

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST -3 EXAMINATIONS-2023

M.Sc. 2nd Semester Microbiology

COURSE CODE (CREDITS): (21MS1MB212)

MAX. MARKS: 35

COURSE NAME: MICROBIAL GENETICS AND PHYSIOLOGY

COURSE INSTRUCTORS: Ashok Kumar Nadda

MAX. TIME: 2 h

Note: All questions are compulsory. Marks are indicated against each question in square brackets.

Section I

Q1 Very short answer type questions. Each question is carrying one mark.

- (a) What do you understand by a susceptible and permissive cell? **(Mark 01)**
- (b) Differentiate between dominance and epistasis. **(Mark 01)**
- (c) Which method is suitable for the measurement of cell growth of filamentous bacteria and fungi. **(Mark 01)**
- (d) Write the autoinducers molecules present in Gram positive and Gram Negative bacteria responsible for quorum sensing. **(Mark 01)**
- (e) What type of lethal genes leads to the onset of Huntington's disease? **(Mark 01)**

Section II

Q 2 Discuss the role of Acetyl-CoA Carboxylase in the biosynthesis of fatty acids. Illustrate the key step catalysed by Acetyl-CoA Carboxylase during fatty acid synthesis. Write the basic steps involved in the synthesis of fatty acids. **(Marks 03)**

Q 3 Explain diagrammatically the process of propionic acid fermentation. What is the role of various microbes in the fermentation of propionic acid. **(Marks 03)**

Q 4 What do you understand by activation of endospore? Comment on the activation and germination of an endospore into vegetative cell. **(Marks 03)**

Q 5 What are the various steps in the one step growth curve of virus life cycle? Explain with the help of a suitable diagram. **(Marks 03)**

Q 6 What are the two different mating switches in yeast and how these are related to sexual differentiation? **(Marks 03)**

Section III

Q 7 **ABC** and **abc** are parental gametes with **390** and **374** in number, respectively. **Abc** and **aBC** gametes are result of single cross over with a number of 27 and 30, respectively. Similarly, second single cross-over has **ABc** and **abC** in 81 and 85 numbers, respectively. Double cross overs were **AbC** and **aBc** were 05 and 08 in number. Calculate the distance, recombination frequency and type of linkage between the genes **A** and **B** and **C**. **(Marks 04)**

Q 8 Hemophilia is a hereditary disease caused by deficiencies in clotting factors, which results in impaired blood clotting is genetic disorder. Give a brief account of genetic disorder associated with the development of haemophilia. **(Marks 03)**

Q 9 If the ratio of F₂ generation in one cross is **9:3:4** and other cross is **9:7** then what type of epistatic interaction is occurred in these individuals? Enlist the various types of types of epistatic phenotypes. **(Marks 04)**

Q 10 What will be the change in allelic frequencies of **p** and **q** after one generation of random mating among individuals of a population. Following is the initial frequency of **p** and **q** and their genetic fitness values depicted as **W**. Solve this question in light of Fisher's theorem.

Frequency of **P** = 0.7 and Frequency of **q** = 0.3

PP (dominant status) and genetic fitness (**W₁₁**) is 1.0

Pq (heterozygous status) and genetic fitness (**W₁₂**) is 1.0

qq (recessive status) and genetic fitness (**W₂₂**) is 0.5

(Marks 04)