

## Pharmaceutical Microbiology

### II Year Pharm D (RS2/RS3)

Sl No	Chapter Name	Long Essay	Short Essay	Short Answer	Total Marks
A	INTRODUCTION	-	-	2+2	4

#### A. INTRODUCTION (2 marks)

1. Write four pharmaceutical uses of microorganisms.
2. State Koch's postulates.
3. List out harmful effects of micro-organisms
4. Write any four applications of Microbiology.
5. Name the major divisions of microbial world.
6. Write contributions of Antony Van Leeuwen hek.
7. Write contributions of Edward Jenner.
8. Write contributions of Robert Koch.
9. Write contributions of Louis Pasteur.
10. Write contributions of Alexander Fleming.
11. Write the concept of spontaneous generation.

<b>Sl No</b>	<b>Chapter Name</b>	<b>Long Essay</b>	<b>Short Essay</b>	<b>Short Answer</b>	<b>Total Marks</b>
<b>B</b>	<b>CLASSIFICATION OF MICROBES ; NUTRITIONAL REQUIREMENTS AND GROWTH</b>	<b>10</b>	<b>-</b>	<b>2</b>	<b>12/11</b>
		<b>-</b>	<b>5</b>	<b>2+2+2</b>	

### **B. CLASSIFICATION OF MICROBES; NUTRITIONAL REQUIREMENTS AND GROWTH**

1. Classify bacteria on the basis of nutritional requirements and add a note on raw materials used for preparation of culture media. (4+6)
2. Define and classify culture media. Mention salient feature of each media along with an example. (1+2+7)
3. Draw an ultra structure of typical bacteria. Write composition and functions of its organelles. (3+7)
4. Classify bacteria on the basis of morphological features. Add a note on composition and functions of cell wall. (6+4)
5. Classify bacteria on the basis of oxygen, pH and temperature requirements. Add note on the effect of hyper and hypotonicity on bacteria. (2+2+2+4)
6. Describe bacterial growth curve. Add a note on physical factors affecting growth of bacteria. (5+5)
7. Classify bacteria on the basis of oxygen requirement. Explain any four efficient methods of cultivation of anaerobic bacteria. (2+8)

**Five Marks**

1. Describe methods of reproduction in fungi.
2. Write a note on cultivation of virus.
3. Discuss about merits and demerits of viral cultivation techniques.
4. Describe steps involved in replication of virus.
5. Write about classification of virus.
6. Classify bacteria on the basis of nutritional requirements
7. Write a note on raw materials used for preparation of culture media.
8. Define and classify culture media with examples.
9. Write salient feature of differential & selective media along with examples.
10. Classify bacteria on the basis of morphological features.
11. Explain composition and functions of cell wall.
12. Differentiate between gram positive and Gram negative cell wall.
13. Describe bacterial growth curve.
14. Write a note on physical factors affecting growth of bacteria.
15. Explain continuous and synchronous growth techniques.
16. Write a note on cultivation of anaerobic bacteria.

(2 marks)

1. Mention media for cultivation of fungi.
2. Write merits of embryonic cultivation of virus.
3. Write merits of embryonic cultivation of virus.
4. What is capsid?
5. What is envelope in virus?
6. Classify fungi.
7. Mention pharmaceutical uses of fungi.
8. Write structure of typical virion.
9. What is mycelium?
10. Why are virus described as obligate parasites?
11. Differentiate between flagella and fimbriae.
12. Differentiate between enrichment and selective media.
13. What is mesosome ?
14. Differentiate between prokaryotes and Eukaryotes.
15. Differentiate between bacteria and virus.
16. Differentiate between fungi and bacteria.
17. Differentiate between phototroph and chemotrophs.
18. Write functions of cytoplasmic membrane.
19. What are plasmids?
20. Write significance of plasmids.
21. What are micronutrients?

22. Write composition of Peptidoglycan.
23. What is pleomorphism? Give examples.
24. What are involution forms?
25. What are Intra cytoplasmic inclusions? Give examples.
26. Mention functions of bacterial capsule.
27. What are mesophilic bacteria? Give examples.
28. What are Psychrophilic bacteria? Give examples.
29. What are Thermophilic bacteria? Give examples.
30. What are fastidious bacteria?
31. What is selective media? Give example.
32. What is pour plate method, write its uses.
33. Differentiate between log phase and decline phase.
34. Differentiate between chemostat and turbidostat.
35. Differentiate between facultative anaerobes and obligatory anaerobes.
36. Differentiate between organotrophs and lithotrophs.
37. Differentiate between autotrophs and heterotrophs.
38. What is anaerobic media? Give examples.
39. What is basal media? Give example.
40. What is synchronous growth?
41. What is transport media? Give one example.
42. What is enriched media? Give example.
43. What is differential media? Give example.
44. What is the role of agar in culture media.
45. Mention arrangement based classification of cocci.
46. What is mean generation time?
46. What is lag phase of growth.
47. What is log phase of growth.
48. What is stationary phase of growth.
49. What is decline phase of growth.
50. List out the different phases of growth of bacteria
51. Mention chemicals used in gaspak system.
52. Write about Spirochets.
53. What are rickettsiae?

<b>Sl</b>	<b>Chapter Name</b>	<b>Long</b>	<b>Short</b>	<b>Short</b>	<b>Total</b>
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No		Essay	Essay	Answer	Marks
C	ISOLATION AND IDENTIFICATION OF BACTERIA	10	-		10
		-	5+5		

### C. ISOLATION AND IDENTIFICATION OF BACTERIA

#### Ten marks questions

1. Differentiate between gram positive and Gram negative cell wall. Add a note on principle and procedure of Gram's staining technique. (5+5).
2. Enlist methods used for total and viability counting bacteria. Describe any two methods of total counting. (4+6)
3. Mention methods used for identification of bacteria. Explain any four biochemical tests Used for identification of bacteria. (2+8)
4. Write briefly on various techniques used for identification of bacteria with emphasis on Biochemical tests.
5. Write in detail about agar plate methods of viability counting.
6. What is pure culture? Enlist methods for isolation of pure culture? Describe any two industrially important techniques of preserving bacteria. (2+3+5)
7. Write about importance of microbial preservation technique. Write procedure, merit and demerit of any four preservation techniques. (2+8)  
What is pure culture? Write in detail about isolation of pure culture. (2+8)

#### Five marks questions

1. Write principle and procedure of Gram's staining technique.
2. Write principle and procedure of Acid-fast staining.
3. Describe any two methods of viability counting.
4. Describe any two methods of total counting.
5. Write a note on filter membrane method of counting bacteria.
6. Explain IMViC tests used for identification of bacteria.
7. Explain MR-VP tests used for identification of bacteria.
8. Write different methods of motility testing
9. Enlist methods for isolation of pure culture?
10. Describe any two industrially important techniques of preserving bacteria.

11. Write about methods for maintenance of pure culture.
12. Write about importance of microbial preservation technique.
13. Write merit and demerit of any four preservation techniques.
14. Write a note on gelatin liquefaction and starch hydrolysis tests.

## Two marks questions

1. Differentiate between mordant and decolourising agent.
2. Differentiate between acid fast and non acid fast bacteria.
3. Mention uses of preservation techniques.
4. What is micromanipulator? Mention its use.
5. Write principle and use of coulter counter instrument.
6. Mention reagents used for acid fast staining.
7. Mention role of each chemical used in gram's staining.
8. What are cryoprotective agents? Give examples.
9. Write principle of starch hydrolysis test.
10. Mention Carbohydrate utilization tests.

Sl No	Chapter Name	Long Essay	Short Essay	Short Answer	Total Marks
<b>D</b>	<b>STERILIZATION AND DISINFECTANTS</b>	<b>10</b>	<b>-</b>	<b>2+2</b>	<b>14/13</b>
		<b>-</b>	<b>5</b>	<b>2+2+2+2</b>	

## 4. STERILIZATION

### I Long Essay

**10 marks**

1. Explain the principle, procedure, applications and demerits of sterilization using autoclave (3+3+2+2)
2. Explain the principle and operating procedure of autoclave along with a neat labeled diagram . (4 +6)
3. Explain the principle, procedure, applications and demerits of sterilization using hot air oven. (3+3+2+2)
3. Explain the mechanism of action, procedure, applications and factors affecting sterilization using ethylene oxide. (2+2+2+4)

4. Explain the source, mechanism of sterilisation, merit, demerits and applications of sterilization using Gamma radiations. (1+3+2+2+2)
5. Describe the steps involved in sterility testing; add a note on its interpretation. (6+4)
6. Explain principles involved in sterilisation by filtration. Add a note on its merits and demerits (5+1+4)
7. Classify different sterilization methods. Add a note on sterility test methods.
8. What are sterilisation indicators? Mention indicators used for various sterilization methods.
9. Explain different factors affecting disinfection
10. Explain different methods for evaluation of bacteriostatic activity.
11. Describe Redial Walker's test. List out the merits and demerits of the test.
12. Explain the principle and operating procedure, merits and demerits of ethylene oxide sterilization.

### **5 marks questions**

1. Write the procedure, merits and demerits of membrane filtration
2. Write the merits and demerits of different sterilizing filters.
3. Write the procedure, merits and demerits of ethylene oxide sterilisation.
4. Explain the principle involved in autoclaving.
5. Explain the mechanism of sterilisation and heat transfer by hot air oven.
6. Write the production, mechanism of action, demerits and applications of UV radiations.
7. Explain the factors affecting gaseous sterilisation.
8. Write a note on heating with bactericide
9. Write a note on sterilisation indicators.
10. Write about sampling technique of sterility testing.
11. Justify the importance of controls in sterility testing.
12. Explain any two methods for evaluation of bacteriostatic activity of a disinfectant.
13. Write the procedure of Redial Walker's co-efficient test.
14. Mention the merits and demerits of Redial Walker's co-efficient tests.
15. Explain a test for evaluation of bactericidal activity of a disinfectant.
16. What is MIC? Explain the method for its determination
17. Explain the antimicrobial sensitivity test.
18. List out the properties of an ideal disinfectant.
19. Classify disinfectants giving examples
20. Outline mechanism of action for each class of disinfectant.
21. Explain different factors affecting disinfection.
22. Write classification, mechanism of action and uses of phenolic disinfectants.
23. Explain the mechanism of action and uses of aldehyde disinfectants.
24. Write classification, mechanism of action and uses of halogens as disinfectants.
25. Write a note on evaluation of preservatives.
26. Explain evaluation of bacteriostatic activity of a disinfectant.

## 2 marks questions:

1. Define sterilisation
2. What is Pasteurization? List out its applications
3. What is incineration?
4. Explain 'Heating to red hot' as a method of sterilisation.
5. Mention applications of UV radiations as a sterilant.
6. Explain the advantage of saturated steam over super heated steam.
7. Explain the advantages of autoclaving over hot air sterilization.
8. List out any four applications of gamma irradiation.
9. Mention any four applications of autoclave.
10. Mention any four applications of dry heat sterilization.
11. Mention any four applications of gaseous sterilization.
12. Mention any four applications of ethylene oxide sterilization
13. Mention any four applications of filtration sterilization
14. Mention any four gaseous sterilants.
15. Mention the ionizing and non-ionising radiations used for sterilization.
16. Write the mechanism of sterilisation by hot air oven.
17. Write the mechanism of sterilisation by autoclave.
18. Write mechanism sterilization by ethylene oxide.
19. Write the mechanism involved in membrane filtration sterilization.
20. Mention the demerits of moist heat sterilization
21. Mention the demerits of dry heat sterilization
22. Mention the demerits of ethylene oxide sterilization
23. Mention the demerits of gaseous sterilization
24. Mention the demerits of membrane filtration method of sterilization
25. Mention the demerits of UV radiation sterilization
26. Mention the demerits of gamma radiation as sterilant
27. Write bio-indicators for thermal sterilization.
28. Mention media used for sterility testing.
29. Why are positive controls used in sterility test
30. Why are negative controls used for sterility test
31. Write applications of membrane filtration
32. Write applications and limitations of formaldehyde as a sterilant.
33. What are HEPA filters?
34. Write time and temperature of incubation for sterility testing.
35. Define disinfection.
36. Define antisepsis.
37. Differentiate between disinfection and antisepsis.
38. What is a preservative? Give examples
39. Give examples for disinfectants with virucidal activity
40. Give examples for disinfectants with antifungal activity
41. Give examples for disinfectants with sporicidal activity
42. Write the ideal properties of an antiseptic
43. Give examples for aerial disinfectants

44. Give two examples for alcoholic disinfectants. Mention its mechanism of action.
45. Give two examples for halide disinfectants. Mention its mechanism of action.
46. Give two examples for heavy metal compounds used as disinfectants. Mention its mechanism of action.
47. Name any two compounds used for disinfection of water, mention their mechanism of action
48. What is 'Zone of inhibition'?
49. What is MIC?
50. What is Disc diffusion method?
51. Write the equation for determination of Redial Walkers co-efficient
52. Difference between bacteriostatic and bactericidal agents.

Sl No	Chapter Name	Long Essay	Short Essay	Short Answer	Total Marks
E	IMMUNOLOGY AND DIAGNOSTIC TESTS	10	-		10/11
		-	5	2+2+2	

#### E. IMMUNOLOGY (10marks)

01. Discuss in general the various types of antigen and antibody reactions. Add a note on their applications. (8+2)
02. Mention various antigen-antibody reactions. Discuss in detail the precipitation test. (2+8)
03. Explain types of antibodies. Explain antigen antibody reactions. (5+5)
04. Discuss in detail the Agglutination and complement fixation tests. (6+4)
05. What are different types of antigen? Write the chemical nature of the antigen and antibody. Add a note on antigenic determinants. (2+4+4)
06. Classify antibodies and write note on salient features of each antibody. (2+2+2+2+2)
07. Write about types of immunity and types of vaccines. (5+5)

#### Five Marks Questions

01. Write principle, procedure and applications of Western Blotting Technique.
02. Write principle, procedure and applications of Southern Blotting Technique.
03. Write principle, procedure and application of Shick's test.
04. Write principle, procedure and application of QBC test.
05. Write principle, procedure and applications of Monteuxs test
  
06. Write principle, procedure and applications of ELISA test.
07. Write principle, procedure and applications of Widal test.
08. Enlist different antibody antigen reactions and mention its diagnostic applications.

09. Define immunity. Classify the types of immunity.
10. Write in detail the structure of different types of antibodies with neat labeled diagram.
11. Highlight on steps involved in production of antibodies.
12. What are vaccines? Classify them.
13. What are toxins & toxoids?
14. Add a note on immunization programme.
15. Write about the role of lymphocytes in immunity.
16. Enumerate the differences between endotoxin and exotoxin
17. Write about microbial virulence factors

### **IMMUNOLOGY ( 02marks)**

01. What are haptens?
02. What are epitopes and paratopes?
03. Mention characters of antigen-antibody reactions.
04. What are mixed vaccines? Give examples.
05. Differentiate between killed and live vaccines.
06. Differentiate between active and passive immunity.
07. Differentiate between vaccine and antisera.
08. What are Toxoids?
09. Write the Principle involved in Widal test.
10. Write the Principle involved in Montoux test.
11. Write the Principle involved in Western blot
12. Write the applications of ELISA test
13. Classify immunity
14. Write significance of H and O antigens
15. Mention diagnostic tests for Tuberculosis
16. Mention diagnostic tests for AIDS
17. Mention diagnostic tests for typhoid
18. Write two differences between agglutination and precipitation reactions.
19. Mention different types of immunoglobulins.
20. What is antitoxin?
21. Write general storage conditions for vaccines and sera.
22. Define vaccine with examples.
23. Define immunity.

<b>Sl No</b>	<b>Chapter Name</b>	<b>Long Essay</b>	<b>Short Essay</b>	<b>Short Answer</b>	<b>Total Marks</b>
<b>F</b>	<b>MICROBIOLOGICAL ASSAYS AND ANTIMICROBIAL SENSITIVITY TESTING</b>	<b>-</b>	<b>5+5</b>		<b>10</b>
			<b>5</b>	<b>2+2</b>	<b>9</b>

## **F. MICROBIOLOGICAL ASSAYS AND ANTIMICROBIAL SENSITIVITY TESTING**

### **Five marks questions:**

1. Write principle and method of microbiological assay of Vitamin B12.
2. Write principle and method of microbiological assay of Vitamin B2.
3. Write principle and method of microbiological assay of Streptomycin by cup plate method.
4. Write principle and method of microbiological assay of Streptomycin by tube assay method.
5. Write principle and method of microbiological assay of vitamin B12 by titrimetric method.
6. Write about standardization of vaccines and sera
7. Describe a method for antimicrobial sensitivity testing.

### **Two marks questions:**

1. Write the organisms used for microbiological assay of streptomycin.
2. Write the organisms used for microbiological assay of vitamin B12 and vitamin B2.
3. Enlist the tests for standardization of vaccines.
4. What is anti-microbial sensitivity? Mention one method for its determination.
5. Write about cup-plate method.
6. Write about agar diffusion method.

<b>Sl No</b>	<b>Chapter Name</b>	<b>Long Essay</b>	<b>Short Essay</b>	<b>Short Answer</b>	<b>Total Marks</b>
<b>G</b>	<b>INFECTIOUS DISEASES</b>	-	<b>5</b>	<b>--</b>	<b>5</b>
			<b>-</b>	<b>2+2+2</b>	<b>6</b>

## **G. INFECTIOUS DISEASES**

### **Five marks questions:**

1. Mention the causative organism, mode of transmission, signs and symptoms, diagnosis and treatment of Typhoid.
2. Mention the causative organism, mode of transmission, signs and symptoms, diagnosis and treatment of malaria
3. Mention the causative organism, mode of transmission, signs and symptoms, diagnosis and treatment of tuberculosis
4. Mention the causative organism, mode of transmission, signs and symptoms, diagnosis and treatment of syphilis
5. Mention the causative organism, mode of transmission, signs and symptoms, diagnosis and prevention of AIDS
6. Mention the causative organism, mode of transmission, signs and symptoms, diagnosis and treatment of cholera
7. Mention the causative organism, mode of transmission, signs and symptoms, diagnosis and treatment of gonorrhoea.
8. What is typhoid? Write the causative organism, mode of transmission, sign and symptoms.

### **Two marks questions:**

1. Name the causative organism and diagnostic test for typhoid.
2. Name the causative organism and diagnostic test for tuberculosis.
3. Name the causative organism and diagnostic test for AIDS.
4. Name the causative organism and diagnostic test for malaria.
5. Enlist preventive measures for AIDS
6. Enlist preventive measures for syphilis
7. Enlist preventive measures for malaria.
8. Enlist preventive measures for typhoid.
9. Enlist preventive measures for cholera.
10. Write the mode of transmission of AIDS.
11. Write the mode of transmission of hepatitis.
12. Write the mode of transmission of malaria.
13. Write the mode of transmission of typhoid.
14. Write the mode of transmission of cholera.
15. Write the mode of transmission of syphilis

16. Write the mode of transmission of gonorrhoea.

**Two marks questions:**

24. Mention drugs used for treatment of Tuberculosis.
25. Mention drugs used for treatment of malaria.
26. Mention drugs used for treatment of typhoid.
27. Mention drugs used for treatment of AIDS.
28. Write signs and symptoms of dengue.
29. Write about prevention of dengue.
30. What are attenuated vaccines? Give examples.