DR. BABASAHEB AMBEDKAR MARATHWADA UNIVERSITY,AURANGABAD
B. Sc. I, II & III Year Botany Curriculum
(SEMESTER PATTERN)
Course Structure

	SEMESTER – III		***Credits**	**Lectures**	**Marks**
	Title of Paper				
B. Sc. II	IX	Taxonomy of Angiosperms	3	45	50
	X	Plant Ecology	3	45	50
	XI	Practical based on Paper - IX	1.5	45	50
	XII	Practical based on Paper - X	1.5	45	50
	SEMESTER – IV				
	XIII	Gymnosperms and Utilization of plants	3	45	50
	XIV	Plant Physiology	3	45	50
	XV	Practical based on Paper - XIII	1.5	45	50
	XVI	Practical based on Paper - XIV	1.5	45	50

***Note:** For theory paper: 1credit = 15 periods/lectures,
For Practical paper 1credit = 30 periods/lectures

B. Sc. II Year (Theory)
Semester III
Paper -IX
(Taxonomy of Angiosperms)

(45L)
Credit - 1

Unit :1

1. Salient features, origin and evolution of Angiosperms (03)
2. Bentham and Hooker's system of classification upto series level, its merits and demerits (03)
3. Taxonomy in relation to anatomy, embryology, palynology, ecology and cytology (03)
4. Concept of Binomial Nomenclature and its advantages (02)
5. Concept of genus, species and epithet. (02)
6. Herbaria and Botanical Gardens. (02)

Unit:2 **Credits :2**

Study of the following families: systematic position , salient features, floral formula, floral diagram, common examples and their economic importance (30)

i. Annonaceae
ii. Malvaceae
iii. Leguminosae
    Fabaceae (Papilionaceae)
    Caesalpiniaceae
    Mimosaceae
iv. Apocynaceae
v. Solanaceae
vi. Acanthaceae
vii. Lamiaceae (Labiatae)
viii. Nyctaginaceae
ix. Liliaceae
x. Poaceae (Gramineae)

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B.Sc.II Year(Theory)
Semester - III
Paper - X
(Plant Ecology)

45 L

Unit: 1 **Credit: 1**

Plant and environment:

A)Climatic factors – a) Light as an ecological factor, global radiation and photosynthetically active radiation (02)

b) Temperature as an ecological factor (02)

c) Water as an ecological factor, physicochemical properties of water (03)

B)Edaphic factor –

Soil formation -soil profile, physicochemical properties of soil, major soil types of India, soil erosion and soil conservation (08)

Unit:2 **Credit:1**

1. Response of plants to water

Morphological, physiological and anatomical response of plants to water – hydrophytes, xerophytes, halophytes and epiphytes (12)

2. Phytogeography: (03)

Biogeographical regions of India, vegetation types of India

Unit: 3 **Credit:1**

1. Community ecology:

Community characteristics -frequency, density, life forms, biological spectrum (06)

1. **Ecosystem:**

structure -biotic and abiotic components, food chain, food web, ecological pyramids, energy flow, biogeochemical cycles-nitrogen and phosphorus. (09)

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B.Sc. II year (Practical)
Semester - III
Paper - XI
(Taxonomy of Angiosperms)

45 L
Credits:1.5

Angiosperms:

Study of locally available plants of the following families :

1. Annonaceae
2. Malvaceae
3. Leguminosae
    a) Fabaceae (Papilionaceae)
    b) Caesalpiniaceae
    c) Mimosaceae
4. Apocynaceae
5. Solanaceae
6. Acanthaceae
7. Lamiaceae (Labiatae)
8. Nyctaginaceae
9. Liliaceae
10. Poaceae (Gramineae)

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B.Sc.II year (Practical)
Semester - III
Paper - XII
(Plant Ecology)

45 L
Credit :1.5

1. Study of morphological and anatomical adaptations in hydrophytes – *Hydrilla*, *Eichhornia*, *Typha* and *Nymphaea* .
2. Study of morphological and anatomical adaptations in xerophytes -*Aloe*, *Nerium, Casuarina.*
3. Study of morphological adaptations in halophytes -Pneumatophore, Stilt roots
4. Study of morphological and anatomical adaptations in epiphytes
5. Study of vegetation by quadrat method
6. Estimation of Importance Value Index (IVI) of grassland ecosystem on the basis of relative frequency, relative density and relative abundance.
7. Determination of water holding capacity of different soils
8. Study of meteorological instruments -Rain gauge, Hygrometer, Barometer
9. Determination of percent leaf area injury of different infected leaf samples
10. Estimation of salinity of different water samples
11. Determination of pH of different soils by pH papers/universal indicator/pH meter.

Note for paper XI and XII:

Candidate shall submit the following at the time of practical exams: Certified laboratory record book, Field note book, Tour report and Collection of specimens.

In addition to number of practicals prescribed above, the students are required to undertake field excursions to the places of botanical interest and industrial places under the guidance of teachers. Collection of rare flowering and non flowering plants should be avoided during excursion. There shall be frequent study tours in local areas. T.A. and D.A. be paid to the teachers, peons and field collectors as per university rules. The record book is to be signed periodically by teacher in charge and certified by the Head of Department at the end of the term. Candidate should not be allowed to appear for practical examination without a certified record book or a certificate from the Head of Department.

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B. Sc. II Year (Theory)
Semester - IV
Paper - XIII
(Gymnosperms and Utilization of Plants)

45 L
Credits 1.5

Unit:1
Gymnosperms:

1. Salient features, classification as per Sporne 1965, economic importance (02)
2. Geological time scale, fossilization, types of fossils, *Lyginopteris*, fossil fuels (04)
3. Contributions of Prof. Birbal Sahani (01)
4. Study of morphology, anatomy, reproduction (excluding developmental stages) and graphical representation of life cycle of the following types:
   a) Cycadales – *Cycas* (08)
   b) Coniferales – *Pinus* (08)

Unit:2 **Credits:1.5**
Utilization of Plants:

1. Domestication of plants and their centers of origin (02)
2. History, origin, cultivation, harvesting, improved varieties and economic importance of the following plants: (15)
   i. Food plants – Wheat, Jowar
   ii. Sugar – Sugarcane
   iii. Fibers -Cotton, Jute
   iv. Vegetable oils – Groundnut, Sunflower
   v. Beverages – Tea, Coffee
3. Botanical name, family name and economic importance of the following plants: (05)
   i. Medicinal plants – *Aloe vera, Withania somnifera, Curcuma longa, Vitex negundo*
   ii. Timber and Gum – Teak, Neem, Babul, Sisham
   iii. Cosmetics and Perfumes – Rose, Mogara, Tuberose
   iv. Spices – Clove, Black pepper, Cumin, Coriander, Cinnamon

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B. Sc. II Year (Theory)
Semester IV
Paper XIV
(Plant Physiology)

45 L

Unit:1 **Credit 1**

1. **Plant water relations:**
   a) Diffusion, osmosis, plasmolysis and imbibition (02)
   b) Water absorption and ascent of sap (Transpiration pull theory) (03)
   c) Transpiration – Definition, types -cuticular, lenticular and stomatal, structure of stomata, mechanism of opening and closing of stomata (starch – sugar hypothesis) (02)
2. **Mineral nutrition:**
   a) Macro and microelements: roles and deficiency symptoms of N, P, K, Mg, Ca, Fe, Zn, Bo, Mo.
   b) Mineral uptake – passive (ion exchange theory) and active (carrier concept) (05)
3. **Translocation of solutes:**
   Mass flow hypothesis, protoplasmic streaming theory, Source and sink relationship (03)

Unit:2 **Credits 1**

1. **Enzymes ::**
   Chemical nature – holoenzyme ,apoenzyme, prosthetic group, cofactor and coenzyme, properties , nomenclature, classification basedon type of reactions, mechanism of enzyme action (06)

2. Growth: Definition, Phases of Growth, Sigmoid growth curve. (02)

3.**Growth regulators**:
Discovery, stucture, roles and practical applications of Auxins, Gibberellins, Cytokinins, Abscisic acid and Ethylene (07)

Unit:3 **Credit 1**

1. **Photosynthesis:**
   Definition, ultra structure of chloroplast, photosynthetic pigments, Light reactions -Hill reaction, red drop and Emerson enhancement effect, two pigment systems (PS I, PS II), photophosphorylation – cyclic and noncyclic, Z-scheme; Dark reactions -C3, C4 and CAM pathways (08)
2. **Respiration:**
   Definition, Ultra structure of mitochondria, types of respiration, Glycolysis, TCA Cycle, Electron transport system, alcoholic and lactic acid fermentation. (07)

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B.Sc. II year (Practical)
Semester IV
Paper XV
(Gymnosperms and Utilization of plants)

45L

Credit:1.5

Gymnosperms:

a) Cycas

i. Habit, young leaf, bulbils, male cone, microsporophyll, megasporophyll, pollen grains, mature seed.
ii. Study through permanent slides-Normal root (T.S.). Stem (T.S.), Ovule (L.S.)
iii. Study through hand section-Coralloid root (T.S.), Rachis (T.S.), Leaflet (T.S.)

b) Pinus

i. Habit, long and dwarf shoot, scale leaves, foliage leaves, male cone, female cone, pollengrains (W.M.), winged seed.
ii. Study through hand sections and permanent slides Root (T.S.), Stem (T.S.), Needle (T.S.)
iii. Study through permanent slide - T.L.S. & R.L.S. of stem, L.S. of male cone, L.S. of female cone

Palaeobotany:

a) Types of fossils (Specimens)
b) *Lygynopteris* (Specimen / Permanent slide)

Utilization of plants :

a) Food plants – Study of the morphology, structure,and histochemical tests of food storing tissue in Jowar & Wheat
b) Histochemical test of lignin and cellulose
c) Vegetable oils – hand section of Groundnut & Sunflower Seed and staining of oil droplets by Sudan III
d) Study of the sources of Timber, Gum, Medicinal plants, Cosmotics and Perfumes
e) Study of Black pepper, Clove, Cinnamon, Cumin, Coriander
f) Field notebook, specimen collection, and tour report.

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B.Sc. II year (Practical)
Semester IV
Paper XVI

(Plant Physiology) 45L

Credits:1.5

1. Osmosis by egg membrane and potato osmoscope
2. Plasmolysis in *Tradescantia* leaves
3. Effect of different conc. of organic solvents on membrane permeability
4. Determination of water potential of any tuber
5. Detection of mineral elements in plant ash
6. Digestion of starch by amylase
7. Detection of enzyme activity : oxidase, peroxidase, catalase and dehydrogenase
8. Separation of chloroplast pigments by paper chromatography
9. Demonstration of Hill reaction
10. Effect of different intensities of light on photosynthesis
11. Effect of different colors of light on photosynthesis
12. Fermentation by Kuhnes fermentation vessel
13. Isolation of starch
14. Isolation of pectin
15. Estimation of total and reducing sugars in fruit juice by Fehling solution
16. Separation of amino acids by paper chromatography
17. Effect of IAA and Gibberellins on seed germination

Note for Paper XV and XVI

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