



# Companion for 2nd MBBS

15th Edition



Singi Yatiraj

Co-author  
Roopali Somani



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15th Edition

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India

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India



**JAYPEE BROTHERS MEDICAL PUBLISHERS**

*The Health Sciences Publisher*

New Delhi | London



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Website: [www.jaypeebrothers.com](http://www.jaypeebrothers.com)

Website: [www.jaypeedigital.com](http://www.jaypeedigital.com)

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### Companion for 2nd MBBS

First Edition	: 2007	Second Edition	: 2008
Third Edition	: 2009	Fourth Edition	: 2010
Fifth Edition	: 2011	Sixth Edition	: 2012
Seventh Edition	: 2013	Eighth Edition	: 2014
Ninth Edition	: 2015	Tenth Edition	: 2016
Eleventh Edition	: 2016	Twelfth Edition	: 2017
Thirteen Edition	: 2018	Fourteenth Edition	: 2019
<i>Fifteenth Edition</i>	: <b>2020</b>		

ISBN 978-93-89776-51-5

Printed at

# PREFACE

Companion series has been a huge success among the medical students of Karnataka, India. Very sincere and heartfelt thanks to all our loyal readers for making it the most preferred question bank in comparison to other question banks.

It is my promise to deliver the latest questions of the Rajiv Gandhi University of Health Sciences (RGUHS), Karnataka, India, in their original format with cross-reference to the latest editions of the student-popular undergraduate (UG) books. And, I take liberty to consider your unabated support for these titles.

I sincerely solicit your valuable comments in this regard. So please, do write your comments to *singi\_yatiraj@yahoo.com* or *@facebook*.

Wishing you all the best.

**Singi Yatiraj**

*www.drSingiyatiraj.5u.com*

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# 2

## **MICROBIOLOGY AND PARASITOLOGY**

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**REFERENCES**

1. CP Baveja (**BVJM**): Medical Microbiology (6th Edition), Arya Publishing Company, Kala Amb; ₹ 895/-
2. Apurba Sankar Sastry, Sandhya Bhat K (**ASTR**): Essentials of Medical Microbiology (2nd Edition), Jaypee Brothers Medical Publishers (P) Ltd., New Delhi; ₹ 895/-
3. Apurba Sankar Sastry, Sandhya Bhat K (**ASTR**): Essentials of Medical Parasitology (2nd Edition), Jaypee Brothers Medical Publishers (P) Ltd., New Delhi; ₹ 495/-
4. CP Baveja, V Baveja (**BVJP**): Medical Parasitology (4th Edition), Arya Publishing Company, Kala Amb; ₹ 340/-

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**COURSE CONTENTS****THEORY****I. Introduction***Must Know*

1. Morbidity and mortality data of infectious diseases prevalent in the country with reference to the National Health Programs and in the local geographic area.

*Desirable to Know*

1. Significant milestones in the history of microbiology.

**II. General Microbiology***Must Know*

1. Definitions: Infections, parasite, host, vector, fomite, contagious disease, infectious disease, epidemic, endemic, pandemic, zoonosis, epizootic, attack rate.
2. Normal flora of the human body.
3. Routes of infection and spread; endogenous and exogenous infections; source and reservoir of infections.
4. Bacterial cell: Morphology limited to recognizing bacteria in clinical samples—shape, motility and arrangement. Structures which are virulence associated. Physiology—essentials of bacterial growth requirements.
5. Sterilization, disinfections and universal precautions in relation to patient care and disease prevention. Definition of asepsis, sterilization, disinfection.
6. Antimicrobials: Mode of action, interpretation of susceptibility tests, resistance, spectrum of activity.
7. Bacterial genetics.

**III. Immunology***Must Know*

1. Basic principles of immunity. Immunobiology—lymphoid organs and tissues. Antigen and antibody reactions with relevance to pathogenesis and serological diagnosis.
2. Humoral immunity and its role in immunity.
3. Cell-mediated immunity and its role in immunity.
4. Immunology of hypersensitivity.
5. Measuring immune functions.
6. Immunological basis of the autoimmune phenomenon.
7. Immunodeficiency with relevance to opportunistic infections.
8. Basic principles of transplantation immunity.
9. Basic principles of tumor immunity.

**IV. Systemic Bacteriology**

To be considered under the following headings:

Morphology, classification according to pathogenicity, mode of transmission, methods of prevention, collection and transport of samples for laboratory diagnosis, interpretation of laboratory reports, rapid bedside diagnosis where feasible, list of antimicrobial agents and control measures with special relevance to the National Control and Eradication Programs, in respect of:

*Must Know*

1. Staphylococci
2. Streptococci and pneumococci
3. *Neisseriae*
4. *Corynebacterium diphtheriae*
5. Mycobacteria: Tuberculosis, *M. leprae*, atypical mycobacteria
6. Enterobacteriaceae
7. Parvobacteria: *Haemophilus*, *Bordetella*, *Brucella*, *Pasteurella*, *Gardnerella*
8. Vibrios: *V. cholerae* and other medically important vibrios
9. *Campylobacters* and *Helicobacters*
10. *Pseudomonas*
11. *Bacillus anthracis*
12. Sporing and nonsporing anaerobes: Clostridia, bacteriodes and fusobacteria
13. *Chlamydiae*: *Mycoplasma*
14. *Actinomycetes*: *Actinomycetes* and *Nocardia*
15. Spirochetes
16. Rickettsiae.

*Desirable to Know*

1. *Listeria monocytogenes*.

**V. General Virology***Must Know*

1. General properties: Basic structure and broad classification of viruses. Pathogenesis and pathology of viral infections. Immunity and prophylaxis of viral diseases. Principles of laboratory diagnosis of viral diseases. List of commonly used antiviral agents. Bacteriophage with action to virulence mechanism and epidemiology.

*Desirable to Know*

1. Replication and genetics.

**VI. Systemic Virology***Must Know*

1. Herpes viruses: List of viruses included, lesions produced, pathogenesis and latency principles and laboratory diagnosis.
2. Arboviruses: List of arboviruses prevalent in India, general properties, mode of transmission, disease syndromes produced, common diagnostic test, prevention of spread.
3. Picornaviruses: Common infections produced, classification and general properties, pathogenesis of poliomyelitis, immunoprophylaxis of poliomyelitis.

4. Myxoviruses: General properties, classification according to diseases produced, antigenic variations in influenza virus with relevance to vaccine efficacy; measles, mumps and rubella; important features and prophylaxis.
5. Rabies virus: General properties, antirabies vaccine, antemortem diagnosis in rabies.
6. Hepatitis virus: List of viruses, pathogenesis, mode of infection, list of diagnostic tests and their interpretation, methods of prevention and control.
7. Human immunodeficiency virus: Structure with relevance to laboratory diagnosis and type of infection, laboratory tests and their interpretation, universal precautions, specific precautions, recent trends in diagnosis and prophylaxis.
8. Rotavirus: Laboratory diagnosis.
9. Adenovirus: Infections caused and laboratory diagnosis.

*Desirable to Know*

1. Slow virus infection
2. Poxviruses
3. Oncogenic viruses.

### VII. Mycology

*Must Know*

1. General properties of fungi. Classification based on disease: Superficial subcutaneous, deep mycoses; opportunistic infections including mycotoxins, systemic mycoses. General principles of fungal diagnosis, rapid diagnosis, method of collection of samples, antifungal agents.

### VIII. Parasitology

*Must Know*

1. Protozoans
  - Intestinal
  - Genital
  - Protozoans in blood
  - Opportunistic protozoans.
2. Helminths
  - Cestodes
    - *Taenia*
    - *Echinococcus*
    - *Hymenolepis*.
  - Nematodes
    - Intestinal
    - Tissue.
3. Medical entomology with reference to vectors.

*Desirable to Know*

1. Trematodes of medical importance.

**IX. Clinical/Applied Microbiology***Must Know*

1. Streptococcal infections: Rheumatic fever and rheumatic heart disease
2. Meningitis
3. Tuberculosis
4. Enteric fever
5. Dysentery
6. Diarrheal diseases
7. Pyrexia of unknown origin
8. Eye infections
9. Leprosy
10. Sexually transmitted diseases
11. Poliomyelitis
12. Hepatitis
13. Acute respiratory infections
14. Central nervous system infections
15. Urinary tract infections
16. Pelvic inflammatory disease
17. Wound infection
18. Opportunistic infections
19. HIV infection
20. Malaria
21. Filariasis
22. Zoonotic diseases.

*Desirable to Know*

1. Bone and joint infections
2. Food poisoning
3. Exanthematous conditions
4. Organism used in bioterrorism.

**X. Biomedical Waste: Types, Potential Risks and their Safe Management****SKILLS***Must know*

1. Do stool examination for ova and cysts and hanging drop for *Vibrio cholerae*.
2. Do and examine a wet film of vaginal smear for trichomonas and fungus.
3. Perform and interpret Gram's stain, Albert's stain, and Ziehl-Neelsen or modified Ziehl-Neelsen stain.
4. Perform skin scrapings and do a potassium hydroxide (KOH) preparation for fungal infections.
5. Do cell counts and Gram stain of cerebrospinal fluid (CSF) and other body fluids.
6. Interpret blood smear for parasites like malaria and filarial.
7. Interpret antimicrobial sensitivity reports.
8. Interpret serological tests, such as venereal disease research laboratory (VDRL), antistreptolysin O (ASLO), Widal, human immunodeficiency virus (HIV), rheumatoid factor, hepatitis and TORCH (toxoplasmosis,

rubella, cytomegalovirus and herpes) infections, *Treponema pallidum*, hemagglutination, hemagglutination in virology, hemagglutination inhibition.

9. Be able to collect and transport following clinical samples for microbiological tests: Blood, pus, urine, CSF, body fluids, stool, sputum, throat swabs and serum.
10. Adopt universal precautions for self-protection against HIV and hepatitis.

## **PRACTICAL**

### **PRACTICAL EXERCISES**

The students would perform the following procedures:

1. Gram stain
2. Ziehl-Neelsen stain
3. Modified Ziehl-Neelsen stain
4. Albert stain
5. Hanging drop
6. Wet mount for stool examination
7. Iodine mount for stool examination
8. Lactophenol cotton blue mount for fungus examination
9. Simple stain.

#### **I. Microscope**

1. Principles and use of compound microscope in detail
2. Dark ground microscope
  - Fluorescent microscope
  - Phase-contrast microscope
  - Electron microscope.

#### **II. Sterilization**

1. Principles, uses and demonstration of common sterilization equipments, namely, autoclave, hot air oven, serum inspissator, Arnold sterilizer, filters.

#### **III. Culture Media**

1. Classification of culture media, principles, main ingredients and uses of common culture media, namely:
  - Peptone water
  - Nutrient broth
  - Nutrient agar
  - Blood agar
  - Chocolate agar
  - MacConkey
  - Wilson Blair
  - Thiosulfate citrate bile salts sucrose (TCBS)
  - Lowenstein-Jensen (LJ)
  - Potassium tellurite
  - Dorset egg
  - Loeffler's serum slope
  - Reinforced clostridial medium (RCM)

- Milk agar
  - Selenite F broth
  - Blood culture broth.
2. Media for biochemical reaction
    - Sugar fermentation
    - Urease
    - Citrate
    - Indole.
  3. Media with growth of common organisms for demonstration of:
    - Staphylococci
    - *C. diphtheriae*
    - *Mycobacterium tuberculosis*
    - *Salmonella* on WB
    - *Vibrio* on TCBS, MacConkey with lactose fermenting (LF) and non-lactose fermenting (NLF)
    - Milk agar with staphylococci
    - *Proteus* on nutrient agar.
  4. Antibiotic sensitivity
    - Methods and principles.

#### IV. Staining and Hanging Drop

1. Demonstration of motility by hanging drop method
2. Gram stain
3. Ziehl-Neelsen (ZN) stain.

#### V. Parasitology

1. Examination of feces for helminthic eggs (Roundworm, hookworm, whipworm, *H. nana*).

#### VI. Applied Bacteriology

1. Demonstration of specimen collection
2. Growth on appropriate media
3. Biochemical reaction
4. Appropriate special tests for the laboratory diagnosis of common infectious diseases, namely:
  - Pyogenic infection
  - Enteric fever
  - Bacillary dysentery
  - Cholera
  - Urinary tract infection (UTI)
  - Infantile diarrhea
  - Tuberculosis.

#### VII. Demonstration of Serological Test

1. Widal test
2. Venereal disease research laboratory (VDRL)
3. Enzyme-linked immunosorbent assay (ELISA).

#### VIII. Demonstration of Fungus

1. Growth and slide mounts of common fungi
  - *Candida*
  - *Aspergillus*

- *Mucor*
- *Rhizopus*
- *Penicillium*
- Dermatophytes (one or two).

#### IX. Uses of Laboratory Animals

1. Rabbit
2. Guinea pig
3. Mouse.

#### X. Demonstration of Slides and Instruments

#### XI. Media and Specimens (Demonstration)

The following procedures are only for demonstration. Students will interpret results, but need not perform the procedure of tests. Serological demonstration of:

1. Widal
2. Venereal disease research laboratory
3. Hemagglutination
4. Hemagglutination inhibition
5. Complement fixation test
6. Viral hemagglutination
7. Enzyme-linked immunosorbent assay.

#### XII. Integrated Teaching

1. Enteric fever
2. Cholera
3. Human immunodeficiency virus and acquired immunodeficiency syndrome
4. Tuberculosis
5. Hospital infection and control measures
6. Malaria.

The following materials are to be procured for the conduct of practical classes:

#### I. Slides

- |                                    |                            |
|------------------------------------|----------------------------|
| 1. Staphylococci                   | 2. Streptococci            |
| 3. Gonococci                       | 4. <i>M. tuberculosis</i>  |
| 5. <i>M. leprae</i>                | 6. <i>C. diphtheriae</i>   |
| 7. <i>T. pallidum</i>              | 8. <i>C. tetani</i>        |
| 9. Negative staining (Pneumococci) | 10. Malarial parasite      |
| 11. Microfilaria                   | 12. Cyclops                |
| 13. Hydatid cyst wall              | 14. Negri bodies           |
| 15. Molluscum contagiosum          | 16. Rhinosporidiosis       |
| 17. <i>Candida</i>                 | 18. <i>Cryptococcus</i>    |
| 19. <i>Aspergillus</i>             | 20. <i>Penicillium</i>     |
| 21. <i>Mucor/Rhizopus</i>          | 22. Pneumococci—Gram stain |
| 23. <i>Y. pestis</i>               | 24. Mycetoma—H and E stain |
| 25. Cestode—segment.               |                            |

**II. Media****A. Without growth**

- |                             |   |
|-----------------------------|---|
| 1. Peptone water            | 2. Nutrient broth                         |
| 3. Nutrient agar            | 4. Blood agar                             |
| 5. Chocolate agar           | 6. MacConkey agar                         |
| 7. Wilson and Blair medium  | 8. Thiosulfate citrate bile salts sucrose |
| 9. Lowenstein-Jensen medium | 10. Robertson cooked meat medium          |
| 11. Milk agar               | 12. Selenite F broth                      |
| 13. Blood culture broth     | 14. Dorset egg medium                     |
| 15. Loeffler's serum slope. |   |

**B. With growth**

1. *Staphylococcus: Albus* and *aureus* on nutrient agar
2. *Staphylococcus: Albus* and *aureus* on milk agar
3. Potassium tellurite medium with *C. diphtheriae*
4. LJ with *M. tuberculosis*
5. MacConkey with LF and NLF
6. Wilson and Blair with growth
7. TCBS with growth
8. *Proteus*: On nutrient agar or on blood agar
9. Sugar fermentation: Indole—negative and positive
10. Urease: Negative and positive
11. Citrate: Negative and positive
12. Sabouraud's glucose agar with *Candida/Aspergillus*
13. Sabouraud's glucose agar with any dermatophyte.

**III. List of Instruments**

- |                          |                       |
|--------------------------|-----------------------|
| 1. Seitz filter          | 2. Sterile swab       |
| 3. Candle filter         | 4. Tuberculin syringe |
| 5. McIntosh Fildes jar   | 6. Microtiter plate   |
| 7. VDRL slide            | 8. Inoculation loop   |
| 9. Widal rack with tubes | 10. Pasteur pipette   |

**IV. List of Specimens**

- |              |                    |
|--------------|--------------------|
| 1. Roundworm | 2. Hydatid cyst    |
| 3. Hookworm  | 4. Embryonated egg |
| 5. Whipworm  | 6. Suckling mouse  |
| 7. Tapeworm  | 8. Guinea worm     |

**V. Experimental Animals**

1. Rabbit
2. Guinea pig
3. Mouse.

**UNIVERSITY EXAMINATION PATTERN****Eligibility for Writing the University Examination**

The candidate should have at least 35% aggregate in the two of the three internals conducted by the college and should also have minimum 75% attendance in Theory and Practical classes conducted.

**Criteria for Passing the University Examination**

The candidate should secure minimum 50% in the university theory examination (University theory + Viva voce) and the university practical examinations separately. Internal assessment marks would not be considered for passing criteria, however, they would be added to final marks to determine class of passing.

**Distribution of Marks**

	<i>Internal Assessment</i>		<i>University Examination</i>	
	<i>Maximum marks</i>	<i>Minimum marks to qualify</i>	<i>Maximum marks</i>	<i>Minimum marks to pass</i>
Theory examination	40 marks	14 marks	200 marks	120 marks
Viva voce	—	—	40 marks	
Practical examination	40 marks	14 marks	80 marks	40 marks

**Theory Examination**

There shall be two theory paper carrying 100 marks each. The pattern of questions would be of three types.

2 Long Essay Questions		2 × 10 marks	20 marks
10 Short Essay Questions	10 × 5 marks		50 marks
10 Short Answer Questions	10 × 3 marks		30 marks
	<b>Total</b>		<b><u>100 marks</u></b>

*Distribution of Chapters in Paper I and II for University Examination with Weightage of Marks*

<b>Paper I</b>		<b>Paper II</b>	
<i>Topics</i>	<i>Marks</i>	<i>Topics</i>	<i>Marks</i>
General Bacteriology	20	Virology	40
Immunology	30	Parasitology	40
Systemic Bacteriology	50	Mycology	10
		Applied Microbiology	10

Topics assigned to the different papers are generally evaluated under those sections. However, a strict division of the subject may not be possible and some overlapping of topics is inevitable and students are advised to be prepared to answer overlapping topics.

**Practical Examination**

Practical examination is of 80 marks each.

*Distribution of Practicals for University Examination with Marks*

<i>Exercise</i>	<i>Marks</i>		
Spotters	10 marks	4 Slides	4 marks
		3 Media	3 marks
		1 Instrument	1 marks
		1 Parasitology Specimen	1 marks
		1 Animal	1 marks
Gram's Stain	15 marks		
Special (ZN or Albert Stain)	10 marks		
Parasitology (Stool Examination)	15 marks	Clinical microbiology can be kept together as charts or culture and slides or biochemical tests	
Clinical Bacteriology	10 marks		
Clinical Virology (Charts)	10 marks		
Clinical Mycology (Slide and Culture)	10 marks		

**Viva Voce Examination**

The viva voce examination shall carry 40 marks and all the examiners will conduct the viva examination separately for each candidate.

*Distribution of Marks for Viva Voce Examination*

<i>Topic</i>	<i>Marks</i>
General Bacteriology and Immunology	10 marks
Systemic Bacteriology	10 marks
Virology and Mycology	10 marks
Parasitology	10 marks

# Companion for 2nd MBBS

## SALIENT FEATURES

- ⇒ Compilation of **original questions** of all the question papers of Revised Scheme (RS) of the **Rajiv Gandhi University of Health Sciences (RGUHS), Karnataka, India**
- ⇒ Questions from **RGUHS only**
- ⇒ Questions are arranged **chapterwise** with cross-reference to latest editions of commonly read student-popular books
- ⇒ **Revised Course Contents** for Revised Scheme 2 (RS2) batch as per the university
- ⇒ **Pattern of examination** including the theory examination, syllabus division for papers I and II, practical examination, and viva
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ISBN 978-93-89776-51-5



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