



DBB-003-001518

Seat No. _____

B. Sc. (Sem. V) (CBCS) Examination

April / May - 2015

Biotechnology

BT - 502 : Genetics & Molecular Biology

Faculty Code : 003

Subject Code : 001518

Time : 3 Hours]

[Total Marks : 70

- Instructions:** (1) All questions are compulsory.
(2) Right side figures indicate marks of the question.

- 1 All questions are compulsory, choose the correct option. **20×1**
- (1) What would be the best term to describe effect of one gene on another in a way that one would hide the effect of another phenotype-
- (a) pleiotropy (c) Epistasis
(b) Homeostasis (d) Hyperstasis
- (2) How many type of gametes will be produced by an individual of AABbCcDd
- (a) 4 (c) 12
(b) 8 (d) 16
- (3) Which of the following features is NOT associated with maternal inheritance?
- (a) It is mostly Uniparental
(b) Its occur due to nuclear gene
(c) Organelle genome is responsible for maternal inheritance
(d) Variegation of four O'clock plant is an example of maternal inheritance.

- (4) Segregation of Mendelian factors (no linkage, no crossing over) occurs during
- (a) anaphase I
 - (b) anaphase II
 - (c) diplotene
 - (d) metaphase I.
- (5) The difference between paracentric inversions and pericentric inversions is
- (a) the number of genes involved in the inversion
 - (b) that one suppresses crossovers and the other encourages crossovers
 - (c) the formation of dicentric bridges
 - (d) the number of centromeres involved in the inversion
- (6) DNA ligase uses the energy of ATP to close nicks in DNA and this involves a mechanism which includes
- (a) an AMP in a phospho-ester linkage to the 5'-hydroxyl at one side of the nick
 - (b) an AMP in a phospho-anhydride linkage to the 5'-phosphate at one side of the nick
 - (c) an AMP in a phospho-anhydride linkage to the side-chain of a tyrosine in DNA .ligase
 - (d) a linkage of the side-chain of a tyrosine in DNA ligase to the 5'-phosphate at one side of the nick
- (7) Which of the following statements about the structure of DNA is incorrect?
- (a) One complete turn requires 3.4nm and 10 base pairs.
 - (b) The backbones of each strand run in opposite directions relative to each other.
 - (c) Each pair of nucleotides is held together by three hydrogen bonds.
 - (d) The width of the molecule is a constant 2nm.

- (8) A DNA strand with the sequence 3'-AACGTAACG-5' is transcribed. What is the sequence of the mRNA molecule synthesized?
- (a) AACGTAACG (c) AACGUAACG
 (b) UUGCAUUGC (d) TTGCATTGC
- (9) How do eukaryotic ribosome identify the start site on m-RNA in protein synthesis
- (a) Via shine dalgarno sequence
 (b) By scanning
 (c) By cap structure
 (d) None of the above
- (10) Which of the following subunit DNA polymeras is related with Mitochondrial DNA Replication in Eukaryotes-
- (a) α -Polymerase (c) γ -Polymerase
 (b) β -Polymerase (d) δ -Polymerase
- (11) Which three statements below are NOT correct?
- (a) Only prokaryotic mRNAs are polyadenylated at the 3' end.
 (b) In prokaryotes, transcription is coupled to translation.
 (c) RNA splicing requires the formation of a spliceosome
 (d) Both prokaryotic and eukaryotic mRNAs are synthesized by RNA polymerase.
- (12) Which of the following enzymes can be described as a DNA-dependent RNA polymerase?
- (a) DNA ligase (c) DNA polymerise III
 (b) Primase (d) DNA polymerase I

- (13) The disease Xeroderma pigmentosa is due to loss of-
- (a) Nucleotide excision repair
 - (b) Base excision repair
 - (c) Mismatch repair
 - (d) Recombinational repair
- (14) Assuming that the level of glucose is low, a mutation in the Repressor of the lac operon in *E. coli*, preventing binding of the repressor to the operator, should result in:
- (a) constitutive expression of the lac operon genes
 - (b) lack of expression or reduced expression of the lac operon genes under all circumstances
 - (c) expression of the genes only when lactose is present
 - (d) expression of the genes only when lactose is absent
- (15) Mammalian chromosomes have specialized structures with highly repetitive DNA at their ends (telomeres). Which aspect of telomeric DNA replication is different from that of other chromosomal regions?
- (a) The DNA polymerase uses an RNA primer but does not degrade it
 - (b) The DNA polymerase must cross-link the 5' and 3' termini
 - (c) The DNA polymerase contains an RNA molecule that serves as template for DNA synthesis
 - (d) The DNA polymerase has a Specific subunit that facilitates binding to repetitive DNA

- (16) An enzyme which work in template independent manner
- (a) Poly A polymerase
 - (b) Reverse Transcriptase
 - (c) RNA Polymaerase
 - (d) DNA Polymerase
- (17) Which of the following drug inhibit protein synthesis by binding with smaller subunit of Ribosome-
- (a) Erythromycin. (c) Streptomycin.
 - (b) Chloramphenicol. (d) Clindamycin.
- (18) Which of the statement is NOT true regarding Restriction endonuclease
- (a) have the ability of cutting double strand DNA
 - (b) cut the DNA at specific site
 - (c) Type II is used most commonly
 - (d) Produced by all Organism
- (19) A part of nucleic acid used to find a gene by hybridization is called
- (a) vector (c) probe
 - (b) clone (d) cybrid
- (20) A clone is a group of organisms produced by
- (a) asexual method and genetically similar
 - (b) asexual method and genetically dissimilar
 - (c) sexual method and genetically similar
 - (d) sexual method and genetically dissimilar

2 (A) Answer any three out of six-

2×3

- (1) Write the difference between linkage and crossing over? Mention the importance of both?
- (2) Write four differences between B-form & Z-form of DNA?
- (3) Define penetrance and expressivity?
- (4) Enlist the type of posttranslational modification of protein?
- (5) What is Transposition? Give an outline?
- (6) Enumerate the difference between Adaptor & Linker?

(B) Answer any three out of six-

3×3

- (1) What do you understand by Supplementary gene action? Describe with example?
- (2) Describe the mechanism of Transformation in Prokaryotes?
- (3) What is semi conservative mode of Replication? Give the evidence in Prokaryotes which proves DNA Replication is Semi conservative in nature?
- (4) Enlist the name of DNA modifying enzyme along with their function in Genetic Engineering?
- (5) Write the step of Eukaryotic Transcription Initiation?
- (6) Write the chemical mechanism of Nucleotide polymerization by DNA Polymerase?

(C) Answer any two out of five- **2×5**

- (1) How Chromosome theory of inheritance relates to Mendel findings? Describe the law of segregation?
- (2) Define Gene frequency and genetic frequency? Explain the Hardy Weinberg law of equilibrium?
- (3) Describe the important step of Prokaryotic Transcription?
- (4) Explain the various application Application of Genetic Engineering in Agriculture and Medicine?
- (5) What is role of Intron in Genome? Describe the different type of Intron Splicing?

3 (A) Answer any three out of six- **3×2**

- (1) Explain the major difference between Prokaryote and eukaryotic Genome? Why Eukaryotic genome is more complex than Prokaryotic Genome?
- (2) Explain Dosage Compensation based on Lyon hypothesis?
- (3) Describe about Translocation?
- (4) Give the evidences of Maternal Inheritance?
- (5) What is role of Polyadenylation or 3'-Capping in Eukaryotic m-RNA?
- (6) What is Expression Vector? Write important component of Expression Vector?

(B) Answer any three out of six- **3×3**

- (1) Describe the function of Various Initiation factor in Translation?.
- (2) Which nucleic acid comes first in evolution, either RNA or DNA? Give the suitable reason?

- (3) Write the brief account of Conjugation in Bacteria?
- (4) Write the difference between DNA-Polymerase and RNA-Polymerase in term of function?
- (5) Describe about Attenuation in Tryptophan Operon?
- (6) Give the Example of Three Restriction Endonuclease along with its Restriction sequence?

(C) Answer any two out of five- **2×5**

- (1) What is polyploidy? Write the difference between Autopolyploidy and Allopolyploidy? Briefly explain about role of polyploidy in plant improvement?
 - (2) Describe the gene regulation involve in Tryptophan Operon in bacteria?
 - (3) Explain briefly about Light dependent DNA repair and Excision DNA Repair?
 - (4) Write short notes on any two vector-
 - (a) YAC
 - (b) BAC
 - (c) PBR-322
 - (d) Cosmid
 - (5) Describe any two methods for screening of Recombinant?
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