomotion in fishes,
13. Significance of locomotion in fishes, 14. Viscous drag, 15. Pressure drag,
16. Sustained swimming, 17. Cycloid scale, 18. Ctenoid scale, 19. Placoid scale,
20. Modification of scales in fishes, 21.. Role of fish scale in taxonomy
22. Physostomous swimbladder, 23. Physoclistous swimbladder,
24. Function of swim bladder, 25 . Catadromous migration,
26. Anadromous migration, 27. Potamodromous migration,
28. Oceanodromous migration

PART-IV ,(Each question carry 6 marks), (within 500 words)

1. Give an account of different types of paired fin in fishes and their modifications.
2. Give an account of different types of unpaired fin in fishes and their modifications.
3. Write an essay on the origin and evolution of the fish fins.
4. Give an account of different types of caudal fin with their modifications.
5. Give an account of Bergs classification of Pisces upto class mentioning the characters with examples .

6. Describe the different types of locomotion found in fishes.
7. Discuss the role of fins in fish locomotion.
8. Write an essay on fish hydrodynamics
9. Give an account of larval fish to survive an encounter in relation to hydrodynamics.
10. Give an account of different types of scales in fishes.
11. Discuss about the use of scale in determination of age of fish.
12. Give an account of structure and function of swim bladder in fishes.
13. What is swim bladder? Discuss the various modifications of swim bladder.
14. Define air bladder. Discuss its location and histomorphology.
15. Give an account of the relationship between swim bladder and lung.
16. Give a comparative account of the air bladder in different group of fishes.
17. Describe the different types of fish migration and its advantages .
18. Describe the factors that cause migration .
19. Give an account of the European Eel migration.
20. Give an account of Hilsa migration .

UNIT-II ,PART-I , (Each question carry 1 mark)

1. Hirakud dam is located in river ----- .
2. The water temperature under cold water fisheries is around ----- .
3. The estuary found in Odisha is ----- estuary.
4. The estuary found in West Bengal is ----- estuary.
5. Collection of eggs from river for culture fishery is made during ----month .

6. Around ----- % of the global Tuna catches are from Indian ocean.
 7. The inshore coastal fisheries is up to ----- nautical miles.
 8. The coastline stretches along ----- number of maritime states.
 9. Mumbai duck fishery is represented by a single species called ----- .
 10. The most prized fish of coastal fishery for its taste is ----- .
 11. Seine used to catch pelagic and migratory fishes is ----- .
 12. Umbrella shaped net sprayed from the edge of water is called ----- .
 13. The gear used to catch individual fish is called _____.
 14. ----- is used to encircle a detected fish school.
 15. The type of overfishing that results in the alteration of ecological balance is called----- .
 16. The device attached to trawls to allow sea turtle to escape is called ----- .
 17. Catching more fish than they are able to reproduce leads to ----- .
- Fishing licence for EEZ is under ----- government.
18. The collection and trade of native ornamental fish species from natural water is regulated by ----- .
 19. Increase in light in water bodies increases its ----- .
 20. Fish yield is maximum when ----- of water bodies is highest .
 21. In a pond a depth of ----- meter is considered congenial from biological productivity point of view .
 22. Rapid movement of water during monsoon leads to ----- .
 23. Primary productivity is a photochemical process energized by ----- .
 24. Suspended dirt and other particles in water cause ----- .

25. In turbid water fish mortality is due to ----- .

26. Mass mortality in marine fishes occur when salinity increases to about ----- ppt .

27. The largest and commercially important marine fish.

28. What is full form of EEZ? .(Exclusive Economic Zone)

29. Instrument used for catching fish.

PART-II ,(Each question carry 1.5 marks) , (within 2/3 sentences)

1. Capture fishery, 2. Culture fishery, 3. Exotic fishery, 4. Open estuary,
5. Mumbai-Duck, 6. Flat fishes, 7. Anchovies, 8. Tuna Fish.,9. Purse seines,
10. Trap nets, 11. Gill net, 12. Scoop net, 13. Bag net, 14. Line fishing,
15. Recruit overfishing, 16. Growth overfishing, 17. Harvest control rule,
18. Fishing impact, 19. Mission of NFP,20. Vision of NFP,21. MCS,
22. Mariculture Technology Parks

PART –III , (Each question carry 2 marks) , (Within 75 words)

1. Ganga River system
2. Indus River system
3. Cold water fisheries
4. Fisheries in Chilka lake
5. Fishes of the Ganga River System
6. Mahanadi Estuary
7. Hoogly-Matlah Estuary
8. Characteristics of Estuary

9. Reservoir fishery
10. EEZ, 11. Indian Exclusive Economic Zone
12. Coastal Fishery, 13. Mackerels
14. Dug out canoe
15. Thermocol raft
16. Seines
17. Hooks and lines
18. Cast net
19. Overfishing
20. Fishery depletion
21. Ecosystem overfishing
22. Causes of Depletion
23. National Fishery Policy
24. Role of State Fisheries Department
25. National Marine Fisheries Authority
26. Regulation of fishing.
27. Regulation of fresh water aquaculture
28. Regulation of brackish water aquaculture
29. Objectives of NFP
9. Impact of climate change on fish productivity.
10. Impact of climate change on ocean ecosystem.

PART-IV ,(Each question carry 6 marks), (within 500 words)

1. Give an account of the estuarine fisheries of India.
2. Give an account of riverine fisheries of India.
3. What is culture fishery? Discuss how it is practiced in India.
4. Discuss the cold water fisheries in India.
5. Give an account of the five major river systems in India. Mention the fisheries in these river System.
6. Give an account of fisheries of Indus river system.
7. Give an account of fisheries of East-Coast river system.
8. Give an account of the Estuaries of East-Coast and contribution to fisheries.
9. What is marine fishery? Discuss marine fishery practice in India.
10. Give an account of Deep sea fishery in India.
11. Give an account of the fishes captured from the coastal area of India.
12. Describe the coastal fisheries of India.
13. Give an account of different fishing crafts operated in India.
14. Give an account of different inland fishing gears operated in Indian fishery.
15. Write an essay on fishing methods in India.
16. Give an account of marine fishing crafts and gears used in India.
17. Give an account of Inland fishing crafts and gears used in India.
18. Enumerate the causes of depletion of fishery resource.
19. What is overfishing? Give an account of effects of overfishing.
20. Discuss the different approach to control overfishing.

21. Discuss the cause of depletion of fish resources and give an account on the control measure to overcome them .
22. What is National Fishery Policy ? Enumerate the objective of NFP.
23. Give an account of Fishery Regulation in Marine Sector.
24. State the objective of Regulation of Inland Fisheries.
25. Give an account of the administrative architecture in fishery.
26. Give an account of the basic law and regulation of fishing.
27. Discuss the post harvest management regulation i
28. Give an account of the environmental factors that influence seasonal variation in fish.
29. Discuss the physical factors that effect fish productivity .

UNIT-III ,PART-I , (Each question carry 1 mark)

1. One of the major cause of depletion of fish stock is _____ .
2. The integration of aquaculture and hydroponics is called _____ .
3. _____ is currently one of the fastest growing food production systems in the world.
4. _____ refers specifically to aquaculture practiced in sea-water.
5. Organic aquaculture is based on the use of _____ .
6. In extensive fish culture the quantity of fish production per unit area is _____ .
7. In intensive fish culture the quantity of fish produced per unit area is _____ .
8. _____ involves commercial breeding of fish for food in artificial enclosures.
9. _____ refers to fish farming conducted in medium to large sized water bodies.

10. In _____ fish culture farmer does not use any feeding practices nor any supporting systems.
11. _____ fish culture involves small ponds with high fish stocking density.
12. The biggest problem in intensive aquaculture is to deal with _____ .
13. In _____ fish farming the fishes are fed on artificial food in addition to the natural food.
14. In _____ culture system natural phytoplankton and zooplankton are used by fish.
15. ----- fish farming requires moderate level of inputs with high fish production by use of fertilizer and supplementary feeding.
16. In __-culture system the natural food forms the major food source.
17. In _____ practice all available niches are utilized.
18. Fish polyculture _____ pond productivity.
19. Generally _____ number of species combinations are accepted in polyculture.
_____ is a column feeder.
20. *Cirrhinus mrigala* is a _____ feeder.
21. Fishes with _____ food chain give highest production .
22. The natural way for pond manuring is _____ .
23. Recommended stocking density of carp broodfish is _____ Kg/Ha.
24. The protein content of supplement feed for broodfish is _____ .
25. For induced breeding the turbidity of water should be between _____ .
26. The endocrine gland extracts used in induced breeding is _____ .
27. Female breeders are identified by their _____ abdomen.

28. Plants are planted in the aquarium with the help of _____ .
29. The temperature in an aquarium is maintained by installing _____ .
30. Installation of _____ maintains proper oxygen content in aquarium.
31. Removal of waste and filtration of water is maintained by _____ .
32. The scientific name brine shrimp is _____ .
33. What is IMTA? (Integrated Multitrophic Aquaculture)
34. Give an example of a fish cultured in brackishwater.

PART-II ,(Each question carry 1.5 marks) , (within 2/3 sentences)

- 1.Sustainable sea food, 2. Bio-flock technology
3. Ecological aquaculture, 4.Organic aquaculture
- 5.Negative impact of extensive fish culture
6. Bottom feeder, 7. Plankton feeder, 8. Algal blooming
9. Bottom dwellers, 10. Pond sanitation
11. Pond selection for composite fish culture
12. Pre-stocking operation, 13. Fish enemies
14. Fish harvesting, 15. Purity of broodfish
16. Sex determination in broodfish
17. Stocking density, 18. Hypophysation
19. Hatching Hapa , 20. Maceration
- 21.Heteroplastic injection, 22. Breeding Hapa
- 23.Homoplastic gland, 24. Homoplastic injection
- 25.Aquatic weeds, 26. Weed fishes, 27. Fish feeds

- 28. Supplementary fish feed, 29. Spawning
- 30. Ornamental plants, 31. Aerators
- 32. Feeding rings, 33. Planting stick
- 34. Thermostat, 35. Metahaline
- 36. DO as a physical factor
- 37. Feeding rate, Nutritional composition of fish feed .

PART –III , (Each question carry 2 marks) , (Within 75 words)

- 1. Challenge for sustainable aquaculture
- 2. Aquaponics
- 3. Need for sustainable aquaculture
- 4. Recirculatory aquaculture system
- 5. Aquaculture is multifaceted – Discuss
- 6. Principles of ecological aquaculture
- 7. Extensive fish culture
- 8. Piscivorous fish
- 9. Principle of polyculture
- 10. Objectives of polyculture
- 11. Advantages of polyculture
- 12. Factors affecting species selection and stocking
- 13. Liming, 14. Fertilization
- 15. Supplementary feeding
- 16. Stocking densities

17. Composite fish culture
18. Importance of brood stock management
19. Pond preparation for broodfish
20. Broodfish ponds
21. Extraction of pituitary gland
22. Advantages of induced breeding
23. Spawning
24. Larval stages of fin fishes
25. Pond fertilization
26. Incubation of eggs
27. Fry Stocking
28. Eradication
29. Aquarium fishes
30. Aquarium food
31. Setting up of aquarium,
32. Effect of overcrowding in aquarium
33. Life factor, 34. Biotic factor,
35. Stocking density
36. Feeding during aquaculture.

PART-IV ,(Each question carry 6 marks), (within 500 words)

1. What is sustainability ? Discuss the need of sustainable aquaculture.
2. Give an account of the different means to adopt sustainable aquaculture practice.
3. Discuss the different approaches for making aquaculture sustainable.
4. What is sustainable aquaculture ? Give an account of the benefits of sustainable aquaculture.
5. Discuss the challenges for sustainable aquaculture.
6. What is sustainable aquaculture ? Discuss the benefits of sustainable aquaculture .
7. What is extensive fish culture? Discuss its feature and draw-backs .
8. What is intensive fish culture? Discuss its feature and draw-backs .
9. What is polyculture? Give an account of combination practice in Indian polyculture system.
10. What is the principle and objective of polyculture in fishery ? Give an account of the draw-backs in polyculture system.
11. How does polyculture work? Give an account of the fishes used in polyculture.
12. What is composite fish culture? Give an account of the pond preparation for composite fish culture.
13. Write an essay on composite fish culture. Mention the advantage of composite fish culture practice.
14. Explain why composite fish culture is preferred ? Give an account of the stocking densities and stocking ratio in composite fish culture in India.
15. What is brood stock management ? Discuss the need for brood stock management.

16. Discuss the steps for an effective brood stock management.
17. Write an essay on feeding management of broodfish. What is induced breeding? Discuss the various steps involved for induced breeding of fish.
18. Describe the steps followed in the preparation and injection of pituitary extract for induced breeding.
19. What is a fish hatchery? Give an account of different types of fin fish hatchery.
20. Discuss the components of fin fish hatchery.
21. Describe the steps involved in pre-stocking pond management.
22. Give an account of post-stocking pond management.
23. Describe the production steps involved in fin fish hatchery .
24. What is aquarium ? Discuss the steps towards preparation of a home aquarium.
25. Give an account of the setting and maintenance of home aquarium.
26. Enumerate the precautionary measures to be taken for proper maintenance of aquarium.
27. What is aquaculture ? Enumerate the factors that affect aquaculture.
28. Mention the salient features of aquaculture.
29. Discuss the physical factors that affect aquaculture.
30. Give an account of the chemical and biotic factors that affect aquaculture .

UNIT-IV ,PART-I , (Each question carry 1 mark)

1. Fin and tail rot disease in fish is a _____ .
2. Vibriosis disease in salmon is caused by _____ .
3. The causative agent of dropsy disease is _____ .

4. Bacterial gill disease is caused by _____ .
5. Columnaris disease in fish is caused by _____ .
6. Dropsy disease is caused by _____ .
7. Tuberculosis disease in fish is caused by _____ .
8. Francisellosis disease in fish is caused by _____ .
9. Red pest disease is caused by _____ .
10. "White Spot Disease" is caused by _____ .
11. Trichodiniasis in fishes is caused by _____ .
12. Chilodonelliasis in fishes is caused by _____ .
13. Coastiasis in fishes is caused by _____ .
14. "Renal Dropsy of Gold fish" in fish caused by _____ .
15. Acanthocephalance are commonly referred as _____ worms .
16. _____ is commonly called as fish lice.
17. Caligus sp. is also known as _____ .
18. Lernaea sp. is also known as _____ .
19. The most widely used disinfectant in fishery management is _____ .
20. Fish spoilage is mainly due to _____ .
21. Fish spoilage can be minimized by _____ the temperature.
22. Water accounts for _____ of the fish weight.
23. A method of food preservation by destruction of organism with heat application is called _____ .
24. Use of an appropriate container for packing fish is called _____ .

25. The vitamins present in fish liver oil are _____ .
26. Gelatin lacks the amino acid _____ .
27. The backs of glued stamps and labels contain _____ .
28. One of the most important byproduct of fish is _____ .
29. Fish meal is used as feed supplement for _____ .
30. Fish silage is used as _____ feed.
31. Shrimp shell and head waste are the largest source of _____ .
32. The gene that offers protection from freezing in transgenic fish is _____ .
33. Microinjection is a mechanism for insertion of _____ .
34. The main purpose to produce transgenic fish is decrease in _____ period .
35. The larval stage of zebrafish is _____ .
36. Complete genome sequence of zebrafish was published in _____ .
37. Zebra fish owes its name due to their striped bodies that resemble _____ animal .
38. The number of protein coding genes in Zebra fish is _____ .
39. Zebra fish embryos are _____ .
40. _____ stage of Zebra fish are used to assess the toxicity in mammals.

PART-II ,(Each question carry 1.5 marks) , (within 2/3 sentences)

1. Viral haemorrhagic septicaemia, 2. Infective haemopoietic necrosis, 3. Anisikiasis,
4. Anchor worm, 5. Fish leeches, 6. Furunculosis disease, 7. Fin and tail rot disease,
10. Chemotherapy, 11. Brine freezing, 12. Cryogenic freezing, 13. Wet curing,
14. Dry curing, 15. Chilled Sea water, 16. Pre-cooking, 17. Blanching,
18. Fish flour, 19. Fish silage, 20. Fish manure, 21. Fish albumin, 22. Fish gelatin,

23. Anti-freeze protein, 24. Transgene, 25. Auto-transgenesis, 26. Disease resistant gene, 27. GM Fish, 28. Drug toxicity and Zebrafish, 29. Zebrafish in aquaculture, 30. Similarities of Zebra fish with human, 31. Cardiotoxicity.

PART –III , (Each question carry 2 marks) , (Within 75 words)

1. Dropsy disease, 2. Fish tuberculosis, 3. Ichthyophthiriosis, 4. Costiasis, 5. Monogenean parasite of fish 6. Digenean parasite of fish, 7. Fish lice, 8. Copepod parasite of fish, 9. Ciliate parasite of fish, 10. Flagellate parasites of fish, 11. Cestode parasite of fish, 12. Nematode parasite of fish, 13. Sea lice. 14. Chilled storage, 15. Sun drying of fish, 16. Smoking, 17. Freezing, 18. Canning, 19. Curing, 20. Gelatin, 21. Fish glue, 22. Ising glass, 23. Use of fish skin, 24. Uses of fish liver oil, 25. Uses of fish body oil, 26. Use of fish meal, 27. Shrimp extract, 28. Fish guano, 29. Micro-injection, 30. Electroporation, 31. Features of zebrafish, 32. Zebrafish in skin cancer, 33. Reproduction in Zebra fish, 34. Tumorigenesis,

PART-IV ,(Each question carry 6 marks) , (within 500 words)

1. Give an account of the bacterial disease in fish. Add a note on their diagnosis and treatment.
2. Discuss the cause, diagnosis and treatment of viral disease in fish.
3. Give an account of protozoan diseases in fish and mention their diagnosis and treatment.
4. Discuss the important disease management measure to prevent occurrence of fish disease.
5. Give an account of the parasitic diseases in fish.
6. Give an account of the fish disease caused by Helminth parasite.
7. Give an account of crustacean disease of fish.
8. Give an account of the processing of harvested fish.
9. What is fish processing? Discuss the importance of fish processing.

10. What do you mean by fish spoilage? Discuss the different factors responsible for fish spoilage.
11. What is fish curing ? Describe the different processes of fish curing practice in India.
12. Discuss the freezing process followed in fish preservation.
13. Give an account of different fish by-products.
14. What are fishery by-products ? Discuss how these products can be utilized commercially .
15. What is a transgenic fish? Describe the steps followed for the preparation of transgenic fish.
16. What is a transgenic fish? Discuss the purpose for creation of transgenic fish.
17. What is transgenesis? Discuss the potential application of transgenesis.
18. What is a transgenic fish ? Give an account of the objection and risks with transgenic fish.
19. What is a model organism ? Discuss the features of a model organism.
21. Give an account of the salient features of zebrafish as a model organism.
22. Justify zebrafish as a model organism for biological research.
23. Give an account of different field of application of zebrafish model.
24. Justify 'Zebra fish' as a cancer model system.
25. Zebra fish is a model organism for human disease' Comment.

DSE –IV , (ECONOMIC ZOOLOGY)

UNIT-I ,PART-I , (Each question carry 1 mark)

- 1.Honey bee belongs to which order?
- 2.Which honey bee produced highest amount of honey?
3. What is the composition of honey?
4. What is apiculture?
5. What is rearing equipment?
6. What is artificial diet?
7. What is bee wax?
8. What is bee venom?
9. What is brood chamber?
- 10.What is newton's hive?
11. What is storage chamber?
- 12 What is parthenogenesis?
- 13.What is apiary?
14. How many chromosomes present in Drone?
15. State different types of honey bee.

PART-II, (Each question carry 1.5 mark)

- 1.What is waggle dance?
2. What is royal jelly?
3. Define nuptial flight of honey bee?
4. Define swarming in honey bee?

5. Define absconding in honey bee.
6. Give medical value of honey bee.
7. What is bee veil?
8. Define social organization of honey bee.
9. Define granulation of honey.
10. Define fermentation of honey.

PART-III, (Each question carry 2 mark)

1. Food of honey bee.
2. Brood chamber of honey bee.
3. Handling of bee
4. Royal jelly
5. Chemical analysis of honey
6. Newton's hive
7. Bee wax
8. American foulbrood
9. European foulbrood
10. Honey extraction
11. Beneficial product of honey bee

PART-IV, (Each question carry 6 mark)

1. Describe life cycle of honey bee.
2. Describe different disease of honey bees and their management.
3. How artificial diet of honey bee are prepared?

4. Describe the methods of bee keeping.
5. Give detailed account of the product of bee keeping industry.
6. Give an account of social organization and life history of honey bee.

UNIT-II ,PART-I , (Each question carry 1 mark)

- 1.What is sericulture?
2. What is imago?
3. What is black boxing?
- 4.The common name of *Attacus ricinii* is
5. Which type of silk worm mostly produced in India?
6. Central silk Board was established in.....
7. Head quarter of central silk Board is
- 8.Define blue egg stage.
9. Define Brushing.
10. Mention Brushing equipments.
11. Define Chawaki rearing.
12. What is the popular method of Brushing?

PART-II , (Each question carry 1.5 mark)

1. What is cocoon?
2. State two disease of silk worm.
3. What is bed clearing?
4. What is moutage?
5. What is Chawki rearing?

6. State use of silk, 7. State different type of silk worm.
8. What is glossy leaf?, 9. Define moulting.
10. What is use of paraffin paper?
11. Name methods of chawki rearing.
12. How many instars are there in larval stage?
13. Mention leaf preservation equipment?
14. Mention popular method of leaf selection.
15. Which mulberry leaves are suitable for chawki works?

PART-III , (Each question carry 2 mark)

- 1.Types of silk, 2. Types of silk worms, 3. Disinfectants
4. Rearing appliances, 5. Chawki rearing, 6. Bed cleaning
7. Mountages, 8. Harvesting of cocoon, 9. Black boxing
10. Pebrine, 11.Flacherie, 12. Grasserie, 13. Muscardine
14. Aspergillosis, 15. Silk worm pests, 16. Silk reeling techniques
17. Uzi fly, 18. Management of silk worm disease

PART-IV , (Each question carry 6 mark)

- 1.Describe detail process of brushing of loose eggs.
2. Discuss importance of chawki rearing.
3. Describe different methods of bed cleaning.
4. Describe methods of chawki rearing
5. How do you select mulberry leaves for chawki worms?
6. Discuss about the importance of quality leaf in chawki rearing.

UNIT-III ,PART-I , (Each question carry 1 mark)

- 1.What is induced breeding?
2. What is rearing pond?
3. What is hatchery?
4. What is nursery pond?
5. What is aquarium?
6. What is aquaculture?
7. What is brood stock?
8. What is breeding hapa?
9. What is spawning?
- 10.What is swimbladder?

PART-II , (Each question carry 1.5 mark)

1. Define by-product of fishery.
2. What is body oil of fish?
3. What is fish maeal?
4. What is induced breeding?
5. What is brood?
- 6.What is rearing pond?
7. What is stocking pond?
- 8.What is tail rot disease?
9. What is vibrosis?
10. what is tuberculosis?

PART-III , (Each question carry 2 mark)

1. Economic importance of fish
2. Fish harvesting
3. Economic importance of fish
4. Brood stock management
5. Preparation and maintenance of fish aquarium
6. Role of water quality in aquaculture.
7. Bacterial disease of fish
8. Viral disease of fishes
9. Protozoan disease of fishes
10. Parasitic disease of fishes
11. Preservation and processing of harvested fish
12. Fishery by-product, 13. Prawn farming
14. pearl culture

PART-IV , (Each question carry 6 mark)

1. Describe the processes of induced breeding in fishes.
2. Describe the management of nursery, rearing and stocking ponds.
3. Describe the preparation and maintenance of fish aquarium.
4. What is artificial diet? Describe the preparation of compound diets of fish.
5. Describe different types of fish diseases and their eradication.
6. Describe preservation of harvested fish.
7. Describe the prawn culture.

UNIT-IV ,PART-I , (Each question carry 1 mark)

- 1.What is diary farming?
2. What is poultry?
3. What is indigenous breeding?
4. What is exotic breed?
5. What is rearing?
6. What is the causative agent of Foot and mouth disease?
7. What is the causative agent of anthrax?
8. What is layer?
9. The annual production of wool is highest in.....
10. Joria type of wool is.....

PART-II , (Each question carry 1.5 mark)

- 1.What is Brolier?
2. What is exotic breeding? Give an example.
3. What is layers?
4. What is rinder pest?
- 5.What is Mastitis?
6. What is footrot disease?
7. What are the symptoms of Anthrax disease?
- 8.Write the treatment method of Rinder pest.
9. What are the symptoms of Mastitis?
10. What is milk fever?

PART-III , (Each question carry 2 mark)

- 1.Exotic breed of cow
2. Importance of diary farming
3. Poultry farm management
4. Commercial importance of poultry farming
5. Diary farm management
6. Business plan for poultry farm
7. Business plan for diary farm
- 8.Vrietal improvement techniques
9. Broiler poultry farming
10. Indigenous breeds of poultry.
11. Exotic breed of poultry
12. Bacterial diseases of poultry, 13. Viral diseases of poultry,
14. Bacterial diseases of cow, 15. Viral disease of cow

PART-IV , (Each question carry 6 mark)

- 1.Describe the rearing of cow.
2. Give an account of diseases and their management in cattle.
- 3.Mention the different type of diseases and their management in poutry.
4. Describe business plan for poultry.
5. Give one business plan for poultry
6. Submit a report on visit to a diary farm

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