

Write the following information in the first page of Answer Script before starting answer

ODD SEMESTER EXAMINATION: 2020-21

Exam ID Number _____

Course _____ Semester _____

Paper Code _____ Paper Title _____

Type of Exam: _____ (Regular/Back/Improvement)

Important Instruction for students:

1. Student should write objective and descriptive answer on plain white paper.
2. Give page number in each page starting from 1st page.
3. After completion of examination, Scan all pages, convert into a single PDF, rename the file with Class Roll No. (2019MBA15) and upload to the Google classroom as attachment.
4. Exam timing from 10am – 1pm (for morning shift).
5. Question Paper will be uploaded before 10 mins from the schedule time.
6. Additional 20 mins time will be given for scanning and uploading the single PDF file.
7. Student will be marked as ABSENT if failed to upload the PDF answer script due to any reason.

B.Sc. BIOTECHNOLOGY
THIRD SEMESTER
GENETICS
BBT - 301

Duration : 3 hrs.

Full Marks : 70

(PART-A: Objective)

Time : 20 min.

Marks : 20

Choose the correct answer from the following:

1 × 20 = 20

- 2 genes A and B are responsible for controlling a trait in an animal and the genes work in direction of A - X- B. When non-expression/mutation in gene A produces the same phenotype as the mutation in both A and B, it is called
 - Complementary gene action
 - Recessive epistasis
 - Dominant epistasis
 - Both 1 and 2
- During a DNA replication, C is added in place T in a gene, due to which codon TAG becomes CAG. This is an example of
 - Synonymous mutation
 - Non-synonymous mutation
 - Nonsense mutation
 - Spontaneous mutation
- Which of these are lethal at an early age?
 - Patau syndrome
 - Edward syndrome
 - Williams syndrome
 - Both 1 and 2
- A group of bees flew from a country and started living on a separate island. This is
 - Founders effect
 - Bottleneck effect
 - Natural selection
 - Overpopulation
- X-linked recessive diseases common in women
 - True
 - False
 - Maybe
 - Can't say
- There are two alleles for the hair color trait- red and blue. What would be the resulting phenotype of a heterozygous pair if the alleles showed incomplete dominance?
 - Red
 - Blue
 - Purple
 - Red and Blue patches
- Who is the 'Father of Linkage'?
 - Aton Von Leewenhock
 - T H Morgan
 - Hugo de Vries
 - Sturtevant
- Recombination frequency between two genes helps to find relative distance between the genes - Who gave this?
 - Morgan
 - Muller
 - Sturtevant
 - Both 1 and 3

9. Which of these is not a deviation from Mendelian genetics?
 a. 27:9:9:9:3:3:3:1
 b. 9:3:4
 c. 1:2:1
 d. Both 2 and 3
10. Which of these is a characteristic of genetic drift?
 a. Ordered process
 b. Small population size
 c. Different alleles become prominent
 d. None
11. In Huntington's disease _ repeats are observed in chromosome no. _
 a. CAG; 4
 b. AGC; 4
 c. ACC; 4
 d. CTC; 4
12. Recombination frequency is measured by
 a. cM
 b. %
 c. Morgan (M)
 d. Map unit
13. Epistasis cannot be defined as
 a. Interaction between 2 alleles
 b. Interaction between 2 genes
 c. Interaction between 2 genes in non-homologous chromosomes
 d. Interaction between 2 units of heredity
14. In Neurospora, Poky(female) x wild type (male) → all poky
 This effect is called _
 a. Female inheritance
 b. Cytoplasmic inheritance
 c. Chromosomal effect
 d. Maternal effect
15. A non important tool for studying human inherited diseases is
 a. Punnett Square
 b. Pedigree charts
 c. p-test
 d. All
16. Which of these diseases can't be detected?
 a. Super female
 b. Cri-du chat syndrome
 c. Jacob's syndrome
 d. Both 1 and 3
17. Continuous to and fro movement in a population doesn't follow HW rule
 a. True
 b. False
 c. Maybe
 d. Can't say
18. Linkage is a Not deviation from which of the Mendelian principles?
 a. Principle of dominance
 b. Principle of segregation
 c. Principle of Independent assortment
 d. Both 1 and 2
19. Reduced size of elephant population after Tsunami is due to
 a. Bottleneck effect
 b. Founders effect
 c. Gene flow
 d. Natural selection
20. Absence of sweat glands in human females is due to
 a. Random inactivation of 1 X chromosome
 b. Barr body
 c. Phenomenon explained by Lyon's hypothesis
 d. All of the above

(PART-B : Descriptive)

Time : 2 hrs. 40 min.

Marks : 50

[Answer question no.1 & any four (4) from the rest]

1. 2 plants with White flowers were crossed but all the plants produced in F1 generation were Red. How many genes are involved for this phenotype? How will you find why this occurred? Explain with appropriate crosses and diagrams 1+7+2
=10

2. Differentiate between 5+5=10
 - a. Genetic drift and natural selection
 - b. Incomplete dominance and codominance

3.
 - a. A population of cheetahs didnot undergo any change for millions of years. What do you call such a population? How can that phenomenon be explained? 5
 - b. There is a gene sequence -CAT CAT CAT- which changes to -CAT TCA TCA-? Explain this 5

4.
 - a. Phenotype of 2 genes A and B, located on the same gene, produced a large no. of offspring having characters different than parents. Why did this occur? Explain. 3
 - b. In a fly, the genes for wing color (Black/white) and wing type (Normal/vestigial) are linked. Explain with suitable diagram and appropriate calculation to find recombination frequency (You can consider any values on your own to depict the no. of flies in the crosses) 7

5.
 - a. What is Nondisjunction and why does it occur? 1+1=2
 - b. What are the modes of sex determination. Write briefly with examples. How can guinea pigs with XX become males and XY become females in experiment? Explain. 3+5=8

6.
 - a. Define gene and allele. 1+1=2
 - b. What is Synonymous mutation? 2 tall plants were crossed to obtain a tall offspring in F1. How to find the genotype of F1. Explain with suitable crosses 2+6=8

7. **a.** What is variegation in leaf? Explain maternal effect in this with crosses. 1+3=4
- b.** A green algae that cannot grow on an antibiotic plate was crossed with one that can grow in the same plates. All the F1 algae can grow on antibiotic plates? Assign the mating types and explain the phenomenon. 6
8. **a.** Name all the deviations from Mendelian genetics with 1 example of each. 2+1=3
- b.** Explain all different kinds of epistasis with suitable crosses and mention the ratios of each. 5+2=7

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