


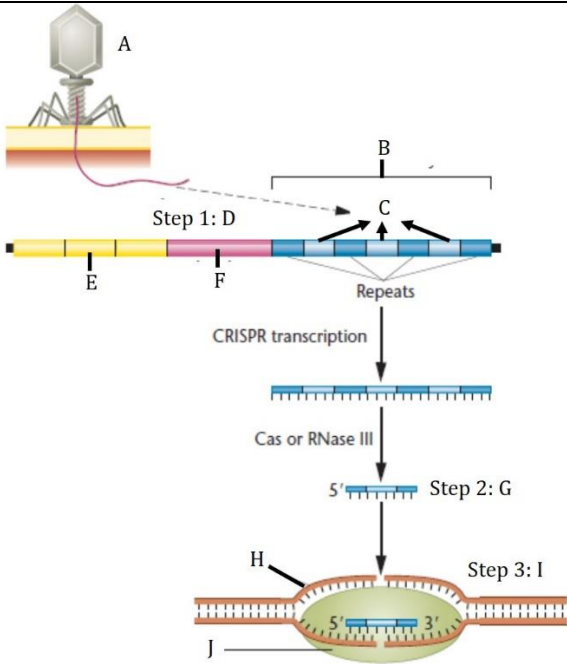
Name:			
Enrolment No:			
UNIVERSITY OF PETROLEUM AND ENERGY STUDIES End Semester Examination, May 2023			
Course: GENETICS Program: B.Tech Biotechnology Course Code: HSBT 2006		Semester: IVth Time : 03 hrs MM: 100	
Instructions: Attempt all Questions			
Q.No	Section A MCQs/Short answer questions/True &False	(20x1.5= 30 Marks)	COs
Q	Statement of question (each question carries 1.5 marks)		CO
1.	Which law was proposed by Mendel based on his dihybrid cross studies? a) Law of Dominance b) Law of Recessiveness c) Law of Segregation d) Law of Independent Assortment	1.5	CO1
2.	Which phenotypic ratio determines recessive epistasis a) 9:3:4 b) 15:1 c) 12:3:1 d) 10:3:3	1.5	CO1
3.	How can it be determined whether the parent progeny is homozygous or heterozygous? a) Test cross b) Back cross c) Monohybrid cross d) Reciprocal cross	1.5	CO1
4.	Genes that show tendency to be inherited together is known as _____ a) Linkage group b) Homologous group c) Co-dependent genes d) None of the mentioned	1.5	CO1
5.	Epigenetics refers to changes in: a) Gene expression b) DNA sequence c) Gene structure d) DNA frequency	1.5	CO1

	e) All of the above		
6.	An example of co-dominance is _____ a) Mouse coat colour b) Human ABO blood group system c) Human hand size d) Human eye colour	1.5	C02
7.	Compare between “gene and allele”?	1.5	C02
8.	Describe the role for “Argonaute and piwi ” proteins, in the process of sRNA mediated gene regulation	1.5	C03
9.	What is a DSCR region in Down’s syndrome? Which chromosome exhibits aberrations in Down syndrome?	1.5	C03
10.	State “True” or “ False” Chromatin remodeling due to histone modifications lead to transcriptional silencing of the downstream target gene.	1.5	C02
11.	In human DNA, which nucleotide base is methylated at the 5' position? a) Adenine b) Cytosine c) Guanine d) Thymine	1.5	C02
12.	Chromosome _____ trisomy leads to Edward’s syndrome. a) 12 b) 13 c) 18 d) 21	1.5	C04
13.	Compare between “Inversion and Translocation” with relevant examples for each.	1.5	C04
14.	Colchicine is used to cause _____ a) Mitotic non-disjunction b) Meiotic non-disjunction c) Mitotic disjunction d) Meiotic disjunction	1.5	C04
15.	RNA molecules that act as enzymes are referred to as: a) RNA polymerase b) Protein c) Ribozymes d) Splice	1.5	C03

16.	State True or False: An organism has one genome, which can be modified in diverse cell types at different times to produce many epigenome.	1.5	C03
17.	Micro RNAs participate in _____ a) posttranslational modification b) posttranscriptional modification c) chromatin remodeling d) gene silencing	1.5	C03
18.	Which family of proteins plays a key role in gene silencing pathways? a) Globulin b) Argonaute c) Intein-containing proteins d) Amino-acyl transferases	1.5	C03
19.	What is the probability that a colorblind father's son will also be colorblind? a) 0 b) 1/4 c) 1/2 d) 1	1.5	C04
20.	A colorblind mother and a normal father give birth to a Klinefelter child with normal vision. Where do you think the non-disjunction has taken place? a) 1st meiotic division of mother b) 2nd meiotic division of the father c) 2nd meiotic division of mother d) 1st meiotic division of father	1.5	C04
Section B		(4x5=20 Marks)	C0
Q	Statement of question (each question carries 5 marks)		
1.	(a) Give the molecular mechanism of the lethal yellow mutation in a wild type agouti mice. (b) State the phenotypes that describe "loss of function" and "gain of function mutations" in lethal yellow mutation	3+2	C01
2.	(a) How would you deduce, if two mutations that yield similar phenotypes are present in the same gene or in two different genes? (b) Describe the central dogma of molecular genetics?	4+1	C02
3.	Explain the effect of following on the expression of a phenotype with the help of relevant example for each: (a) Genetic background	5	C03

	(b) Temperature		
4.	Differentiate between the following and list anomalies associated with the syndromes: (a) Klinefelter syndrome (b) Turner syndrome	5	CO4
	Section C	(2x15=30 Marks)	
Q	Statement of question (Case studies) (each question carries 15 marks)		CO
1.	<p>With relevance to the diagram above, answer the following questions:</p> <ol style="list-style-type: none"> What is this pathway called? Who is credited with the discovery of this pathway? Where does this event take place in a cell? Label A-F. State the function of B and D. What do these sncRNAs' regulate: <ol style="list-style-type: none"> miRNA piRNA What is the fate of G? State the plausible reason for this fate. 	15	CO3

(2+1+6+2+2+2)

2.	 <p>With relevance to the diagram above, answer the following questions:</p> <ol style="list-style-type: none"> Compare between an innate and adaptive viral defense strategy in prokaryotes? Which of the two is the above mechanism? Label A-J in the diagram above. Describe the three steps (D, G and I) in detail. State the function of C, E and F. How does a bacterial Cas enzyme differentiate between self and viral target genome prior to initiating the cleavage. 	15 (2+5+3+3+2)	CO4
Section D		(2x10=20 Marks)	
Q	Statement of question (each question carries 10 marks)		CO
1.	Discuss the mechanisms for: (i) RNA Induced Transcriptional silencing (ii) DNA methylation, as a means to introduce epigenetic alteration in a genome	5+5	CO3
2.	<ol style="list-style-type: none"> Discuss the significance “dosage compensation”? How does the dosage compensation in mammals differ from that in <i>Drosophila</i> Give a detailed account of the mechanism of X-chromosome inactivation. Draw a well labelled diagram for the same. 	5+5	CO2