GONDWANA UNIVERSITY, GADCHIROLI

SYLLABUS

For

B. Sc.

BOTANY

Semester I & II

Under

Choice Based Credit System (CBCS)

(With effect from: 2020-21)
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<table>
<thead>
<tr>
<th>SEMESTER – I</th>
</tr>
</thead>
<tbody>
<tr>
<td>Papers</td>
</tr>
<tr>
<td>Paper – I</td>
</tr>
<tr>
<td>Paper – II</td>
</tr>
<tr>
<td>Practical</td>
</tr>
</tbody>
</table>

**Internal Assessment:**
Based on Assignment, Seminar, Unit Test & overall attendance and performance of the student.

<table>
<thead>
<tr>
<th>SEMESTER – II</th>
</tr>
</thead>
<tbody>
<tr>
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</tr>
<tr>
<td>Paper – I</td>
</tr>
<tr>
<td>Paper – II</td>
</tr>
<tr>
<td>Practical</td>
</tr>
</tbody>
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**Internal Assessment:**
Based on Assignment, Seminar, Unit Test & overall attendance and performance of the student.
UNIT – I (12 Periods)

1. General characteristics of life (Growth, metabolism and reproduction).
2. Viruses:
   a) General characteristics and nature of viruses (living and non-living).
   b) Morphology and Structure of T4 phase (DNA virus) and TMV (RNA virus).
   c) Transmission of viruses in plants w.r.t. Grafting, Seeds, Contact, Air and water, Soil, Agricultural tools, Smokers, Store house and Insects.
3. Mycoplasma:
   General characteristics and Structure.
4. Bacteria:
   a) Structure of bacterial cell.
   b) Morphology of bacteria (Bacillus, Coccus, Spirillum and Vibrio).
   c) Economic importance: i) Useful bacteria (Agriculture, Industries and Medicine)
      ii) Harmful bacteria (Pathogenic bacteria, Food spoiling, Food poisoning and Denitrification).

UNIT – II (12 Periods)

Algae
1. General Characters.
5. Classification - G. M. Smith (1955) up to classes.
6. Study of life cycle w.r.t. Systematic position, thallus structure and reproduction of
   a) Nostoc and
   b) Chara.
UNIT – III:  

Fungi  

1. General Characters.  
2. Thallus structure.  
3. Mode of nutrition (Parasites, Saprophytes and Symbionts).  
5. Classification of Fungi - according to G. Ainsworth (1973) upto classes.  
6. Study of life cycle w. r. t. Systematic position, thallus structure reproduction of  
   a) *Mucor* and  
   b) *Puccinia*.  
7. Economic importance w. r. t. Agriculture, Industries, Food and Medicine. 

UNIT – IV  

1. Lichens:  
   a) Definition and General Characters.  
   b) Types - Crustose, Foliose and Fruticose.  
   c) Ecological importance and Economical importance w.r.t. Agriculture, Industries,  
      Food and Medicine. 
2. Plant Pathology:  
   a) Classification of plant diseases based on pathogens (viral, bacterial and fungal).  
   b) Plant diseases caused by –  
      i. Viruses- w.r.t. Leaf curl of Papaya (Symptoms, Causal organism and Control  
         measures).  
      ii. Bacterial- Bacterial blight of cotton (Symptoms, Causal organism and  
         Control measures).  
      iii. Fungal- Red rot of Sugarcane (Symptoms, Causal organism- *Colletotrichum  
         falcatus* and Control measures).  

Note: Developmental stages not expected. 

Note: Student activates like seminars, quiz, debate, assignments, field work, study Project and  
      models etc. are part of curriculum for all units. 

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UNIT – I

Bryophyta

1. General characteristics w.r.t. Habit, Habitat, Gametophytes, Reproduction and Sporophyte.
2. Adaptations to land habit.
3. Range of thallus organization w.r.t. Morphology and Anatomy.
4. Classification as per G. M. Smith (up to order).
5. Morphology, reproduction and life cycle of following type.
   a) Riccia (Hepaticopsida) and
   b) Funaria (Bryopsida)

UNIT – II

Pteridophytes

1. General characteristics w.r.t. Habit, Habitat, Sporophyte and Reproduction.
2. Classification of Pteridophytes according to G. M. Smith (1955) upto classes.
4. Morphology, anatomy, reproduction and life cycle of following type.
   a) Equisetum and
   b) Marsilea
5. Types of stele.
6. Ecological and Economical importance w.r.t. Food, Soil binding, Scouring, Nitrogen fixation, Medicines, Ornamentals etc.
UNIT – III

Gymnosperm

1. General characteristic w.r.t. Habitat, Habitat, Morphological features of sporophyte and Reproduction.

2. Classification of Gymnosperms by K. R. Sporne upto order with suitable examples.

   a) Cycas and
   b) Pinus

4. Economic importance w.r.t. Food value, Medicinal value, Timber value, Source of oil, Industrial value, Ornamental value and other uses.

UNIT – IV:

Paleobotany:

1. Definition, importance and significance.

2. Contributions of Indian Paleobotanists-Birbal Sahni.

3. The process of fossilization (Replacement theory, Infiltration theory)

4. Types of fossils:
   a) Impression,
   b) Compression and
   c) Petrification.

5. Fossil gymnosperms w.r.t. Morphology and Reproductive structure of following
   a) Glossopteris (Pteridospermatophyta) and
   b) Cycadeoidea (Cycadopsida)


Note: Developmental stages not expected.

Note: Student activates like seminars, quiz, debate, assignments, field work, study Project and models etc. are part of curriculum for all units.

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B.Sc. BOTANY
SEMESTER – I

REFERENCE BOOKS

4. Bhatia, K.N. Algae R. Chand & Co
   New Delhi
27. Sharma, O. P. : Fungi (TMH)
37. Sporne, K. R. J : The Morphology of Bryophytes (Hutchinson University, London)

***************
Make use of the permanent micro-preparation, temporary mounts, transparencies, photographs, charts etc.

1) Study of construction and working principle of Compound and Dissecting microscopes.

2) Study of various bacterial forms w.r.t. Cocci, Bacillus, Spirillum and Vibrio.

3) To perform Gram staining of Bacteria.

4) Study of Cyanobacteria w.r.t. systematic position, structures and Identification and Classification with reasons. e.g. *Nostoc*:
   i. Specimen of *Nostoc* Ball,
   ii. Mounting of thallus: Colony, Trichome & filament and
   iii. Cell structure.

5) Study of various forms of Algae: w.r.t. systematic position, structures and Identification & Classification with reasons.
   a) *Chara*:
      i. Mounting of thallus (Vegetative) and
      ii. Mounting of Reproductive Structures: Globule and Nucule.
   b) *Vaucheria*:
      i. Mounting of thallus (Vegetative),
      ii. Gongrosira stage (permanent slides) and
      iii. Stage in sexual reproduction (permanent slides).
   c) *Ectocarpus*:
      i. Mounting of thallus (Vegetative) and
      ii. Mounting of Reproductive Structures: Unilocular and Plurilocular sporangium
   d) *Batrachospermum*:
      i. Mounting of thallus (Vegetative) and
      ii. Mounting of Reproductive Structures: glomerule with carposporangium.

6) Study of various forms of Fungi w.r.t. systematic position, structures and Identification & Classification with reasons.
   a) *Albugo*:
      i. External features,
      ii. Asexual phase section/ temporary mounts and
      iii. Sexual structures through permanent slides.
   b) *Mucor*:
      i. External features,
      ii. Asexual phase section/ temporary mounts and
      iii. Sexual structures through permanent slides.
   c) *Penicillium*:
      i. External features,
      ii. Asexual phase section/ temporary mounts and
      iii. Sexual structures through permanent slides.
d) *Puccinia*:
   i. External features,
   ii. Asexual phase section/ temporary mounts and
   iii. Sexual structures through permanent slides.

7) **Study of different types of Lichens**: i) Crustose, ii) Foliose and iii) Fruticose.

8) **Study of different Plant Diseases**:
   a) **Viral Disease**:  
      Mosaic disease of Tobacco (TMV)
   b) **Fungal Disease**:  
      i. Red rot of Sugarcane (*Colletotrichum falcatum*),
      ii. Brown spot of rice (*Helminthosporium oryzae*) and
      iii. Loose smut of wheat (*Ustilago tritici*).
   c) **Bacterial disease**:  
      Bacterial Blight of Cotton (*Xanthomonas campestris*)

9) **Study of different forms of Bryophytes** w.r.t. systematic position, structures and Identification & Classification with reasons.
   a) **Riccia**:
      i. External morphology,
      ii. Mounting of rhizoids & scales,
      iii. T. S. of Thallus,
      iv. V. S. of antheridia (Permanent Slide),
      v. V.S. of archegonia (Permanent Slide) and
      vi. V.S. of sporophyte (Permanent Slide).
   b) **Funaria**
      i. External morphology,
      ii. T. S. of axis (Permanent Slide),
      iii. V.S. antheridial head (Permanent Slide),
      iv. V.S. of archegonial head (Permanent Slide) and
      v. V.S. of Capsule (Permanent Slide).

10) **Study of different forms of Pteridophytes** w.r.t. systematic position, structures and Identification & Classification with reasons.
    a) **Equisetum**:
       i. External morphology,
       ii. T. S. stem,
       iii. Mounting of sporangia,
       iv. V. S. of Strobilus (Permanent Slide) and
       v. V. S. of Strobilus (Permanent Slide).
    b) **Marsilea**
       i. External morphology,
       ii. T. S. rhizome,
       iii. Mounting of sporangia,
       iv. V. T. S. of the sporocarp (Permanent Slide),
       v. V.L.S. of the sporocarp (Permanent Slide) and
       vi. H.L.S. of the sporocarp (Permanent Slide).

11) **Study of different forms of Gymnosperms** w.r.t. systematic position, structures and Identification & Classification with reasons.
    a) **Cycas**:
       i. T. S. of Rachis,
       ii. T. S. of leaflet,
iii. Male cone, microsporophyll (Permanent Slide) OR Specimen,  
iv. Female cone, megasporophyll(Permanent Slide) OR Specimen and  
v. V. S. of Ovule (Permanent Slide).  

b) *Pinus* :  
i. T. S. of Needle,  
ii. T. S. of Stem – dwarf shoot (Section/Permanent Slide),  
iii. Male cone, microsporophyll (Permanent Slide OR Specimen),  
iv. Pollen grain (Permanent Slide),  
v. Female cone, megasporophyll (Permanent Slide) OR Specimen and  
vi. V. S. of Ovule (Permanent Slide).  

12) Study of different types of fossil:  
i. Impression (Specimen)  
ii. Compression (Specimen) and  
iii. Petrification (Specimen)   

13) Study of fossil Gymnosperms:  
i. *Glossopteris* (Specimen) and  
ii. *Cycadeoidea* (Specimen)  

14) Spotting:  
a) Algae (two from each genus mentioned),  
b) Fungi (two from each genus mentioned),  
c) Lichens,  
d) Plant Pathology,  
e) Bryophyta (two from each genus mentioned),  
f) Pteridophyta (two from each genus mentioned),  
g) Gymnosperms (two from each genus mentioned) and  
h) Fossils.  

Submission:  
1. Two Diseased Plant parts.  
2. Tour report duly signed by HOD.  

Note: *Short or long excursion tour and visit to any botanical garden is compulsory.*  

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GONDWANA UNIVERSITY, GADCHIROLI
CBCS Semester Pattern Syllabus
SEMESTER – I
PRACTICAL
Based on Theory Paper - I & II of Semester – I

[Time 5 Hours] [Max. Marks – 30]

Que. 1: To stain given Bacterial strain/Cyanobacterial material [A] and identify. [Writing not necessary] 02 M

Que. 2: To prepare temporary mount of given Algal material [B] and identify and classify with diagnostic characters. [Slide preparation 2 marks, writing 1 mark]. 03 M

Que. 3: To prepare temporary mount of given Fungal material [C] and identify and classify with diagnostic characters. [Slide preparation 2 marks, writing 1 mark]. 03 M

Que. 4: To prepare temporary mount of given Bryophytic material [D] and identify and classify with diagnostic characters. [Slide preparation 2 marks, writing 1 mark]. 03 M

Que. 5: To prepare temporary mount of given Pteridophytic material [E] and identify and classify with diagnostic characters. [Slide preparation 2 marks, writing 1 mark]. 03 M

Que. 6: To prepare temporary mount of given Gymnospermic material [F] and identify and classify with diagnostic characters. [Slide preparation 2 marks, writing 1 mark]. 03 M

Que. 7: SPOTTING: 07 M
- SPOT-G: Algae
- SPOT-H: Fungi/ Lichens
- SPOT-I: Plant Pathology
- SPOT-J: Bryophyta
- SPOT-K: Pteridophyta
- SPOT-L: Gymnosperms
- SPOT-M: Fossils

Que. 8: 02 M
- Viva-voce.
- Practical Record.
- Excursion Report & diseased plant parts submission.

NOTE: Well labeled diagrams are expected wherever necessary.

**********
Note: 1) All questions are compulsory and carry equal marks.
   2) Draw well labelled diagram where ever necessary.

[Time 3 Hours] [Max. Marks – 50]

Question 1. Based on Unit - I

   a) Unit – I
   b) Unit – I
   OR
   c) Unit – I
   d) Unit – I
   e) Unit – I
   f) Unit – I

   \[ 05 \times 2 = 10 \]

   \[ 2\frac{1}{2} \times 4 = 10 \]

Question 2. Based on Unit - II

   a) Unit – II
   b) Unit – II
   OR
   c) Unit – II
   d) Unit – II
   e) Unit – II
   f) Unit – II

   \[ 05 \times 2 = 10 \]

   \[ 2\frac{1}{2} \times 4 = 10 \]

Question 3. Based on Unit - III

   a) Unit – III
   b) Unit – III
   OR
   c) Unit – III
   d) Unit – III
   e) Unit – III
   f) Unit – III

   \[ 05 \times 2 = 10 \]

   \[ 2\frac{1}{2} \times 4 = 10 \]

Question 4. Based on Unit - IV

   a) Unit – IV
   b) Unit – IV
   OR
   c) Unit – IV
   d) Unit – IV
   e) Unit – IV
   f) Unit – IV

   \[ 5 \times 2 = 10 \]

   \[ 2\frac{1}{2} \times 4 = 10 \]
Question 5. Write answers to any ten questions in one or two lines only
(Diagrams are NOT necessary)

1 x 10 = 10

a. Unit - I
b. Unit - I
c. Unit - I
d. Unit - II
e. Unit - II
f. Unit - II
g. Unit - III
h. Unit - III
i. Unit - III
j. Unit - IV
k. Unit - IV
l. Unit - IV

************
Vegetative Morphology of Angiosperm

   ii. Weak forms w.r.t. Creepers, Trailers and Climbers.

2. Root: i. General characters and functions.
   ii. Types of root system – a) Tap and b) Adventitious (Fibrous, Foliar and Prop)
   iii. Modified root -
      A) Tap root system w.r.t.
         a) Food storage (Fusiform, Conical and Napiform),
         b) Nitrogen fixation (Nodulated roots) and
         c) Respiration (Respiratory roots).
      B) Adventitious roots system w.r.t.
         a) Food storage (Tuberous, Fasciculated, Moniliform & Nodulose) and
         b) Mechanical strength (Prop, Stilt, Climbing and Butteress).

   ii. Modification of stem w.r.t.
      a) Underground (Rhizome, Bulb and Tuber),
      b) Sub-aerial (Runner, Sucker and Offset) and
      c) Aerial (Stem tendrils, Thorns and Phylloclades)

4. Leaf: i. Parts of foliage leaf w.r.t. Hypopodium, Mesopodium and Epipodium.
   ii. Venation w.r.t Definition and types.
   iii. Types of leaves w.r.t.
      a) Simple and
      b) Compound-i) Palmately compound & its types
         ii) Pinnately compound & its types
   iv. Modification of leaves w.r.t. Storage, Leaf tendrils, Leaf spines, Phyllode, and
         Insect catching.
   v. Phyllotaxy w.r.t Definition and types (Alternate, Opposite and Whorled).
Reproductive Morphology of Angiosperm

1. Inflorescence: Definition and Types w.r.t.
   a) Racemose (Raceme, Spike and Umbel),
   b) Cymose (Uniparous, Biparous and Multiparous) and
   c) Special (Cyathium, Verticillaster and Hypanthodium).

2. Flower: Parts and functions of typical flower.


5. Corolla and its forms w.r.t
   a) Polypetalous (Cruciform, Caryophyllaceous and Papilionaceous) and
   b) Gamopetalous (Tubular, Infundibuliform and Bilabiate).

6. Aestivation: Definition and types (Valvate, Twisted, Imbricate, Quincuncial and Vexillary)

7. Androecium:
   a) Anther filament relationship: Basifixed, Adnate, Dorsifixed and Versatile.
   b) Cohesion of stamens (Monadelphous, Syngenesious and Synandrous) and
   c) Adhesion of stamens (Epipetalous, Epitepalous and Gynandrous).

8. Gynoecium:
   a) Types w.r.t Monocarpous and Multicarpous (Apocarpous and Syncarpous).
   b) Types of placentation (Marginal, Axile, Parietal and Basal).

9. Types of fruits:
   A. Simple Fruits
      i) Dry Fruits -a) Dehiscent Fruits (Legume and Follicle) and
         b) Indehiscent Fruits (Caryopsis and Achene).
      ii) Fleshy Fruits -(Drupe and Berry).
   B. Aggregate Fruits (Etaerio of achenes and Etaerio of berries).
   C. Composite Fruits (Sorosis).
UNIT – III  

Anatomy

1. Meristems:
   a) **Classification** (Based on origin and position).
   b) **Root apical Meristem** (Newman’s Theory).
   c) **Shoot apical Meristem** (Tunica-Carpus Theory).

2. **Tissue: Types** w.r.t. structure and function.
   a) **Simple** (Parenchyma, Collenchyma and Sclerenchyma),
   b) **Complex** (Xylem and Phloem) and
   c) **Secretary** (Secretary Cells, Glands and Laticiferous tissue)

3. **Tissue Systems**: Epidermal and Ground or Fundamental.

4. **Cambium**: Structure and function.

5. **Vascular Bundle: Types** w.r.t. Radial, Concentric and Conjoint.

6. **Periderm**: Structure and function.

UNIT – IV  

Anatomy

1. **Primary Structure of Dicotyledons** (e.g. Sunflower) w.r.t.
   a) **Root**,  
   b) **Stem** and  
   c) **Leaf**.

2. **Primary Structure of Monocotyledons** (e.g. Maize) w.r.t.
   a) **Root**,  
   b) **Stem** and  
   c) **Leaf**.

3. **Secondary structure**: Dicot stem e. g. *Moringa*.

4. **Anomalous secondary structure in stem**: e.g.
   a) **Boerhaavia** and  
   b) **Dracaena**.

5. **Anomalous secondary structure in root**: e.g. *Beta vulgaris* (Beet).
UNIT – I  

Taxonomy:

1. **Angiosperms**: Origin (Bennettitalean Theory).
2. **Fossil Angiosperms**:
   a) Flower - *Sahnianthus* and  
   b) Fruit - *Enigmocarpus*
3. Example of primitive angiosperm – *Magnolia*
4. Definition, Scope and Importance of taxonomy.
5. **Numerical Taxonomy** w.r.t. Definition, Advantages and Application.
6. **Modern trends in Taxonomy** - Taxonomic evidences from  
   a) Palynology  
   b) Cytology and  
   c) Phytochemistry.
7. **Botanical Nomenclature**:
   a) Principles.  
   b) **Taxonomic Ranks**: Major Categories.  
   c) Principle of priority.  
   d) **Typification** (Nomenclatural type, Holotype, Isotype, Paratype,  
       Lectotype, Syntype and Neotype).

UNIT – II  

Taxonomy:

1. **Binomial nomenclature** w.r.t Definition, rules and example.  
2. **Types of Classification**.  
   a) Artificial  
   b) **Natural** and  
   c) **Phylogenetic** (Definition and example)  
3. **Plant classification**:
   a) Theophrastus's system  
   b) Linnaeus's system  
   c) **Bentham & Hooker's system** w.r.t outline, merits and demerits.
4. Botanical Gardens
   a) Definition and Functions.
   b) Special Features of Following:
      i) Indian Botanical Garden, Kolkata and

5. Herbarium Techniques:
   a) Classical (steps and importance) and
   b) Virtual (Digital) w.r.t. Equipment needed, merits and demerits.

UNIT – III (12 Periods)

1. Diversity of flowering plants: w.r.t. systematic position, vegetative characters, reproductive characters and economic importance (at least 5 plant species from each family).

Dicotyledonous families
   a. Brassicaceae w.r.t Brassica campestris.
   b. Malvaceae w.r.t. Hibiscus rosa-sinensis.
   c. Fabaceae w.r.t. Pisum sativum.
   d. Solanaceae w.r.t. Datura stramonium.

UNIT – IV (12 Periods)

1. Diversity of flowering plants: w.r.t. systematic position, vegetative characters, reproductive characters and economic importance (at least 5 plant species from each family).

A) Dicotyledonous families
   a. Asclepiadaceae w.r.t Calotropis procera.
   b. Asteraceae w.r.t. Tridax procumbens.

B) Monocotyledonous family
   a. Liliaceae w.r.t. Allium cepa.
   b. Poaceae w.r.t. Triticum vulgare.
B.Sc. BOTANY
SEMESTER – II

REFERENCE BOOKS

7. Dutta, A. C. – College Botany
22. Naik, V. N. – Taxonomy of Angiosperm
25. Pandey P. B. Economic Botany, S. Chand & Co.,

********************
Make use of the permanent micro-preparation, temporary mounts, transparencies, photographs, charts etc.

1) **Study of Vegetative Morphology of Angiosperms**:
   a. **Root**:
      i. Type (Tap and Adventitious) and
      ii. Modifications (as per theory syllabus)
   b. **Stem**: Modifications (as per theory syllabus).
   c. **Leaves** :
      i. Parts,
      ii. Type (as per theory syllabus),
      iii. Phyllotaxy (as per theory syllabus),
      iv. Venation (as per theory syllabus) and
      v. Modification (as per theory syllabus).

2) **Study of Reproductive Morphology of Angiosperms**:
   a. **Inflorescence**: Types (as per theory syllabus).
   b. **Flower** :
      i. Types (as per theory syllabus) and
      ii. Parts of flower
   c. **Androecium**:
      i. Anther filament relationship (as per theory syllabus).
      ii. Cohesion of stamens (as per theory syllabus) and
      iii. Adhesion of stamens (as per theory syllabus).
   d. **Gynoeceum**:
      i. Types (as per theory syllabus).
      ii. Types of placentation (as per theory syllabus).
   e. **Fruit**: Types (as per theory syllabus).

3) **Study of types of tissues**: Parenchyma, Collenchyma and Sclerenchyma (Permanent Slides).

4) **Study of Anatomy of primary structure in following**: w.r.t. preparation of permanent slides.
   i. Dicot : Root, stem & leaf e.g. Sunflower or other Dicot plant and
   ii. Monocot : Root, stem & leaf e.g. Maize

5) **Study of Anatomy of secondary structure in Dicot stem** w.r.t. preparation of permanent slides e.g. *Moringa*

6) **Study of Anomalous secondary growth in stems** w.r.t. preparation of permanent slides  i) *Boerhaavia* and ii) *Dracaena*

7) **Study of Anomalous secondary growth in root** w.r.t. *Beta vulgaris* (Permanent Slide only)

8) **Study of fossil Angiosperms** w.r.t. Flower- *Sahnianthus* and Fruit- *Enigmocarpum*
9) How to describe an angiospermic plant in technical language.

10) Study of locally available plants belonging to families included in the syllabus (at least one genus from each family included in theory syllabus) w.r.t.
   i. Morphological characters,
   ii. reproductive characters,
   iii. floral formula,
   iv. floral diagram and
   v. systematic position with reasons

11) To construct/compose Virtual (Digital) herbarium of plant resources available in the area. (at least two plants from each family prescribed in theory syllabus).

12) Spotting
   i. Vegetative morphology of angiosperms
   ii. Reproductive morphology of angiosperms
   iii. Fossil angiosperms
   iv. Anatomy

Submission:
1. Tour report duly signed by HOD.
2. Permanent slides (anatomy).
3. Digital herbarium (soft copy to dedicated email address).

Note:
1. Short or long excursion tour and visit to any botanical garden is compulsory.
2. The teacher should prevent students from collecting plants from the wild and submitting for practical examination, instead the students should asked to prepare the field report [photographic evidences].
3. Teachers are suggested to make a dedicated e-mail account for the submission of virtual (Digital) herbarium.

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<thead>
<tr>
<th>Question</th>
<th>Description</th>
<th>Marks</th>
</tr>
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<tbody>
<tr>
<td>Que. 1</td>
<td>To describe vegetative morphology of given Angiospermic plant material [A].</td>
<td>02 M</td>
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<tr>
<td>Que. 2</td>
<td>To describe Reproductive morphology of given Angiospermic plant material [B].</td>
<td>02 M</td>
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<tr>
<td>Que. 3</td>
<td>To prepare double stained permanent mount of the given Angiosperm material [C] and identify giving diagnostic characters. [Slide preparation 3 marks, writing 2 mark]</td>
<td>05 M</td>
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<tr>
<td>Que. 4</td>
<td>To describe given angiospermic plant [D] in technical language (vegetative and reproductive characters only) &amp; identify with reasons upto family level.</td>
<td>05 M</td>
</tr>
<tr>
<td>Que. 5</td>
<td>To draw floral diagram and write floral formula of the given flower [E]. [T.S. of ovary 1 marks, Floral diagram 2 marks, and Floral formula 1 mark]</td>
<td>04 M</td>
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<tr>
<td>Que. 6</td>
<td>SPOTTING:</td>
<td>04 M</td>
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<tr>
<td></td>
<td><strong>SPOT- F</strong>: Vegetative morphology of angiosperms</td>
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<td><strong>SPOT-G</strong>: Reproductive morphology of angiosperms</td>
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<td><strong>SPOT- H</strong>: Fossil angiosperms</td>
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<td></td>
<td><strong>SPOT-I</strong>: Anatomy</td>
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<tr>
<td>Que. 7</td>
<td>Viva-voce</td>
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<td>Practical Record</td>
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<tr>
<td></td>
<td>Excursion Report and slide submission (Anatomy)</td>
<td>02 M</td>
</tr>
<tr>
<td></td>
<td>Digital Herbarium</td>
<td>02 M</td>
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**NOTE:** Well labeled diagrams are expected wherever necessary.

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### GONDWANA UNIVERSITY, GADCHIROLI
CBCS Theory Question Paper Pattern
For
B.Sc. BOTANY SEMESTER – II
Theory

**Note:** 1) All questions are compulsory and carry equal marks.
2) Draw well labelled diagram where ever necessary.

<table>
<thead>
<tr>
<th>Question 1. Based on Unit - I</th>
<th>[Max. Marks – 50]</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) Unit – I</td>
<td>05 x 2 = 10</td>
</tr>
<tr>
<td>b) Unit – I</td>
<td></td>
</tr>
<tr>
<td><strong>OR</strong></td>
<td></td>
</tr>
<tr>
<td>c) Unit – I</td>
<td>2½ x 4 = 10</td>
</tr>
<tr>
<td>d) Unit – I</td>
<td></td>
</tr>
<tr>
<td>e) Unit – I</td>
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<tr>
<td>f) Unit – I</td>
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<table>
<thead>
<tr>
<th>Question 2. Based on Unit - II</th>
<th>[Max. Marks – 50]</th>
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<tbody>
<tr>
<td>a) Unit – II</td>
<td>05 x 2 = 10</td>
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<td>b) Unit – II</td>
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<tr>
<td><strong>OR</strong></td>
<td></td>
</tr>
<tr>
<td>c) Unit – II</td>
<td>2½ x 4 = 10</td>
</tr>
<tr>
<td>d) Unit – II</td>
<td></td>
</tr>
<tr>
<td>e) Unit – II</td>
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<td>f) Unit – II</td>
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<thead>
<tr>
<th>Question 3. Based on Unit - III</th>
<th>[Max. Marks – 50]</th>
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<td>b) Unit – III</td>
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<tr>
<td><strong>OR</strong></td>
<td></td>
</tr>
<tr>
<td>c) Unit – III</td>
<td>2½ x 4 = 10</td>
</tr>
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<td>d) Unit – III</td>
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<td>e) Unit – III</td>
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<td>f) Unit – III</td>
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<table>
<thead>
<tr>
<th>Question 4. Based on Unit - IV</th>
<th>[Max. Marks – 50]</th>
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<tbody>
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<td>5 x 2 = 10</td>
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<td>b) Unit – IV</td>
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<tr>
<td><strong>OR</strong></td>
<td></td>
</tr>
<tr>
<td>c) Unit – IV</td>
<td>2½ x 4 = 10</td>
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<td>d) Unit – IV</td>
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<tr>
<td>e) Unit – IV</td>
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<tr>
<td>f) Unit – IV</td>
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</tr>
</tbody>
</table>
Question 5. Write answers to any ten questions in one or two lines only
(Diagrams are NOT necessary)

\[ 1 \times 10 = 10 \]

a. Unit - I
b. Unit - I
c. Unit - I
d. Unit - II
e. Unit - II
f. Unit - II
g. Unit - III
h. Unit - III
i. Unit - III
j. Unit - IV
k. Unit - IV
l. Unit - IV

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