B.N.BANDODKAR COLLEGE OF SCIENCE, THANE

SECOND TERM EXAMINATION, MARCH 2010 - 2011

S.Y. B.Sc.

MARKS: 60 **BIOTECHNOLOGY PAPER II** **TIME: 2 hrs**

N.B. 1. All the questions are compulsory.
2. Illustrate your answers with suitable examples.
3. All Questions carry equal marks.

Q. 1.A. ANSWER THE FOLLOWING (any 3) **12**

1. Explain the importance of pedigree analysis.
2. Distinguish between mismatch repair and NER.
3. What are the 3' modifications that take place on eukaryotic mRNA? Give its significance.
4. Give the hypothesis to explain the origin of chloroplasts.
5. Distinguish between transcription in prokaryotes and eukaryotes.

Q. 1.B. ANSWER THE FOLLOWING **3**

1. Explain: Genetic code is degenerate.
2. What is a 'Barr body'?
3. Define: Peptidyl transferase.

Q. 2.A. ANSWER ANY TWO OF THE FOLLOWING **12**

1. The genes a, b, c are on the same chromosome arm in *N. crasa*. The follwing ordered asci were obtained from the cross ab+ × ++c

45	05	146	01	10	20	15	58
abc	ab+	ab+	ab+	ab+	ab+	ab+	ab+
+bc	a++	ab+	+++	a+c	++c	Abc	+b+
a++	+bc	++c	abc	+b+	ab+	+++	a+c
++c	++c	++c	++c	++c	++c	++c	++c

a). Determine the correct gene order.

b). Determine all gene- gene distances.

2. a). Give the significance and factors of 'crossing over'.

   b). In the Chinese primrose, slate colored flower (s) is recessive to blue flower (S); red stigma (r) is recessive to green stigma (R); and long style (l) is recessive to short style(L). All the three genes involved are on the same chromosome. The F1 of a cross between the two true breeding strains when subjected to three point testcross, gave the following progeny.

	Phenotype	No. of progeny
1.	Slate flower, green stigma, short style	27
2.	Slate flower, red stigma, short style	85
3.	Blue flower, red stigma, short style	402
4.	Slate flower, red stigma, long style	977
5.	Slate flower, green stigma, long style	427
6.	Blue flower, green stigma, long style	95
7.	Blue flower, green stigma, short style	960
8.	Blue flower, red stigma, long style	27
	Total	3000

a). What were the genotypes of the parents in the cross of the two true breeding strains?

b). Make a map of these genes, showing gene order, and distance between them.

c). Derive coefficient of coincidence for interference between these two genes.

3). The genes met and thi are linked in *N. crasa*. We wish to locate arg with respect to met and thi. From the cross of arg++ × +thi met, the following random ascospore isolates were obtained. Map these three genes.

arg thi met	26
arg thi +	17
arg + met	03
+ thi met	53
arg ++	51
+ thi +	04
++ met	14
+++	29

B. GIVE ONE WORD ANSWERS TO THE FOLLOWING. (any 3) **3**

1. Traits which appear in every generation.
2. Transmission of gene from male parent to female child to male grandchild.
3. Mating between relatives.
4. The male member of a family who came to the attention of geneticist whom the pedigree is ascertened.
5. Biochemical enzyme deficiency is caused by which type of inheritance?

Q3. A. ANSWER ANY TWO OF THE FOLLOWING **12**

1. What are introns? Explain the process of removal of intron by the spliceosome using a neat labeled diagram.
2. Explain the process of transcription initiation in eukaryotes using a neat labeled diagram. Also explain the role of promoter and enhancer elements.
3. Explain the 'termination' stage of translation in prokaryotes using a neat labeled diagram.

Q3. B. DEFINE ANY THREE OF THE FOLLOWING TERMS **3**

1. Release factor.
2. Photoreactivation
3. Polysome
4. Shine Dulgarno sequence

Q. 4. A. ANSWER IN BRIEF (any 2) **4**

1. Freemartin cattles
2. Sex determination by XX-XO mechanism
3. Origin of mitochondria
4. Characteristics of yeast petites
5. Hormones and sex determination.

Q4. B. HIGHLIGHT THE FOLLOWING **6**

1. Sex determination in hermaphrodite animals.
2. Haploploidy phenomenon.

Q. 4. C. FILL IN THE BLANKS **5**

1. Small colonies of yeast are called ---------- and wild type colonies are called----------.
2. Neutral and nuclear petites are deficient in ---------- synthesis.
3. ---------- entered as chloroplast endosymbiont in plants and algae.
4. The point at which sex developmental stages in an individual takes place is called----------.
5. In haplodiploidy males develop ---------- from ----------egg while females and workers develop from ---------- eggs.
6. Barr body is ----------type of chromatin material.

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N.B. 1. All the questions are compulsory.
2. Illustrate your answers with suitable examples.
3. All Questions carry equal marks.

Q1.A. ANSWER THE FOLLOWING (any 3) **12**

1. Explain any two characteristics of sex- linked inheritance.
2. Distinguish between translation in prokaryotes and eukaryotes.
3. What are introns? Explain the spicing process using a neat labeled diagram.
4. Give the hypothesis to explain the origin of mitochondria.
5. Explain the excision repair system in *E. coli*.

Q1.B. ANSWER THE FOLLOWING **3**

1. What is a 'gynander' in insects?
2. Define: nonsense codon.
3. What is splicing?

Q2.A. ANSWER THE FOLLOWING (any2) **12**

1). The genes met and thi are linked in *N. crasa*. We wish to locate arg with respect to met and thi. From the cross of arg++ × +thi met, the following random ascospore isolates were obtained. Map these three genes.

arg thi met	26
arg thi +	17
arg + met	03
+ thi met	53
arg ++	51
+ thi +	04
++ met	14
+++	29

2). i). Briefly enumerate stages of crossing over

ii).Using three point test cross, answer the following.

a).Genotypes of the parents

b). Gene order and their distance

c). Coefficient of coincidence for interference between the genes.

Phenotype	No. of progeny
Hot foot, obese, waved	357
Hot foot, obese	74
Waved	66
Obese	79
Wild Type	343
Hot foot, waved	61
obese, waved	11
Hot foot	09
Total	1000

3). a).Give all the possible symbols used for pedigree analysis.

b). An inborn error in the metabolism of the amino acid showed the following pedigree.

I. What is the mode of inheritance/
II. Give the number of heterozygous members.
III. What is the probability of III-2 to be a carrier?

Q2. B. GIVE ONE WORD ANSWERS TO THE FOLLOWING 3

1. Traits which appear in every generation.
2. Transmission of gene from male parent to female child to male grandchild.
3. Mating between relatives.
4. The male member of a family who came to the attention of geneticist whom the pedigree is assigned.
5. Biochemical enzyme deficiency is caused by which type of inheritance?

Q3 A. ANSWER THE FOLLOWING (any 2) 12

1. What are the 5' and 3' modifications that take place on eukaryotic RNA?
2. Explain the properties of 'Genetic code'.
3. Explain the 'elongation' stage of translation in prokaryotes using a neat labeled diagram.

Q3. B. EXPLAIN THE FOLLOWING TERMS (any 3) 3

1. Translocation
2. hnRNA
3. Post lesion DNA synthesis
4. Genetic code

Q.4. A. ANSWER IN BRIEF (any 2) 6

1. Environmentally controlled sex determination in Borrelia
2. Poky mutants of Neurospora
3. Monoecious plants
4. Sex reversal

Q4. B. GIVE ONE WORD ANSWERS FOR THE FOLLOWING (any 4) 4

1. Mutations in respiratory diseases in yeast
2. The poky mutant is also called as
3. Deficiency of rRNA in poky mutants
4. According to gene balance theory if X:A=below 0.5 and above 1.0, it results in

   --------.

5. Sex chromosomal mechanism.

Q4. C. FILL IN THE BLANKS WITH APPROPRIATE WORDS 5

1. The fungus *N. crasa* is an ----------aerobe.
2. The poky mutant involves a change in ----------.
3. Intersex with many new sex characters are called ----------.
4. If the sex organs are in the same flower in the same plant, it is said to be ----------.
5. A superfemale has ---------- number of barr bodies while a Klinefelter man has ---------- number of barr bodies.
6. Barr body is ----------type of chromatin material.