



CAMBRIAN PUBLIC SCHOOL

KANKE ROAD, RANCHI

REVISION ASSIGNMENT

Subject: Biology (044)

Class: XII

Section A – 1 Mark Questions

- 1) Enumerate the molecular rationale underlying the selective degeneration of synergid cells immediately following successful double fertilization in angiosperms.
- 2) Differentiate, with precise cytological justification, the physiological significance of capacitation from the acrosomal reaction during mammalian fertilization.
- 3) Explain why lactational amenorrhoea is regarded as an effective but temporally restricted natural contraceptive strategy.
- 4) State the cytogenetic consequence of nondisjunction occurring during meiosis-I with reference to chromosomal constitution of gametes.
- 5) Justify the indispensability of histone proteins in the hierarchical organization of eukaryotic chromatin.
- 6) Define codon degeneracy and explain its evolutionary significance in minimizing mutational consequences.
- 7) Mention the biochemical function of DNA ligase during recombinant DNA replication and repair.
- 8) Explain why Hardy–Weinberg equilibrium is considered a theoretical benchmark rather than a perpetual biological reality.
- 9) State the evolutionary implication of homologous structures despite marked differences in their external morphology.
- 10) Identify the molecular mechanism responsible for the generation of genetic variability during meiotic prophase-I.

Section B – 2 Mark Questions

- 1) Elucidate the sequential developmental transformations occurring within the embryo sac immediately after triple fusion and syngamy, emphasizing the origin of nutritive and embryonic tissues.
- 2) Compare spermatogenesis and oogenesis with reference to cytological events, meiotic divisions, and quantitative production of functional gametes.
- 3) Explain the endocrine regulation governing the ovarian cycle, highlighting the coordinated interaction among FSH, LH, estrogen, and progesterone.
- 4) Differentiate between chromosomal mutation and gene mutation by citing one biologically significant example of each.
- 5) Explain the molecular basis through which DNA replication ensures remarkable fidelity despite continuous cellular proliferation.
- 6) Describe the structural organization of a transcriptional unit and explain the functional significance of promoter, structural gene, and terminator.
- 7) Explain the operon concept by illustrating how environmental lactose concentration regulates transcriptional activity in prokaryotes.
- 8) Distinguish between homologous evolution and analogous evolution by correlating structural organization with evolutionary origin.

- 9) Explain the significance of adaptive radiation using one appropriate vertebrate example.
- 10) Describe how gene flow and genetic drift independently alter allele frequencies within a biological population.

Section C – 3 Mark Questions

- 1) Describe the complete mechanism of double fertilization in angiosperms and critically evaluate its evolutionary significance in ensuring reproductive efficiency.
- 2) Explain the hormonal regulation of the menstrual cycle, correlating ovarian events with cyclic structural modifications of the endometrium.
- 3) Critically discuss the scientific principles, methodology, advantages, limitations, and ethical concerns associated with Assisted Reproductive Technologies (ART).
- 4) Explain Mendel's Law of Independent Assortment with an appropriate dihybrid cross and justify why linkage constitutes an exception to this law.
- 5) Describe the experimental evidence provided by Hershey and Chase in establishing DNA as the universal genetic material.
- 6) Explain the semi-conservative mechanism of DNA replication with reference to enzyme functions and the experimental validation by Meselson and Stahl.
- 7) Discuss transcription and translation in prokaryotes, emphasizing enzyme specificity, codon recognition, initiation, elongation, and termination.
- 8) Explain Darwin's theory of Natural Selection and critically discuss the principal evidences supporting modern evolutionary synthesis.
- 9) Describe the origin of genetic variation through mutation, recombination, chromosomal rearrangement, and sexual reproduction, highlighting their evolutionary significance.
- 10) Explain Hardy-Weinberg equilibrium and discuss, with suitable examples, the five evolutionary forces responsible for disturbing genetic equilibrium.

Section D – Diagrammatic Questions

- 1) Draw a longitudinal section of a mature anatropous ovule and label all essential reproductive structures.
- 2) Draw a Polygonum type mature embryo sac showing all constituent cells with proper labeling.
- 3) Draw and label the human female reproductive system, indicating the principal sites of fertilization and implantation.
- 4) Draw the human sperm and label all ultrastructural components associated with fertilization.
- 5) Draw a human Graafian follicle and label every significant anatomical region.
- 6) Draw a replication fork showing leading strand, lagging strand, Okazaki fragments, DNA polymerase, helicase, ligase, RNA primer, and direction of synthesis.
- 7) Draw the double-helical structure of DNA and label sugar-phosphate backbone, complementary bases, hydrogen bonds, antiparallel strands, major groove, and minor groove.
- 8) Draw the Lac Operon under induced conditions and label regulator gene, promoter, operator, structural genes, repressor, RNA polymerase, and mRNA.
- 9) Draw homologous organs (forelimbs of human, whale, bat, and horse) and indicate the corresponding homologous bones.
- 10) Draw the evolutionary lineage of horse (Equus) from ancestral forms to the modern horse, indicating major morphological modifications during evolution.
