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| Name: |  |
| Enrolment No: | |

UNIVERSITY OF PETROLEUM AND ENERGY STUDIES
End Semester Examination, May 2021

Course: Genetics and Epigenetics

Semester: II

Program: B.Sc. FND

Time : 03 hrs.

Course Code: HSCC1016

Max. Marks: 100

Instructions: All the sections are compulsory

SECTION A

1. Each Question will carry 1.5 Marks

2. Instruction: Answers all the 20 questions

| S. No. | Type the answer/True or False /MCQ/Fill in the blanks Questions. | 30 Marks | CO |
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| 1 | Name the three scientists, who discovered the Mendel's findings. | 1.5 | CO1 |
| 2 | Name the geometrical device that helps to find out all the possible combinations of male and female gametes. | 1.5 | CO2 |
| 3 | When activity of one gene is downregulated by the activity of a non-allelic gene is known as..... | 1.5 | CO3 |
| 4 | How many phenotypes can occur in the human blood group ABO with alleles $I^A I^B i$? | 1.5 | CO1 |
| 5 | Which term represents a pair of contrasting characters? | 1.5 | CO2 |
| 6 | An exception to Mendel's law is? (a) Independent assortment, (b) Linkage, (c) Purity of gametes, (d) Dominance | 1.5 | CO3 |
| 7 | Pea plants were used in Mendel's experiments because. (a) They were cheap, (b) They had contrasting characters, (c) They were available easily, (d) All of the above | 1.5 | CO1 |
| 8 | Homozygosity and heterozygosity of an individual can be determined by? (a) Back cross, (b) Self-fertilization, (c) Test cross, (d) All of the above | 1.5 | CO2 |
| 9 | Alleles are. (a) Alternate forms of genes, (b) Linked genes, (c) Chromosomes that have crossed over, (d) Homologous chromosomes | 1.5 | CO3 |
| 10 | The tendency of an offspring to resemble its parent is known as. (a) Variation, (b) Heredity, (c) Resemblance, (d) Inheritance | 1.5 | CO1 |
| 11 | Test Cross: It is to find out the genotype of the plant showing dominant trait, the given plant is crossed with the recessive homozygote. The two observations are..... | 1.5 | CO2 |
| 12 | What does dominant vs recessive mean? | 1.5 | CO3 |
| 13 | Why don't identical twins look the same? | 1.5 | CO1 |
| 14 | What are genes? | 1.5 | CO2 |

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| 15 | Non-homologous end joining is a pathway that repairs double-strand breaks in DNA which is referred to as non-homologous because the break ends are directly ligated without the need for a homologous template, in contrast to homology directed repair, which requires a homologous sequence to guide repair. (True/ False) | 1.5 | CO3 |
| 16 | Transcription is the conversion of.....and the translation is the conversion of..... | 1.5 | CO1 |
| 17 | Gene silencing is the inhibition of translation steps (True/False) | 1.5 | CO2 |
| 18 | Histone protein acetylation resulting into inhibition of..... | 1.5 | CO3 |
| 19 | Which of the following is an example of epigenetic inheritance? (a) Histone methylation patterns, (b) Mismatch mutations, (c) Coding regions of genes, (d) Purine dimers | 1.5 | CO4 |
| 20 | Nucleosome is made up of..... | 1.5 | CO2 |

SECTION B

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| Q | Short Answer Type Question (5 marks each) Scan and Upload 4 questions 5 marks each | 20 Marks | CO |
| 1 | Explain what was interesting about the results of Mendel's famous second cross between red pea plants from the initial first cross of red and white pea plants? Include the percentages of the traits in your answer. | 5 | CO1 |
| 2 | Explain reason behind why Mendel's work was not recognized when he first published? | 5 | CO2 |
| 3 | Draw the dihybrid cross punnett square. | 5 | CO2 |
| 4 | Draw the figures of all epigenetic factors in Alzheimer's disease. | 5 | CO4 |

SECTION C

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| Q | Two case studies 15 marks each subsections | 30 Marks | CO |
| 1 | <p>Case Study 1: A man with AB blood group marries a woman with O group blood.</p> <p>(i) Work out all the possible phenotypes & genotypes of the progeny. (7)</p> <p>(ii) Discuss the kind of domination in parents & progeny in this case? (8)</p> | 15 | CO1 |

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| 2 | <p>Case Study 2: A tall plant with red flowers (dominant) is crossed with a dwarf plant with white flowers (recessive). Work out a dihybrid cross and state the dihybrid ratio.</p> <p>(i) What type of cross is this? (5)</p> <p>(ii) Work out the genotype & phenotype of progeny (5)</p> <p>(iii) What principle of Mendel is illustrated through result of this cross? (5)</p> | 15 | CO3 |
| | <p style="text-align: center;">SECTION- D</p> <p>1. Each Question will carry 10 Marks</p> <p>2. Instruction: Answers all the questions</p> | | |
| Q | Long Answer type Questions Scan and Upload (10 marks each) Word limit (500 Words) | 20 Marks | CO |
| 1 | <p>Differentiate between dominance, co-dominance & Incomplete dominance with one example each. (5)</p> <p>Draw the mechanisms of epigenetic regulation and pharmacological inhibition by drawing schematic representation of nucleosome, the elementary unit of chromatin, and the main mechanisms of chromatin modifications, including DNA methylation and histone modifications responsible for solid tumors (5)</p> | 10 | CO4 |
| 2 | <p>Describe the detailed process of eukaryotic transcription by using diagrammatic representation with explanation.</p> <p>Initiation Process (6), Elongation (2) and Termination Process (2)</p> | 10 | CO4 |