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**Subject: Biology**

**Topic: Molecular Basis of Inheritance**

**M.M. 360 COMPETITIVE TEST**  **Time: 60 Min.**

1. The process of translation of mRNA to proteins begins as soon as:

a) the larger subunit of ribosome encounters m RNA

b) both the subunits joins together to bind with mRNA

c) the tRNA activated and he larger subunit of ribosome encounters mRNA

d) the small subunit of ribosome encounters mRNA

1. Read the following statements and choose the correct set :
2. Euchromatin is loosely packed chromatin
3. Heterochromatin is transcriptionally active
4. Histones octamer is wrapped by negatively charged DNA in nucleosome
5. Histones are rich in lysine and arginine.
6. A typical nucleosome contains 400 base pairs of DNA helix.

|  |  |  |  |
| --- | --- | --- | --- |
| a) I , III & IV | b) II , V | c) I , III , V | d) II , IV , v |

1. If the length of DNA molecule is 1.1 m what will be the approx. number of base pairs?

|  |  |  |  |
| --- | --- | --- | --- |
| a) 6.6 x 109 bp | b) 3.3 x 106 bp | c) 6.6 x 106 bp | d) 3.3 x 109 bp |

1. Ten E.coli cells with 15N ds DNA incubated in medium containing 14N nucleotide. After 60 minutes, how many E.coli cells will have DNA total free from 15N?

|  |  |  |  |
| --- | --- | --- | --- |
| a) 40 cells | b) 60 cells | c) 80 cells | d) 20 cells |

1. Which one of the following statements about histones is wrong?

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| --- | --- |
| a) Histones are organized to form a unit of 8 molecules | b) The Ph of histones is slightly acidic |
| c) Histones are rich in amino acids lysine and arginine | d) histones carry positive charge in the side chain |

1. Which is the only enzyme that has capability to catalyze initiation , elongation and termination in the process of transcription in prokaryotes?

|  |  |
| --- | --- |
| a) DNA dependent DNA polymerase | b) DNA dependent RNA polymerase |
| c) DNA ligase | d) DNase |

1. Which of the following RNAs is not required for the synthesis of protein?

|  |  |  |  |
| --- | --- | --- | --- |
| a) mRNA | b) tRNA | c) rRNA | d) siRNA |

1. If adenine makes 30 % of the DNA molecule, what will be the percentage of thymine , guanine and cytosine in it ?

|  |  |  |  |
| --- | --- | --- | --- |
| a) T : 20 , G : 30 , C : 20 | b) T : 20 , G : 20 , C : 3s0 | c) T : 30 , G : 20 , C : 20 | d) T : 20 , G : 25 , C : 25 |

1. Complete the flow chart on central dogma:

|  |  |
| --- | --- |
| a) replication – transcription – transduction – protein | b) translation – replication – transcription – transduction |
| c) replication – transcription – translation – protein | d) transduction – translation – replication – protein |

1. E.coli has only 4.6 x 106 base pairs and completes their process of replication with in 18 minutes, then the average rate of polymerization is approx.

|  |  |  |  |
| --- | --- | --- | --- |
| a) 2000 bp/sec | b) 3000 bp/sec | c) 4000 bp/sec | d) 1000 bp/sec |

1. Name the enzyme that facultative opening of DNA helix during transcription :

|  |  |  |  |
| --- | --- | --- | --- |
| a) DNA helicase | b) DNA polymerase | c) RNA polymerase | d) DNA ligase |

1. In the polynucleotide chain of DNA , a nitrogen base linked to the OH group of :

|  |  |  |  |
| --- | --- | --- | --- |
| a) 2’C pentose sugar | b) 3’C pentose sugar | c) 5’C pentose sugar | d) 1’C pentose sugar |

1. The term Nuclein for the genetic material was used by :

|  |  |  |  |
| --- | --- | --- | --- |
| a) Franklin | b) Meischer | c) Chargoff | d) Mendel |

1. Which of the following statements is correct :

|  |  |
| --- | --- |
| a) Adenine pairs with thymine through one H-bond | b) Adenine pairs with thymine through three H-bond |
| c) Adenine do not pairs with thymine | d) Adenine pairs with thymine through two H-bond |

1. If the distance between two consecutive base pairs is 0.34 nm and the total number of base pairs of a DNA double helix in a typical mammalian cell is 6.6 x 109 bp, then the length of DNA is :

|  |  |  |  |
| --- | --- | --- | --- |
| a) 2.5 m | b) 2.2 m | c) 2.7 m | d) 2.0 m |

1. In RNAi, the genes are silenced by using :

|  |  |  |  |
| --- | --- | --- | --- |
| a) dsRNA | b) ssDNA | c) ssRNA | d) dsDNA |

1. What initiation and termination factors are involved in transcription :

|  |  |  |  |
| --- | --- | --- | --- |
| a) and respectively | b) and respectively | c) and respectively | d) and respectively |

1. Which scientist experimentally proved that DNA is the sole genetic material in bacteriophage ?

|  |  |  |  |
| --- | --- | --- | --- |
| a) Beadle and Tatum | b) Meselson and Stahl | c) Hershey and chase | d) Jacob and monad |

1. What will be the sequence of mRNA produced by the following stretch of DNA? 5’ TACGTACGTACGTACG 3’

|  |  |  |  |
| --- | --- | --- | --- |
| a) 3’AUCGAUCGAUCGAUCG 5’ | b) 5’UACGUACGUACGUACG 3’ | c) 3’UACGUACGUACGUACG 5’ | d) 5’AUCGAUCGAUCGAUCG 3’ |

1. Which of the following nucleic acid is present in an organism having 70s ribosome only ?

|  |  |
| --- | --- |
| a) ss DNA with protein | b) ds circular naked DNA |
| c) ds DNA enclosed in nuclear membrane | d) ds circular DNA with histone proteins |

1. Purine found in both DNA and RNA is :

|  |  |  |  |
| --- | --- | --- | --- |
| a) Adenine and guanine | b) Guanine and cytosine | c) Cytosine and thymine | d) Adenine and thymine |

1. The experimental proof for semiconservative replication of DNA was shown in a :

|  |  |  |  |
| --- | --- | --- | --- |
| a) Plant | b) bacterium | c) Fungus | d) virus |

1. The association of histone H1 with a nucleosome indicates :

|  |  |
| --- | --- |
| a) transcription is occurring | b) DNA replication is occurring |
| c) the DNA is condensed into chromatin fibre | d) the DNA double helix is exposed |

1. Removal of introns and joining of exons in a defined order during transcription is called :

|  |  |  |  |
| --- | --- | --- | --- |
| a) looping | b) inducing | c) slicing | d) splicing |

1. Whose experiments cracked the DNA and discovered unequivocally that a genetic code is triplet?

|  |  |  |  |
| --- | --- | --- | --- |
| a) Nirenberg & Matthaei | b) Hershey & chase | c) Morgan & Sturtevant | d) Beadle & Tatum |

1. In RNA, thymine is replaced by :

|  |  |  |  |
| --- | --- | --- | --- |
| a) Adenine | b) guanine | c) Cytosine | d) Uracil |

1. The recombination frequency between the gene a & c = 5 % , b & c = 15 % , b & d = 9 % , a & b = 20 % , c & d = 24 % , a & d = 29 % . What will be the sequence of these genes on a linear chromosome?

|  |  |  |  |
| --- | --- | --- | --- |
| a) d , b , a , c | b) a , b , c , d | c) a , c , b , d | d) a , d , b , c |

1. Identify the correct statement :

a) In capping, methyl guanosine triphosphate is added to the 3’end of the hnRNA

b) RNA polymerase binds with Rho factor to terminate the process of transcription in bacteria

c) The coding strand in a transcription unit is copied to an mRNA

d) Split gene arrangement is characteristic of prokaryotes

1. The first phase of translation is :

|  |  |
| --- | --- |
| a) recognition of DNA molecule | b) Aminoacylation of tRNA |
| c) recognition of an anti-codon | d) binding of mRNA to ribosome |

1. From the following identify the correct combination of salient features of genetic code.

|  |  |
| --- | --- |
| a) universal , non-ambiguous , overlapping | b) Degenerate , Overlapping , commaless |
| c) universal , ambiguous , degenerate | d) degenerate , non-overlapping , non - ambiguous |

1. Which of the following features of genetic code does not allow bacteria to produce human insulin by rDNA technology?

|  |  |
| --- | --- |
| a) genetic code is redundant | b) genetic code is nearly universal |
| c) genetic code is specific | d) genetic code is non ambiguous |

1. Match column I and column II

|  |  |
| --- | --- |
| Column I | Column II |
| A. RNA polymerase I | I. tRNA |
| B. RNA polymerase II | II. rRNA |
| C. RNA polymerase III | III. hnRNA |

|  |  |  |  |
| --- | --- | --- | --- |
| a) A – I ; B – III ; C – II | b) A – I ; B – II ; C – III | c) A – II ; B – III ; C – I | d) A – III ; B – II ; C – I |

1. Which of the following is the start codon?

|  |  |  |  |
| --- | --- | --- | --- |
| a) UGA | b) UAA | c) UAG | d) AUG |

1. Amino acid sequence, in protein synthesis is decided by the sequence of :

|  |  |  |  |
| --- | --- | --- | --- |
| a) tRNA | b) mRNA | c) cDNA | d) rRNA |

1. In the genetic code dictionary, how many codons are used to code for 20 amino acids?

|  |  |  |  |
| --- | --- | --- | --- |
| a) 61 | b) 60 | c) 20 | d) 64 |

1. What would happen if a gene encoding a polypeptide of 50 amino acids, 25th codon (UAU) is mutated to UAA?

|  |  |
| --- | --- |
| a) A polypeptide of 49 amino acids will be formed | b) A polypeptide of 25 amino acids will be formed |
| c) A polypeptide of 24 amino acids will be formed | d) Two polypeptide of 24 & 25 amino acids will be formed |

1. Protein synthesis in animal cell takes place :

|  |  |
| --- | --- |
| a) Only in cytoplasm | b) In the nucleolus as well as in the cytoplasm |
| c) In the cytoplasm as well as in mitochondria | d) only on ribosome attached to nucleus |

1. The tRNA molecule in 3d appears :

|  |  |  |  |
| --- | --- | --- | --- |
| a) L-shaped | b) E- shaped | c) Y- shaped | d) S- shaped |

1. The codon causing chain termination is :

|  |  |  |  |
| --- | --- | --- | --- |
| a) TAG , TAA , TGA | b) GAT , AAT , AGT | c) AGT , TAG , UGA | d) UAA , UAG , UGC |

1. The process of translation is :

|  |  |  |  |
| --- | --- | --- | --- |
| a) ribosome synthesis | b) Protein synthesis | c) DNA synthesis | d) RNA synthesis |

1. Genetic code consists of :

|  |  |  |  |
| --- | --- | --- | --- |
| a) Adenine & guanine | b) Cytosine & uracil | c) cytosine & guanine | d) All of the above |

1. In an E.coli strain, i gene gets mutated and its product cannot bind the inducer molecule. If growth medium is provided with lactose, what will be the outcome?

|  |  |
| --- | --- |
| a) z , y , a gene will be transcribed | b) z , y , a gene will not be transcribed |
| c) RNA polymerase will bind the promoter region | d) Only z gene will be transcribed |

1. In the process of transcription in eukaryotes the RNA polymerase I transcribed :

|  |  |
| --- | --- |
| a) mRNA with additional processes; capping & tailing | b) tRNA , 5 srRNA , snRNA |
| c) rRNA – 28 S , 18 S , 8 S | d) precursor of mRNA , hnRNA |

1. Match column I and column II

|  |  |
| --- | --- |
| Column I | Column II |
| A. i gene | I. -galactosidase |
| B. z gene | II. Permease |
| C. a gene | III. Repressor |
| D. y gene | IV. Transacetylase |

|  |  |
| --- | --- |
| a) A – III ; B – I ; C – II ; D – IV | b) A – III ; B – I ; C – IV ; D – II |
| c) A – III ; B – IV ; C – I ; D – II | d) A – I ; B – III ; C – II ; D – IV |

1. All of the following are part of an operon except :

|  |  |  |  |
| --- | --- | --- | --- |
| a) an enhancer | b) structural genes | c) an operator | d) a promoter |

1. Which of the following is required as inducer for the expression of lac operon?

|  |  |  |  |
| --- | --- | --- | --- |
| a) galactose | b) lactose | c) both (a) & (b) | d) Glucose |

1. Which of the following is wrongly matched :

a) Transcription : Writing information from DNA to tRNA

b) Translation : Using information in mRNA to make protein

c) Repressor protein : Binds to operator to stop enzyme synthesis

d) Operon : Structural gene , operator & promoter

1. Select the collect statement among the following :
2. Glucose and galactose may bind with the repressor and inactivate it.
3. In the absence of lactose repressor binds with operator region
4. The z gene codes for Permease
5. This was elucidated by Jacob and Monad

|  |  |  |  |
| --- | --- | --- | --- |
| a) I and III | b) II and III | c) II and IV | d) I and IV |

1. DNA polymorphism forms basis of :

|  |  |
| --- | --- |
| a) DNA fingerprinting | b) Both genetic mapping and DNA fingerprinting |
| c) Translation | d) Genetic mapping |

1. If a geneticist used the blind approach for sequencing the whole genome of an organism, followed by assignment of function to different segments the methodology adopted by him is :

|  |  |  |  |
| --- | --- | --- | --- |
| a) gene mapping | b) expressed sequenced tags | c) bioinformatives | d) sequence annotation |

1. DNA fingerprinting involves identifying differences in some specific regions in DNA sequence called :

|  |  |  |  |
| --- | --- | --- | --- |
| a) satellite DNA | b) repetitive DNA | c) single nucleotide | d) Polymorphic DNA |

1. DNA strand on a gel stained with ethidium bromide when viewed under UV radiation, appears as :

|  |  |  |  |
| --- | --- | --- | --- |
| a) yellow bands | b) bright orange bands | c) dark red bands | d) bright blue bands |

1. Which is the basis of genetic mapping of human genome as well as DNA fingerprinting?

|  |  |
| --- | --- |
| a) Polymorphism in DNA sequence | b) Single nucleotide polymorphism |
| c) Polymorphism in hnRNA sequence | d) Polymorphism in RNA sequence |

1. Read the following statement and choose the incorrect option :
2. Nitrogenous base in linked to pentose sugar through a N-glycosidic bond
3. Phosphate group is linked to 5 OH of a nucleoside through phosphoester linkage
4. Two nucleosides are linked through 3’ -5’ N-glycosidic linkage
5. Negatively charged DNA is wrapped around positively charged histone octamer to form nucleosome
6. The chromatin that is more densely packed and stains dark is called Euchromatin

|  |  |  |  |
| --- | --- | --- | --- |
| a) I , II , III | b) IV | c) III , V | d) I |

1. Aminoacyl synthase enzymes takes part in :

|  |  |
| --- | --- |
| a) attachment of mRNA of 30s ribosome | b) transfer of activated amino acid to tRNA |
| c) activation of amino acids | d) hydrolysis of ATP to AMP |

1. Match column I and column II

|  |  |
| --- | --- |
| Column I | Column II |
| A. F. Meischer | I. DNA double helix |
| B. Griffith | II. Nuclein |
| C. Hershey and chase | III. S. pneumoniae chase |
| D. Watson and crick | IV. Bacteriophage |
| E. Wilkins and Franklin | V. X-ray diffraction studies |

|  |  |
| --- | --- |
| a) A – II ; B – III ; C – IV ; D – I ; E – V | b) A – V ; B – IV ; C – III ; D – I ; E – II |
| c) A – I ; B – III ; C – IV ; D – II ; E – V | d) A – I ; B – IV ; C – III ; D – II ; E – V |

1. Match column I and column II

|  |  |
| --- | --- |
| Column I | Column II |
| A. Sigma factor | I. 5’-3’ |
| B. Capping | II. Initiation |
| C. Tailing | III. Termination |
| D. Coding strand | IV. 5’end |
|  | V. 3’end |

|  |  |
| --- | --- |
| a) A – III ; B – V ; C – IV ; D – II | b) A – II ; B – IV ; C – V ; D – I |
| c) A – II ; B – IV ; C – V ; D – III | d) A – III ; B – V ; C – IV ; D – I |

1. The mutation that involves addition , deletion or substitution of a single base pair :

|  |  |  |  |
| --- | --- | --- | --- |
| a) point mutation | b) lethal mutation | c) Silent mutation | d) retrogressive mutation |

1. Sickle cell anaemia results from a single base substitution in a gene, this is example of :

|  |  |  |  |
| --- | --- | --- | --- |
| a) point mutation | b) frame-shift mutation | c) silent mutation | d) Both (a) & (b) |

1. To prove that DNA is the genetic material, which radioactive isotope were used :

|  |  |  |  |
| --- | --- | --- | --- |
| a) 35S and 15N | b) 32P and 35S | c) 33P and 15N | d) 14SN and 15N |

1. The enzymes DNA dependent RNA polymerase catalysis the polymerization reaction in \_\_\_\_\_\_\_\_\_ direction :

|  |  |  |  |
| --- | --- | --- | --- |
| a) only 5’-3’ | b) only 3’-5’ | c) both direction | d) none of these |

1. Which RNA carries the amino acids from the amino acid pool to mRNA during protein synthesis?

|  |  |  |  |
| --- | --- | --- | --- |
| a) rRNA | b) mRNA | c) tRNA | d) hnRNA |

1. Which was the last human chromosome to be completely sequenced ?

|  |  |  |  |
| --- | --- | --- | --- |
| a) Chromosome 1 | b) Chromosome 11 | c) Chromosome 21 | d) Chromosome X |

1. Select the incorrect statement regarding DNA replication :

|  |  |
| --- | --- |
| a) leading strand is formed in 5’-3’ direction | b) Okazaki fragment are formed in 5’-3’ direction |
| c) DNA polymerase catalyze polymerization in 5’-3’ direction | d) DNA polymerase catalyze polymerization in 3’-5’ direction |

1. Select the correct match of enzyme with its related function.

|  |  |
| --- | --- |
| a) DNA polymerase : Synthesis of DNA strand | b) Helicase : unwinding of DNA helix |
| c) Ligase : Join together small DNA segments | d) All are correct |

1. Select the correct statement with respect to AUG.

|  |  |
| --- | --- |
| a) It code for methionine only | b) it is an initial codon |
| c) It codes formylthionine in prokaryotes & Eukaryotes | d) both (a) & (b) |

1. The human chromosome with the highest and least number of genes in them :

|  |  |  |  |
| --- | --- | --- | --- |
| a) Chromosome 21 & Y | b) Chromosome 1 & X | c) Chromosome 1 & Y | d) Chromosome X & Y |

1. Which of the following statements regarding human genome is incorrect?

a) Human genome consist 3 x 109 bp and about 30,000 genes

b) The average gene size of 3000 bp and dystrophin is the largest known human gene

c) Chromosome 1 contains maximum (2968) number and Y chromosome has the least (231) gene

d) Repeated sequence are not present in human genome

1. Find out the wrong statement about heterochromatin

|  |  |  |  |
| --- | --- | --- | --- |
| a) it is densely packed | b) Its stains dark | c) it is transcriptionally active | d) It is late replicating |

1. The process of transformation is not affected by which of the following enzymes?

A. DNase B. RNase C. Peptidase D. Lipase

|  |  |  |  |
| --- | --- | --- | --- |
| a) A , B | b) A , B , C , D | c) B , C , D | d) A , B , C |

1. Transcription takes place in eukaryotes in :

|  |  |  |  |
| --- | --- | --- | --- |
| a) matrix | b) cytosol | c) nucleus | d) cytoplasm |

1. The name of nucleic acid is derived from :

|  |  |
| --- | --- |
| a) The type of sugar it contains | b) Its abundance in nuclei |
| c) its hydrophilic or water loving nature | d) The type of phosphate it contains |

1. The distance between the two consecutive base pairs of DNA is :

|  |  |  |  |
| --- | --- | --- | --- |
| a) 3.4 m | b) 3.4 | c) 0.34 x 10 – 9 m | d) both (b) & (c) |

1. Diploid content of human DNA is :

|  |  |  |  |
| --- | --- | --- | --- |
| a) 3.3 x 106 bp | b) 33 x 109 bp | c) 4.6 x 106 bp | d) 6.6 x 109 bp |

1. The left handed form of DNA is called :

|  |  |  |  |
| --- | --- | --- | --- |
| a) A- DNA | b) cDNA | c) B- DNA | d) Z- DNA |

1. In a DNA percentage of thymine is 20% then what will be the percentage of guanine?

|  |  |  |  |
| --- | --- | --- | --- |
| a) 20 % | b) 40 % | c) 30 % | d) 60 % |

1. Nitrogenous bases are linked to sugar by :

|  |  |  |  |
| --- | --- | --- | --- |
| a) Hydrogen bond | b) Phosphodiester bond | c) N-glycosidic bond | d) Covalent bond |

1. Which of the following is nucleoside?

|  |  |  |  |
| --- | --- | --- | --- |
| a) Adenosine | b) Adenine | c) Deoxyribose | d) Adenylic acid |

1. The charge on DNA is :

|  |  |  |  |
| --- | --- | --- | --- |
| a) Negative | b) positive | c) No charge | d) Both (a) & (b) |

1. Nucleoside means :

|  |  |  |  |
| --- | --- | --- | --- |
| a) Sugar + Nitrogen base | b) Nucleoside + Phosphate | c) Deoxyribose sugar + N base | d) Both purine & pyrimidines |

1. Five types of histone proteins are :

|  |  |
| --- | --- |
| a) H1 , H2A , H2C , H2D and H3A | b) H1 , H2A , H2B , H3 and H4 |
| c) H1 , H2A , H2B , H3A and H4 | d) H1 , H2A , H2B , H3 and H5 |

1. Which amino acids are present in histones?

|  |  |  |  |
| --- | --- | --- | --- |
| a) Lysine & histidine | b) Valine & histidine | c) Arginine & Lysine | d) Arginine & histidine |

1. S strain of streptococcus pneumoniae is :

|  |  |
| --- | --- |
| a) capsulated , virulent , smooth | b) non-capsulated , avirulent , rough |
| c) capsulated , avirulent , rough | d) non-capsulated , virulent , smooth |

1. Multiplication of DNA is called :

|  |  |  |  |
| --- | --- | --- | --- |
| a) Translation | b) replication | c) transduction | d) transcription |

1. DNA replication is :

|  |  |
| --- | --- |
| a) Conservative and discontinuous | b) Semi conservative and semi discontinuous |
| c) Semi conservative and discontinuous | d) Conservative |

1. The type of centrifugation technique that can be used to differentiate heavy DNA from normal DNA is :

|  |  |  |  |
| --- | --- | --- | --- |
| a) AgCl density gradient | b) CCsCl density gradient | c) CsCl density gradient | d) KCl density gradient |

1. Isotopes used for providing semiconservative replication of DNA are :

|  |  |  |  |
| --- | --- | --- | --- |
| a) N14 and P13 | b) N14 and P14 | c) N14 and N15 | d) C14 and P31 |

1. Reverse transcription is :

|  |  |
| --- | --- |
| a) RNA dependent RNA polymerase | b) DNA dependent RNA polymerase |
| c) DNA dependent DNA polymerase | d) RNA dependent DNA polymerase |

1. Which form of RNA has a structure resembling clover leaf?

|  |  |  |  |
| --- | --- | --- | --- |
| a) mRNA | b) tRNA | c) rRNA | d) hnRNA |

1. Which one of the following is not a part of transcription unit in DNA?

|  |  |  |  |
| --- | --- | --- | --- |
| a) The inducer | b) A terminator | c) A promoter | d) The structural gene |

**[Class =12th]**

**Answers**

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**Topic: Molecular Basis of Inheritance**

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