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Roll No. | | | | | | | | | | | |

S. No. of Question Paper : **1564-D**

Unique Paper Code : **107479** **C**

Name of the Paper : **Immunology, Molecular Biology and Development (Paper 15)**

Name of the Course : **B.Sc. (Prog.) Agro. Chem. and Pest Mgt.**

Semester : **IV**

Duration : **3 Hours** Maximum Marks : **75**

(Write your Roll No. on the top immediately on receipt of this question paper.)

1. Attempt any *ten* of the following. Write True *or* False. If False, rewrite the statement correctly. 1½×10=15

   (*i*) The enzyme responsible for DNA synthesis during replication and repair is DNA topoisomerase.

   (*ii*) A 5' to 3' synthesis of DNA means that growth occurs by addition of dNTPs to the exposed 3' OH group and release of inorganic pyrophosphate.

   (*iii*) DNA polymerase I possesses a 3' to 5' proofreading exonuclease activity in addition to its polymerizing activity.

   (*iv*) One strand of a section of DNA reads 5' GTAGCCTACCCATAGG3'. The sequence of the mRNA transcribed from its complementary strand as a template will be 5' CAUCGGAUGGGUACC3'.

P.T.O.

(*v*) Bacterial cells use one type of RNA polymerase to transcribe all classes of RNA, while eukaryotic cells use three types of RNA polymerase.

(*vi*) Because AUG serves as the start codon for protein synthesis, methionine is found only at the N-termini of proteins.

(*vii*) In a comparison of DNAs from human and mice, conserved sequences represent functionally important exons and regulatory sequences, while non-conserved sequences represent non-coding DNA.

(*viii*) Genetic markers on different chromosomes are always genetically unliked, while markers on the same chromosome are always linked.

(*ix*) Triglycerides which are composed of three molecules of fatty acids held in ester linkage to glycerol have no charge and are fully soluble in water, coalescing into droplets in the cytosol.

(*x*) To ensure a continuous supply of energy from oxidative metabolism, animal cells store fuel in the form of fatty acids and glucose.

(*xi*) The most important contribution of the citric acid cycle to metabolism is the extraction of high energy electrons during oxidation of two acetyl carbon atoms to carbon dioxide.

(*xii*) The proteins that constitute the respiratory chain all use iron atoms as electron carriers.

(*xiii*) The toxicity of the poisons cyanide and azide is due to their ability to bind tightly to cytochrome oxidase complex and thereby block all electron transport.

(*xiv*) The two electron-energizing steps catalysed by Photosystem I and II are linked together to form the W system of Photosynthesis.

(*xv*) It is believed that mitochondria arose by endocytosis of a bacterium that had lost the ability to survive on light energy alone and came to rely entirely on respiration.

(*xvi*) Cytotoxic T-cells release gamma interferons of fight viral infection.

(*xvii*) Main phagocytic cells that kill microorganisms are polymorphonuclear nuetrophils and macrophages.

(*xviii*) Pathogen associated molecular patterns (PAMPs) on the surfaces of microbes are recognized by pattern recognition receptors on antibodies.

(*xix*) Centrolecithal eggs (yolk in center of egg) are commonly found in fish, reptiles and birds.

(*xx*) In holometabolous insects like *D. melanogaster*, undifferentiated nests of cells called imaginal discs develop into larvae from eggs.

2. Draw a labeled diagram/formula/scheme for any *five* : 5×2=10

(*i*) Immunoglobulin

(*ii*) Ribosome active site

(*iii*) Vaccination strategies

(*iv*) A plant and animal cell at Telophase

(*v*) Protein translation in a mitochondrion

(*vi*) A peptide bond between any basic amino acid and an acidic amino acid

(*vii*) t-RNA cloverleaf structure

(*viii*) Cleavage in a holoblastic mesolecithal egg.

3. Write short notes on any *five* : 5×4=20

(*i*) HOX Genes

(*ii*) Wobble hypothesis

(*iii*) Semi-conserved mode of DNA replication

(*iv*) Plantibodies

(*v*) Gluconeogenesis

(*vi*) Shine-Dalgarno sequence

(*vii*) Humoral immunity

(*viii*) Morula stage in Amphibians

(*ix*) Spliceosome

(*x*) ELISA

(*xi*) Peptide mapping

(*xii*) CD4+ cells

(*xiii*) Michaelis-Menten equation

(*xiv*) Competitive inhibition

(*xv*) P-Caldherin

(*xvi*) SDS-PAGE.

4. Answer any *five* of the following : 5×6=30

(*i*) Distinguish between Class I and Class II MHC.

(*ii*) Draw a labeled diagram to compare fate maps of frog and mouse at the early gastrula stage.

(*iii*) What is the central dogma of molecular biology ? What is a major exception to this rule ? Name the scientist who discovered this exception and was awarded the Nobel Prize in 1975 for his discovery ?

(*iv*) What is an epitope ? Why are some epitopes more immunogenic than others ? How are epitopes mapped ? How can identification of epitopes be used to design effective vaccines ?

(*v*) Briefly comment on the roles of pH and gravity in the development of a chick embryo.

(*vi*) What is amniotic fluid ? How does it arise from a blastocyst ? Why is it used for genetic analyses of a foetus ?

(*vii*) What are the differences between eukaryotic promoter and enhancer sequences ?

(*viii*) What is polyspermy ? How is it prevented the following fertilization of egg and sperm ?

(*ix*) Briefly describe various types of cell movement during gastrulation in mammals.

(*x*) What is meant by "commitment" of the cell to a certain fate ? How is autonomous specification shown by most invertebrates different from conditional specification shown by vertebrates ?

(*xi*) What is codon bias ? How is codon bias of bacterial genes encoding Bt endotoxin optimized to make transgenic crops ?

(*xii*) Draw a diagram of a typical eukaryotic gene containing enhancer, promoter, 5'UTR, 3'UTR, intron and exons.