SYLLABUS

FOR

B.Sc. SEMESTER PATTERN IN

MICROBIOLOGY

GONDWANA UNIVERSITY

GADCHIROLI

INDIA
1. There shall be total six Semesters. Total 3000 Marks.

2. The Division / Grade of the student shall be calculated on the basis of Science subjects as per the previous yearly pattern.

3. Each semester shall comprise of 90 teaching days.

4. Semester I and II shall be of 600 Marks

5. Semester III to VI shall be of 450 Marks

6. Microbiology subject in each semester will comprise of
   a. Two theory papers – 50 Marks each
   b. One internal assessment based on two theory papers for 10 Marks each. Total 20 Marks.
   c. One practical / Laboratory work – Total 30 marks

7. In addition to above Semester I and II will have
   a. One compulsory English paper of 60 marks with 15 marks internal assessment.
   b. One second language paper (Supp Eng / Hindi / Marathi / Urdu / etc) of 60 Marks with 15 marks internal assessment.

8. The Internal assessment shall be conducted by the University approved teachers in the relevant subjects.

9. The internal assessment shall be done by the respective college one month prior to the final exam of each semester. The Marks shall be sent to the university immediately after the internal assessment is over.

10. The pattern of Internal assessment and guidelines for the same shall be prepared by the respective subject Board of Studies

11. All Theory papers shall be divided into four units. Each unit shall be covered in 7.5 hours.
12. The theory question papers shall be of 3 hours duration and comprise of 5 questions with internal choice and with equal weightage to all units. (as per the previous pattern)
13. Practical exam shall be of 10 hours duration, 5hrs each for two consecutive days.
14. Table of teaching and examination scheme attached.

Teaching & Examination Scheme
Bachelor of Science (Microbiology)
Three Year (SIX SEMESTER) DEGREE COURSE
B. Sc. Part III (Semester V and VI)

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Subject</th>
<th>Teaching scheme</th>
<th>Examination scheme</th>
<th>Theory</th>
<th>Practical</th>
<th>Total Marks / credits (Th, Pr, IA)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Th + Tu (Periods)</td>
<td>Pr (Periods)</td>
<td>Total Periods</td>
<td>Duration Hrs</td>
<td>Max Marks Th</td>
</tr>
<tr>
<td>1</td>
<td>Semester V</td>
<td>3+@</td>
<td>-</td>
<td>6+@</td>
<td>3</td>
<td>50</td>
</tr>
<tr>
<td>2</td>
<td>Microbiology Paper I- Medical Microbiology</td>
<td>3+@</td>
<td>-</td>
<td>3</td>
<td>50</td>
<td>18</td>
</tr>
<tr>
<td>3</td>
<td>Microbiology Paper-II Bioinstrumentation</td>
<td>3+@</td>
<td>-</td>
<td>3</td>
<td>50</td>
<td>18</td>
</tr>
<tr>
<td>4</td>
<td>Practical</td>
<td>-</td>
<td>6</td>
<td>6</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>5</td>
<td>Semester VI</td>
<td>3+@</td>
<td>-</td>
<td>6+@</td>
<td>3</td>
<td>50</td>
</tr>
<tr>
<td>6</td>
<td>Microbiology Paper I- Recombinant DNA Technology</td>
<td>3+@</td>
<td>-</td>
<td>3</td>
<td>50</td>
<td>18</td>
</tr>
<tr>
<td>7</td>
<td>Microbiology Paper-II Immunology</td>
<td>3+@</td>
<td>-</td>
<td>3</td>
<td>50</td>
<td>18</td>
</tr>
<tr>
<td>8</td>
<td>Practical</td>
<td>-</td>
<td>6</td>
<td>6</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

Grand Total of Semester V &VI: 450 each semester = TOTAL - 450 Marks per semester

Note: Th = Theory; Pr = Practical; Tu = Tutorial; IA = Internal Assessment; @ = Tutorials wherever applicable; * = If required, for two days.
Paper I: Medical Microbiology

Unit I: Epidemiology and Host-Parasite Relationship
   a. Explanation of medical terms
      i) Infection, types of infections, primary infection, Secondary infection, Acute and chronic infection, Local and systemic infection, Fulminating infection, Nosocomial infection, Iatrogenic infection, Teratogenic infection, Congenital infection
      ii) Disease, Sign, Symptoms, Syndrome, Types of disease, Epidemic, Endemic, Pandemic, Prosodemic, Sporadic, Exotic, Venereal, Zoonotic, Epizootic, Exotic
      iii) Infection process(pathogenesis)- Bacteremia, Septicemia, Pyaemia, Sapremia, Toxemia, Viremia

   b. Stages of Infectious disease- Incubation period, Prodromal phase, invasive phase, decline phase, convalescence.

   c. Control of communicable diseases, different methods.


Unit II: Dynamics of Disease Transmission
   a. Causative/etiological agents of various diseases, bacterial, viral, fungal, protozoan, rickettsial, waterborne, foodborne, airborne (list only).
   b. Sources/reservoir of infections- endogenous sources, exogenous sources, case, carriers, animals, insect, non-living sources.
   c. Portals of exit, Portals of entry.
   d. Modes of transmission- Contact, Vehicle, Vector, airborne, Trans-placental, Laboratory, Hospital.
   e. Susceptibility of host.

Unit III: Microbial Mechanism of Pathogenicity
   a. Pathogenicity and Virulence, difference
   b. Variation of virulence, Exaltation, Attenuation, methods of attenuation.
   c. Virulence determining factors
      i) Infectivity – MID, MLD, ID50, LD50
      ii) Invasiveness, factors responsible (aggresins)
      iii) Toxigenicity – Exotoxin, Endotoxin, comparison, enterotoxin.
      iv) Vaccine and toxoid, types
Unit IV: Microbial Diseases of Human
   a. Diseases of skin, eye, digestive tract, respiratory tract, urinary tract, reproductive system, nervous system, cardiovascular and lymphatic system (only list with causative organism).
   b. Study of pathogenic organisms (Morphology, cultural and biochemical characteristics, Pathogenesis, laboratory diagnosis, prevention)
      i. Salmonella typhi ii) Mycobacterium tuberculosis iii) Shigella dysentery iv) Plasmodium
      v) Chickungunia virus vi) Dengue virus vii) HIV

MICROBIOLOGY
B. Sc. Semester V

Paper II: Bioinstrumentation

Unit I: Spectrophotometry
   a. Concept of electromagnetic radiation, spectrum of light
   b. Beer’s law and deviations, extinction coefficient
   c. Difference between spectrophotometer and colorimeter.
   d. Construction and working of UV and visible Spectrophotometry.
   e. Applications in biological science.

Unit II: Chromatography
   a. Partition principle, partition coefficient, nature of partition force
   b. Brief account of paper chromatography, application
   c. Thin layer chromatography- Application
   d. Column chromatography- Principle and application of gel filtration, Ion-exchange, Affinity chromatography

Unit III: Electrophoresis & Blotting of Biomolecules
   a. Electrophoresis- Migration of ions under electric field, factors affecting electrophoretic mobility,
   b. Paper electrophoresis, cellulose acetate electrophoresis, application
   c. Gel electrophoresis-Types of gels, solubilizers, procedure, column, slab gels application
   d. SDS-PAGE electrophoresis- principle, procedure and applications
   e. Blotting technique-Southern blotting, Northern blotting, Western blotting (in brief)

Unit IV: Centrifugation & Isotopic Tracer Technique
   a. Centrifugation: Basic principles, concept of RCF, Sedimentation coefficient
   b. Types of centrifuges- clinical, high speed and ultracentrifuge- application, Density gradient centrifugation
c. Radioactive and stable isotopes, rate of radioactivity decay, units of radioactivity
d. Radioisotope methods, types of radioactive decay - Half life and radioactivity- GM counter – Scintillation counter – Autoradiography

Practical Course for Semester V (Based on Paper I & Paper II)
Marks: 30

1. *Laboratory diagnosis of i) E.coli ii) P. vulgaris iii) S. typhi
2. *Isolation and detection of S. aureus from pus sample.
3. To study normal flora of skin and oral cavity.
4. Detection of Malarial parasite from blood sample.
5. Detection of Chikungunia and Dengue fever (demonstration only)
7. *Estimation of Blood sugar by GOD-POD method
8. *Liver function test - SGOT and SGPT
9. Kidney function test- Creatinine , Urea
10. Detection of Bilirubin.
12. Estimation of blood urea by Diacetylmonoxime method (DAM)
15. Demonstration of separation of components by paper electrophoresis
16. Separation of protein by SDS-PAGE (Sodium dodecyl sulfate-Polyacrylamide gel electrophoresis)
17. Blotting of DNA by Southern Blotting technique

**Note:**
1. Underlined experiments are treated as major experiments.
2. Students should perform at least 4 major and 6 minor experiments
3. Practicals with asterisk mark are compulsory.

**Distribution of marks during practical examinations of B.Sc. Semester V**

1. One major experiment- 10
2. Two minor experiment- 2 X 5 = 10
3. Viva voce- 5
4. Practical record- 5

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Total 30

*(Duration of Practical exam will be 10 hrs., 5 hrs. each for two consecutive days)*

**Books Recommended for Theory & Practical Microbiology B.Sc. Sem. V**

1. Ananthnarayan and Panikars ,Textbook of Microbiology(8th edition), University Press, Hyderabad
3. Essentials of Medical Microbiology. 4th Edition. Rajesh Bhatia. JAYPEE Publisher
5. Powar and Daginawala General Microbiology Vol.I&II (Himalaya Publication)
6. Dubey R. C. and Maheshwari D.K. Text Book of Microbiology, S. Chand Publishe
7. Pelzar, Chan and Kreig, Microbiology 5th edition, TMH Publishe
9. Stainer, Roger et al., General Microbiology
10. Atlas R.A. Microbiology- Fundamental and Applications, Macmillan
13. Alcamo, Fundamentals of Microbiology
14. Purohit, Microbiology fundamentals and applications
15. Davis, Dulbecco, Microbiology
16. Thomas, Clinical Microbiology, University Press, Hyderabad
17. Ramkrishnan, Textbook of Medical Biochemistry University Press, Hyderabad
18. Medical Microbiology and parasitology, Day and Day, Himalaya Publisher
19. Manual of Practical Microbiology and Parasitology, P. Chakrobarty. NCBA, Kolkata

8. David T. Plummer, An Introduction to Practical Biochemistry
9. Curikshank, Medical Microbiology
10. Parasitology, Chatterjee