

ACHARYA NAGARJUNA UNIVERSITY :: NAGARJUNANAGAR-522 510**BIOTECHNOLOGY****SEE: Semester End Examination -**

Semester	Course Code	Title of course	Number of Credits	Number of teaching hrs	Marks		
					Internal	SEE	Total
I	BT 101	Microbiology and cell biology	4	4	25	75	100

ACHARYA NAGARJUNA UNIVERSITY :: NAGARJUNANAGAR-522 510

BIOTECHNOLOGY

B. Sc. Semester Syllabus

Semester based credit

system(CBCS)

B. Sc. Part II – Semester I

BIOTECHNOLOGY

(With effect from academic session 2015-16)

- 1) The examination shall comprise one theory paper, an Internal assessment and a practical, in each semester up to fourth semester. Each theory paper shall be of three hours duration and carry 100 marks. The practical shall be of 6 hours duration and carry 100 marks. Internal assessment shall carry 25 marks.

Theory Paper (Semester end examination, SEE)	75	marks
Practical (Semester end examination, SEE)	75	marks
Internal Assessment theory	25	marks
Internal Assessment practical	25	marks

Total - 200marks per
seven credits
Or 300 marks per 11
credits

- 2) The distribution of marks in practical shall be as follows.

[A] Experiments (SEE)	75	marks
[B] Practical record	10	marks
[C] Viva	05	marks
[D] Internal experiments	10	marks

Total - 100 marks

- 3) The syllabus is based on four theory periods and three practical periods per week. Candidates are required to pass separately in theory, internal assessment and practical examination.
- 4) Students are expected to perform all the practicals mentioned in the syllabus.
- 5) Internal assessment: There shall be two internal assessments based on theory paper for 25 Marks each. The average of the two tests shall made to average of 25 marks. The Internal assessment shall be conducted by the University approved teachers in the relevant subjects. 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.
- 6) At the beginning of each semester, every teacher / department / college shall inform his / her students unambiguously the method teacher / department / college propose to adopt a scheme of marking for internal assessment.
- 7) The internal assessment marks assigned to each theory paper shall be awarded on the basis of attendance / home assignment / class test / Project assignment / seminar / any other innovative practice / activity.
- 8) The concerned teacher / department / college shall have to keep the record of all the above activities till six months after the declaration of result of that semester.
- 9) In the fifth and sixth semesters two theory courses and one practical course shall be opted by the students. The practical course shall consist of experiment of two theory courses.

* * * * *

ACHARYA NAGARJUNA UNIVERSITY :: NAGARJUNANAGAR-522 510

I B. Sc. – Semester I - BT 101 MICROBIOLOGY AND CELL BIOLOGY

UNIT I

History, Development and Microscopy

History and development of microbiology: contributions of Louis Pasteur, Robert Koch and Edward Jenner.

Microscopy: Compound microscopy: Numerical aperture and its importance, resolving power, oil immersion objectives and their significance, principles and applications of dark field, phase contrast, fluorescent microscopy.

Electron microscopy: Principle, ray diagram and applications, TEM and SEM, comparison between optical and electron microscope, limitations of electron microscopy.

Stains and staining procedures: Acidic, basic and neutral stains, Gram staining, Acid fast staining, Flagella staining, Endospore staining.

UNIT II

A. Bacteria:

Bacterial morphology and subcellular structures, general morphology of bacteria, shapes and sizes, generalized diagram of typical bacterial cell.

Slime layer and capsule, difference between the structure, function and the position of the two structures.

Cell wall of gram +ve and Gram -ve cells, Prokaryotic classification.

General account of flagella and fimbriae.

Chromatin material, plasmids; definition and kind of plasmids (conjugative and non-conjugative) F, R, and Col plasmids.

A brief idea Bergey's manual. Morphology of archaea, archaeal cell membrane (differences between bacterial and archaeal cell membrane), other cell structures, concept of the three distinct archaea groups.

B. **Viruses:** General characteristics of viruses, difference between virus and typical microbial cell, structure, different shapes and symmetries with one example of each type, classification of viruses on the basis of nucleic acids, phage and animal cell viruses, example of each and their importance. Brief idea of lytic cycle and lysogeny.

UNIT III

Microbial Nutrition: Basic nutritional requirements: Basic idea of such nutrients as water, carbon, nitrogen, sulfur and vitamins etc., natural and synthetic media, nutritional classification of bacteria. Selective and Differential media, Enriched media, Enrichment media.

UNIT IV: Microbial growth and control:

Growth: Growth rate and generation time, details of growth curve and its various phases.

Concept of synchronous cultures, continuous and batch cultures (chemostat and turbidostat). Measurement of growth.

Physical conditions required for growth: Temperature (classification of microorganisms on the basis of temperature requirements), pH etc. Pure cultures and cultural characteristics. Maintenance of pure culture.

Microbial Control: Terminologies - Sterilization, disinfection, antiseptic, sanitization, germicide, microbistasis, preservative and antimicrobial agents.

Mechanism of cell injury: Damage to cell wall, cell membrane, denaturation of proteins, inhibition of protein synthesis, transcription, replication, other metabolic reactions and change in supercoiling of DNA.

Physical control: Temperature (moist heat, autoclave, dry heat, hot air oven and incinerators), dessication, surface tension, osmotic pressure, radiation, UV light, electricity, ultrasonic sound waves, filtration.

Chemical control: Antiseptics and disinfectants (halogens, alcohol, gaseous sterilization).

Concept of biological control.

UNIT V Cell Biology

Eukaryotic Cell - Structure and function of the following: nucleus, nuclear membrane, nucleoplasm, nucleolus, golgi complex, Mitochondria, Chloroplast, endoplasmic reticulum, lysosomes, peroxisomes, glyoxisomes and vacuoles.

Plant cell wall.

Cytoskeleton (Micro and Macro filaments, microtubules) and cell locomotion. Mitosis and meiosis. Brief idea of cell cycle.

Muscle and nerve cell structure, synaptic transmission and neuromuscular junctions.

ACHARYA NAGARJUNA UNIVERSITY :: NAGARJUNANAGAR-522 510

I B.Sc. SEMESTER PRACTICALS Biotechnology 102 Microbiology & Cell Biology

1. Demonstration, use and care of microbiological equipments.
2. Preparation of media, sterilization and isolation of bacteria.
3. Isolation of Bacteriophage from sewage / other sources.
4. Demonstration of motility of Bacteria.
5. Simple staining of bacteria
6. Gram staining of Bacteria
7. Acid fast staining of Bacteria
8. Endospore staining.
9. Demonstration of starch hydrolysis by bacterial cultures
10. Growth of fecal coliforms on selective media.
11. Isolation of pure culture by pour plate method
12. Isolation of pure culture by streak plate method.
13. Anaerobic cultivation of microorganisms.
14. Cultivation of yeast and moulds.
15. Antibiotic sensitivity assay.
16. Oligodynamic action of metals.
17. To study germicidal effect of UV light on bacterial growth.
18. Stages of mitosis.
19. Stages of meiosis.

Note: - Mandatory to perform at least ten practical.

* * * * *

