Mid semester examination

Name of the Student: _____ Roll Number: _____
DEPARTMENT OF BSBE IIT GUWAHATI
COURSE NAME: Advanced Genetic Engineering COURSE NUMBER: BT503
DATE: 26.09.2021 Time: 9 - 11am MARKS: 30

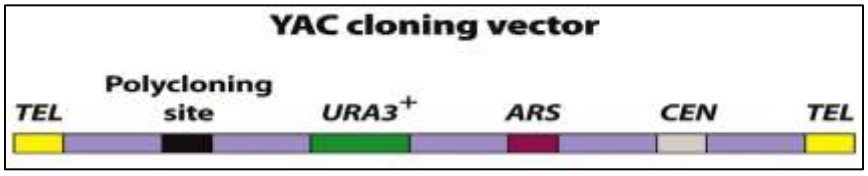
1. Following is the absorption value (A260) for dsDNA, ssDNA, ssRNA.
   A260 dsDNA of 1.0 = 50 µg/ml
   A260 ssDNA of 1.0 = 33 µg/ml
   A260 ssRNA of 1.0 = 40 µg/ml

   Explain the possible reason behind this. (**1 mark)**

2. What are the different classes of promoters in *E.coli* expression vector? **(1 mark)**

Following questions are of 2 marks each (2x10=20)

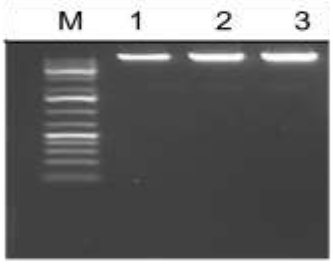
3. What are the contributions of (i) Herbert Boyer (ii) Paul Berg in Recombinant DNA Technology?
4. Prokaryotic genes are co linear with their proteins, do you agree with this? Explain with reason.
5. What are the mutation(s) which can affect a gene function? Explain how they do so.
6. TCGATATTAGCTA**Y**TATA**N**GCG**R**TAT. (i) Calculate T_m of given sequence? Why is knowing T_m important for primer design? (ii) Calculate degeneracy for given sequence following IUPAC norms.
7. Explain two methods for screening inserts in cloning.
8. Explain the mechanism of action of Restriction Endonuclease and DNA Ligases.
9. State one important function/feature of each of the following: *rop* gene, Tet^R , pUC series vector, *lacZ'* genes.
10. Explain the difference between plasmids, cosmids and fosmids?
11. (i) What is a YAC cloning vector and what are its advantages? (ii) Explain the different marked regions of YAC image shown below and their functions.



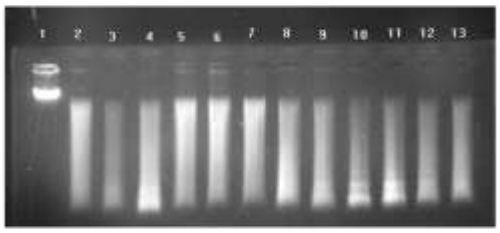
12. Name two books with publishers name you read for "Advanced Genetic Engineering" course. Which topic did you like most and why? What are the improvements you would like to have in the course?
13. Following is representation of gel run for extracted genomic DNA along with standard markers. (**3 marks)**
    (i) What could be the causes of shearing in genomic DNA extraction in the lanes 2-13?
    (ii) How will you assess the purity of DNA?
    (iii) Which factors do you take into account to calculate it and why?
    (iv) What is the rationale behind taking into account each of the wavelength you will use in the formula?

(v) How will a scan help you in the spectrum of 200 to 350 while you are assessing DNA purity?
(vi) State any other method for quantitation of genomic DNA.

Genomic DNA



M = 1kb + DNA ruler
1 = Lambda DNA (control)
2 - 3 = gDNA



1 = Lambda DNA (control)
2 – 13 = gDNA

14.Suggest all steps in experimental design for cloning and expression of alpha amylase from *Aspergillus oryzae* (gene sequence and whole genome sequence of the organism is known). You are provided with a pure culture of *Aspergillus oryzae*. (5 marks)