

Name:

Enrolment No:



UNIVERSITY OF PETROLEUM AND ENERGY STUDIES

End Semester Examination, May 2023

Course: Molecular Biology

Program: B.Sc, Int B.Sc./M.Sc- CR, FN&D, Microbiology

Course Code: HSMB 1008

Semester: II

Duration: 03 hrs

Max. Marks: 100

Instructions:

S. No.	Section A Short answer questions/ MCQ/T&F (20Qx1.5M= 30 Marks)	Marks	COs
1	If a double stranded DNA has 20% Thymine, the percentage of Guanine in the DNA a) 30% b) 10% c) 90% d) 40%	1.5	CO2
2	Mode of DNA replication is (a) Conservative and bidirectional (b) Semiconservative and unidirectional (c) Semiconservative and bidirectional (d) Conservative and unidirectional	1.5	CO2
3	How many RNA polymerases are present in a bacterial system? (a) 4 (b) 2 (c) 1 (d) 3	1.5	CO1
4	DNA intercalating agent is sized such that it can fit between adjacent base pairs. ....is a DNA intercalating agent. a. Ethidium Bromide b. Actinomycin D c. Acridine orange d. All of the above	1.5	CO1
5	Which of the $\sigma$ factors is heat stable? (a) $\sigma^{54}$ (b) $\sigma^{70}$ (c) $\sigma^{28}$ (d) $\sigma^{32}$	1.5	CO2
6	Short strands of _____ primer are used in DNA replication. (a) DNA (b) RNA	1.5	CO1

	(c) Histone (d) Protein		
7	Which of the following is a type of RNA involved in protein synthesis? a) snRNA b) rRNA c) yRNA d) dsRNA	1.5	CO1
8	Which of the following is wrongly paired? a) Nucleic acid – hydrogen bond b) Polysaccharide – glycosidic bond c) Proteins – peptide bond d) Phospholipids –phosphate linkage	1.5	CO1
9	Which of the following function of DNA is necessary for the purpose of evolution? a) Mutation b) Replication c) Translation d) Transcription	1.5	CO1
10	Which of the following does not contribute to the stability of tRNA? a) Hydrogen bonding b) Hydrophobic interactions c) Base and sugar-phosphate backbone interaction d) Base pairing	1.5	CO1
11	Which of the following cannot be used for the separation of nucleic acids? a) SDS-PAGE b) PAGE c) Northern blotting d) None of the mentioned	1.5	CO3
12	Which of the following processes does not occur in prokaryotes? (a) Transcription (b) Translation (c) Splicing (d) Replication	1.5	CO1
13	Klenow fragment has the ability to do nick translation. Comment on the statement.	1.5	CO2
14	Define non-sense suppression.	1.5	CO1

15	.....is a DNA alkylating agent. a. Nitrous acid b. Actinomycin D c. Nitrosourea d. All of the above	1.5	CO2
16	Oxidative deamination of cytosine leads to formation of .....	1.5	CO2
17	Which is the following is dark repair pathway a. Nucleotide Excision Repair b. Base Excision Repair c. Both a and b d. None of these	1.5	CO2
18	Give an example of a ribozyme.	1.5	CO1
19	Transcription in eukaryotes happens in .....direction and in prokaryotes happens in ..... direction.	1.5	CO2
20	The genetic code is a. same between species b. same between siblings c. same for all living forms or universal d. same for living and non living	1.5	CO3
<b>Section B</b> <b>(4Qx5M=20 Marks)</b>			
1	What is Direct repair pathway? Elucidate with the help of an example.	5	CO2
2	Write a note on mutation by base analogues.	5	CO1
3	Write a note on rolling circle mechanism of replication. Where do you find it?	5	CO1
4	How is chromatin organized and what are chromatin remodeling enzymes?	5	CO1
<b>Section C</b> <b>(2Qx15M=30 Marks)</b>			
1	In a youthful somatic cell, the ends of chromosome are maintained well. There is no shortening of ends observed while in ageing somatic cells, the length of these ends progressively decreases with successive cell division. Give reasonable explanation for the following-  (i) What are these ends called? (1) (ii) Name the biomolecule active in maintaining length of chromosome and its composition (2) (iii) What is mechanism by which this biomolecule works? Explain preferably with a suitable illustration. (6) (iv) Who discovered it and in which organism? (2) (v) What is the composition of ends of chromosome? (1)	15	CO3

	(vi) This phenomenon of end maintenance is implicated in cancer too. Can you explain/envisage what happens in cancer, what are the consequences? How can you reverse it assuming you are a molecular biologist? (4)		
2	<p>Bacterial ribosomes are extracted from cells and treated with protease, the peptide bond formation activity is retained. Given this answer the following:</p> <ol style="list-style-type: none"> <li>1) What is activity of ribosome called and why is it retained upon treatment with protease? (2)</li> <li>2) Explain structural difference between prokaryotic and eukaryotic ribosomes. (3)</li> <li>3) Explain the process of prokaryotic translation with suitable illustrations. (7)</li> <li>4) Will the ribosome retain its activity if treated with RNase? If yes, why; if no why. (2)</li> <li>5) Name one antibiotic which inhibits bacterial translation. (1)</li> </ol>	15	CO3
<b>Section D</b> <b>(2Qx10M=20 Marks)</b>			
1.	Explain why splicing is needed? Is it needed in both prokaryotes and eukaryotes? What are the different ways in which cells splice RNA? What are the rules governing splicing? Use suitable illustrations in support of your answer.	10	CO2
2	<p>Explain with suitable examples, how does molecular mimicry play a role in driving essential processes such as translation in prokaryotes.</p> <p style="text-align: center;">OR</p> <p>Give an account of initiation of transcription (assembly of TFs) in eukaryotes with suitable diagram/cartoon.</p>	10	CO2