



**UNIVERSITY OF PETROLEUM AND ENERGY
STUDIES**

End Semester Examination, December 2021

Course: Principles of Microbiology

Program: M.Sc. Microbiology

Course Code: HSMB 7001

Semester: I

Duration: 03 hrs.

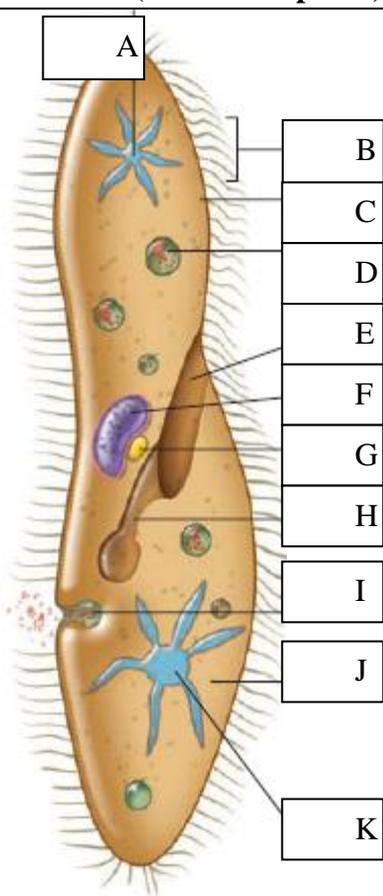
Max. Marks: 100

Instructions:

SECTION A (Type the answers in test box)		(20Q x1.5M= 30 Marks)	CO
MCQs or Fill in the blanks		1.5	CO
Q1	The application of microorganisms to produce antibiotics in bulk falls under the following sub-discipline: a. Geochemical microbiology b. Medical microbiology c. Agricultural microbiology d. Industrial microbiology	1.5	1
Q2	Which of the following is NOT always present in bacterial cells? a. Cell wall b. Genetic material c. Slime layer d. Plasma membrane	1.5	1
Q3	Which of the following is seen only in eukaryotic cells? a. Mitochondria b. Chloroplast c. Golgi apparatus d. All of the above	1.5	1
Q4	Mycology is the study of a. Fungi b. Algae c. Bacteria d. Protozoa	1.5	1
Q5	After seeing microorganisms under the microscope, Antony Van Leeuwenhoek called them ____ a. Bacteria b. Virus c. Protozoa d. Animalcules	1.5	1
Q6	Which of the following organisms do not have a membrane surrounding their genetic material? a. Algae b. Bacteria c. Fungi d. Protozoa	1.5	2
Q7	In Whittaker's five-kingdom classification system, bacteria are placed in the kingdom a. Protista	1.5	2

	<ul style="list-style-type: none"> b. Fungi c. Algae d. Monera 		
Q8	<p>Which of the following method is most reliable for bacterial classification?</p> <ul style="list-style-type: none"> a. Intuitive method b. Genetic relatedness c. Numerical taxonomy d. None of the above 	1.5	2
Q9	<p>Which of the following is NOT a part of the Whittaker's five-kingdom classification system</p> <ul style="list-style-type: none"> a. Kingdom Plante b. Kingdom Monera c. Kingdom Procaryotae d. Kingdom Protista 	1.5	2
Q10	<p>Which of the following is NOT a differential staining?</p> <ul style="list-style-type: none"> a. Simple staining b. Gram staining c. Capsule staining d. Spore staining 	1.5	2
Q11	<p>Which of the following is an acellular organism?</p> <ul style="list-style-type: none"> a. Bacteria b. Virus c. Protozoa d. Fungi 	1.5	2
Q12	<p>Suppose a bacterial culture produces three generations per hour. The generation time of this culture is</p> <ul style="list-style-type: none"> a. Greater than that produces two generations per hour b. Lesser than that produces two generations per hour c. Equal to that produces two generations per hour d. Lesser than that produces four generations per hour 	1.5	3
Q13	<p>Which of the following group of fungi does NOT perform sexual reproduction?</p> <ul style="list-style-type: none"> a. Zygomycota (conjugation fungi) b. Ascomycota (Sac fungi) c. Basidiomycota (Club fungi) d. Deuteromycota (Imperfect fungi) 	1.5	3
Q14	<p>Phytoplankton is made up of</p> <ul style="list-style-type: none"> a. Algae b. Virus c. Protozoa d. None of the above 	1.5	3
Q15	<p>In virus growth cycle, "Rise period" means</p> <ul style="list-style-type: none"> a. Time of attachment of phages b. Time of penetration of phages c. Time of intracellular replication of phages d. Time of cell lysis and release of phages 	1.5	3
Q16	<p>Spore is resistant to</p> <ul style="list-style-type: none"> a. Heat b. Desiccation c. Radiation d. All of the above 	1.5	3
Q17	<p>Resolving limit "d" of a lens can be calculated using the formula $d = 0.5\lambda/N\sin\theta$, where λ = wavelength of the light, θ = half the angle of the cone of light entering an objective lens and N=Refractive index of the medium between the specimen and the front of the objective lens.</p>	1.5	4

	Which of the following can improve resolving limit of a lens? a. Decrease the wavelength b. Decrease the refractive index c. Increase the wavelength d. All of the above		
Q18	Suppose you are observing a specimen using 100x oil immersion lens. The ocular lens present in the eyepiece reads 10x. What is the total magnification that you could achieve? a. 110x b. 1000x c. 10x d. 0.1x	1.5	4
Q19	Ideally, a microscope should be parfocal, it means a. the image should stay in focus when we change objective lens b. the image should not stay in focus when we change objective lens c. microscope does not need an objective lens d. microscope does not need an ocular lens	1.5	4
Q20	Which of the following is NOT a light microscope? a. Confocal microscope b. Fluorescent microscope c. Phase contrast microscope d. Scanning tunneling microscope	1.5	4
	SECTION B (Scan and upload)	(4Qx5M=20 Marks)	CO
	Short Answer Type Question (5 marks each) (100-120 words)		
Q1	A. What is the spontaneous generation theory Vs. biogenesis? B. Which scientist disproved the spontaneous generation theory? C. State the experiments performed to disprove the spontaneous generation theory?	1+1+3	1
Q2	a. What are the “run” and “tumble” processes in bacterial motility? b. Write down the contribution of the following scientists: - Joseph Lister - Charles Chamberland	3+1+1	1
Q3	a. Explain the principle of fluorescence microscopy (basically how does a fluorescent microscope work)? b. Identify the differences between light microscopy and electron microscopy c. Name the two important components of a phase contrast microscope	2+2+1	4
Q4	a. Define prophage b. How does the Lambda virus make a decision of pursuing lytic Vs. lysogeny cycle? Explain	1+4	3
	SECTION C (Scan and upload)	(2Qx15M=30 Marks)	CO
	Two case studies 15 marks each subsections (300 words max)		
Q1	a. Identify the rules you need to prove a causal relationship between an organism and a disease? b. In your mid-term exam, you proved that bacteria called “ <i>Blackboard onlino</i> (<i>B.onlino</i>)” cause “sloppy sleep” disease in mice. You are now studying the underlying molecular mechanisms of the disease. You found that <i>B.onlino</i> produces a protein called “CCC99” in mice. You now suspect that <i>B. onlino</i> causes “sloppy sleep” disease in mice by producing CCC99.	5+7+3	1

	<p>What experiments will you perform to check whether your suspicion is correct? In other words what experiments will you perform to establish a causal relation of <i>B.onlino</i>-induced CCC99 to sloppy sleep disease?</p> <p>Note: If you write multiple strategies, you will earn more marks. If you mention proper control groups, you can earn more marks.</p> <p>c. What is diauxic growth?</p>		
Q2	<p>a. What are the two modes of reproduction in bacteria?</p> <p>b. Explain conjugation (different mating strategies) in detail</p> <p>c. What is transduction? Explain transduction in detail</p>	1+7+7	3
	<p>SECTION- D (Scan and upload) (200 words max)</p>	<p>(2Qx10M=20 Marks)</p>	<p>CO</p>
Q1	 <p>a. Identify the organism. Label all the organelles (A to K) of this organisms and write down the function of each organelle/structure (in one or two sentences)</p> <p>b. Briefly state (point wise) the life cycle of <i>Plasmodium</i> (malaria parasite)</p>	<p>6+4</p>	<p>3</p>
Q2	<p>a. Draw a graph for microbial growth curve in a closed system, label the axis of the graph and write the name of different phases on the graph</p> <p>b. Explain each phase of the growth curve</p> <p>c. Define generation time</p>	<p>3+6+1</p>	<p>3</p>