Name: **Enrolment No:**	UPES UNIVERSITY WITH A PURPOSE

UNIVERSITY OF PETROLEUM AND ENERGY STUDIES
End Semester Examination, December 2022

Course: Antimicrobial Drug Resistance — **Semester: III**
Program: M.Sc. Microbiology — **Time: 03 hrs.**
Course Code: HSMB8013 — **Max. Marks: 100**

Instructions: Read question carefully.

SECTION A

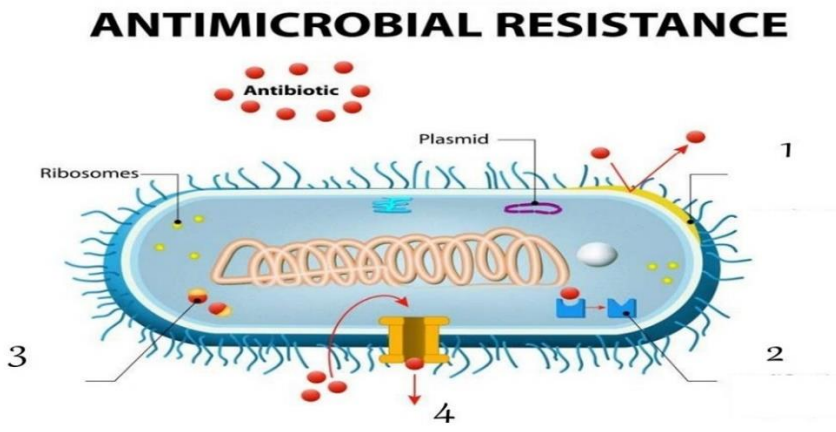
S. No.	MCQ's /Fill in the blanks/ T&F (1.5 marks each)	**30 Marks**	**CO**
1	Which of the following antimicrobial drugs is synthetic? a) Sulfanilamide b) Penicillin c) Actinomycin d) Neomycin	**1.5**	**CO3**
2	Which of the following terms refers to the ability of an antimicrobial drug to harm the target microbe without harming the host? a) Mode of action b) Therapeutic level c) Spectrum of activity d) Selective toxicity	**1.5**	**CO2**
3	Which of the following is not a type of β-lactam antimicrobial? a) Penicillins b) Glycopeptides c) Cephalosporins d) Monobactams	**1.5**	**CO2**
4	Antibiotics are used to treat infections by a) Virus b) Bacteria c) All the microorganisms d) None of the above	**1.5**	**CO4**

5	What is meant by antibiotic resistance? a) It means our body has become resistant to the antibiotic b) It means the bacteria have developed antibiotic resistance c) Both (a) and (b) d) None of the above	**1.5**	**CO4**
6	Ampicillin is a bactericidal antibiotic. a) True b) False	**1.5**	**CO4**
7	Which of the following interferes with the regeneration of the monophosphate form of bactoprenol from the pyrophosphate form? a) Vancomycin b) Ampicillin c) Bacitracin d) Cephalosporins	**1.5**	**CO2**
8	Streptomycin is produced by which of the following organisms? *a) Stretomyces noursei* *b) Streptomyces nodosus* *c) Streptomyces fradiae* *d) Streptomyces griseus*	**1.5**	**CO4**
9	Which of the following inhibits protein synthesis by combining with the 50S subunit ribosome? a) Streptomycin b) Tetracycline c) Chloramphenicol d) Penicillin	**1.5**	**CO2**
10	Which of the following antimicrobials inhibits the activity of DNA gyrase? a) polymyxin B b) clindamycin c) nalidixic acid d) rifampin	**1.5**	**CO3**
11	Which of the following is a nucleoside analog commonly used as a reverse transcriptase inhibitor in the treatment of HIV? a) acyclovir b) ribavirin c) adenine-arabinoside	**1.5**	**CO4**

	d) azidothymidine		
12	In the Kirby-Bauer disk diffusion test, the _____ of the zone of inhibition is measured and used for interpretation. a) diameter b) microbial population c) circumference d) depth	**1.5**	**CO4**
13	What type of side effect is most commonly observed in beta-lactam antibiotics? a) Hearing loss b) Aplastic anaemia c) Allergic reaction d) Yellowing of teeth	**1.5**	**CO1**
14	Which of the following species is used for producing erythromycin? a) *S. erythreus* b) *S. griseus* c) *S. aureofaciens* d) *S. griseoflavus*	**1.5**	**CO1**
15	Which of the following has yielded compounds with the most antimicrobial activity? a) water b) air c) volcanoes d) soil	**1.5**	**CO1**
16	Tyrocidines are more effective against _____ a) Gram-positive organisms b) Gram-negative organisms c) Mycoplasmas d) Spirochetes	**1.5**	**CO1**
17	Which one infection could be orally treated with an antibacterial agent? a) lung infection b) brain infection c) kidney infection d) gut infection	**1.5**	**CO1**

18	The utility of an antibiogram is that it shows antimicrobial susceptibility trends a) Over a large geographic area. b) For an individual patient. c) In research laboratory strains. d) In a localized population.	**1.5**	**CO1**
19	Wh ich of the following types of drug-resistant bacteria do not typically persist in individuals as a member of their intestinal microbiota? a) MRSA b) VRE c) CRE d) ESBL-producing bacteria	**1.5**	**CO1**
20	A scientist discovers that a soil bacterium he has been studying produces an antimicrobial that kills gram-negative bacteria. She isolates and purifies the antimicrobial compound, then chemically converts a chemical side chain to a hydroxyl group. When she tests the antimicrobial properties of this new version, she finds that this antimicrobial drug can now also kill gram-positive bacteria. The new antimicrobial drug with broad-spectrum activity is considered to be which of the following? a) Resistant b) Semisynthetic c) Synthetic d) Natural	**1.5**	**CO3**
	SECTION B (5 marks each question)		
Q	Short Answer Type Question (5 marks each) Scan and Upload 4 questions 5 marks. Word limit (100-120)	**20 Marks**	**CO**
1	Write down the drug related factors influencing antimicrobial drug effectiveness.	**5**	**CO2**
2	Write down the mechanism of action of Amphotericin B and Metronidazole.	**5 (2.5x2)**	**CO3**
3	Antibiotics produced by microbes are regarded as one of the most significant discoveries of the twentieth century. Antibiotics are the chemical substances which are produced by some microbes and can kill or retard the growth of other (disease causing) microbes. (a) Name the scientist who discovered the first antibiotic. (b) Name the first antibiotic, its source organism. (c) Write down its mode of action.	**5 (1+1+3)**	**CO1**
4	What do you understand by drug resistance and explain molecular basis of penicillin resistance.	**5**	**CO1**

SECTION C 30 marks			
Q	**Two case studies 15 marks each subsection**	**30 Marks**	**CO**
1	Case Study 1 (Word limit-250-300) *Updates to the Guidelines for the Prevention and Treatment of Opportunistic Infections in Adults and Adolescents with HIV* In 1989, the Guidelines for Prophylaxis Against Pneumocystis carinii Pneumonia for Persons Infected with the Human Immunodeficiency Virus became the first HIV-related treatment guideline published by the U.S. government. This guideline was published in the Morbidity and Mortality Weekly Report (MMWR), which was the most rapid mode of publication at the time. It was followed by a guideline on prevention of Mycobacterium avium complex disease in 1993. In 1995, these guidelines were expanded to include the treatment of 18 HIV-related OIs. In 2004, information about the prevention of HIV-related OIs was incorporated into the guidelines. The NIH, the CDC, and the HIV Medicine Association (HIVMA) of the Infectious Diseases Society of America (IDSA) now jointly co-sponsor these guidelines, which have been published in peer-reviewed journals and/or the MMWR in 1997, 1999, and 2002. Since 2009, the guidelines have been managed as a living document on the web with each chapter reviewed quarterly by the guidelines committee. Updates are published as often and as promptly as deemed appropriate by the guidelines committee. The above paragraph states about the opportunistic infections among HIV patients. **Q1**: What are opportunistic infections? **Q2**: Why do only some people get them? **Q3**: Write four examples of opportunistic infections caused by fungi, the parts of the human body that may be affected, and the name(s) of the etiological agent(s) (4x3)	**15 (1+2+12)**	**CO1**
2	A 22-year-old pregnant woman had just completed a two-week course of ampicillin for the treatment of *E. coli* pyelonephritis. She then started experiencing perivaginal pruritus, dysuria, and burning in the vulvar region, and noted thick curd like vaginal discharge. On examination the vulvar and labial region was mildly erythematous; tiny papulopustular lesions were seen on the perineum. Shallow linear ulcerations were noted on the posterior part of the introitus. A thick whitish discharge was noted, there was no foul odor. **Q1:** What could be the causative agent? **Q2:** What diagnostic procedures are helpful in establishing the etiology of vaginitis?	**15 (2+3+2+ 4+4)**	**CO2**

	(Word limit: 80) **Q3:** What could be the source for infection? **Q4:** What are the virulent factors of this organism? (Word limit: 120) **Q5:** What are the treatment options for this patient? (Word limit: 120)		
	SECTION- D 20 marks		
Q	Long Answer type Questions Scan and Upload (10 marks each) Word limit 200-250	**20 Marks**	**CO**
1	 Q1: The above figure showing an experimental result. Name the experiment. Q2: What are the factors that influence the susceptibility of an Antibiotics. Q3: Write down the mode of action of Zidovudine (AZT).	**10 (1+5+4)**	**CO4**
2	 Q1: Briefly describe the process, shown as “1, 2, 3 and 4” on the above figure (4x2). Q2: Define Bactericidal vs Bacteriostatic (with examples).	**10 (8+2)**	**CO3**