I. INTRODUCTION/ PREPARING CULTURES:
1. Apply all safety guidelines when working in the laboratory.
2. Differentiate among the following: pure culture; mixed culture; contaminated culture.
3. Prepare a broth culture; a slant culture; a streak plate, & a agar deep/stab culture.
4. Define aseptic technique.
5. Demonstrate the steps involved in preparing a culture using aseptic technique.
6. Explain why aseptic technique must be used when preparing cultures.
7. Explain the rationale for preparing a streak plate; an agar deep.
8. Define the following terms: culture, culture medium, agar, inoculate, colony.
9. Describe the terminology used to describe bacterial growing in liquid broth; an agar slant; agar plate.
10. Describe the properties of agar; explain why agar is preferable to use as a solidifying agent in bacteriology rather than gelatin.

II. MICROSCOPY:
1. Identify the names & the functions of the parts of the Brightfield Microscope.
2. Briefly explain the principle behind the following microscopes: electron Darkfield, Phase Contrast, Fluorescent, & Brightfield Microscopes.
3. Explain the advantage of each type of microscope listed in #2.
5. Calculate the total magnification of an image using the Brightfield Microscope.
6. Define resolution/resolving power.
7. Briefly discuss how the wavelength of illumination & numerical aperture affect resolving power.
8. Explain how immersion oil functions to increase resolution.
9. Describe & identify on a diagram the following terms related to bacterial morphology: coccus; bacillus; spirochete; spiralum; streptococcus; staphylococcus; diplococcus; tetrad; sarcina; streptobacillus.

III. STAINING:
1. Differentiate between basic stains & acidic stains on the basis of how they work; cite some examples.
2. Outline the steps involved in preparing a heat fixed slide of bacteria.
3. Describe in detail the steps involved in preparing a gram stain.
4. Explain the rationale behind the gram stain.
5. Prepare a negative stain and a gram stain.
6. Outline the steps involved in preparing an acid-fast stain.
7. Explain a situation where information obtained from an acid fast stain might be useful.
8. State the gram reaction of selected medically significant genera of bacteria.
IV NUTRITIONAL AND PHYSICAL REQUIREMENTS:
1. Differentiate among the following: chemically defined media; complex media; enrichment media; differential media, & selective media; cite an example of each type.
2. Describe in detail how Mannitol-salt agar and McConkey’s agar serve as both differential & selective media.
3. Explain a situation where Mannitol salt media & McConkey’s media might be media of choice.
4. Explain what is meant by alpha hemolysis; beta hemolysis, & gamma hemolysis.
5. Interpret the results of cultures grown on the media listed in #3.
6. Explain why thioglycollate media and the gas pak are useful systems to culture anaerobes.
7. Explain how you would determine if a culture is an obligate aerobe, an obligate anaerobe, or a facultative anaerobe.
8. Explain how you would interpret if a culture is a mesophile, a psychrophile or a thermophile.

V. BIOCHEMICAL PATTERNS:
1. Briefly explain , using examples, how the results of biochemical tests can be helpful in identifying bacteria.
2. For each test performed in the laboratory, discuss the principle behind the test.
3. For each test performed in the laboratory, explain how a positive test and a negative test result are determined.
4. Using a specific example describe how the catalase test and the oxidase test can help differentiate between two similar genera of bacteria.
5. Describe how Bergen’s Manual of Determinative Bacteriology can be useful to help identify an unknown species of bacteria.

VI. QUANTITATIVE GROWTH CHARACTERISTICS:
1. Explain the four phases of the bacterial growth curve.
2. Discuss some of the practical applications of the growth curve when culturing bacteria in the laboratory.
3. Define: dilution; dilution factor.
4. State the dilution obtained when given the volume of the sample & the volume of the diluant.
5. Calculate the dilution of each sample in a serial dilution, given the volume of the sample & the volume of the diluant.
Calculate the number of cells/ml of a culture, given the colony count and the dilution factor.

VII ANTIBIOTIC SENSITIVITY TEST/KIRBY-BAUER TEST:
1. Interpret the results of the Kirby Bauer test when given a standardized table.
2. Perform the Kirby-Bauer test accurately.
3. Explain what is meant by the “zone of inhibition.”
4. Discuss how knowledge of the Kirby Bauer test can be useful to the health care provider.
5. Discuss factors other than the results of this test that must be considered before prescribing an antibiotic.