



KARNATAKA STATE AKKAMAHADEVI WOMEN'S UNIVERSITY, VIJAYAPURA

Syllabus for B.Sc. Optional Botany
(Semester Scheme) with effect from
2018-19 and onwards

I and II semester syllabus Approved in BoS (UG) Biotechnology dated 14-05-2018
III and IV semester syllabus Approved in BoS (UG) Biotechnology dated 11-06-2019
V and VI semester syllabus Approved in BoS (UG)Biotechnology dated 10-02-2020



KARNATAKA STATE AKKAMAHADEVI WOMEN'S UNIVERSITY, VIJAYAPURA

New syllabus of B.Sc. Botany Optional Subject, I, II, III, IV, V and VI semesters, w.e.f. 2018-19 and onwards

| Subject Code | Subject Title | Teaching Scheme | | Examination | | | |
|--|--|-----------------|-----------|----------------------|-------------------|----|-------|
| | | Hrs/week | | Exam. Duration (Hrs) | Marks | | |
| | | Theory | Practical | | Theory/ Practical | IA | Total |
| BSc I Semester (w.e.f. 2018-19 and onwards) | | | | | | | |
| BSBOT 01 | Viruses, Bacteria, Cyanobacteria, Algae, Fungi, Lichens And Plant Pathology | 4 | -- | 3 | 60 | 10 | 070 |
| | BSBOT 01: PRACTICALS (Based on BSBOT 01) | -- | 6 | 3 | 20 | 10 | 030 |
| BSc II Semester (w.e.f. 2018-19 and onwards) | | | | | | | |
| BSBOT 02 | Bryophytes , Pteridophytes , Paleobotany and Gymnosperms. | 4 | -- | 3 | 60 | 10 | 070 |
| | BSBOT 02: PRACTICALS (Based on BSMB 02) | -- | 6 | 3 | 20 | 10 | 030 |
| BSc III Semester (w.e.f. 2019-20 and onwards) | | | | | | | |
| BSBOT 03 | Morphology, Taxonomy of Angiosperms and Economic Botany | 4 | -- | 3 | 60 | 10 | 070 |
| | BSBOT 03: PRACTICALS (Based on BSBOT 03) | -- | 6 | 3 | 20 | 10 | 030 |
| BSc IV Semester (w.e.f. 2019-20 and onwards) | | | | | | | |
| BSBOT 04 | Ecology, Environmental Biology, Conservation and Management of plant resources | 4 | -- | 3 | 60 | 10 | 070 |
| | BSBOT 04: PRACTICALS (Based on BSBOT 04) | -- | 6 | 3 | 20 | 10 | 030 |
| BSc V Semester (w.e.f. 2020-21 and onwards) | | | | | | | |
| BSBOT 051 | Plant Anatomy, Plant Breeding And Propagation And Evolution | 4 | -- | 3 | 80 | 20 | 100 |
| BSBOT 052 | Cytology, Genetics and Biostatistics | 4 | -- | 3 | 80 | 20 | 100 |
| BSBOT 053 | BSPR 05: PRACTICALS based on BSBOT 051 and BSBOT 052 | -- | 6 | 3 | 80 | 20 | 100 |
| BSc VI Semester (w.e.f. 2020-21 and onwards) | | | | | | | |
| BSBOT 061 | Palynology and Biotechnology | 4 | -- | 3 | 80 | 20 | 100 |
| BSBOT 062 | Plant Physiology and Phytochemistry | 4 | -- | 3 | 80 | 20 | 100 |
| BSBOT 063 | BSBOT 06: PRACTICALS (Based on BSBOT 061 and BSBOT 062) | -- | 6 | 3 | 80 | 20 | 100 |

BSc I SEMESTER

| | |
|---------------------------|--|
| BSBT 01 | VIRUSES, BACTERIA, CYANOBACTERIA, ALGAE, FUNGI, LICHENS AND PLANT PATHOLOGY |
| Teaching: 4Hrs/week | Exam. Marks: 60 |
| Total Teaching Hours : 56 | IA Marks : 10 |

UNIT-I: Aim and Scope of Microbiology:

7 Hrs

Viruses: History & Discovery – Characteristics of Viruses, Structure of T.M.V. and Bacteriophage (T-Phase)-Viral disease (papaya leaf curl) (PCLV)

UNIT-II

5 Hrs

Bacteria: Occurrence of Bacteria in air water and soil, Cell structure, Plasmids, Reproduction, Economic importance of Bacteria (Useful and Harmful aspects). Bacterial disease –Citrus canker.

UNIT-III:

6 Hrs

Cyanobacteria : A general account, a occurrence, reproduction, Economic importance, Type study of Gloeotrichia and Scytonema.

UNIT-IV

22 Hrs.

Phycology (Algae): General account, Habitat, Thallus Structure, pigments, pyrenoids, Reproduction and Classification (According to Fristch). Study of structure, reproduction and life cycles of the following. Chlorophyceae: Volvox, Oedogonium and Chara. Xanthophyceae: - Vaucheria. Bacillariophyceae: Diatoms (Pinnate) Phaeophyceae: Sargassum. Economic importance of Algae in general (Algal bloom, diatomaceous earth, Agar-Agar)

UNIT-V

10 Hrs

Mycology (Fungi): General character, classification (According Alexopolus) structure and reproduction of the following. Albugo, Penicillium , Puccinia graminis and Cercospora.

UNIT-VI

5 Hrs

Lichens: Structure, reproduction and economic importance of lichens.

UNIT-VII

5 Hrs

Plant Pathology: Symptoms, casual organisms and control measures of the following diseases.

- 1) Red rot of sugarcane
- 2) Wilt of pigeon pea.
- 3) Grain smut of Sorghum.

References

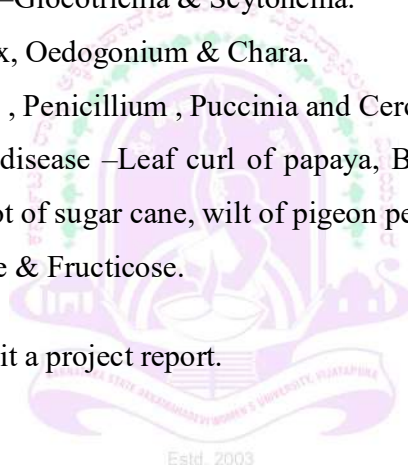
- 1) A text Book of Botany – Singh, Jain & Pandey.
- 2) Microbiology & Plant pathology – P.D.Sharma
- 3) College Botany for Degree Students – B.P.Pandey.
- 4) Introduction to plant Viruses – C.L.Mandhar.
- 5) Fungi & Lichens – Vasista.
- 6) Text Book of Botany Voll to V. –Ajantha Chadda and S.N.Pandey.

- 7) Mushroom Growity Agro Bios – Jodhpur.
- 8) Bryophyta _ Vashista & others.
- 9) Fungi – S.Chopra
- 10) Algae – Sunder Rajan.
- 11) Botany Vol.II – Gangulee & Kar.

| BSBOT 01 | Practicals | |
|-----------------------|-------------------|---------------|
| Practical: 6 Hrs/week | Exam. Marks: 20 | IA Marks : 10 |

- 1) Mounting techniques – Mounting of Algae and Fungi
- 2) Gram staining of bacteria.
- 3) Study of Cyanobacteria –Gloeotrichia & Scytonema.
- 4) Study of Algae – Volvox, Oedogonium & Chara.
- 5) Study of Fungi –Albugo , Penicillium , Puccinia and Cercospora.
- 6) Plant pathology _Viral disease –Leaf curl of papaya, Bacterial disease; Citeres canker,
“Fungal disease - Red rot of sugar cane, wilt of pigeon pea.
- 7) Study of lichens: Foliose & Fruticose.

Note: Every student must submit a project report.



MODEL BOTANY QUESTION PAPER OF B.SCI SEM. PRATICAL EXAMINATION
Time : 02 Hrs. Max. Marks: 30

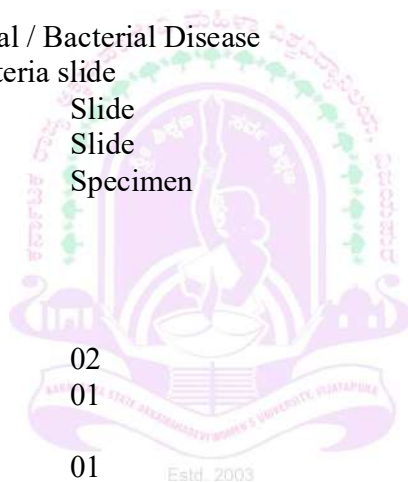
| | |
|--|------------------|
| 1) Stain and Mount the Speciman 'A' Write the Procedure (flow chart only) & Identify with reasons (Leave the preparation for evaluation).. | 06 |
| 2) Identify and classify the specimans B, C & D with reasons. | 04 |
| 3) Identify the disease 'E' mention the casual organism with symptoms. | 02 |
| 1) Identify the slides specimen F, G, H & I Write the critical notes. | 08 |
| 2) Record Book. | 05 |
| 3) Project Report. | 05 |
| Total | <u>30</u> |

Scheme of Examination :-

| | | |
|------|-----|---------------------------------|
| Q.1 | A - | Gram Staining of Bacteria. |
| Q.2 | B - | Cynobacteria. |
| | C - | Algae |
| | D - | Fungi |
| Q.3 | E - | Plant Viral / Bacterial Disease |
| Q.4 | F - | Cynobacteria slide |
| | G- | Algae Slide |
| | H- | Fungi Slide |
| | I - | Lichen Specimen |
| Q.05 | | Record Book. |
| Q.06 | | Project Report. |

Scheme of Evaluation :

| | | | | |
|------|--|-------|---------|------------------|
| Q.1 | Preparation | 02 | | |
| | Procedure (Flow chart) | 01 | | |
| | Identification With reasons Sketch & label | 01 | | 04 |
| Q. 2 | Identification -1/2 Classification 1/2 Reason with Sketch & label For each | 01 | Each 2 | 06 |
| Q.3 | Identification - 1/2 Causal organism Symptoms with Sketch & label | 1.1/2 | | 02 |
| Q.4 | Identification 1/2 Reasons Sketch & label | 1.1/2 | Each 02 | 08 |
| Q.5 | Record Book | | | 05 |
| Q.6 | Project Report | | | 05 |
| | Total | | | <u>30</u> |



THEORY MODEL QUESTION PAPER

BSBOT01: Viruses, Bacteria, Cyanobacteria, Algae, Fungi, Lichens and Plant Pathology.

Time: 03 Hrs.

Max Marks: 60

Instructions – a) Part –A: All are compulsory

b) Part-B: Solve any five questions from 8 questions

PART-A

Answer the following questions

(1 x 10 = 10)

- 1.
- 2.
- 3.
- 4.
- 5.
- 6.
- 7.
- 8.
- 9.
- 10.

PART – B

Answer any FIVE of the following:

Q-1

a)

6 marks

b)

4 marks

Q-2

a)

6 marks

b)

4 marks

Q-3

a)

5 marks

b)

5 marks

Q-4

a)

5 marks

b)

5 marks

Q-5

a)

5 marks

b)

5 marks

Q-6

a)

5 marks

b)

5 marks

Q-7

10 marks

Q-8

10 marks



BSc II SEMESTER

| | | |
|---------------------|---|----------------------------------|
| BSBOT 02 | Bryophytes , Pteridophytes , Paleobotany and Gymnosperms | |
| Teaching: 4Hrs/week | Total Teaching Hours : 56 | Exam. Marks: 60 IA Marks : 10 |

UNIT-I 15 hrs
Bryophytes : General characters, classification of Bryophytes, Structure and reproduction of Marchantia, Anthoceros and Funaria (Developmental Details are not required) Brief account

UNIT-II
 Economic importance and Evolution of sporophytes in bryophytes. 3 Hrs

UNIT-III 14 Hrs
Pteridophytes : General characters, classification of pteridophytes structure and Reproduction of Selaginella, Equisetum & Marselia (Developmental details are not required)

UNIT-IV 4 hrs
 (1) Stealer evolution in pteridophytes.
 (2) Economic importance of pteridophytes
 (3) Heterospory and Seed habit.

UNIT-V 4 Hrs
Paleobotany: Brief account of Geological Time Scale: Types and Process of Fossilization, Impression, Compression, Petrification and Amber.

UNIT-VI 2 Hrs
 A brief study of Fossil plants, Rhynia and calamities.

UNIT-VII 18 Hrs
Gymnosperms : (1) General characters, Classification of Gymnosperms.
 (2) Structure and reproduction of Cycas, Pinus & Gnetum. (Developmental details are not required)
 (3) Economic importance of Gymnosperms.

References

- | | | |
|------------------------------|---|----------------------------|
| 1) Text Book of Botany | - | Singh , Jain & Pandey |
| 2) Biology of Bryophytes | - | Chopra R.N. |
| 3) Bryophytes | - | B.P.Pandey |
| 4) College Botany | - | S.Sunder Rajan. |
| 5) Text Book of Botany Vol.2 | - | Pandey and Ajantha Chada . |
| 6) Pteridophytes | - | B.P.Pandey |
| 7) Gymnosperms | - | G.L.Chopra |

8) College Botany - A.C.Datta

| BSBOT 02 | Practicals |
|-----------------------|----------------------------------|
| Practical: 6 Hrs/week | Exam. Marks: 20 IA Marks : 10 |

- 1) Study of structure and reproductive parts of Marchantia, Anthoceros and Funeria.
- 2) Study of morphological, anatomical and reproductive structures of Selaginella, Equisetum and Marselia.
- 3) Study of fossil slides: Rhynia and Calamities.
- 4) Study of morphological, anatomical & reproductive structures of Cycas, Pinus and Gnetum.
- 5) Project on above plants (Bryophytes, Pteridophytes, Gymnosperms). Mention in the record Book.



**MODEL BOTANY QUESTION PAPER OF B.SC.II SEM. PRACTICAL
EXAMINATION.**

Time : 03 Hrs.

Max: Marks : 30

| | | |
|------|--|------------------|
| Q.1) | Identify, classify the specimans A,B & C with reasons. | 06 |
| Q.2) | Describe the anatomy of specimans D and E | 06 |
| Q.3) | Identify and write the reasons of F, G H and I | 08 |
| Q.4) | Record Book | <u>05</u> |
| Q.5) | Project Report | 05 |
| | Total | <u>30</u> |

Scheme of Examination:

- Q.1 A.- Bryophyte
 B- Pteridophyte
 C- Gymnosperm
- Q.2 E- Pteridophyte/Gymnosperms.
- Q.3 F. Bryophyte
 G- Pteridophyte
 H- Gymnosperm
 I- Fossil slide.
- Q.4 Record Book
- Q.5 Project Report

Scheme of Evaluation:

| | | | |
|------|---|---|------------------|
| Q.1 | Identification ½ | | |
| | Classification ½ | | |
| | Reasons, Sketch and Labell | 1 | 06 |
| Q. 2 | Sketch and labell Characters | 2 | 04 |
| Q. 3 | Identification Reasons with Sketch & labell | 1 | 08 |
| Q.4 | Record Book | | <u>05</u> |
| Q.5 | Project Report | | 05 |
| | Total | | <u>30</u> |



THEORY MODEL QUESTION PAPER

BSBOT 02: Bryophytes, Pteridophytes, Paleobotany and Gymnosperms.

Time: 03 Hrs.

Max Marks: 60

Instructions –a) Part –A: All are compulsory

b) Part-B: Solve any five questions from 8 questions

PART-A

Answer the following questions

(1 x 10 = 10)

- 1.
- 2.
- 3.
- 4.
- 5.
- 6.
- 7.
- 8.
- 9.
- 10.

PART – B

Answer any FIVE of the following:

Q-1

a)

b)

Q-2

a)

b)

Q-3

a)

b)

Q-4

a)

b)

Q-5

a)

b)

Q-6

a)

b)

Q-7

Q-8

6 marks

4 marks

6 marks

4 marks

5 marks

5 marks

5 marks

5 marks

5 marks

5 marks

5 marks

5 marks

10 marks

10 marks



BSc III SEMESTER

| | | |
|---------------------|--|----------------------------------|
| BSBOT 03 | Morphology, Taxonomy of Angiosperms and Economic Botany | |
| Teaching: 4Hrs/week | Total Teaching Hours : 56 | Exam. Marks: 60 IA Marks : 10 |

Morphology:

Root: – Characters, functions & Types of Root system. Modification for storage, support & vital functions (Respiratory, Photosynthetic, Haustorial Epiphytic) 05 Hrs

Stem:- Characters, functions & Types. Underground, sub-aerial & aerial modification 05 Hrs

Leaf: Structure & Functions, Phyllotaxy, venation types of Compound leaves. Modifications of Leaf & Stipules. Insectivorous plants (Sundew, Pitcher & Bladderwort) 06 Hrs

Inflorescence: Types of Inflorescence – Racemose , Cymose and Special types. (Cyathium, Hypanthodium & Verticillaster) 04 Hrs

Flower: Bract, Calyx, variations, Corolla variations & aestivation, Androecium Placentation: Types. Types of flowers based on Insertion of floral whorls on the thalamus 06 Hrs

Fruit: Classification & Types – Simple aggregate & composite. 04 Hrs

Taxonomy of Angiosperms: - 1) Botanical nomenclature, (ICBN principals Herbarium techniques) Botanical Gardens, Botanical Survey of India its functions. Important Herbaria.

2) Classification systems by Bentham & Hooker, Engler & Prantal Salient features, Merits & demerits 04 Hrs

Study of following families with economic importance (Bentham & Hooker system to be follows).

Dicotyledons: Brassicaceae, Malvaceae, Rutaceae, Papilioaceae, Caesalpinae, Mimosidae, Myrtaceae, Cucurbitaceae, Rubiaceae, Asteraceae, Apocyanaceae, Asclepiadaceae, Solanaceae, Verbinaceae, Lamiaceae , Amaranthaceae & Euphorbiaceae. 17 Hrs

Monocotyledons : Liliaceae, Arecaceae & Poaceae, 04 Hrs

Economic Botany: (Botanical name, Family, Part used & Uses)

- 1) **Cereals & Millets:-** Jower, Ragi, Wheat, & Rice.
- 2) **Pulses:** Black gram, Bengal gram & Red gram.
- 3) **Fats:** Ground nut, Coconut & Safflower.

- | | | |
|-----------------------------|---|--------|
| 4) Beverages: | Tea & Coffee. | |
| 5) Fibers: | Cotton, Coir & Deccan Hemp. | |
| 6) Spices: | Cardamom & Clove. | |
| 7) Timber: | Teak & Rose wood. | |
| 8) Narcotic: | Tobacco. Ganja & Opium | 05 Hrs |
| 9) Medicinal plants: | Rawolfia, Withania, Vinca, Mentha, Aloe & Ocimum. | |

References

- | | | |
|----------------------------|---|------------------------|
| 1) College Botany | - | A.C.Datta. |
| 2) College Botany Vol.I | - | Gangulee, Das & Datta. |
| 3) Economic Botany | - | B.P.Pandey. |
| 4) Taxonomy of Angiosperms | - | Singh & Jain. |
| 5) Plant Taxonomy | - | Sunder Rajan. |
| 6) Plant Taxonomy | - | Saxena&Saxena. |
| 7) Plant Taxonomy | - | Vasishta |
| 8) Plant Taxonomy | - | B.P.Pandey |
| 9) Economic Botany | - | Bendre& Kumar |
| 10) Plant Taxonomy | - | G.P.Sharma. |

| | | |
|-----------------------|-------------------|----------------------------------|
| BSBOT 03 | Practicals | |
| Practical: 6 Hrs/week | | Exam. Marks: 20 IA Marks : 10 |

- Angiosperm Morphology:** Specimens of morphological interest based on theory. (Root, Stem & Leaves: modifications, phyllotaxy, compound leaves, Types of inflorescence & fruits.
- Dicot families:** Brassicaceae, Malvaceae, Rutaceae, Ceasalpiniaceae, Mimosae, Papilionaceae, Cucurbitaceae, Rubiaceae, Asteraceae, Apocynaceae, Ascelpiadaceae, Solanaceae, Amaranthaceae & Euphorbiaceae.
Monocot families : Liliaceae, Arecaceae & Poaceae.
- Floral formula & floral diagram:** Hibiscus, Ixora, Vinca & Calotropis.
- Economic Botany:** Study of Economic important products based on theory.
- Visit to nearby forests / Botanical Gardens to study natural Habitat.
- Submission of minimum of 05 herbarium/ photographs.

MODEL BOTANY QUESTION PAPER OF B.SC.III SEM. PRACTICAL
EXAMINATION.

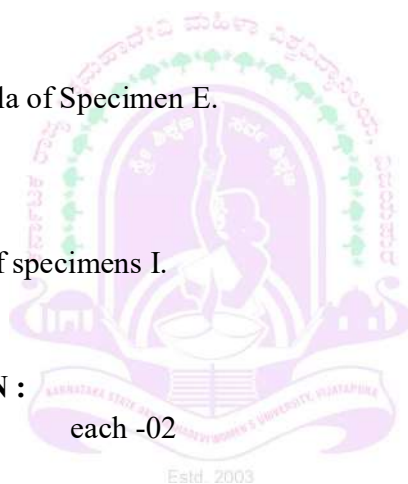
Time: 03Hrs.

Max. Marks : 20

| | |
|---|-----------|
| Q.1 Identify, classify the specimens A, B, C & D with reasons: | 08 |
| Q.2 Draw floral diagram & write floral formula of specimen E. | 02 |
| Q.3 Identify & Describe morphological peculiarities of specimen F, G & H. | 06 |
| Q.4 Identify & Mention the economic importance of specimens J. | 02 |
| Q.5 Record Book | 02 |
| | ---- |
| | 20 |

SCHEME OF EXAMINATION

- Q.1 A.-Polypetalae.
 B- Gamopetalae.
 C- Apetale
 D- Monocot
- Q.2 Floral diagram & formula of Specimen E.
- Q.3 F) - Root/Stem
 G) Leaf /Inflorescence.
 H) Fruit.
- Q.4 Economic importance of specimens I.
- Q.5 Record Book



SCHEME OF EVALUATION :

| | | | | | |
|------|---|----|----------|--|-----------|
| Q.1 | Identification | ½ | each -02 | | 08 |
| | Classification | ½ | | | |
| | Reasons | 01 | | | |
| Q 2 | Floral diagram | 01 | | | |
| | Floral formula | | | | 02 |
| | Identification | 01 | | | |
| Q.3. | Identification | 01 | each-02 | | |
| | Morphological Peculiarities | 01 | | | 06 |
| | Sketch & label | | | | |
| Q.4. | Identification | 01 | -02 | | |
| | Economic Importance With Common, Botanical name | 01 | | | 02 |
| | Sketch & label | | | | |
| Q.5. | Record Book | | | | <u>02</u> |
| | | | | | <u>20</u> |

Theory Model Question Paper

**BSBOT 03: Morphology, Taxonomy of Angiosperms and
Economic Botany**

Time: 03 Hrs.

Max. Marks: 60

Instructions:

- 1) Questions of PART-I are compulsory.
- 2) Answer any FIVE Questions from PART-II
- 3) Labeled diagrams will enhance the value of answer.

PART-I

Q.1 Answer the following:

(1 x 10=10)

- 1)
- 2)
- 3)
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)
- 10)

PART-II

Q.II Answer any FIVE of the Following:

(10 x 5 = 50)

- 1) a)
- b)
- 2) a)
- b)
- 3) a)
- b)
- 4) a)
- b)
- 5) a)
- b)
- 6) a)
- b)
- 7)
- 8)

- 06
04
06
04
05
05
05
05
05
05
10
10



BSc IV SEMESTER

| | | |
|---------------------|---|----------------------------------|
| BSBOT 04 | Ecology, Environmental Biology, Conservation and Management of plant resources | |
| Teaching: 4Hrs/week | Total Teaching Hours : 56 | Exam. Marks: 60 IA Marks : 10 |

- 1) Concepts and components of Ecosystem: – Types of Ecosystem, Trophic organization, Ecological pyramids. **06 Hrs**
 - 2) Energy flow methods :- (Food chain & Food web) **02 Hrs.**
 - 3) Gynecology:- E-cads & Ecotypes. **02 Hrs.**
 - 4) Plant succession:–Xerosere, Hydrosere & Climax concept **03 Hrs.**
 - 5) Ecological Adaptations: –Hydrophytes, Xerophytes, Halophytes, Epiphytes, Parasitic, angiosperms (Biology) **05 Hrs.**
 - 6) Pollution:- Air, water & Soil pollution – Its definition, pollutants effects on organisms and control measures. **05 Hrs**
 - 7) Noise pollution: –Definition, effect and control measures. **01 Hrs**
 - 8) Radioactive pollution: –Definition, effect & control measures. **01 Hrs.**
 - 9) Ozone depletion, Global warming, Acid rain and nuclear winter (Definition, causes & control measure) **03 Hrs.**
 - 10) Activities of NEERI, IUCN, WWF, CPCB & BNHS. **03 Hrs.**
 - 11) Remote sensing and its applications. **01 Hrs.**
 - 12) Biological diversity – Genetic and species diversity. Endangered species, Hot spots, Natural forests and their importance in biodiversity & Red Data Book. **06 Hrs.**
 - 13) Energy Resources: - Renewable and non-Renewable Energy resources **02 Hrs.**
 - 14) Phytogeography: - Major plant communities
 - a) Aquatic – Fresh Water , Marine and Eusturion communities
 - b) Terrestrial – Grassland, Desert & Forest.
- Forest Communities: - Tropical rain forest – Tropical deciduous and coniferous forest –Floristic regions of India (Botanical) Vegetation of Karnataka. **10 Hrs.**
- 13 Plant Genetic resource Management:- Conservation of Genetic Resource of Economic plants.

In-Situ:- Biosphere reservoirs, National parks, Wild life sanctuaries.

Ex-Situ: - Field Gene banks, Seed banks. Tissue culture & Cryo-preservation.

Brief Study of National & International organizations concerned with explanation, collection and conservation such as BSI (Botanical Survey of India) NBPGR (National Bureau of Plant genetic resources) CGAIR (Consultative Group for Indian agriculture research.)

10 Hrs.

References

- 1) Plant ecology and Soil science - Shukla & Chandel.
- 2) Environmental Science - S.S.Purohit
- 3) Ecology & Environment - P.D.Sharma
- 4) Ecology , Environment & Pollution - S.S.Purohit
- 5) Plant Ecology - Amnbast R.S.
- 6) Plant Ecology - Kocher P.L.
- 7) Plant Genetic Resources - Rana R.S.
- 8) A. Text Book of Plant Ecology. - Bharucha F.R.
- 9) Pollution &Biomonitoring. - Rana B.C.
- 10) Plant Propagation, Principles & Practices - Hartman H.T.

| BSBOT 04 | Practicals | |
|-----------------------|-------------------|----------------------------------|
| Practical: 6 Hrs/week | | Exam. Marks: 20 IA Marks : 10 |

- 1) Study of Ecological adaptation :- (Morphological& Anatomical)
Hydrophytes, Xerophytes, Halophytes & Epiphytes.
- 2) Ecological Instruments :-
Anemometer, Rain guage, Hygrometer (Wet & Dry bulb Thermometer) Max-Min Thermometer.
- 3) A Project of botany related subject.
- 4) Trip to nearby forest to study vegetation.
- 5) Visit to a pond to study communities / Visit to meteorological station and submit a report.

**MODEL BOTANY QUESTION PAPER OF B.SC. IV SEM. PRACTICAL
EXAMINATION.**

Time: 03 Hrs.

Max. Marks: 20

| | |
|--|-----------|
| Q.1 Identify & assign the plant 'A' to its respective ecological group. Explain Morphological Adaptations with labeled diagrams. | 05 |
| Q.2 Identify & assign the plant 'B' to its respective ecological group. Explain Anatomical Adaptations with labeled diagrams. | 05 |
| Q.3. Identify & comment on the given slides / Specimen / Instrument, C, D, E & F | 08 |
| Q.3 Record Book | 02 |
| Total | 20 |

Scheme of Examination :-

- Q.1 Ecology (Adaptations) Entire plant / Twig (Morphology & Anatomy) any one Plant Belongs to Hydrophytes, Xerophytes, Halophytes & Epiphytes.
- Q.2 Identification Reasons with diagram. B-Ecological Slide, C-Ecological instrument D-Ecological plant, E –Ecological Slide.
- Q.3 Record Book



Scheme of Evaluation :-

| | |
|---|-----------|
| Q.1 Identification -01 Morphological & Anatomical Peculiarities 04 & Sketch | 10 |
| Q.2 Identification – 01 each -02 Sketch with reasons 02 | 08 |
| Q.3 Record Book With Report | <u>02</u> |
| | <u>20</u> |

Theory Model Question Paper

BSBOT 04: Ecology, Environmental Biology, Conservation and Management of Plant Resources.

Time: 03 Hrs.

Max. Marks: 60

Instruction:

- 1) Questions of PART-I are Compulsory.
- 2) Answer any FIVE Questions from PART –II
- 3) Labeled diagrams will enhance the value of Answer.

PART- I

Q.1 Answer the following:

(1 x 10=10)

- 1)
- 2)
- 3)
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)
- 10)

PART-II

Q.II Answer any FIVE of the Following:

(10 x 5 = 50)

- 1) a)
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- 2) a)
b)
- 3) a)
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BSc V SEMESTER

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| BSBOT 051 | Plant Anatomy, Plant Breeding And Propagation And Evolution |
| Teaching: 4Hrs/week Total Teaching Hours : 60 | Exam. Marks: 80 IA Marks : 20 |

PLANT ANATOMY:

1. **Meristems:** General account, Classification of meristems based on–Origin, function, position and development. **3hrs**
2. **Tissues:** General account of Permanent tissues and tissue systems: Epidermal tissue system, Ground tissue system, Vascular tissue system and Secretory tissue system – structure of xylem and phloem. **6hrs**
3. Anatomy of Dicot stem, root and leaf (ex: Bengal gram). **3hrs**
4. Anatomy of Monocot stem, root and leaf (ex: Grass). **3hrs**
5. Normal secondary growth in Dicot stem and root. A brief account of cambium (origin, types and function). Origin and development of lateral roots. **6hrs**
6. A brief account of anomalous secondary growth in stem – Study of anomalous secondary growth in Bougainvillia , Boerhaavia and Dracena (stem). **4hrs**

Plant Breeding:

12hrs

1. Introduction and objectives.
2. Methods in plant breeding;
 - a) Mass selection
 - b) Pure line selection
 - c) Clonal selection
3. Hybridization and somatic hybridization.
Heterosis and its significance.

Plant Propagation and Nursery Management:

20 hrs

1. Tools and materials used in propagation, importance of green house
2. Plant propagation: – Methods of propagation – through seeds, cuttings, roots, corm, bulb, rhizome and leaf. Cuttings, layering, budding grafting.

- Nursery – definition, importance of nursery management, site selection, planning, budgeting, layout of nursery, preparation of nursery beds, raising of seedlings, transplanting techniques.
- Green House: Types and significance

Evolution:

Brief account of theories of evolution- Darwinism, Lamarckism and mutation theory.

References:

- M.S. Tayal, plant anatomy, Rastogi publications, Meerut.
- Singh, Pandey and Jain, A textbook of Botany (Angiosperm anatomy, Economic).
- B.P. Pandey, Embryology of Angiosperm, Rastogi publication, Meerut.
- B.P. Pandey, Plant anatomy, S. Chand and Co. Ltd, Ram nagar, New Delhi.
- Embryology of Angiosperm Bhajwani and Bhatnagar, 1998 Vikas publication, New Delhi.
- Pandey SN and Ajanta Chaddha Plant anatomy and Embryology, Vikas publication, New Delhi.
- P.C. Vasista, Plant anatomy, S.Chand publishing house, New Delhi.
- Singh, B.D. (2005). Plant Breeding: Principles and Methods. Kalyani Publishers. 7th edition.
- Chaudhari, H.K. (1984). Elementary Principles of Plant Breeding. Oxford – IBH. 2nd edition.
- Acquaah, G. (2007). Principles of Plant Genetics & Breeding. Blackwell Publishing.

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| BSBOT 052 | Cytology, Genetics and Biostatistics | |
| Teaching: 4Hrs/week | <small>Estd. 2003</small> | Exam. Marks: 80 |
| Total Teaching Hours : 60 | | IA Marks : 20 |

Cytology:

- Introduction to cytology. **1hr**
- Study of ultra structure of plant cell and organelles :- cell membrane, endoplasmic reticulum **5hrs**
- Nucleus – structure and function. **2hrs**
- Chromosomes – types, structure and functions, ultra structure of chromosomes with special reference to the nucleosome. Giant Chromosomes: – salivary gland and lamp brush chromosomes. **4hrs**
- Chromosomal aberrations: Deletion, duplication, translocation and inversion **4hrs**
- Numerical variation - Euploidy and Aneuploidy and its significances **4hrs**

Genetics:

1. Introduction, Mendel and his experiments on Pea. Mendel's laws of inheritance, test cross, dihybrid test cross, back cross (with related problems). **4hrs**
2. Modification of Mendelian ratio. **6hrs**
 - a. Gene interaction – supplementary, duplicate, complementary Genes, Epistasis (Dominant and recessive) – with suitable plant examples.
 - b. Polygenic inheritance – Ear size in maize.
 - c. Multiple alleles – Blood groups
3. Sex determination: **3hrs**
 - a. Chromosome theory of sex determination –Heterogametic, Haplo-diploidy, and genic balance theory, XX – XY. Human beings and Mellandrium.
 - b. Sex linked inheritance – Color blindness in human beings, hypertrichosis.
4. Linkage and crossing over mechanism in maize and mechanism of crossing over (coupling and repulsion) **2hrs**
5. Cytoplasmic inheritance with reference to *Mirabilis jalapa* **2hrs**
6. Gene: Concept of gene, Gene expression and regulation (exons, introns, inducible, repressible genes), Lac-operon concept. **4hrs**
7. Mutation: types (Spontaneous, induced and point mutation), mutagens **2hrs**
8. Nucleic acids: **6hrs**
 - a. Structure, chemical composition and function of DNA and RNA. **3hrs**
 - b. DNA replication, semi conservative method **1hr**
9. Genetic Code – meaning and properties and protein synthesis. **3hrs**

Biostatistics (Biometry):

1. Mean, mode and median (meaning and definition) **1hr**
2. Measures of variation, standard deviation, standard error and correlation, regression (only meaning and definition). **1hr**

References:

1. Genetics – P. K. Gupta, Rastogi Publications, Meerut.
2. College Botany Vol 04 – S. Sundarajan, Himalaya Publishing House, Mumbai.
3. Cytogenetics – P. K. Gupta, Rastogi Publications, Meerut.
4. Cytology, genetics and evolution – P. K. Gupta, Rastogi Publications, Meerut.
5. Cell Biology – Singh and Tomeir, Rastogi Publications, Meerut.
6. A Text book of Cell and Molecular Biology – P. K. Gupta, Rastogi Publications, Meerut.
7. Elements of Biostatistics – Sadguru Prasad , Rastogi Publications, Meerut.
8. Nursery Management – Kulkarni
9. Indoor Gardening – G. V. Publication House, 322, Raibhadur Bazar, Jodhpur

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| BSPR 053 | Practicals based on BSBOT 051 and BSBOT 052 |
| Practical: 6 Hrs/week | Exam. Marks: 80 IA Marks : 20 |

Section A:

I. Plant Anatomy:

- 1) Study of root apex and shoot apex (Permanent slides only) Study of tissues, Parenchyma, Collenchyma, Sclerenchyma, Xylem and Phloem (Permanent slides only)
- 2) Maceration of tissues and the observation of sclereids- types, vessel- thickenings (10% Chromic acid, 10% Sulphuric acid).
- 3) Study of Stomata and Epidermal hair of (a) Sunflower / Tridax, (b) Tomato/ Vinca/Solanum, (c) Spinach (d) Tradescantia /Rheo (e) Cucurbits (f) any locally available plant.
- 4) Anatomy of young Dicot Stem (TS) – Tridax/ Bengal gram/ Cucurbits.
- 5) Anatomy of young Dicot root (TS) – Bengal gram
- 6) Anatomy of young Monocot stems (TS) Grass/ Sorghum/ Bamboo.
- 7) Anatomy of young Monocot root (TS) Grass/ Sorghum/ Bamboo.
- 8) Anatomy of young Dicot leaf (TS) Sunflower
- 9) Anatomy of young Monocot leaf (TS) Grass/ Sorghum/ Bamboo.
- 10) Anatomy of stem Boerhaavia (TS) – Sectioning.
- 11) Anatomy of Bougainvillea stem (TS) sectioning.
- 12) Anatomy of Dracena Stem (TS) Sectioning.

II. Plant breeding:

1. Practice of hybridization techniques in a self pollinated and cross pollinated plants (any available plant).
2. A visit to agricultural research centre for observation and record of inter variety and inter species

III. Plant Propagation

1. Methods of plant propagation
 - a) Budding
 - b) Grafting
 - c) Gooting
 - d) Layering
 - e) Cutting

Section B:

I. Cytology:

1. Study of cell division – Mitosis in onion root tips (Squash method).
2. Study of cell division – Meiosis in Rheo discolour or Allium Cepa or any available material/flower buds (Smear method).
3. Cytological technique of making (Mitosis and Meiosis) permanent slides.
4. Observation of polytene and lamp brush chromosomes (Permanent slides).

5. To conduct the micro chemical tests (cellulose, lignin, starch, protein, cutin, cystolith, raphides/sphero raphides) procedures.

II. Genetics:

1. Genetics problems based on theory syllabus – monohybrid, dihybrid, test cross and interaction of factors.



MODEL QUESTION PAPER B.Sc- V Sem (BSBOT 053)

PRACTICAL EXAMINATION

Time : 4 Hrs

Max. Marks : 80

- Q1. Prepare a temporary double stain TS of material “A” and indentify with reasons (leave the observation for examiner) 10 Marks
- Q2 Macerate / mount the specimen “B” , identify any two elements with labelled sketch and give reasons./ type of stomata 05 Marks
- Q3 Demonstrate the technique of hybridization specimen “C” Emasculation and Bagging. 05 Marks
- Q4 Prepare a plant propagation “D” by cutting / Layering /Budding and explain its advantages 05 Marks
- Q5 Identify & describe the Anatomy slide “E” & “F” 08 Marks
- Q6 Make a squash / Smear preparation of specimen “G” . Identify any two stages , sketch and label and show the preparation to the examiner 10 Marks
- Q7 Conduct Micro chemical test of specimen ‘H’ . Identify , sketch and label and show the preparation to the examiner 05 Marks
- Q8 Solve the genetic problem ‘I’. 05 Marks
- Q9 Identify the Cytology slides ‘J’, ‘K’ & ‘L’ 12 Marks
- Q 10 Certified Journal 10 Marks
- Q11 Project report 05 Marks

BSc VI SEMESTER

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| BSBOT 061 | Palynology and Biotechnology | |
| Teaching: 4Hrs/week | Total Teaching Hours : 60 | Exam. Marks: 80 |
| | | IA Marks : 20 |

PLANT EMBRYOLOGY AND PALYNOLOGY

- 1 **Introduction:** Plant embryology a general account
- 2 **Indian embryologists:** P. Maheshwari, B.G.L. Swamy and B. M. Johri
- 3 **Anther development** –Microsporogenesis, Male gametophyte.
- 4 Types and role of tapetum, ubisch bodies, pollen kit, concept of male germ unit (MGU)
- 5 **Ovule development:** Megasporogenesis, Female gametophyte–Structure of mature
- 6 embryo sac (Polygonum). Endothelium, Epistase, Hypostase.
- 7 **Types of embryo sacs:** Monosporic (Polygonium), Bisporic (Allium) and Tetrasporic (Adaxa), concept of female germ unit (FGU)
- 8 **Types of Ovule :** Orthotropous, Anatropous, Hemianatropous, Amphitropous, Camphylostropous and Circinotropous.
- 9 **Pollination:** Self and cross Pollination, general account and Contrivances for self and cross pollination. Significance of self and cross pollination
- 10 **Fertilization :** Double fertilization and triple fusion, its significance
- 11 **Endosperm:** Development and types, Free nuclear, cellular and Helobial . A brief account of perisperm
- 12 Structure and development of dicot embryo (Cruciferae) monocot embryo (Grass)
- 13 A brief account of Polyembryony, Apomixis and Parthenocarpy.
- 14 **Palynology:** Definition and scope. Pollen morphology (size, shape, structure,
- 15 Aperature, symmetry and significance

BIOTECHNOLOGY:

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| 16 Introduction and scope of Biotechnology and its applications. | 06 hrs. |
| 17 13. Genetic engineering; r-DNA technology and its applications. | 03 hrs. |
| 18 14. DNA finger printing and its applications. | 03 hrs. |
| 19 15 Transgenic plants: BT-Cotton and Golden rice | 02 hrs. |
| 20 16. Plant tissue culture and its applications. | 04 hrs |

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| BSBOT 062 | Plant Physiology and Phyto chemistry | |
| Teaching: 4Hrs/week | Total Teaching Hours : 60 | Exam. Marks: 80 IA Marks : 20 |

Plant Physiology

- 1 Introduction to plant physiology
- 2 Water sources, types and importance to plant life.
- 3 Physical process of water absorption - Imbibition, Diffusion, Osmosis, Plasmolysis water potential, D.P.D., Osmotic potential, Pressure potential, T.P. and W.P.
- 4 Absorption of water – Absorbing regions (region of root)
Mechanism of absorption – active absorption (osmotic and non-osmotic)
Passive absorption (symplast and apoplast). Factors affecting water absorption
- 5 Ascent of Sap – meaning, mechanism and theories.
Vital theory, rhythmic theory, pulsatory and root pressure theory.
- 6 Physical theories – capillary force, imbibitional, atmospheric pressure, transpiration pull and cohesive force theory
Transpiration – definition, types, structure of stomatal apparatus.
- 7 Mechanism of opening and closing of stomata.
Theories – Photosynthesis theory, Starch and sugar inter conversion theory, active proton or K^+ , transport concept.
Factors affecting the process of transpiration (external and internal)
Significance of transpiration.
Guttation – definition and structure of Hydathode
- 8 Mineral absorption – passive absorption, ion exchange, Donnan's equilibrium.
Active absorption – carrier concept, Landgrath's theory, Protien Leacithin theory
- 9 Enzymes – Nomenclature, Characteristics, classification and mode of action.
Translocation of organic solutes – Cytoplasmic streaming and Munch's mass flow hypothesis
- 10 Photosynthesis – Introduction, significance, structure and function of chloroplast
Quantosomes, Pigment System, Solar spectrum and its importance. Mechanism of photosynthesis – Light reaction, cyclic and non-cyclic photo phosphorylation
Dark reaction – C_2 C_3 and C_4 cycle.
Factors affecting the photosynthesis
- 11 Respiration – Introduction, definition, types of respiration (aerobic and anaerobic). 6 hrs
Mechanism of glycolysis, Kreb's cycle and terminal oxidation.
Anaerobic – Alcoholic and acidic fermentation.
Factors affecting respiration (internal and external). RQ
12. Growth hormones – Auxins, Gibberllins, Cytokinins, ABA and Ethylene – their role in growth and applications (experimental study not necessary).
13. **Seed dormancy:** General account, factors regulating
Physiology of senescence: General account, role of plant growth regulators in senescence

Plant Movements: Tropic and nastic movements, Geotropism, Thigmotropism, Phototropism, hydrotropism, Seismonasty, Thigmonasty

14. Physiology of flowering: Photoperiodism and Vernalization, devernalization, florigen concept. 2 hrs
15. Nitrogen metabolism: Sources of nitrogen, nitrogen cycle and its importance. Mechanism of biological nitrogen fixation

References:

- 1 Parihar, N.S. (1991). An introduction to Embryophyta. Vol. I. Bryophyta. Central Book Depot, Allahabad.
- 2 Bhojwani, S.S. & Bhatnagar, S.P. (2011). Embryology of Angiosperms. Vikas Publication House Pvt. Ltd. New Delhi. 5th edition.
- 3 Bhojwani, S.S. and Razdan, M.K., (1996). Plant Tissue Culture: Theory and Practice. Elsevier Science Amsterdam. The Netherlands.
- 4 Glick, B.R., Pasternak, J.J. (2003). Molecular Biotechnology- Principles and Applications of recombinant DNA. ASM Press, Washington.
- 5 Dubey, R.C., 2005 A Text book of Biotechnology S.Chand & Co, New Delhi.
- 7 Kumaresan, V. 2005, Biotechnology, Saras Publications, New Delhi.
- 8 John Jothi Prakash, E. 2004. Outlines of Plant Biotechnology. Emkay Publication, New Delhi.

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| BSPR 063 | Practicals based on BSBOT 061 and BSBOT 022 |
| Practical: 6 Hrs/week | Exam. Marks: 80 IA Marks : 20 |

Section A:

EMBRYOLOGY:

1. Study of anther and ovule – microsporogenesis and megasporogenesis (Permanent slides of different stages)
2. Mounting of pollen grains (available flowers only) Ipomea, Vinca, Malvaceae and Legume.
3. Study of Ovule – Megasporogenesis and Female gametophyte (permanent slides of different stages)

4. Placentation types mounting and Permanent slides.
5. Mounting of endosperm – Cucumis/ Croton/ Radish/Tridax.
6. Mounting of Embryo croton/ Tridax/ Cucumis/ Cotalaia/ Cluster beans/ Chilli.
7. Study of embryo development by observing Globular, heart shaped and mature dicot embryo (permanent slides).
8. M.S Media preparation procedure and inoculation techniques.

Section B:

Physiology Experiments:

1. Diffusion – Diffusion of solid into liquid (minor)
2. Osmosis – Physical and physiological – Endosmosis and Exosmosis (minor).
3. Plasmolysis and Deplasmolysis – In cells of Rheo discolour leaf.
4. Imbibition – Imbibition process (minor) – Imbibition pressure(Dilatometer)
5. Absorption of water – To show passive absorption by showing relationship between absorption and transpiration.(Trans absorbometer)
6. Ascent of Sap:
 - a) To show ascent of Sap by Balsam plant and in a fresh plant twig (minor).
 - b) To show root pressure.
 - c) To show suction due to transpiration.
7. Translocation of solutes:
 - a. Girdle Experiment – Phloem as food translocation tissue.
 - b. Girdle Experiment –Xylem as conducting tissue.
8. Transpiration:
 - a) Experiment to show transpiration by bell jar (minor).
 - b) Ganong's and Former's Photometer
 - c) Four leaf and cobalt chloride paper method.
 - d) Guttation to be observed (minor).
9. Photosynthesis:
 - a) Evolution of oxygen (minor).
 - b) Effect of quality of light on photosynthesis.
 - c) Effect of CO₂ concentration on photosynthesis.
 - d) Light is essential for photosynthesis (minor).

- e) CO₂ is essential for photosynthesis.
- f) Chlorophyll separation by paper chromatography method.
- g) Chlorophyll is necessary for photosynthesis (minor). (with starch test)

10. Respiration:

- a) Aerobic respiration – Ganong’s Respiroscope and lime water method.
- b) Anaerobic respiration.
- c) Alcoholic fermentation – Kunhe’s tube (minor)
- d) Measurement of R.Q.
- e) Evolution of heat during respiration (minor)

11. Growth: Arc Auxonometer(minor)

12. Plant growth movements:

- a) Phototropism(minor)
- b) Clinostat (minor)
- c) Hydrotropism(minor)
- d) Thigmotropism (minor)

Note: Students should visit nearby tissue culture laboratory.



MODEL BOTANY QUESTION PAPER – BSBOT063
B.Sc.- VI SEMESTER PRACTICAL (Embryology and Plant Physiology)
Time: 4 Hrs **Marks: 80**

- Q1 . Setup Physiology Experiment “A” . Write the procedure & conclusion with diagram.
Show to the examiner (major) 09 Marks
- Q2. Setup physiology experiment “B”. Write the diagram, observation and conclusion.
Show to the examiner (minor) 06 Marks
- Q3. Write the Procedure of the inoculation technique/ write MS media preparation procedure. 05 Marks
- Q4. Identify and comment on the physiological.Experiment “D”, “E”, “F”, “G” & “H”. 15 Marks
- Q5. Mount the Endosperm “I” sketch & label the parts, (Leave the preparation for observation) 09 Marks
- Q6. Mount the embryo “J” sketch & label the parts. (Leave the preparation for observation). 05 Marks
- Q7. Mount / Take T.S. of given material “K” Pollen grain/ Pollinium/ Placentaion .
Sketch & label the parts (Leave the preparation for observation). 06 Marks
- Q8.. Identify & describe the embryology slides “L” & “M” with reasons. 10 marks
- Q9. Certified Journal 10 Marks
- Q10 Project Submission 05 Marks

