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**DA-003-001632** Seat No. _____

# Third Year B. Sc. (Sem. VI) (CBCS) Examination

**April / May – 2015**

## Microbiology

## MB-602 : Genetics & Bioengineering

**Faculty Code : 003**
**Subject Code : 001632**

Time : $2\frac{1}{2}$ Hours] [Total Marks : **70**

**Instructions :** (i) There are two sections. Both are compulsory.

(ii) Numbers on right side indicate marks.

## SECTION - I

**1** Multiple choice questions : **20**

(1) The form of inheritance in which the heterozygous state is expressed as an intermediate is :

(A) Sex-linked inheritance

(B) Multiple-allele inheritance

(C) Incomplete dominance

(D) Polygenic inheritance

(2) Any two matched genes that are _____ are called alleles.

(A) Found only on autosomes

(B) Found only in the mother

(C) At the same locus on homologous chromosomes

(D) At the same position on the sex chromosomes

(3) _____ proposed the chromosomal theory of the inheritance.

(A) Sutton and Boveri (B) Hershey and Chase

(C) Beadle and Tatum (D) T.H.Morgan

(4) Shine Dalgarno sequence is found on _____.

(A) m-RNA (B) r-RNA

(C) t-RNA (D) m-RNA and r-RNA

(5) What is not the function of bacterial DNA polymerase III ?

(A) It reads the template in 3' to 5' direction.

(B) It makes phosphodiester bonds between nucleotides.

(C) It carries out proof reading function.

(D) It produces Okazaki fragments.

(6) Chargaff found that for DNA

(A) The ratio of A to C is close to 1:1 and the ratio of G to T is closed to 1:1

(B) The ratio of A to T is close to 1:1 and the ratio of G to C is close to 1:1

(C) The ratio of A to G is close to 1:1 and the ratio of T to C is close to 1:1

(D) A+T=G+C

(7) The Transcriptase Holo enzyme is made up of total how many subunits ?

(A) 4 (B) 5

(C) 6 (D) 3

(8) In the context of prokaryotic gene expression, which of the following is the most appropriate definition of an operator ?

(A) A cluster of genes that are regulated by a single promoter.

(B) A DNA-binding protein that regulates gene expression.

(C) A non-coding, regulatory DNA sequence that is bound by RNA polymerase.

(D) A non-coding, regulatory DNA sequence that is bound by a repressor protein.

(9) Which of the following is true of the lac operon in E.coli ?

(A) The operon is only switched on in the absence of lactose in the growth medium.

(B) The lac operon messenger RNA is a polycistronic mRNA (it carries information for synthesis of several proteins)

(C) The enzyme β – galactosidase is only produced in large quantities when the lac repressor is bound to the operator.

(D) The promoter is the binding site for the lac repressor.

(10)

| | |
|---|---|
| A-AraC | 1-Permease |
| B-LacY | 2-A Multi Regulatory protein |
| C-Tryptophan | 3-A Co repressor |

Find correct matches...

(A) A1, B2 and C3 (B) A2, B1 and C3

(C) A3, B2 and C1 (D) A1, B3 and C2

(11) Consider the following :

(i) Strand exchange

(ii) Initiation

(iii) Synapsis

(iv) Branch migration

Arrange these steps in order as per Recombination process.

(A) i, ii, iii, iv (B) iii, i, ii, iv

(C) iii, ii, i, iv (D) iv, i, ii, iii

(12) Match the following :

| | | | |
|---|---|---|---|
| i. | Conjugation | - a. | Leaderberg and Zinder |
| ii. | Transformation | - b. | Leaderberg and Tatum |
| iii. | Transduction | - c. | Griffith |
| iv. | Replica plating | - d. | Leaderberg and Leaderberg |

*Choose the correct from following :*

(A) i-a, ii-c, iii-b, iv-d

(B) i-b, ii-d, iii-a, iv-c

(C) i-b, ii-a, iii-d, iv-c

(D) i-b, ii-c, iii-a, iv-d

(13) i. $NH_2OH$ is an intercalating agent.

ii. UVR creates pyrimidine dimers in DNA.

iii. Di Mehyl Sulfonate is an alkylating agent.

iv. Sickle cell anemia occurs due to nonsense mutation.

Find that the above sentences are true(T) or false(F) in correct order.

(A) TTFF (B) TFTF

(C) FTTF (D) FFFT

(14) Which DNA repair mechanism involves Rec A Lex A regulon?

(A) Mismatch repair (B) Recombinational repair

(C) Photoreactivation (D) SOS repair

(15) Which of the following is used to solve problem of blunt ends on vector and/or foreign DNA ?

(A) S1 nuclease (B) DNA linkers

(C) Homopolymer tailing (D) All of the above

(16) UAA is recognized by _____.

(A) RF-1 (B) RF-2

(C) RF-3 (D) RF-1 and RF-2

(17) Isoschizomers means

(A) Phosphate removed ends.

(B) Identical similar cohesive ends on vector and foreign DNA.

(C) Blunt ended vectors.

(D) Homopolymer tailing sites.

(18) Full form of SV40 is.....

(A) Simian Vacuolating Virus 40

(B) Sterile Vector 40

(C) Somatic Vector 40

(D) None of above

(19) Consider the following statements :

i. Insertion vector can uptake 10kb of Foreign DNA.

ii. Replacement vector can uptake 21kb of foreign DNA.

iii. Xgal is used as a substrate in blue white screening.

iv. Replacement vectors have one cleavage site.

Which of the above statements are correct ?

(A) i and ii (B) ii and iii

(C) only iii (D) i, ii, iii, iv

(20) What is true for chaperons ?

(A) They are high capacity vectors.

(B) They are responsible for protein folding.

(C) They are products of noc gene of Ti plasmid.

(D) (A) and (C)

## SECTION - II

**2** (a) Write any three : **6**

(1) Define terms : Low stringency, Insertional inactivation

(2) Define terms : Intercalating agents, Frameshift mutation

(3) Define terms : Pleiotrophy, Allele

(4) Define terms : Sexduction, Electroporation

(5) Define terms : AP sites, Homopolymer tailing

(6) Define terms : Phenotypic lag, Proofreading

(b) Write any three : **9**

(1) Write a note on contribution of T.H. Morgan.

(2) Explain the semiconservative mode of DNA replication.

(3) Explain : Photoreactivation.

(4) What is attenuation ?

(5) Discriminate between generalized and specialized transduction.

(6) Explain the properties of c-DNA.

(c) Write any two : **10**

(1) DNA is almost universal genetic material - Comment.

(2) Explain various models of homologous recombination.

(3) Discuss dihybrid cross and corresponding laws.

(4) Explain microcycle of polypeptide chain elongation.

(5) Describe inducible mutations with examples.

**3** (a) Write any three : **6**

(1) Enlist major properties of genetic code.

(2) Discriminate between intergenic and intragenic reversion.

(3) Explain the structure of Tn3 transposon in brief.

(4) Discuss the contribution of Cohen and Boyer in brief.

(5) Explain genomic library.

(6) What do you mean by competence ?

(b) Write any three : **9**

(1) Explain incomplete domainance in nature.

(2) Describe phenotypic classes of mutations.

(3) What is directed evolution ?

(4) Explain the structure of bacterial RNA polymerase.

(5) Explain agricultural applications of genetic engineering.

(6) What is antigenic variation ?

(c) Write any two : **10**

(1) Describe gene cistron relationship in prokaryotes and eukaryotes.

(2) Describe arabinose operon in detail.

(3) Explain the process of transduction.

(4) Describe fluctuation analysis and add a note on mutation rate.

(5) Write a note on strategies of generating a recombinant vector.

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