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Register Number:

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**ST. JOSEPH’S COLLEGE (AUTONOMOUS), BENGALURU-27**

**M.Sc MICROBIOLOGY- II SEMESTER**

**SEMESTER EXAMINATION- APRIL 2019.**

**MB 8316- Molecular Biology**

**Time: 2 ½ hrs Max Marks: 70**

This question paper has 2 printed pages and 4 parts.

I. Answer any **Five** of the following questions: **3x5 =15**

1. Describe Rho dependent termination of transcription.
2. What does HAT and HDAC stand for? What are their roles?
3. Name any two translational inhibitors and their modes of action.
4. Write a note on prokaryotic and eukaryotic ribosome composition.
5. What is the role of sigma factor in gene expression?
6. Illustrate the RNA pol I mediated initiation of transcription.
7. If a stretch of DNA is 2100bp long, how many nucleosomes will it

contain upon packaging?

II. Answer any **Five** of the following questions: **5x5= 25**

1. What is nonsense and nonstop mediated decay?
2. Explain the proof reading mechanisms of amino acyl tRNA synthetase.
3. What is the importance of abortive initiation? How is promoter escape achieved?
4. How is the 5’ end of the mRNA protected in eukaryotes?0 Explain the process in

detail.

1. What is reverse of central dogma? Are there organisms where this occurs? If yes how does it occur?
2. Telomeric length is a factor influencing ageing in humans, how is it maintained? Discuss termination of replication at telomeric region.
3. What changes in gene expression with respect to the tryptophan operon will you notice when *E coli* grown in minimal medium is shifted to a tryptophan rich medium?

III. Answer any **Two** of the following questions: **10x2 =20**

1. a. How does replication initiation occur in yeast cells?

b. Explain tRNA processing in prokaryotes.

1. Eukaryotic complexity demands for accuracy and intricate detailing during developmental stages, explain how regulation at the mRNA processing stage can affect the sex of an organism.
2. A) Imagine you have engineered a set of genes, each encoding a protein with a pair of conflicting signal sequences that specify different compartments.  If the genes were expressed in a cell, predict which signal would win out for the following combinations. Justify your answers.

i) Signals for import into the nucleus and import into the ER.

ii) Signals for import into mitochondria and import into the ER.

iii) Signals for import into the mitochondria and retention in the ER (i.e. the KDEL

signal for retrieval from Golgi to ER) **6m**

B) What is the result of a mutation in the Ran-GTP binding domain of the nuclear

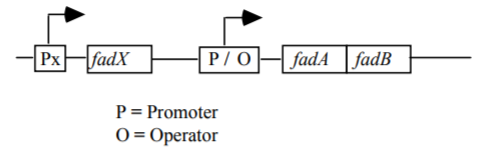
Import receptor such that it cannot bind to Ran GTP? **2m**

C) What is the fate of proteins transported via clathrin coated vesicle if there is a

knockout of tSNARE’s? **2m**

IV. Answer the following: **10x1 = 10**

1. Consider the following hypothetical region of the chromosome consisting of fad A and fad B genes, necessary for the breakdown of oleic acid in bacterium.



The FadX protein, which is continuously produced, binds to the operator in the presence of oleic acid.

1. Is FadX protein a repressor or an activator of the fadA and the fadB genes? Briefly justify your

reasoning. **2m**

b)To study the functionality of the operon mutants were generated, For each of the following

mutants (m1 – m4), predict the level of FadA in the presence of oleic acid.(indicate high or low)

i) m1- O is deleted.

ii) m2- Loss-of-function mutation in fadX.

iii) m3- P is deleted.

iv) m4- fadX gene is altered to give FadX protein which is always bound to O. **8m**