# GOVERNMENT COLLEGE (AUTONOMOUS)

# RAJAMAHENDRAVARAM

(ESTD: 1853, NAAC Re-Accredited with Grade 'A')

# DEPARTMENT OF BOTANY



# BOARD OF STUDIES MEETING 2017 - 2018

# GOVERNMENT COLLEGE (AUTONOMOUS) RAJAMAHENDRAVARAM

# APSCHE - CBCS / Semester System I B.Sc. BOTANY THEORY SYLLABUS CORE - I : MODULE - I : MICROBIAL DIVERSITY, ALGAE AND FUNGI (w.e.f. 201 5- 2016 Admitted Batch) Total Hours of Teaching 60 Hrs @ 4 Hrs per Week

### UNIT-I: MICROBIAL WORLD (Origin and Evolution of Life, Microbial diversity (12hrs)

- 1. Discovery of microorganisms, origin of life, spontaneous, Biogenesis, Pasteur experiments, germ theory of diseases.
- 2. Classification of microorganisms R.H. Whittaker's five kingdom concept.
- 3. Brief account of special groups of bacteria- Archaebacteria, Mycoplasma, Chlamydia, Actinomycetes and Cyanobacteria.

### **UNIT- II: VIRUSES**

- 1. Viruses- Discovery, general account, structure and replication of –T4 Phage (Lytic, Lysogenic) and TMV, Viroids.
- 2. Plant diseases caused by viruses Symptoms, transmission and control measures (Brief account only).
- 3. Study of Tobacco Mosaic, Bhendi Vein clearing and Papaya leaf curl diseases.

### **UNIT III: BACTERIA**

- 1. Bacteria: Discovery, General characteristics, cell structure and nutrition
- 2. Reproduction- Asexual and bacterial recombination (Conjugation, Transformation, Transduction).
- 3. Economic importance of Bacteria.

### UNIT –IV Algae

- 1. General account Thallus organization and reproduction in Algae.
- 2. Fritsch classification of Algae (up to classes only) and Economic importance.
- 3. Structure, reproduction and life history of Oedogonium, Ectocarpus and Polysiphonia.

### **UNIT V: FUNGI**

- 1. General characteristics and outline classification (Ainsworth).
- 2. Structure, reproduction and life history of *Rhizopus* (Zygomycota), *Pencillium* (Ascomycota), and *Puccinia* (Basidiomycota).
- 3. Lichens-Structure and reproduction; Ecological and Economic importanc

#### nia.

(12hrs)

### (12hrs)

(12hrs)

# (12hrs)

### **Additional Topics:**

- 1. Chlmydomonas
- 2. Spirogyra
- 3. Chara
- 4. S C P
- 5. Nostoc
- 6. Scytonema

**Suggested activity**: Seminar, Quiz, debate, collection of diseased plant parts – studying symptoms and identification of pathogen, collection and study of fresh and marine Algae available in local area.

\*\*Student Activities like Seminars, Assignments, Fieldwork, Study Projects, Models etc. are Part of Curriculum for all units in all papers.

#### **Books for Reference:**

- 1. Oladele Ogunseitan (2008) Microbial Diversity: Form and Function in Prokaryotes Wiley Blackwell.
- 2. Pelczar, M.J. (2001) Microbiology, 5<sup>th</sup> edition, Tata Mc Graw-Hill Co, New Delhi.
- Presscott, L. Harley, J. and Klein, D. (2005) Microbiology, 6<sup>th</sup> edition, Tata Mc Graw
   Hill Co. New Delhi.
- Fritsch F.E. (1935 The Structure & Reproduction of Algae 1945): Cambridge University Press Cambridge, U.K. Vol. I, Vol. II.
- Smith, G.M (1955) : Cryptogamic Botany (Vol.I Algae, Fungi & Lichens) Mc Graw-Hill Book Co., New York.
- 6. Ian Morris (1967): An Introduction to the Algae, Hutchinson, London.
- Alexopoulos, C.J., Mims, C.W. & Blackwell, M. (1996): Introductory Mycology John Wiley & Sons, Inc., N.Y., Chicester, Berisbane, Toronto, Singapore.
- 8. Webster, J (1999): Introduction to Fungi (2<sup>nd</sup> edition) Cambridge University Press.

# GOVERNMENT COLLEGE (A) RAJAMAHENDRAVARAM I B.Sc. BOTANY SEMESTER - I MICROBIAL DIVERSITY, ALGAE AND FUNGI MODEL QUESTION PAPER

### Time : 3 Hrs.

### Max Marks : 60

### Section – A

- L. Answer All the Questions :  $v \square \square \square \Xi \square \square \square \oplus \le \square \delta \square \varepsilon \sqrt{< (\square H \square \square T | \psi \square \phi \langle T + \& \square$ 4x10=40 a) Explain theories involved in origin of life. 1)  $\Im \varepsilon \lor : |\Box \lor \ge T \ldots \lor \le \forall \Box \Box \lor = T \Box \lor \ge \Box \lor \le \Box \lor = I$  $\square$ (or) b) Define cyanobacteria & expain its cell structure & the use of cyanobacteria as Biofertilizers.  $\Box \delta \prod H \wp \upsilon'' \leftrightarrow \downarrow \Upsilon \dots ] \wp \langle T \theta T \Box \sigma \mathfrak{I} \cap \equiv + \equiv, < \Box \Box \downarrow \leq \Delta \Box \sigma \Box \Delta \varepsilon T$ T $\theta$ T  $\exists \varepsilon$ ]+=, v $\exists \vartheta \varepsilon \mu \sigma \Im T \varepsilon \lor \pm \exists \varepsilon$ ]+#]  $\exists < \int \Box \theta \varepsilon T T \theta T T M \bigcup \Box + \& \Box$ . a) Explain the growth cycles in virus. 2)  $\psi [ \prod \sigma \Im \delta \tau \therefore \Box | \sigma \Im T > \bullet T < \Box \therefore \# \langle | \downarrow \pm \therefore \theta T \exists \Xi / B \downarrow \leq ] + \# \langle + \& \Box.$ b) Describe the types of sexual reproduction in Bacteria.  $\upsilon'' \downarrow \Upsilon \dots ] \varphi \langle T \psi \Box T \dots \rangle \not\subset \exists \exists < f \Box \sigma \mathfrak{I} \downarrow \pm \dots \rangle \supset \prod + \angle \downarrow \le | |\Box^{TM} \langle T \rangle$  $\leftrightarrow^{TM} \langle \in \Leftarrow | \Box \exists \epsilon B \downarrow \leq ] + \# \langle T \epsilon T T ?$ a) Describe the various methods of reproduction in algae. 3)  $\in \subset | > \bullet T ] + \equiv \exists \varepsilon ] + \# \langle + \& \Box ?$ (or)
  - b) Describe the sexual Reproduction in polysiphonia.

$$\begin{array}{l} \beta \underline{\quad} * \Box \delta \prod \beta \rfloor \Box \varphi \langle \sqrt{ \langle \not \downarrow \Box } \rangle \\ \neg \prod + \angle \downarrow \leq | | \Box^{TM} \langle T \longleftrightarrow^{TM} \langle \in \Leftarrow | \Box \exists \epsilon ] + \\ \# \langle + \& \Box. \end{array}$$

4) a) What is Heterocieous rust ? Describe the spores produced in wheat Rust.  $\begin{array}{c|c} (H \Box \Box \not \Xi \not \varepsilon T \oplus \leq \Box + \oplus \leq \Box \varepsilon T \ ^{TM} \downarrow > \bullet T \therefore \theta T \ \Box \sigma \mathfrak{I} \cap \equiv + \equiv, > \wp < \Box \\ T \varepsilon T \oplus \leq \Box + \oplus \leq \Box \varepsilon T \ ^{TM} \downarrow > \bullet T \therefore T \theta T \ \varepsilon ] \Box + \# \langle + \& \Box. \\ (or) \end{array}$ 

b) Describe the structure and reproduction in lichens. Add anote on their economic Importance.

### <u> PART – B</u>

### Answer any three of the following.

### 3x4=12

 $\cong \psi \left( \prod H \square \epsilon T \sqrt{\&} \square T \mid | \square \Xi \right) \square \therefore \oplus \le \square \delta \square \epsilon \sqrt{<} \int \square \theta \epsilon T T \mid \psi \square \phi \langle T + \& \square.$ 

- 5) Archaebacteria  $\Box] \neg \upsilon \int [" \downarrow \Upsilon ...] \phi \langle \sqrt{}$
- 6) T.M.V. {∫.μψ⊡T.∃.
- 7) Economic Importance of Bacteria  $\upsilon'' \rightarrow \Upsilon \dots ]\phi \langle \sqrt{\Box} ] \Box \rightarrow \leq | \beta \subseteq \epsilon TTK \leftrightarrow^{TM} \langle$
- 8) Oedogonium Macrandrous  $\Box \& \wp >= \Box \phi \langle T + \varepsilon \sqrt{|} \downarrow \leq H \Box | \geq \delta \tau$
- 9) Pencillium A sexual Reproduction  $\Box | \Box \delta \longrightarrow \phi \langle T \psi \Box T \nu \rangle \supset \Pi + \angle \downarrow \leq | | \Box^{TM} \langle T \leftrightarrow^{TM} \langle \in \Leftarrow |$ <u>PART – C</u>

Answer all the Questions.

$$\mathbf{v} = \mathbf{v} =$$

10) Transduction

 $\cup \theta T \leftrightarrow \psi \Box \varsigma \Box'' \theta \epsilon T T$ 

- 11) Heterocyst  $\Box | + \{ \int \sigma \wp \delta - \delta \tau \dots$
- 12) economic Importance of algae  $\infty \checkmark + | < (\Box : T \Box] \Box \downarrow \le | \beta \subseteq \epsilon TTK \leftrightarrow^{TM} \langle$
- 13) Tikka disease in groundnut  $\psi \Box \sigma \Im T \Xi D \to \phi \not\subset \{ \Box \Box \neg T \Box \to T :: T \}$

# **GOVERNMENT COLLEGE (AUTONOMOUS) RAJAMAHENDRAVARAM**

# **CORE - I , MODULE - I : MICROBIAL DIVERSITY, ALGAE AND FUNGI**

### **BOTANY PRACTICAL SYLLABUS**

Total hours of laboratory Exercises 30 hrs @ 2 per week

- 1. Knowledge of Equipment used in Microbiology: Spirit lamp, Inoculation loop, Hot-air oven, Autoclave/Pressure cooker, laminar air flow chamber and Incubator.
- 2. Preparation of liquid and solid media for culturing of microbes (Demonstration).
- Study of viruses and bacteria using electron photo micrographs (TMV, Bacteriophage, HIV, Cocci, Bacillus, Spirillum bacteria).
- 4. Gram staining technique.
- 5. Study of Plant disease symptoms caused by Bacteria (Citrus canker, leaf blight of rice, Angular leaf spot of Cotton) and viruses (TMV, Bhendi vein clearing and Leaf curl of Papaya),Fungi (Late blight of potato, Red rot of Sugarcane and Paddy blast).
- 6. Study of vegetative and reproductive structures of the following :
  - a) Cyanobacteria: Nostoc and Scytonema.
  - b) Algae: Oedogonium, Ectocarpus, Polysiphonia,
  - c) Fungi: Rhizopus, Penicillium and Puccinia.
- 7. Study of plant materialinfected by Fungi (Rot of tomatoes, blue and greenmoulds of Ciitrus fruits and wheat rust(Section cutting of diseased parts of Wheat and Barberry identification of different spores).
- 8. Lichens: Morphology and of anatomy of different thalli.
- 9. Field Visit.

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# GOVERNMENT COLLEGE (AUTONOMOUS) RAJAMAHENDRAVARAM CORE - I, MODULE - I: MICROBIAL DIVERSITY, ALGAE AND FUNGI

### **I B.Sc – BOTANY THEORY INTERNAL EXAMINATION**

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Written examination	- 25 M
Assignment	– 5 M
Seminar	- 5 M
Viva – Voce	- 5 M
TOTAL	= 40 M

# **GOVERNMENT COLLEGE (AUTONOMOUS) RAJAMAHENDRAVARAM**

# I B.Sc. BOTANY

**CORE - I : MODULE - I : MICROBIAL DIVERSITY, ALGAE AND FUNGI** 

Question Paper Design and Weightage to the Contents

**SECTION - A** 

**Duration : 3 Hrs.** 

Max. Marks: 60

### **Essay Questions :**

1 Question from Unit - I

(**OR**)

1 Question from Unit - I

1 Question from Unit - II

(**OR**)

1 Question from Unit - III

1 Question from Unit - IV (OR)

1 Question from Unit - IV

1 Question from Unit - V (OR)

1 Question from Unit - V

### **SECTION - B**

### **Short Answer Questions :**

5 Short Answer Questions from FIVE Units

# <u>SECTION – C</u>

### Very Short Answer Questions :

4 Very Short Answer Questions from All Units as pre weightage

NAME OF	NO. OF	NO. SA	NO. OF	MARKS	]
THEUNIT	E.Q.S	QS	VSA QS	WEIGHTAGE	P
Unit I	1+1	1	1		
Unit II & Unit	1+1	2	1		
III					
Unit IV	1+1	1	1		
Unit V	1+1	1	1		

BLUE RINT

# **GOVERNMENT COLLEGE (AUTONOMOUS) RAJAMAHENDRAVARAM**

### **APSCHE - CBCS / Semester System I B.Sc. BOTANY THEORY SYLLABUS CORE – II MODULE-I: Diversity of Archaegoniates and Plant Anatomy**

### **UNIT – I: BRYOPHYTES**

- 1. General characters, Classification (up to classes)
- 2. Structure, reproduction and Life history of Marchantia, and Funaria.
- 3. Evolution of Sporophyte in Bryophytes.

### **UNIT - II: PTERIDOPHYTES**

- 1. General characters, classification (up to Classes)
- 2. Structure, reproduction and life history of Lycopodium, and Marsilea.
- 3. Heterospory and Seed habit.
- 4. Stelar Evolution in Pteridophytes.

### **UNIT - III: GYMNOSPERMS**

- 1. General characters, classification (up to classes)
- 2. Morphology, anatomy, reproduction and life history of Pinus and Gnetum
- 3. Economic importance.

### **UNIT –I V: TISSUES AND TISSUE SYSTEMS**

- 1. Meristems Root and Shoot apical meristems and their histological organization.
- 2. Tissues Meristematic and permanent tissues (simple, complex, secretory)
- 3. Tissue systems–Epidermal, ground and vascular.

### UNIT - V. SECONDARY GROWTH

- 1. Anomalous secondary growth in Achyranthes, Boerhaavia and Dracaena.
- 2. Study of local timbers of economic importance-Teak, Rosewood.

### **Additional Topics:**

- 1. Anthoceros
- 2. Polytrichum
- 3. Equisetum
- 4. Azolla
- 5. Selaginella

(12hrs)

(12hrs)

(12hrs)

(12hrs)

(12hrs)

### **Books for Reference:**

- 1. Smith, G.M. (1971): Cryptogamic Botany Vol. II. Tata Mc Graw Hill
- Pandey & Trivedi, A Text Book of Botany Vol. II Vikas Publishing House Pvt. Ltd. 3.Parihar, N.S. (1970): Bryophyta , Central Book Depot, Allahabad.
- Vasistha P C , A K Sinha and Adarsh Kumar 2008- Botany for Degree students: Bryophyta S Chand & Co, New Delhi.
- 4. Parichar N 1972 Pteridophyta, Central Book Depot, Allahabad.
- 5. Sporne, K.R. (1965) : Morphology & Gymnosprerms, Hutchinson University Library, London
- 6. Esau, K. (1971) : Anatomy of Seed Plants. John Wiley and Son, USA.

# GOVERNMENT COLLEGE (A) RAJAMAHENDRAVARAM I B.Sc., SEMESTER – II DIVERSITY OF ARCHAEGONIATES & PLANT ANATONY BOTANY MODEL QUESTION PAPER - II

Time : 3 Hrs.

Max Marks : 60

# Section – A

Answer All the following Questions :

 $\mathbf{v} \square \square \mid \square \Xi / \square \therefore \bigoplus \leq \square X \psi \square \square T \mid \psi \square \phi \langle T + \& \square. \mid \square \geq \varepsilon TT \therefore T \perp \phi \langle T + \& \square.$ 

# 4x10=40

1) Describe the structure of funaria sporophyte?  $|\Box \lor \leftrightarrow H \rfloor ] \phi \langle T \delta - \langle \Box \uparrow \uparrow; \cup \langle \Box \epsilon T T \theta T \exists \epsilon ] + \# \langle + \& \Box.$ 

b) Describe the Evolution of Sporophyte in Bryophytes.

$$\Box \varphi [ \sqrt{\Box} | \Box \prod \{ " \} \not\subset \delta \longrightarrow \Box \widehat{\Box}; \cup | \Box ] \Delta " \varepsilon \sqrt{\Box \Box} \exists \varepsilon ] + \# \langle + \& \Box.$$

2) Describet the structure of sporocarp in Marselia.

$$\varepsilon \sqrt{\downarrow} \diamond * \varphi \langle \sqrt{\kappa} \downarrow \in \sigma \wp \downarrow \pm \sigma \Psi \in \Box \sigma \Box \Delta'' \Box \Box \varepsilon ] \Box + \# \langle + \& \Box .$$

b) Describe the evolution of steles in pteridophytes.

(or)

 $\phi \supset ]\& \& \square \square \prod \{ \land \therefore \} \not\subset \square \square \delta \square \sigma \Im \Delta \delta \square + \upsilon \cap \square \square \Delta'' \varepsilon T \varepsilon T T \theta T \exists \varepsilon ] + # \langle + \& \square , a \rangle$ a) Describe the structure of Pinus needle & add note on xerophytic characters.

3) a) Describe the structure of Pinus needle & add note on xerophytic characters.  $\Box | \Pi \theta \delta \tau | \& \Box \rangle \land \Box \epsilon ] \Box + \equiv \langle \Box \Box \rangle \not\subset \Box \mu \& \Box ] \therefore \Box \leq \Box \Delta'' \therefore \theta T \operatorname{TM} \bigl( \therefore | \Box + \& \Box \bigr).$ 

b) Briefly describe the economic Importance of Gymnospherms related to wood, essential oils & drugs.

 $\exists \varepsilon \Box^{\mathsf{TM}} \langle ; X'' \therefore \rangle \not\subset \Box \downarrow \leq \therefore |\Box \Box \varepsilon \Xi \rangle \leftrightarrow^{\mathsf{TM}} \langle \prod \rangle'' \therefore T, \Omega \omega \Box < \Box \therefore \delta \Box + \Box + < (\Box \Box)$  $\Box \downarrow \leq |\beta \subseteq \varepsilon TTK \leftrightarrow^{\mathsf{TM}} \langle \theta T \mathsf{TM} \langle \therefore |\Box + \& \Box.$ 

4) a) Explain the theories related to shoot Apical meristems.

$$|\pm +\&\Box| > \bullet \land \longrightarrow \Box \uparrow +^{TM} \Box \therefore \Theta T \exists \varepsilon] + \# \langle +\&\Box.$$

b) Define Anamolous Secondary growth ? Explain the Anamolous secondary growth in Boerhaavia Stem.

 $\begin{array}{l} \nu \delta \square + > \bullet^{TM} \langle \ \sim \frown \rho \phi \langle T \ \epsilon \square \sim \varnothing \ \nu \theta > \pm H \ \exists T? \ \upsilon \not\sqsubset \sigma TT \sigma \Psi \varsigma \square'' \exists \epsilon TT \ \lrcorner \pm + \& \square \epsilon T \\ T \ \not \not\sqsubset \ \nu \delta \square + > \bullet^{TM} \langle \ \sim \frown \rho \phi \langle T \ \epsilon \square \sim \varnothing \square \end{array}$ 

# $\exists \varepsilon ]+\#\langle +\& \Box ?$

### PART – B

#### Answer any 3 of the following, Draw diagrams whenever necessary. 3x4=12



- 13)
- Brachy Schreids  $\upsilon'' \downarrow \delta \Box \neg \downarrow \& \Box \diamond$

# GOVERNMENT COLLEGE (AUTONOMOUS) RAJAMAHENDRAVARAM I B.Sc Botany Practical Syllabus

**CORE-II MODULE-I : Diversity of Archaegoniates and Plant Anatomy** 

Total hours of laboratory Exercises 30 hrs @ 2 per week

- 1. Morphology (vegetative and reproductive structures), anatomy of the following : *Marchantia, Funaria, Lycopodium* and *Pinus*.
- Anatomy:
  - a)Demonstration of double staining technique.
  - b)Tissue organization in root and shoot apices using permanent slides
  - c)Preparation of double staining slides
  - d) Anomalous secondary structure of Achyranthes, Boerhavia and Dracaena.
  - e)Anatomical study of wood in T.S., T.L.S. and R.L.S.
- Field visits to local timber depots.

# GOVERNMENT COLLEGE (AUTONOMOUS) RAJAHMUNDRY CORE-II MODULE-I : Diversity of Archaegoniates and Plant Anatomy I B.Sc – BOTANY THEORY INTERNAL EXAMINATION

Written examination	- 25 M
Assignment	- 5 M
Seminar	- 5 M
Viva – Voce	- 5 M
TOTAL	= 40 M

# **GOVERNMENT COLLEGE (AUTONOMOUS) RAJAMAHENDRAVARAM**

**I B.Sc. BOTANY** 

CORE-II MODULE-I: Diversity of Archaegoniates and Plant Anatomy Question Paper Design and Weightage to the Contents

**Duration : 3 Hrs.** 

## **SECTION - A**

**Essay Questions :** 

1 Question from Unit - I

(**OR**)

1 Question from Unit - I

1 Question from Unit - II

(**OR**)

1 Question from Unit - III

1 Question from Unit - IV (*OR*)

1 Question from Unit - IV

1 Question from Unit - V (*OR*)

1 Question from Unit - V

#### **SECTION - B**

### **Short Answer Questions :**

5 Short Answer Questions from FIVE Units

## <u>SECTION – C</u>

### **Very Short Answer Questions :**

4 Very Short Answer Questions from All Units as pre weightage

#### **BLUE PRINT**

NAME OF THEUNIT	NO. OF E.Q.S	NO. SA QS	NO. OF VSA QS	MARKS WEIGHTAGE
Unit I	1+1	1	1	
Unit II & Unit III	1+1	2	1	
Unit IV	1+1	1	1	
Unit V	1+1	1	1	

Max. Marks: 60

### **GOVERNMENT COLLEGE (AUTONOMOUS) RAJAHMUNDRY** II B.Sc. BOTANY THEORY SYLLABUS

### CORE-III MODULE-II PLANT TAXONOMY AND EMBRYOLOGY

Total hours of teaching 60hrs @ 4 hrs per week

### **UNIT – I: INTRODUCTION TO PLANT TAXONOMY**

- 1. Fundamental components of taxonomy (identification, nomenclature, classification)
- 2. Taxonomic resources: Herbarium- functions& important herbaria, Botanical gardens.
- 3. Botanical Nomenclature Principles and rules of ICBN (ranks and names; principle of priority, binomial system; type method, author citation, valid-publication).

### UNIT – II: CLASSIFICATION

- 1. Types of classification- Artificial, Natural and Phylogenetic.
- 2. Bentham & Hooker's system of classification- merits and demerits.
- 3. Engler & Prantle's system of classification- merits and demerits
- 4. Phylogeny

### UNIT -III: SYSTEMATIC TAXONOMY-I

1. Systematic study and economic importance of the following families: Annonaceae, Fabaceae, Rutaceae, Curcurbitaceae, and Apiaceae.

### UNIT -IV: SYSTEMATIC TAXONOMY-II

1. Systematic study and economic importance of plants belonging to the following families: Asteraceae, Asclepiadaceae, Lamiaceae, Ephorbiaceae,orchidaceae and Poaceae.

### **UNIT – V: EMBRYOLOGY**

- 1. Anther structure, microsporogenesis and development of male gametophyte.
- 2. Ovule structure and types; Megasporogenesis, development of Monosporic, Bisporic and Tetrasporic types (*Peperomia*, *Drusa*, *Adoxa*) of embryo sacs.
- 3. Pollination and Fertilization (out lines) Endosperm development and types.
- 4. Development of Dicot and Monocot embryos, Polyembryony

**Suggested activity**: Collection of locally available plants of medicinal importance, observingpollen grains in honey, Aero palynology-collection of pollen from air using glycerin strips in different seasons.

### (12hrs)

# (**12hrs**)

# (12hrs)

(12hrs)

# (12hrs)

### **Books for Reference:**

- Jefferey, C. (1968) : An Introduction to Plant Taxonomy J.A. Churchill, London.
- Mathur, R.C. (1970): Systematic Botany (Angiosperms) Agra Book Stores Lucknow, Ajmer, Allahabad, Delhi.
- Maheswari, P (1963): Recent Advances in the Embryology of Angiosperms (Ed.,) International Society of Plant Morphologists University of Delhi.
- Swamy. B.G.L. & Krishnamoorthy. K.V. (1980) : From flower to fruit Tata McGraw Hill Publishing Co., Ltd., New Delhi.
- Maheswari, P. (1985) : An Introduction to the Embryology of Angiosperms Tata McGraw Hill Publishing Co., Ltd., New Delhi.
- Bhojwani, S.S. & Bhatnagar, S.P. (2000) : The Embryology of Angiosperms (4<sup>th</sup> Edition) Vikas Publishing House (P) Ltd., UBS Publisher's Distributors, New Delhi.
  - Porter, Taxonomy of flowering Plants, Eurasia Publishing House, New C.L. Delhi.
  - Lawrence, G.H.M. (1953): Taxonomy of Vascular Plants, Oxford & IBH Publishers, New

# GOVERNMENT COLLEGE (A) RAJAMAHENDRAVARAM II B.Sc. BOTANY TAXONOMY and EMBRYOLOGY MODEL QUESTION PAPER

Time : 3 Hrs.

# Max Marks : 60

## Section – A

Answer All the following Questions :

 $\Box \mid \Box \mid + \sim \nu \Box \Box \mid |\Box \Xi / \Box :: \oplus \leq \Box \delta \Box \epsilon \sqrt{<} \int \Box H \Box :: T \mid \psi \Box \phi \langle T + \& \Box.$ 

# 4x10=40

1) How are plants named Scientifically as per International code of Botanical Nomenclature?  $\nu + TM \langle \sigma \Box \blacklozenge \rho \phi \langle T \epsilon \Box \downarrow \leq \Box \delta \Box MT \downarrow \leq \sigma \Im \Delta \Box \phi \langle T \epsilon \sqrt{\epsilon} [\Box \Box \{ \int \ldots \cong \exists < \int \Box + b \forall \psi TT \downarrow \leq \neg \therefore \oplus \leq \Box \Xi f | \delta \odot | \phi \langle T + b \forall MT \downarrow \leq \sigma \Im \Delta \# ] \kappa \subseteq | \sigma \Im T.$ (or)

b) Explain the various components of taxonomy?

 $\varepsilon \downarrow Z \downarrow \leq \sigma \Im \Delta \Xi (| \delta \Box | + \} \not\subset \Box \theta \Box \exists \exists < \int \Box v + \Xi ( \therefore \theta T \exists \varepsilon ] + \# \langle + \& \Box.$ 

2) a) Give a comparative account of Bentham and Hooker's and Engler and prantle's systems of classification.

 $\begin{array}{c} \upsilon \supset + < \div \Box \psi \Box T \quad \overline{\varsigma} \Box A_{+} \leq \sigma \Psi, \ \mu + > \bullet' \sigma \Psi \quad \left\lceil \beta \subseteq \theta \in \right\rbrace \rangle \therefore \ \varepsilon \downarrow Z_{+} \leq \sigma \mathfrak{I} \Delta \ \varepsilon \leftrightarrow \varepsilon \\ \delta \Box \Leftarrow \mathsf{IM} \langle T \therefore H \Box^{\mathsf{TM}} \langle \Box_{+} \leq \delta \Box \varepsilon \sqrt{<} \int \Box H \Box \Box \Box \Box \varepsilon \cap + \& \Box. \\ (or) \end{array}$ 

b) Describe the phylogenetic classification of Arngiosperms?

$$\exists \varepsilon \exists \mathsf{TM} \langle \ ; \mathsf{X}'' \therefore \ \rangle \not\subset \varepsilon \sigma \mathfrak{IZ} \ \exists \mathsf{I} \pm \delta \Box \ \varepsilon \checkmark \mathsf{Z} \mathsf{I} \mathtt{I} \leq \sigma \mathfrak{I} \Delta \theta \mathsf{T} \ \exists \varepsilon ] + \# \langle + \& \Box.$$

3) a) Write about the family "Rutacease"?  $\sigma \sqrt{\frac{1}{2}} \sqrt{\frac{1}{2}}$ 

 $\sigma \Im \sqrt{\phi} \delta \longrightarrow \oplus \leq \square \geq T + \square + > \bullet \sqrt{]} \subset |\psi \square \phi \langle T + \& \square.$ (or)

- 4) a) Describe the anther structure and Micro Sporogenesis?  $|\Box \sigma \Box > \bullet \downarrow \& \Xi \downarrow \Box \sigma \Box \Box \Delta \epsilon TT \epsilon T] \phi \langle TT \delta \Box \sqrt{\downarrow} \leq \Box \Box \delta \longrightarrow \langle \Box \uparrow ; \cup \epsilon \Box \sim \emptyset \Box \epsilon ]$   $Z + |\Box \lor \epsilon TT.$ (or)
  - b) Write about different types of Endosperm development in Arngiosperms.

 $\begin{array}{c} \square \epsilon \square^{TM} \langle \ ; X'' \therefore \ \rangle \not\subset \exists \exists < f \square \ \sigma \mathfrak{I} \downarrow \pm \therefore \ \nu + \oplus \leq \square \sigma \mathfrak{I} \# \langle \bigcirc < \square \ f \epsilon \square < \square \ f \uparrow \therefore \theta T \\ > \bullet \sqrt{]} \bigcirc \ | \ \psi \square \phi \langle T + \& \square. \end{array}$ 

# <u>PART – B</u>

### Answer any three of the following.

### 3x4=12

 $\cong \psi \left( \prod H \square \varepsilon T \sqrt{\&} \square T \mid | \square \Xi \right) \square \therefore \bigoplus \le \square \delta \square \varepsilon \sqrt{<} \int \square \theta \varepsilon T T \therefore T \mid \psi \square \phi \langle T T \varepsilon T T.$ 

- 5) Chemotaxonomy  $\sigma\Im\kappa\subseteq\phi\langle TH\Box < \int\Box\sigma\Im \varepsilon \downarrow Z \lrcorner \leq \sigma\Im\Delta \Xi | \delta\Box | +.$
- 6) Cucurbitaceous Anthers  $\oplus \leq \square \oplus \leq \square ] \dots \phi \rangle \delta \longrightarrow |\square \sigma \square > \bullet \downarrow \& \Xi (:.T)$
- 7) Economic Importance of Euphobiaceae  $\varphi(\sqrt{|\Box\sigma\Psi \otimes \varphi]T\delta} = [\beta \subseteq \epsilon TTK \leftrightarrow^{TM} \langle \beta \subseteq \epsilon TTK \rangle$
- 8) Herbarium
  □ς"≠σ®]φ⟨T+
- 9) Embryo development in monocot plants  $\cong \downarrow \pm < \Box \Longrightarrow ; \cup \psi [TT \downarrow \leq \neg :. ] \not\subset \Box \models \& \Box \_ f \in \Box \sim \emptyset$

### Answer all the following Questions.

 $|\downarrow|+\sim v \Box \Box ||\Box \Xi / \Box \therefore \oplus \leq \Box \delta \Box \epsilon \sqrt{<} \int \Box \theta \epsilon TT \therefore T |\psi \Box \phi \langle TT \epsilon TT.$ 

PART – C

### 4x2=8

- 10) Artificial classification  $\Box \leq \Box = \varepsilon T \varepsilon \forall Z \downarrow \leq \sigma \Im \Delta$
- 11) Economic Importance of poaceae  $\beta \int \phi T \delta = \Box d \leq \beta \epsilon TTK \leftrightarrow TM \langle$

- 12) Double fertilization  $\sim \cap \square \square \therefore B \downarrow \leq \sigma \Im \Delta +$
- 13) Piston mechanism  $\mid - \delta \Box \dots H \Box \phi \langle \sqrt{+} \mid \longleftarrow \downarrow \leq +$

# GOVERNMENT COLLEGE (AUTONOMOUS) RAJAHMUNDRY II B.Sc BOTANY PRACTICAL SYLLABUS PLANT TAXONOMY AND EMBRYOLOGY

Total hours of laboratory Exercises 30hrs @ 2 per week

# Suggested Laboratory Exercises:

- Systematic study of locally available plants belonging to the families prescribed in theory syllabus.
- Demonstration of herbarium techniques.
- Structure of pollen grains using whole mounts (Catharanthus, Hibiscus, Acacia, Grass).
- Demonstration of Pollen viability test using *in- vitro* germination (*Catharanthus*). Study of ovule types and developmental stages of embryo sac using permanent slides /Photographs.
- Structure of endosperm (nuclear and cellular); Developmental stages of dicot and monocot
- Isolation and mounting of embryo (using Symopsis / Senna / Crotalaria)
- Field visits .
- Study of local flora and submission of Field Note Book.

# **GOVERNMENT COLLEGE (AUTONOMOUS) RAJAHMUNDRY** II B.Sc. BOTANY INTERNAL EXAM CORE-III MODULE-II PLANT TAXONOMY AND EMBRYOLOGY

Written examination	- 25 M
Assignment	-5 M
Seminar	- 5 M
Viva – Voce	- 5 M
TOTAL	= 40 M

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# **GOVERNMENT COLLEGE (AUTONOMOUS) RAJAHMUNDRY**

II B.Sc. BOTANY THEORY CORE-III MODULE-II PLANT TAXONOMY AND EMBRYOLOGY Question Paper Design and Weightage to the Contents

Duration : 3 Hrs.	Max. Marks : 60
SECTION - A	
Essay Questions :	
1 Question from Unit - I	
(OR)	
1 Question from Unit - I	
1 Question from Unit - II	
(OR)	
1 Question from Unit - II	
1 Question from Unit - III (OR)	
1 Question from Unit - IV	
1 Question from Unit - V ( <b>OR</b> )	
1 Question from Unit - V	
SECTION - B	
Short Answer Questions :	

5 Short Answer Questions from FIVE Units

# **SECTION - C**

### **Very Short Answer Questions :**

4 Very Short Answer Questions from All Units as pre weightage

### **BLUE PRINT**

# **GOVERNMENT COLLEGE (AUTONOMOUS) RAJAMAHENDRAVARAM**

## **II B.Sc. BOTANY**

## **CORE-IV MODULE-II: Plant Physiology and Metabolism**

Total hours of teaching 60hrs @ 4 hrs per week

### **UNIT - I: PLANT - WATER RELATION**

- 1. Physical properties of water, Importance of water to plant life.
- 2. Diffusion, imbibition and osmosis; concept & components of Water potential.
- 3. Absorption and transport of water and ascent of sap.
- 4. Transpiration Definition, types of transpiration, structure and opening and closing mechanism of stomata.

#### **UNIT -II: MINERAL NUTRITION AND ENZYMS** (12hrs)

- 1. Mineral Nutrition: Essential elements (macro and micronutrients) and their role in plant metabolism, deficiency symptoms.
- 2. Nitrogen metabolism biological nitrogen fixation in *Rhizobium*, outlines of protein synthesis (transcription and translation).
- 3. Enzymes: General characteristics, mechanism of enzyme action and factors regulating enzyme action.

# **UNIT –III: PHOTOSYNTHESIS**

NAME OF THEUNIT	NO. OF E.Q.S	NO. SA QS	NO. OF VSA OS	MARKS WEIGHTAGE
пшенин			২১	WEIGHTINGE
Unit I	1+1	1	1	
Unit II	1+1	1	1	
Unit III & IV	1+1	2	1	
Unit V	1+1	1	1	

1. Photosynthesis: Photosynthetic pigments, photosynthetic light reactions, photo-

# (12 hrs)

(12 hrs)

phosphorylation, carbon assimilation pathways: C3, C4, and CAM (brief account)

- 2. Photorespiration and its significance.
- 3. Translocation of organic solutes: mechanism of phloem transport, source-sink relationships.

# **UNIT – IV: PLANT METABOLISM**

- 1. Respiration: Glycolysis, anaerobic respiration, TCA cycle, electron transport system. Mechanism of oxidative phosphorylation.
- 2. Lipid Metabolism: Types of lipids, Beta-oxidation.

# UNIT -V: GROWTH AND DEVELOPMENT

### (12hrs)

- 1) Growth and development: definition, phases and kinetics of growth.
- 2. Physiological effects of phytohormones Auxins, Gibberellins, Cytokinins, ABA, Ethylene and Brassinosteroids.
- 3. Physiology of flowering -photoperiodism, role of phytochrome in flowering; Vernalization.

Suggested activity: Seminars, Quiz, Debate, Question and Answer sessions,

observing animations of protein biosynthesis in you tube.

### (12 hrs)

# **Books for Reference:**

- Steward. F.C (1964): Plants at Work (A summary of Plant Physiology) Addison-Wesley Publishing Co., Inc. Reading, Massachusetts, Palo alto, London.
- Devlin, R.M. (1969) : Plant Physiology, Holt, Rinehart & Winston & Affiliated East West Press (P) Ltd., New Delhi .
- Noggle, R.& Fritz (1989):Introductory Plant Physiology Prentice Hall of India.
- Lawlor.D.W. (1989): Photosynthesis, metabolism, Control & Physiology ELBS/Longmans-London.
- Mayer, Anderson & Bonning(1965): Introduction to Plant Physiology
- Mukherjee, S. A.K. Ghosh(1998) Plant Physiology ,Tata McGraw Hill Publishers(P) Ltd., New Delhi.
- Salisbury, F.B & C.W. Ross (1999): Plant Physiology CBS Publishers and Printers, New Delhi.
- Plummer, D.(1989) Biochemistry–the Chemistry of life ,McGraw Hill Book Co., London, N.Y. New Delhi, Paris, Singapore, Tokyo.
- Day, P.M.& Harborne, J.B. (Eds.,) (2000): Plant Biochemistry. . Harcourt Asia (P) Ltd., India & Academic Press, Singapore.

# GOVERNMENT COLLEGE (A) RAJAMAHENDRAVARAM II B.Sc. BOTANY SEMESTER - IV PLANT PHYSIOLOGY & METABOLISM MODEL QUESTION PAPER

Time : 3 Hrs.

# Max Marks : 60

# Section – A

Answer All the following Questions with neat Labelled Diagrams.



b) Define photo periodism ? Write an essay of photoperiodism.

 $\begin{array}{l} \downarrow \pm + \Leftarrow \downarrow \pm \rangle " \epsilon \sim \int v \theta > \pm H \ \exists T? \downarrow \pm + \Leftarrow \downarrow \pm \rangle " \epsilon \sim \int \Box | \prod \psi \Box \leftrightarrow \delta \Box \epsilon T \\ T \ | \psi \Box \phi \langle T + \& \Box. \end{array}$ 

# <u>PART – B</u>

### Answer any three of the following.

### 3x4=12

 $\cong \psi \left( \prod H \square \epsilon T \sqrt{\&} \square T \mid |\square \Xi / \square \therefore \oplus \le \square \oplus \le \square' |\square \right| +> \pm \delta \square \epsilon \sqrt{<} \int \square \theta \epsilon T T \mid \psi$ 

 $\Box \phi \langle T + \& \Box$ .

- 5) Ascent of Sap  $|< = \psi \wp < = Z \epsilon T \epsilon T T$
- 6) Mechanism of Enzyme Action  $\mu + X \supset \Pi \psi \Box T \therefore \# \langle \sigma \Box \leftrightarrow \phi \langle \sqrt{+} | \Leftarrow \downarrow \leq \epsilon TT$
- 7) Photo Systems  $\downarrow \pm + \Leftarrow \epsilon \leftrightarrow \epsilon \delta \Box \Box \therefore T$
- 8) Fermentation  $\Box \Delta \Delta \epsilon TT$
- 9) Vernalization  $\psi \langle \sigma \mathfrak{I} \rangle \supset \prod X \rangle \omega \Box H \Box$

### <u> PART – C</u>

### Answer all the Questions.



10) Imbibition

□β⊆θεΤΤ

- 11) Leg Hemoglobin  $\Rightarrow < \zeta - \psi \forall \forall = 0^{\circ} H \Box$
- 12) Respiratory quotient

 $\Xi(\frown \delta \Box \mid \downarrow [\phi \langle T \downarrow \wp \omega \Box + \geq T$ 13) A.B.A.  $\nu_{\delta} = \Box \epsilon T' \epsilon TT$ 

# GOVERNMENT COLLEGE (AUTONOMOUS) RAJAMAHENDRAVARAM II B.Sc – BOTANY THEORY INTERNAL EXAMINATION CORE-IV MODULE-II: Plant Physiology and Metabolism

Written examination	- 25 M
Assignment	- 5 M
Seminar	- 5 M
Viva – Voce	- 5 M
TOTAL	= 40 M

# **GOVERNMENT COLLEGE (AUTONOMOUS)** RAJAMAHENDRAVARAM **II B.Sc PRACTICAL SYLLABUS CORE-IV MODULE-II: Plant Physiology and Metabolism**

Total hours of laboratory Exercises 30 hrs @ 2 per week

# **Suggested Laboratory Exercises:**

- Osmosis by potato osmoscope experiment
- Determination of osmotic potential of plant cell sap by plasmolytic method using leaves of Rhoeo / Tradescantia.
- Structure of stomata (dicot & monocot)
- Determination of rate of transpiration using cobalt chloride method.
- Demonstration of transpiration by Ganongs' photometer
- Demonstration of ascent of sap/Transpiration pull.
- Effect of Temperature on membrane permeability by colorimetric method. •
- Study of mineral deficiency symptoms using plant material/photographs. •
- Separation of chloroplast pigments using paper chromatography technique.
- Rate of photosynthesis under varying Co2 concentrations.
- Effect of light intensity on oxygen evolution in photosynthesis using Wilmott's bubbler.

# GOVERNMENT COLLEGE (AUTONOMOUS) RAJAMAHENDRAVARAM II B. Sc BOTANY PRACTICAL MODEL PAPER CORE-IV MODULE-II Plant Physiology and Metabolism

TIME:3hrs	MARKS:50
1. Perform the Experiments A and B. Give the observation. Tabulate the results if any. Draw	e aim, principle, procedure an aw labeled diagram.
	$2 \ge 15 = 30$ marks
2. Give the Procedure of the experiments C and D	2 x 5 -= 10 marks
3. Record and Viva-voce	10 marks
	50 marks

# GOVERNMENT COLLEGE (AUTONOMOUS) RAJAMAHENDRAVARAM II B.Sc. BOTANY

# **CORE-IV MODULE-II : Plant Physiology and Metabolism**

Question Paper Design and Weightage to the Contents

**Duration : 3 Hrs.** 

Max. Marks: 60

### **SECTION - A**

**Essay Questions :** 1 Question from Unit - I

(**OR**)

1 Question from Unit - II

1 Question from Unit - III

(OR)

1 Question from Unit - III

1 Question from Unit - IV (OR)

1 Question from Unit - IV

1 Question from Unit - V (OR)

1 Question from Unit - V

### **SECTION - B**

### **Short Answer Questions :**

5 Short Answer Questions from FIVE Units

## **SECTION - C**

### Very Short Answer Questions :

4 Very Short Answer Questions from All Units as per weightage

#### **BLUE PRINT**

NAME OF	NO. OF	NO. SA QS	NO. OF VSA	MARKS
THEUNIT	E.Q.S		QS	WEIGHTAGE
Unit I & II	1+1	2	1	
Unit	1+1	1	1	
III				
Unit IV	1+1	1	1	
Unit V	1+1	1	1	

## GOVERNMENT COLLEGE (AUTONOMOUS) RAJAMAHENDRAVARAM III B.Sc – BOTANY SYLLABUS PAPER - III (At the end of V Semester) CELL BIOLOGY AND ECOLOGY

# **SECTION - A**

# **CELL BIOLOGY**

# UNIT - I

- 1. Plant cell envelops: Ultra structure of cell wall, molecular organization of cell membranes.
- 2. Nucleus: Ultrastructures, Nucleic aicds Structure and replication of DNA, types and functions of RNA

## UNIT - II

- 3. Chromosomes: Morphology, Organization of DNA in a chromosome, Euchromatin and Heterochromatin, Karyotype.
- 4. Cell division: Cell cycle and its regulation, mitosis, meiosis and their Significance.

# **SECTION - B**

# **ECOLOGY**

### UNIT - I

- 1. Concept and components of Ecosystem, energy flow, food chains, food webs, ecological pyramids, biogeochemical cycles: Carbon, Nitrogen, Phosphorus.
- 2. Plants and environment: Ecological factors Climatic (light and temperature), edaphic and biotic, Ecological adaptations of plants.
- 3. Population ecology: Natality, mortality, growth curves, ecotypes, ecads.

# UNIT - II

- 4. Community ecology: Frequency, density, cover, life forms, biological spectrum, ecological succession (Hydrosere, Xerosere)
- 5. Production ecology: Concepts of productivity, GPP, NPP, CR (Community Respiration) and secondary production, P/R ratio and Ecosystems.

## **Additional Topics:**

- 1. Structure of other cell Organelles and their importance
- 2. Apomixis
- 3. Study of Ecosystem of the Local area like Pond Ecosystem.
- 4. Special type of Chromosomes like polytene chromosomes Giant chromosomes Lampbrush chromosomes.

### SUGGESTED READINGS

- 1. Bharucha, E.2005. Text book of Environmental studies for Undergraduate courses. Universities Press (India) Private Limited, Hyderabad.
- 2. Pukuri, K and S Nakayama 1996. Plant Chromosomes: Laboratory Methods CRC Press, Boca Raton, Florida.
- 3. Harris, N. and K. J. Oparka 1994. Plant Cell Biology: A Practical Approach. IRL Press at University Press, Oxford, UK.
- 4. Khotoliya, R. K. 2007. Environmental pollution Management and Control. for Sustainable Development. S. Chand and Company Ltd. New Delhi.
- 5. Kormondy. E. 1989 Concpets of Ecology (3rd Ed.) Printice Hall of India, New Delhi
- 6. Michael: S. 1996 Ecology, Oxford University Press London.
- 7. Mishra D. D. 2008. Fundamental Concepts in Environmental Studies. S. Chand & Company Ltd., New Delhi.
- 8. Odum E. P. 1983, Basics of Ecology, Saunder's International students Edition, Philadelphia.
- 9. Pandey, B. P. 2007 Botany for Degree Students, Diversity of Microbes. Croptogams, Cell Biology and Genetics. S. Chand & Company Ltd., New Delhi
- 10. Sharma P. D. 1989, Elements of Ecology. Rastogi Publications, Meerut.
- 11. Sharma A. K. and A. Sharma, 1999 Plant chromosomes, Analysis, Manipulation and Engineering Hardwood Academic Publishers, Australia
- 12. Singh, H. R. 2005, Environmental Biology, S. Chand & Company Limited.
- 13. Varma, P. S and V. K. Agrawal, 2004. Cell Biology, Genetics, Molecular Biology, Evolution and Ecology, S. Chand and Company Ltd., New Delhi.
# GOVERNMENT COLLEGE (AUTONOMOUS) RAJAMAHENDRAVARAM III B.Sc. BOTANY PAPER III (At the end of Semester – V) CELL BIOLOGY AND ECOLOGY MODEL QUESTION PAPER

Time : 3 Hrs.

Max Marks: 75

Section – A

# Answer all the Questions.

1) Explain various theories involved in the cell wall and molecular organization of cell membrance.

 $\downarrow \leq \Delta \downarrow \leq \epsilon \# \langle \nu \Delta T \Box \sigma \Box \Delta \epsilon \leftrightarrow \epsilon \delta \Box \Theta T, \downarrow \leq \Delta \downarrow \leq \epsilon \# \langle \Box \sigma \Box \Box \Delta \epsilon \leftrightarrow \epsilon \delta \Box \Theta T, \downarrow \leq \Delta \mu \leq \epsilon \# \langle \Box \sigma \Box \Box \Delta \epsilon T T \Theta T \exists \epsilon ] + \# \langle T \delta \to \langle O \sigma \rangle$ 

Discuss various types of RNA with their functions  $\exists \exists < \left( \Box \ \sigma \mathfrak{T}_{+} \leq \epsilon TT : \Box \sigma \Psi . \mu H \Box . \mu . \nu \Delta T \ \delta \Box + \exists < \left( \Box \theta \epsilon TT \theta T \right) B_{+} \leq \right] + \# \langle + \& \Box ?$ 

2) Enumerate the molecular organization of DNA in a Chromosome.  $| \downarrow = \psi [ \sqrt{X} \not\subset \epsilon TT ] \not\subset \& \Box . \mu H \Box . \mu. \nu \Delta T \delta \Box + \exists < (\Box \theta \epsilon TT \theta T \exists \Xi) B ( \downarrow \le ] + \# \langle + \& \Box ?$ (or)

What is cell cycle and explain its regulation.  $\downarrow \leq \Delta \# \langle | \downarrow \leq \epsilon TT \nu \theta \rangle \pm H \exists T? < \Box \Box \Box \phi \langle T + | TM \langle \Delta'' \exists < \int \Box \theta \epsilon TT \theta T \exists \epsilon ] + \# \langle + \& \Box ?$ 

3) What is biogeochemical cycle, explain any two types of biogeochemical cycles?  $\vartheta \varepsilon \upsilon \left( \Box \sqrt{\sigma \Im \kappa \Box \phi} \langle T \theta \# \langle | \downarrow \leq \varepsilon T T \nu \theta > \pm H \rfloor \exists T ? \cong \psi \lfloor \Pi H \Box \Re \sigma + \& \Box T \sigma \Im \downarrow \leq \varepsilon T T \therefore \vartheta \varepsilon \upsilon \left( \Box \sqrt{\sigma \Im \kappa \Box \phi} \langle T \theta \varepsilon \therefore \phi \langle \sqrt{\therefore \theta T} \exists \Xi \rangle B_{\downarrow} \leq ] + \# \langle + \& \Box ? \rangle$ 

(or) What is adaptations? Enumerate xerophytic adaptations with examples?  $\nu\theta T \oplus \leq \Lambda \therefore \theta \epsilon TT \ \nu\theta > \pm H \exists T? \ \mu\&\Box \end{bmatrix} \psi [TT \downarrow \leq \neg \therefore \nu\theta T \oplus \leq \Lambda \therefore H\Box \therefore T \ \kappa ] < \Box \varsigma \Box'' \sigma \Im \Delta + > \pm \exists \epsilon ] + \# \langle +\&\Box ?$  4) Define succession, Explain various stages involved in Hydrosere with examples?  $\nu\theta T \mid \downarrow \leq \epsilon T \epsilon T T \theta T \mid \sigma \mathfrak{I} \cap = +\#\langle +\& \Box . \mid \{ \mid \nu\theta T \mid \downarrow \leq \epsilon T \epsilon T T \} \not\subset \Box$   $\exists \exists < \bigcap < \Box \Xi \end{pmatrix} \therefore \theta T \mid \kappa \downarrow < \Box \varsigma \Box'' \sigma \mathfrak{I} \Delta + > \pm \exists \epsilon ] + \#\langle +\& \Box ?$ (or) Discuss the various concepts of productivy  $\Box^{TM} \langle \in \leftarrow \mid \rangle \not\subset \Box \exists \exists < \bigcap \cup \bigcap'' \epsilon \theta \therefore \theta T \# \langle ] \subset +\# \langle +\& \Box .$ 

### Section – B



### Section - C

Answer all the Questions.  $v = | | = 2 / : \oplus \le \delta = \varepsilon \sqrt{\langle | H | : T | \psi = \phi \langle T + \& | .}$  10x2=201) Telocentric Chromosome - { | / \angle = 0 \left | . | \angle = \u03c6 | \left \left \angle E TT
2) Z-DNA - \u03c6 & . \u03c6 &

- 7) Nucleus
- 8) Centromere
- 9) Natality
- 10) PIR Ratio
- 6) Secondary production  $\sim \cap \rho \phi \langle T \Box^{TM} \langle \in \Leftarrow |$ 
  - ≠₊⊥+ | <□₊1≤εTT
  - $\Box \delta + | \langle \not \Box \exists T \phi \langle T \sigma \Psi \rangle$
  - ∪θH□∴≠σ≥
  - PIR  $\Box \omega \Box \in \Leftarrow |$ .

### GOVERNMENT COLLEGE (AUTONOMOUS) RAJAMAHENDRAVARAM III B.Sc., Paper - III Semester - V Internal Exam (Theory) Written Test - I

Time: 1 Hour		Max. Marks:15
I.	Answer any one of the following	10 Marks
a)	Essay Question from Cell Biology Unit -	
	I (OR)	
b)	Essay Question from Ecology Unit - I	
II	Answer any one of following	5M
a)	Short Notes Question from Cell Biology Unit - I	
	(OR)	
b)	Short Notes Question from Ecology Unit - I	

#### GOVERNMENT COLLEGE (AUTONOMOUS) RAJAMAHENDRAVARAM

### III B.Sc., PAPER - III Semester - V Internal Exam (Theory) Written Test - II

Time:	1 Hour	Max. Marks: 15
I	Answer any one of the following	10M
a)	Essay Question from Cell Biology Unit -	
	II (OR)	
b)	Essay Question from Ecology Unit - II	
II	Answer any one of following	5M
a)	Short Notes Question from Cell Biology Unit - II	
	(OR)	
b)	Short Notes Question from Ecology Unit - II	

	PAPER III THEORY SEMESTER- V	
Time: 3 Hours	SECTION- A	Max. Marks:75
Answer All the questions:		10 x 2 =20
Very short Notes:	5 from Cell Biology 5 from Ecology	
	SECTION-B	
Answer any three of the followi	ng	3 x 5 =15
Short Notes:	2 from Cell Biology 3 from Ecology	
	SECTION-C	
Answer all the questions (Intern	nal Choice)	4 x 10 =40
1. 2 from Cell Biology	Unit - I	
2. 2 from Cell Biology	Unit - II	
3. 2 from Ecology Unit	I	

2 from Ecology Unit II

4.

Name of the unit	No. of	No. of	No. of	Weightage of
	VSA	SA	Essays	Marks
Cell Biology Unit - I			1+1	5x2=10
	5	2		3x5=15
Cell Biology Unit - II			1+1	4x10=40
Ecology Unit - I			1+1	5x2=10
	5	3		3x5=15
Ecology Unit - II			1+1	4x10=40

### GOVERNMENT COLLEGE (AUTONOMOUS) RAJAHMUNDRY III B.Sc - BOTANY SYLLABUS ELECTIVE- I PHYSIOLOGY

### **PHYSIOLOGY**

- Water Relations: Importance of water to plant life, physicl properties of water diffusion, imbibition, osmosis, water osmotic and pressure potentials, absorption transport of water, ascent of sap, transpiration, stomatal structure and movements.
- Mineral Nutrition: Essential macro and micro mineral nutrients and their role,
- symptoms of mineral deficiency, absorption of mineral ions: passive and active processes.
- Enzymes: Nomenclature, characteristics, mechanism and regulation of enzyme action, enzyme kinetics, factors regulating enzyme action.
- Photosynthesis; Photosynthetic pigments, absorption and action spectra; Red drop and Emerson enhancement effect, concept of two photosystems, mechanism of photosynthetic electron transport and evolution of oxygen, photophosphorylation, carbon assimilation pathways: C3, C4, and CAM photorespiration.
- Translocation of organic substances: Mechanism of phloem transport, source-sink relationships.

# **Reference books:**

- Hopkins, W. G. 1995, Introduction to Plant Physiology, John Wiley & Sons Inc. New York, USA.
- Pandey, B. P. 2007, Botany for Degree Students; Plant Physiology.
  Biochemistry. Biotechnology, Ecology and Utilization of Plants. S. Chand & Company Ltd., New Delhi.
- Salisbury, F. B. and C. W. Ross. 1992. Plant Physiology 4th Edn. (Indian Edition) Wordsworth, Thomson Learning Inc., USA.Taiz L and E. Zeiger, 1998. Plant Physiology (2nd Ed) Sinauer Associates, Inc., Publishers, Massachusetts. USA

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# GOVERNMENT COLLEGE (AUTONOMOUS) III SYLAJABUABUABUABUARAM ELECTIVE- II TISSUE CULTURE AND BIOTECHNOLOGY

- Tissue culture, Introduction, sterilization procedures, culture media composition and preparation, Explants.
- Callus culture, cell and protoplast culture, somatic hybrids and cybrids.
- Applications of tissue culture: production of pathogen free plants and somaclonal variants, production of stress resistant plants, secondary metabolities and synthetic seeds.
- Biotechnology: Introduction, history and scope.
- r-DNA technology: Vectors and gene cloning and transgenic plants.

### **Additional Curriculum**

Germplasma - its scope

### SUGGESTED READINGS

- 1. Balasubrahmanian, D., C.F.A. Bryce, K. Dharmalingam, J. Green and K. Jayaraman, 2004. Biotechnology, Universities Press (India) Private Limited Hyderabad.
- 2. Channarayappa, 2007 Molecular Biotechnology Principles and practices. Universities Press India Private Limited, Hyderabad.
- 3. Chawla, H. S. 2002, Introduction to Plant Biotechnology. Oxford and IBH publishing Company, New Delhi.
- 4. Dubey, R. C. 2001. A Text book of Biotechnology. S. Chand & Company Ltd. New Delhi.
- 5. Jha, T. B. and B. Ghosh, 2005, Plant Tissue Culture Basic and Applied Universities Press (India) Private Limited, Hyderabad.

.

6. Ramawat, K. G. 2008, Plant Biotechnology. S. Chand & Company Ltd New Delhi.

GOVERNMENT COLLEGE (AUTONOMOUS) RAJAMAHENDRAVARAM

# III B.Sc. BOTANY : MODEL QUESTION PAPER : 2017 - 2018 SKILLED BASED ELECTIVE - II : TISSUE CULTURE & BIOTECHNOLOGY (At the end of V Semester)

Time : 3 Hrs.

Max. Marks: 75

### **SECTION - A**

Answer the following questions.	$4 \ge 10 = 40 $ M
$  \downarrow \downarrow$	ψ□φ⟨ΤΤεΤΤ.

1. (a). Write about the various culture media preparation in Tissue Culture.

$$\downarrow \leq \Delta X'' \therefore \varepsilon \sigma \mathfrak{I} \square \theta + \not \downarrow \exists \exists < \int \square \sigma \mathfrak{I} \downarrow \pm \therefore \varepsilon \sigma \mathfrak{I} \square \theta \varphi \langle \sqrt{\theta} \downarrow \le + \mathsf{I} \mathsf{M} \langle \varphi \langle \sqrt{\downarrow} \square | \psi \square \varphi \langle \mathsf{T} + \& \square. \end{cases}$$

- (**OR**)
- (b). Describe the mechanisms of Ovule & Embryo cultures.

$$\begin{array}{c} \nu + \& \Box \ \epsilon T ] \phi \langle TT | \longrightarrow \& \Box \ \epsilon \sigma \Im \Box \theta \ \phi \langle \sqrt{+} | \Longleftarrow \bot \vdots \theta T \ \epsilon ] \Box + \# \\ \langle + \& \Box. \end{array}$$

2. (a). Define Callus, explain the steps involved in Callus culture.

$$\downarrow \pm \therefore \delta \tau \theta T \Box \sigma \mathfrak{I} \cap = +=, \ \downarrow \pm \therefore \delta \tau \varepsilon \sigma \mathfrak{I} \Box \theta + \not \downarrow \Box \exists \exists < \int \Box < \Box \\ \equiv \not \bot \vdots \theta T \exists \Xi / B \downarrow \leq ] + \# \langle + \& \Box. \\ (OR)$$

(b). Define Somaclonal hybrid & explain the methods to obtain the somaclonal hybrids.

$$\begin{aligned} &\kappa \rfloor \varepsilon \sqrt{\downarrow} \wp' \theta \rangle \wedge \delta \Box + \downarrow \leq \sigma \Box \Box \Box \Box \sigma \mathfrak{I} \cap \equiv + \equiv, < \Box \Box \Box \cong \sigma \mathfrak{I} \in ] \# \\ &|\Box < \Box \varnothing^{\mathsf{TM}} \langle T :: \theta T^{\mathsf{TM}} \lfloor :: |\Box + \& \Box. \end{aligned}$$

3. (a). Define - DNA. Explain the mechanism of - DNA Technology with the help of restriction enzymes.

$$|\Box \lor \theta \ni \delta\Box + \varphi ( \checkmark \cup \downarrow \leq \&\Box.\mu H\Box.\mu.\theta T \Box \sigma \Im \cap \equiv + \equiv, |\Box \lor \theta \ni \delta\Box + \varphi ( \checkmark \cup \downarrow \leq \&\Box.\mu H\Box.\mu. \\ \varphi ( \checkmark \downarrow + | \iff \downarrow \pm \Box\Box \Box \sigma \Im \cap \equiv + \# ( + \&\Box. \\ (OR)$$

(b). Define vectors. Describe the various types of vectors used in - DNA Technology.

4. (a). Write an essay on Transgenic plants.

$$\begin{array}{c} \psi \mid TT \exists \Box \delta \leftrightarrow \Box \psi \geq \Box \Box \mid \Box : \neg \succeq \neg T \downarrow \psi \\ \forall \forall T \exists \Box \delta \leftrightarrow \Box \psi \geq \Box \phi \\ \Box \phi = T \exists \Box \delta \leftrightarrow \Box \psi = T \\ \Box \phi = T \\ \Box$$

(OR)

(b). Describe the applications of genetic engineering with regard to Agriculture.

$$\mathfrak{Costron} = \mathbb{C} \times \mathfrak{Costron} = \mathbb{C} \times \mathbb$$

#### **SECTION - B**

5. Sterilization procedure of Tissue Culture  $\texttt{III} \leq \Delta X'' \therefore \texttt{Egg} = \theta + \neq \delta = \forall \texttt{III} \leq \texttt{III} \leq$ Meristem culture 6.  $\exists \upsilon (" \cup \leftrightarrow \dashv \leq \Delta X" \therefore \varepsilon \sigma \mathfrak{I} \Box \theta +$  $| β J { { β ⊆' δτ... εσ3 □θ+} }$ -7. Protoplast culture  $- ; \cup | < \square \varepsilon \leftrightarrow \square : . \cap$ 8. Germplasm storage

- 9. Restriction Enzyme -  $\Re \sigma \square \delta \longrightarrow \square \leq \square H \square \mu + X \supset \prod \psi \square T$ 10. Gene Cloning -  $\Im H \square \square \wp' \square + > \times$ 11. Expression of Transferred genes - $| \{ "H \square \Diamond | \square \square \sigma \Psi \cup \Theta T \leftrightarrow \varepsilon \lor \therefore \varepsilon \leftrightarrow \square \Upsilon | \square \leq \sigma \Im \Delta \}$
- 12. Herbicide resistance

 $>\bullet T$  :  $\Box H \Box \omega \Box \downarrow \leq \Box \sigma \wp < \int \Box \downarrow \leq \mathsf{TM} \langle \frown \epsilon TT$ 

### **SECTION - C**

Answer <u>ALL</u> questions from the following.  $10 \ge 2 \ge 20$  M  $\square \mid \downarrow \mid \downarrow \downarrow \downarrow \downarrow \downarrow \downarrow \downarrow \square \downarrow \mid \square \Xi \downarrow \square \therefore \oplus \le \square \delta \square \varepsilon \sqrt{<} (\square \theta \varepsilon TT \therefore T \mid \psi \square \phi \langle TT \varepsilon TT.$ 

13.	Explant.	-	μ₊⅃⅂◊β⊆′+{∧
14.	Synthetic seeds	-	$\delta\Box + \Xi \mathbb{B}' \omega \underline{} TM \langle \exists TM \langle H \Box :: T$
15.	Cybrids	-	$\Box \delta \prod   \& \Box T'$
16.	Secondary metabolite	-	$\sim \cap \rho \varphi \langle T \vartheta \varepsilon   \downarrow [ \varphi \langle \sqrt{\Box^{TM}} \langle \in \theta \Box +$
17.	Staggered ends	-	$\kappa \subseteq \ldots > \bullet \sigma \Psi f                                $
18.	Plasmid	-	β⊆′δ—□&□
19.	Reporter gene	-	]β∫σℑσΨ∪θΤ↔ε∨
20.	Oral Vaccine	-	ζσℑϟヘψ□↔₊ᠨ⌒◊Η□
21.	Biotech product	-	₽Ξ₩ <u></u> =₩, ₩ ₩ ₽ ₽ ₽ ₽ ₽ ₽ ₽ ₽ ₽ ₽ ₽ ₽ ₽ ₽ ₽ ₽ ₽
22.	Seed storage protein	-	
	∃™⟨│H□∴⟩⊄□∴∩	$\Theta$	$ \beta J \{\Upsilon H \Box$

#### GOVERNMENT COLLEGE (AUTONOMOUS) RAJAHMUNDRY III B.Sc - BOTANY SYLLABUS PAPER - III (At the end of Semester-VI) (GENETICS, BIODIVERSITY, AND CONSERVATION)

#### **SECTION - A**

#### **GENETICS**

#### UNIT - I

- 1. Mendelism: Laws of inheritance. Genetics interactions Epistasis, complementary supplementary inhibitory genes.
- 2. Linkage and crossing over: A brief account, construction of genetic maps 2 point and 3 point test cross data.

#### UNIT - II

- 3. Mutations: Chromosomal aberrations structural and numerical changes, gene mutation, transposable elements.
- 4. Gene expression: Organization of gene, transcription, translation, mechanism and regulation of gene expression in prokaryotes (Lac. and Trp. Operons)
- 5. Extra nuclear genome: Mitochondrial and plastid.

#### SECTION - B BIODIVERSITY AND CONSERVATION

#### UNIT - I

- 1. Biodiversity: Concepts, convention on Biodiversity Earth Summit. Types of biodiversity.
- 2. Levels, threats and value of biodiversity.
- 3. Hot spots of India Endemism, North Eastern Himalayas, Western Ghats.

#### UNIT - II

- 4. Agro Biodiversity, Vavilov centres of crop plants.
- 5. Principles of conservation: IUCN threat categories RED data book threatened and endangered plants of India. Role of organization in the conservation of Biodiversity IUCN, UNEP, WWF, NBPGR, NBD.

#### **Additional Topics:**

- 1. Colloborative genes, duplicating genes
- 2. Extra Chromosomal inheritance
- 3. Engangering plants & conservation

#### SUGGESTED READINGS

- 1. Kothari. A. 1997 Understanding Biodiversity: Life, Sustainability and Equity, Tracts for the Times 11. Orient Langman Ltd. New Delhi.
- 2. Pandey, B. P. 2007, Botany for Degree students: Diversity of Microbes, Cryptogams, Cell Biology and Genetics. S. Chand and Company Limited, New Delhi.
- 3. Shukla, R. S. and P. S. Chandel, 2007, Cytogenetics, Evolution, Biostatistics and Plant Breeding. S. Chand and Company Limited, New Delhi.
- 4. Snustad, D. P. and M. J. Simmons. 2000. Principles of Genetics, John Wiley and Sons, Inc. USA.
- 5. Strickberger, M. W. 1990. Genetics (3rd Ed.) Macmillan Publishing Company.
- 6. Varma. P.S and V. K. Agrawal. 2004. Cell Biology, Genetics, Molecular Biology, Evolution and Ecology, S. Chand and Company Ltd. New Delhi.
- 7. Varma, P. S. and V. K. Agrawal, 2006 Genetics S Chand & Company Limited New Delhi.
- 8. Chand., K. P. S. Shukla G. Sharma N, 1996, Biodiversity in Medicinal and Aromatic plants in India.
- 9. Gastron K. J. (Ea) Biodiversity A Biology of numbers and differences, Blackwell sciences Limited, Oxford, U.K.

### GOVERNMENT COLLEGE (AUTONOMOUS) RAJAMAHENDRAVARAM III B.Sc., BOTANY PAPER - III, Semester -VI Internal Exam (Theory) Written Test - I

Time: 1 Hour		Max. Marks:15
I.	Answer any one of the following	10 Marks
a)	Essay Question from Genetics Unit - I	
	(OR)	
b)	Essay Question from Biodiversity Unit - I	
П	Answer any one of following	5M
a)	Short Notes Question from Genetics Unit - I	
	(OR)	
b)	Short Notes Question from Biodiversity Unit - I	

### GOVERNMENT COLLEGE (AUTONOMOUS) RAJAMAHENDRAVARAM III B.Sc., BOTANY PAPER - III, Semester - VI Internal Exam (Theory) Written Test - II

Time	: 1 Hour	Max. Marks: 15
I	Answer any one of the following	10M
a)	Essay Question from Genetics - Unit - II	
	(OR)	
b)	Essay Question from Biodiversity Unit - II	
II	Answer any one of following	5M
a)	Short Notes Question from Genetics - Unit - II	
	(OR)	
b)	Short Notes Question from Biodiversity Unit - II	

### PAPER III THEORY SEMESTER VI

Time: 3 Hours		Max. Marks:75
	SECTION-A	
Answer All the questi	ions:	10x 2 =20
Very short Notes:	5 from Genetics 5 from Biodiversity	
	SECTION-B	
Answer any three of t	3 x 5 =15	
Short Notes:	3 from Genetics 2 from Biodiversity	
	SECTION-C	
Answer all the question	ons (Internal Choice)	4 x 10 =40
1. 2 from Gene	etics Unit - I	
2. 2 from Biod	liversity Unit - I	
3. 2 from Gene	etics Unit - II	

4. 2 from Biodiversity Unit - II

Name of the unit	No. of	No. of	No. of	Weightage of
	VSA	SA	Essays	Marks
Genetics Unit - I			1+1	5x2=10
	5	3		3x5=15
Genetics Unit - II			1+1	4x10=40
Biodiversity Unit - I			1+1	5x2=10
	5	2		3x5=15
Biodiversity Unit - II			1+1	4x10=40

# GOVERNMENT COLLEGE (AUTONOMOUS) RAJAMAHENDRAVARAM III B.Sc. BOTANY PAPER III (At the end of Semester – VI) GENTICS, BIODIVERSITY AND CONSERVATION MODEL QUESTION PAPER

# Time : 3 Hrs.

# Section – A Answer all the Questions. 4x10=40 Write about the construction of chromosome maps based on two point and three 1) point test cross? $\Re \sigma + \& \Box T \cup \Theta T \leftrightarrow \varepsilon \lor \therefore, \varepsilon T \checkmark \& \Box T \cup \Theta T \leftrightarrow \varepsilon \lor \therefore |\Box \downarrow \downarrow \Box \pm \delta \Box$ $+ \downarrow \leq \sigma \Im \Delta \varepsilon TT \Box < \int \Box \sigma \Im \varepsilon TT > \pm \int \downarrow = \psi [\sqrt{\kappa} \varepsilon TT \neq \sigma Y''] \Box \geq \varepsilon T$ $T \Box ] \Box + \# ] \exists < \int \Box \theta \epsilon T T \theta T | \psi \Box \phi \langle T + \& \Box ?$ (or) What is gene interaction? Write about the complementary and supplementary genes with suitable examples? $\cup \theta T \leftrightarrow \nu + \mathsf{TM} \langle \sigma \mathfrak{I} \delta \Box + | \Box \Box T \geq \theta \nu \theta \rangle \pm H \exists T? \cup \theta T \leftrightarrow \nu + \mathsf{TM} \langle \sigma \mathsf{I} \delta \Box + | \Box \Box T \geq \theta \nu \theta \rangle \pm H \exists T? \cup \theta T \leftrightarrow \nu + \mathsf{TM} \langle \sigma \mathsf{I} \delta \Box + | \Box \Box T \geq \theta \nu \theta \rangle = 0$ $\Im \delta = |\Box T \ge \theta \theta T \kappa | < \Box \varsigma = \sigma \Im \Delta \varepsilon T T > \pm \exists \varepsilon ] + \# \langle + \& \Box ?$ What is Mutation? Explain the types and molecular mechanism of gene mutation? 2) $\Box^{\mathrm{TM}} \langle \in ] \varepsilon \sigma \mathfrak{I} | \theta \varepsilon \mathrm{TT} \ \nu \theta \rangle \pm \mathrm{H} \exists \mathrm{T?} \cup \theta \mathrm{T} \leftrightarrow \Box^{\mathrm{TM}} \langle \in ] \varepsilon \sigma \mathfrak{I} | \theta \sigma \mathfrak{I} \downarrow$ $\leq \epsilon TT :: \forall \not\subset \nu \Delta T \phi \langle \forall + | \Leftarrow \exists < (\Box \theta \epsilon TT \theta T \Box \downarrow :: \in + \& \Box?)$ (or) Explain the mechanism of gene regulation and expression in prokaryotes with the help of lac. Operon?

 $\begin{aligned} \neq_{\downarrow} + | < \square_{\downarrow} \leq |\square\Pi\sigma\mathfrak{I} \cap \vartheta\epsilon \lor \therefore \not \not \subset \not i "_{\downarrow} ] \zeta |\square\sigma\squareH\square \square < (\square\sigma\mathfrak{I} + \\ > \pm \cup \theta T \leftrightarrow \square\phi \langle T + | \intercal \langle \Delta, \cup \theta T \leftrightarrow \epsilon \leftrightarrow_{\downarrow} \Upsilon | \downarrow \leq \sigma \mathfrak{I} \Delta \theta T \exists \epsilon] + \# \langle \\ + \& \square? \end{aligned}$ 

3) Describe the concepts and convention of Biodiversity?  $\vartheta \varepsilon \psi [\Pi \exists < \Box \leftrightarrow \upsilon ("\varepsilon \theta \therefore T \varepsilon T] \phi \langle TT \psi \Box \Box \delta \Box \varepsilon \sqrt{\psi} \exists \varepsilon ( \therefore \theta T \exists \varepsilon ] + \# \langle + \& \Box ? \rangle$ 

(or) Discuss the levels, threats and value of Biodiversity?  $\Im \varepsilon \psi [\Pi \exists < i \ominus \leftrightarrow \kappa \subseteq \Box \sigma TT \therefore T, \exists H \Box \exists / \downarrow \leq \Box \varsigma''^{TM} \langle T\varepsilon \lor \therefore T \varepsilon T gT ] \phi \langle TT \exists \therefore T\varepsilon \therefore \theta T \# \langle ] \subset + \# \langle + \& \Box ? \rangle$ 

4) Explain the role of organization in conservation of Biodiversity?

### Max Marks : 75



### <u>Section – B</u>

### Answer any three of the following.

$ = \psi \left( \prod_{H \supseteq \epsilon} T \sqrt{\&_{\Box} T} \right)  _{\Box} = \int_{\Box \epsilon} \int_{\Box \epsilon} \delta_{\Box} \epsilon \sqrt{\langle \Box \theta \epsilon} T T   \psi \Box \phi \langle T + \&_{\Box} .$					
5)	Neo Mendelism		$\Box \phi [ \sqrt{\psi} T + \& \Box * \cup +$		
6)	Linkage		$\delta \Box \varsigma \Box'' \therefore > \bullet \Box^{\mathrm{TM}} \langle$		
7)	Transcription		$\nu\theta T$ $\rangle K\theta +$		
8)	Vavilov Centres of crop plant $ \Box + \ge \psi (TT \downarrow \le \neg \therefore)$	ts \ {(	≠ų□∃ \⊄ų□ ≠₊ן+  <□∴T		
9)	Types of Biodiversity $\vartheta \varepsilon \psi [\Pi \exists < \int \Box \leftrightarrow \varepsilon ]$	Γ	ℾϟ⊄□σℑ₊⅃≤ℇ⅂⅂∴⅂		
			<u>Section – C</u>		
Ans	swer all the Questions.				
$\nu$	יז⊔  ⊒ב)ם∴⊕≤ם ל⊒בי	√<	$\langle \int \Box H \Box \therefore T \mid \psi \Box \phi \langle T + \& \Box \rangle$		
	2x6=12				
10)	Test Cross -		$ \Box \downarrow \downarrow \Box \pm \delta \Box + \downarrow \leq \sigma \Im \Delta \epsilon TT$		
11)	Barbera Meclinctock -		υ″ℜσ…σ□ ψ\Τ₊Γ'₊ᄀ {″₊ᄀ		
12)	CP DNA -		CP DNA		
13)	Endemism -		$\mu + \& \Box \exists T \cup \psi \Box T$		
14)	NBPGR -		NBPGR		
15)	Endangered plants $\exists :: T   \Box   \epsilon T \epsilon \& \Box \Box \downarrow$	[	$\delta \longrightarrow \forall \psi \forall TT = 0 \forall \psi TT = 1 $		
16)	Epistasis -		μ κ⊆δδτ		

- 17) Plastid
- β⊆′δ—…&□ - X″⇐ψ\∏∃<□↔+ 19) Green revelution -  $\zeta \Box'' ]^{TM} \langle \exists | \Box' \epsilon +$
- 18) Species diversity

### **SUGGESTED READINGS**

- 1. Adams, C.R., K.M. Banford and M.P. Early, 1993, Principles of Horticulture Butterworth Heineman Ltd., London.
- 2. Agrawal, P.K. 1993, Hand book of Seed Technology, Dept, of Agriculture and Cooperation, National Seed Corporation Limited, New Delhi.
- 3. Bedell, Y.E. Seed Science and Technology, Indian Forest Species. Allied Publishers Limited, New Delhi.
- 4. Edmond, J.B., T.L. Senn, F.S. Adrews and R.J.Halfacre. 1977. Fundamentals of Horticulture (4th Ed.) Tata Mc. Graw Hill, New Delhi.
- 5. Gorer, R. 1978, The Growth of Gardens, Faber and Faber Limited, London.
- 6. Hartman, H. T. and D. E. Kestler, 1976. Plant Propagation: Principles and Practices, Prentice & Hall of India, New Delhi.
- Jain, J.L., S. Jain and Nitin Jain, 2008, Fundamentals of Biochemistry. S. Chand & Company Ltd., New Delhi.
- 8. Janick Jules, 1979. Horticulture Science (3rd Ed.) W.H. Freeman and Co., San Francisco, USA.

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- Pandey, B.P. 2007 Botany fro Degree Students, Plant Physiology Biochemistry, Biotechnology, Ecology and Utilization of Plants S. Chand and Company Ltd., New Delhi.
- 10. Rao, K. M. 1991, A Text Book of Horticulture. Mc.Millan India Ltd.,.
- Tiwari, G.N. and R.K. Goal, Green House Technology, Fundamentals, Design Modelling and Application, Narosa Publishing House, New Delhi.

# ANDHRA UNIVERSITY BOTANY PRACTICAL SYLLABUS Practical - III: CELL BIOLOGY, GENETICS, ECOLOGY AND BIODIVERSITY

(Total Hours of Laboratory Exercises: 90 @ 3h/week in 30 Sessions)

# Suggested Laboratory Exercises:

1 Demonstration of cytochemical methods: Fixation of plant mate	rial
staining for mitotic and meiotic studies.	(6h)
2 Study of various stages of mitosis using cytological preparation of	of (Ch)
. Onion root ups	(61)
<ul><li>3 Study of various stages of metosis using cytological preparation</li><li>. Onion</li></ul>	n of
flower buds	(12h)
4 Karyotype study using cytological preparation of dividing of . dividing root tip	
cells of Onion/ photographs / permanent slides	. (3h)
5 Solving genetic problems related to monohybrid, dihybrid ratio a . interaction	and
of genes (minimum of six problems in each topic).	(15h)
6 Operation of links are seen to be a sint to stand	
. Construction of linkage maps: two point test cross	(6N)
7 Knowledge of ecological instruments: Working principles ar	hd
7. Knowledge of ecological instruments. Working principles at	IU

 Knowledge of ecological instruments: Working principles and applications of Hygrometer, rain, gauze, anemometer, altimeter, light meter, wet and dry bulb

thermometer (with the help of Equipment / diagrams / photographs). (6h)

8. Determination of soil texture (composition of clay, sand silt etc.) and PH (3h)

Determination of frequency and frequency class of various species by

quadrate method.

 Study of morphological and anatomical characteristics of plant communities using locally available plant species: Hydrophytes (Eichhorma, Hydrilla, Pistia, Nymphaea, Vallisneria) Xerophytes (Asperagus, Opuntia, Euphorbia)

antiquorum) and Halophytes (Rhizophora, Avecenia)

# 10. Growth inbibitors

(9h)

(3h)

11. Detailed study on flora of a local fresh water or aquaculture pond (6h)

12. Geographical spotting of certain endemic and endangered plant species of A.P

Geographical spotting of protected areas of Bio-diversity & Biosphere reserves

in India

Geographical spotting of reserves sanctuaries of Andhra pradesh Geographical spotting of mega diversity Nations in the World. Geographical spotting of Hot spots in the World.

13. Minimum of two field visits to local areas of ecological conservation of

biodiversity importance (Sacred grove / Reserved forest / Botanical garden /

Zoo Park / Lake etc.)

(6h)

### GOVERNMENT COLLEGE (AUTONOMOUS) RAJAHMUNDRY III B.Sc. BOTANY, Paper - III Practical Model Paper (CELL BIOLOGY, ECOLOGY, GENETICS AND BIODIVERSITY)

Time : 3 Hours			Max. Marks : 75
I.	a)	Squash Technique	12 Marks
	b)	Karyotype/Polytene Chromosome Identification	03 Marks
	c)	Cell Organelles identification	03 Marks
II	a)	Ecology Experiment	08 Marks
	b)	Identification of Equipments in Ecology	04 Marks
	c)	Section Cutting	07 Marks
ш	a)	Problem from Monohybrid Cross	04 Marks
	b)	Probelm from Dihybrid Cross or Gene Interactio	n 8 Marks
	c)	Problem from Linkage or 2 point test cross	06 Marks
IV	a)	Geographical Spotting on the given Map regardi plant diversity and Animal Diversity	ng 05 Marks
	b)	Record	10 Marks
	c)	Field Note book	05 Marks

# GOVERNMENT COLLEGE (AUTONOMOUS) RAJAHMUNDRY III BOTANYSYLLABUS (At the end of Semester VI) ELECTIVE – 1 PLANT PHYSIOLOGY

- Respiration: Aerobic and Anaerobic, Glycolysis, Krebs cycle, electron transport system, mechanism of oxidative phosphorylation, pentose phosphate pathway.
- Nitrogen Metabolism: Biological nitrogen fixation, nitrate reduction, ammonia assimilation, amino acid synthesis and protein synthesis.
- Lipid Metabolism: Structure and functions of lipids, conversion of lipids to carbohydrates, *B*-oxidation.
- Growth and development: Definition, phases and kinetics of growth, Physiological effects of phytohormone auxins, gibberellins, cytokinins, ABA, ethylene and brassinosteroids, Physiology of flowering and photoperiodism, role of phytochrome in flowering.
- Stress Physiology: Concept and plant responses to water, salt and temperature stresses.

ffhfh

# GOVERNMENT COLLEGE (AUTONOMOUS) RAJAHMUNDRY III B.Sc - BOTANY SYLLABUS ELECTIVE – II <u>SEED TECHNOLOGY AND HORTICULTURE</u>

- Seed: Structure and types, Seed dormancy, causes and methods of breaking dormancy.
- Seed storage: Seed Banks, factors affecting, seed viability, genetic erosion. Seed production technology, seed testing and certification.
- Horticulture techniques: Introduction, Cultivation of ornamental and vegetable crops, Bonsai and landscaping.
- Floriculture: Introduction, Importance of green house, polyhouse, mist chamber, shade nets, Micro irrigation systems. Floriculture potential and its trade in India.
- Vegetative propagation of plants: Stem, root and leaf cuttings, Layering and bud grafting. Role of plant grwoth regulators in horticulture.

# **Additional Curriculum**

Vernalization - Significance in Floriculture

# GOVERNMENT COLLEGE (AUTONOMOUS) RAJAMAHENDRAVARAM

### **III B.Sc. BOTANY : MODEL QUESTION PAPER**

### SKILL BASED ELECTIVE - II : SEED TECHNOLOGY & HORTICULTURE (w.e.f. from Admitted Batch 2014 - 2015) (At the end of VI Semester)

Time : 3 Hrs.

Max. Marks: 75

### **SECTION - A**

Answer the following questions.  $4 \times 10 = 40 \text{ M}$  $\Box \mid \downarrow \uparrow + \sim \mid \Box \Xi \square \Box \oplus \leq \Box \delta \Box \epsilon \sqrt{\langle \Box \theta \epsilon TT \Box T \mid \psi \Box \phi \langle TT \epsilon TT. \rangle}$ 

1. (a) Given an account on Seed Structure and Seed viability.

$$\exists^{\mathrm{TM}} \langle | \theta + \Box \sigma \Box \Box \Delta + \varepsilon T ] \phi \langle TT \exists^{\mathrm{TM}} \langle | \theta \nu + \bigoplus \leq \Box \sigma \Im \Delta \Xi \rangle \downarrow [ | :: \theta T > \bullet T ] + \equiv \exists \varepsilon ] + \# \langle T \varepsilon T T.$$

#### (**OR**)

(b) Write about Seed Storage and Seed Banks.

$$\exists^{\mathsf{TM}} \langle | \theta \Box :: \cap \varepsilon T ] \phi \langle TT \exists^{\mathsf{TM}} \langle | \theta \upsilon'' \leftrightarrow + \downarrow ] :: \theta T > \bullet T ] + \equiv | \psi \Box \phi \langle TT \varepsilon TT.$$

2. (a) Write an essay on Soil preparation and organic manures.

$$\begin{split} \epsilon T & = \left| \downarrow \leq \theta T \ {}^{TM} \langle \phi \langle \sqrt{\sigma} \mathfrak{T} T \ \# \rfloor \phi \langle TT \geq \epsilon T \right] \phi \langle TT \ \square \delta + \left| B \phi \langle T \ \mu \sigma \right\rangle \\ \mathfrak{T} \epsilon \lor \therefore T > \bullet T ] + & = \psi \square \leftrightarrow \delta \square + \left| \psi \square \phi \langle TT \epsilon TT. \right. \end{split}$$

#### (**OR**)

(b) Explain the Bonsai technique with examples.

 $\begin{array}{l} \forall \not\subset H \square \kappa \subseteq \varphi \Psi T \ \kappa \subseteq + \neq \downarrow \Leftarrow \downarrow \leq | | \square | \downarrow | \varphi \langle T \theta T \square \langle \square \varsigma \square '' \sigma \Im \Delta \\ \end{array} \\ \overset{\text{TM}}{\longrightarrow} \exists \epsilon] + \# \langle T \epsilon T T. \end{array}$ 

3. (a) Explain the Micro irrigation systems in Horticulture.

 $\Box < \Box \leftrightarrow \theta \downarrow \leq \Box \omega \longrightarrow \left\{ \neq \delta \Box \sqrt{\downarrow} \leq \left| \left\{ \left( \beta \subseteq \sigma \Im T < \Box \therefore \epsilon \leftrightarrow \epsilon \delta \Box \Box \therefore \theta T \exists \epsilon \right] + \# \langle T \epsilon T T . \right\} \right\}$ 

#### (**OR**)

(b) Explain the various grafting methods in vegetative propagation.

$$\begin{split} \Xi \big( \Phi \phi \langle T \psi \Box \leftrightarrow \big| - \big| \big\} \not\subset \exists \exists < \int \Box v + \ge T_{\star} \exists \le T \dots \exists < \int \Box H \Box \therefore \theta \\ T \exists \varepsilon ] + \# \langle T \varepsilon T T. \end{split}$$

4. (a) Write about the cultivation of Chrysantheman and Marigold

 $#\Box \epsilon T + \Leftarrow, \Box + \Leftarrow \psi [TT \downarrow \leq \neg : \kappa \leq > \bullet T # ] \phi (TT \exists < \int \Box \theta + \theta T \\ \exists \epsilon] + # (T \epsilon TT.$ 

### (**OR**)

(b) Write about the Cultivation of Fruit Vegetable crops.  $|\Box\Box \therefore \oplus \leq \Lambda \sigma \Im \therefore \kappa \leq \bullet T \exists < (\Box\theta + \theta T \exists \varepsilon] + \# \langle T\varepsilon TT.$ 

### **SECTION - B**

5.	Seed Dormancy	-	$\exists^{\mathrm{TM}} \langle   \theta \ \delta \Box T \beta \underline{\subset}   \epsilon \delta \Box \Box$
6.	Seed Certification	-	$\exists TM \langle   \theta < \int \Box \Box M I \leq \sigma \mathfrak{I} \Delta$
7.	Horticulture division	-	□<□↔θ₊J≤□ω— ¯∃υ∫">±∴Τ
8.	Indoor plants	-	>∙□ç□″+ }⊄ □∴ψ\TT₊J≤¬∴T
9.	Mist Chamber	-	$\exists T \delta \tau \dots \# \Box + \Box \sigma \Psi$
10.	Bulbs, Babils	-	$\therefore \Xi \square H \square \therefore T, \therefore \square \square \square T T \square \therefore \Xi \square \Sigma H \square \therefore T$
11.	Bedding plants	-	$\upsilon \supset \& \Box f + > \times \psi (TT \downarrow \leq \neg : T$
10	<b>T</b> T . <b>11 1 1</b>		

12. Vegetable garden general principles -  

$$\oplus \leq \Lambda \sigma \Im > \pm \varphi \langle T : TM \wp \geq \kappa \subseteq \langle \int \Box \sigma \Im \Delta \delta \Box \sqrt{TM} \Box : T$$

### **SECTION - C**

Answer <u>ALL</u> questions from the following.10 x 2 = 20 M $\Box \mid \Box \mid \Box \mid \Box \equiv \Box : \Box \equiv \delta \Box \epsilon \sqrt{<} \int \Box \theta \epsilon TT : T \mid \psi \Box \phi \langle TT \epsilon TT \rangle$ 

13.	Seed Dressing	-	$\exists TM \langle   \theta \Xi \rangle \Box \sim \emptyset$
14.	Genetic erosion	-	Ⅻ⊃□{Ĺ┛]□σ℘∪Η□
15.	Biofertilizers	-	θε μσℑΤε∨
16.	Land scaping	-	}″+&□ □δ¬ +>×
17.	Shadenet	-	#∫□φ⟨ΤεΤΤ
18.	Stem cuttings	-	↓±+&□#(]<□H□∴T
19.	Floriculture	-	β□∫′]₊ι≤∴⊂σΨ
20.	Cole crops	-	,⊥ & \∧  □+≥.∵.T
21.	IBA	-	·µ.
22.	Foundation Seed	-	$ \Box \lor H \Box \sim \exists^{TM} \langle   \theta +$

# **Certificate Course on**

# PLANT PROPAGATION AND NURSERY MANAGEMENT

### **OBJECTIVES :**

This course aims to develop a basic understanding of the principles of plant propagation, an overview of propagation techniques, a general knowledge of the methods of propagation of the more commonly cultivated plants, basic knowledge on to work in commercial nursery or to run a small scale commercial nursery.

### **JUSTIFICATION :**

The main problem of unemployment in the present situation can only be alleviated with self employment. There are lot of areas in agriculture to take up an enterprise and one of it is plant propagation. The number of educated but untrained youth who have passed Plus two or above is increasing. These youth lack technical skill to start an enterprise. This course aims to give applied knowledge on basics of plant propagation, nursery management and basics of entrepreneurship development. In this region where horticulture nurseries dominate, require more specialist propagators for successful management of the nursery industry.

### **Details of the Proposed Programmes :**

Duration :	10 weeks
No. of Hours :	60
Location :	Department of Botany,
	Government College (A), Rajahmundry.

### **Major areas of Teaching :**

### **Major Areas**

No.	Module	Hours
(a).	Seed Propagation	12
(b).	Vegetative Propagation	12
(c).	Basics of Nursery Management	12
(d).	Commercial Nursery Management	12
(e).	Field Work / Practical classes	12
	TOTAL	60

### **Mode of Delivery :**

Theory	:	Class room sessions
Practical	:	Hands on practical sessions

### **Scheme of Evaluation :**

The performance of the student will be evaluated through theory examination and practical examination.

Theory Paper (Maximum – 75 Marks & Minimum for pass – 30 Marks) Practical Paper (Maximum – 25 Marks & Minimum for pass – 10 Marks)

# Score Card :

Percentage		Grade to be awarded
65% and above	=	"A" Grade

50 - 65%	=	"B" Grade
40 - 50%	=	"C" Grade
< 40%	=	Failed

# **Absence for Examination :**

Those who miss / fail in the final examination will get two supplementary chances within the maximum period of one year.

# **Facilities :**

Admission :: By Application Eligibility for Admission :: Candidate should have a minimum qualification of pass in +2 <b>Implementing Team ::</b> Institutional Head :: Principal Supervisory Head :: In-charge of the Botary Department Course Coordinator : B. Venkateswara Rao, Course Coordinator : B. Venkateswara Rao, Lecturer in Botary Department Principal Faculty :: Faculty of Botary Department / Satyadeva Nursery Eligible Staff Collaborating Centres / U: (Proposed) : Sri Satyadeva Nursery, Kadiyapulanka, Near Rajahmundry.		Existing facilities of College will be utilized.		
Eligibility for Admission       :       Candidate should have a minimum qualification of pass in +2         Implementing Team :       Institutional Head       :       Principal         Supervisory Head       :       Principal         Course Coordinator       :       B. Venkateswara Rao,         Lecturer in Botany Department         Principal Faculty       :       Faculty of Botany Department / Satyadeva Nursery         Collaborating Centres / Units       (proposed)       :       Sri Satyadeva Nursery, Kadiyapulanka, Near Rajahmundry.         Course Fee       :       Rs. 2,500/- per student       Eligible		Admission	:	By Application
of pass in +2Implementing Team :Institutional Head:PrincipalSupervisory Head:In-charge of the Botany DepartmentCourse Coordinator:B. Venkateswara Rao,Course Coordinator:B. Venkateswara Rao,Principal Faculty:Faculty of Botany DepartmentPrincipal Faculty:Faculty of Botany Department / Satyadeva Nursery Eligible StaffCollaborating Centres / Units(proposed):Sri Satyadeva Nursery, Kadiyapulanka, Near Rajahmundry.Course Fee:Rs. 2,500/- per student		Eligibility for Admission	:	Candidate should have a minimum qualification
Implementing Team :PrincipalInstitutional Head:PrincipalSupervisory Head:In-charge of the Botany DepartmentCourse Coordinator:B. Venkateswara Rao,Lecturer in Botany DepartmentLecturer in Botany DepartmentPrincipal Faculty:Faculty of Botany Department / Satyadeva Nursery Eligible StaffCollaborating Centres / Units(proposed):Sri Satyadeva Nursery, Kadiyapulanka, Near Rajahmundry.Course Fee:Rs. 2,500/- per student				of pass in +2
Institutional Head:PrincipalSupervisory Head:In-charge of the Botany DepartmentCourse Coordinator:B. Venkateswara Rao,Lecturer in Botany DepartmentLecturer in Botany DepartmentPrincipal Faculty:Faculty of Botany Department / Satyadeva Nursery Eligible StaffCollaborating Centres / Units:Sri Satyadeva Nursery, Kadiyapulank, Near Rajahmundry.Course Fee:Rs. 2,500/- per student	Imple	ementing Team :		
Supervisory Head:In-charge of the Botany DepartmentCourse Coordinator:B. Venkateswara Rao, Lecturer in Botany DepartmentPrincipal Faculty:Faculty of Botany Department / Satyadeva NurseryCollaborating Centres / Units(proposed):Sri Satyadeva Nursery, Kadiyapulanka, Near Rajahmundry.Course Fee:Rs. 2,500/- per student		Institutional Head	:	Principal
Course Coordinator:B. Venkateswara Rao,Lecturer in Botany DepartmentPrincipal Faculty:Faculty of Botany Department / Satyadeva NurseryCollaborating Centres / Units(proposed)Course Fee:Rs. 2,500/- per student		Supervisory Head	:	In-charge of the Botany Department
Lecturer in Botany DepartmentPrincipal Faculty:Faculty of Botany Department / Satyadeva NurseryCollaborating Centres / Units(proposed):Sri Satyadeva Nursery, Kadiyapulanka, Near Rajahmundry.Course Fee:Rs. 2,500/- per student		Course Coordinator	:	B. Venkateswara Rao,
Principal Faculty:Faculty of Botany Department / Satyadeva NurseryCollaborating Centres / Units(proposed):Sri Satyadeva Nursery, Kadiyapulanka, Near Rajahmundry.Course Fee:Rs. 2,500/- per student				Lecturer in Botany Department
Satyadeva NurseryEligible StaffCollaborating Centres / Units(proposed):Sri Satyadeva Nursery, Kadiyapulanka, Near Rajahmundry.Course Fee:Rs. 2,500/- per student		Principal Faculty	:	Faculty of Botany Department /
Collaborating Centres / Units(proposed):Sri Satyadeva Nursery, Kadiyapulanka, Near Rajahmundry.Course Fee:Rs. 2,500/- per student				Satyadeva Nursery Eligible Staff
Kadiyapulanka, Near Rajahmundry.Course Fee:Rs. 2,500/- per student		Collaborating Centres / Un	its (p	proposed) : Sri Satyadeva Nursery,
Course Fee : Rs. 2,500/- per student				Kadiyapulanka, Near Rajahmundry.
		Course Fee	:	Rs. 2,500/- per student

# **SYLLABUS**

# I. Seed Propagation

- 1. Seed as propagule
- 2. Germination of seeds
- 3. Seed dormancy
- 4. Seed viability
- 5. Seed treatment
- 6. Classes of seed
- 7. Seed testing

# II. Vegetative Propagation

- 1. Propagation through stolons, runners, offsets, bulbs, bulbils, corms, Rhizomes, Stemtubers.
- 2. Cuttings and layering.
- 3. Grafting and budding, root stock-scion relationship
- 4. Micro propagation (tissue culture / in-vitro culture) Artificial seeds

### III. Basics of Nursery Management

- 1. Introduction to Nursery Taxonomy of Nursery Plants.
- 2. Factors effecting plant growth & Growth regulators.
- 3. Tools, Equipment, Structures required for Nursery Management.
- 4. Soil and its preparation, Organic Manures.
- 5. Watering, Fertilizer usage, Weeding in Nursery management

### IV. Commercial Nursery Management

- 1. Nursery site selection, layout, records.
- 2. Potting, Repotting & Transplantation
- 3. Plant packing & loading process
- 4. Bonsai Technique
- 5. Land scaping Introduction
- 6. Problems in nursery management and its control

# GOVERNMENT COLLEGE (AUTONOMOUS) RAJAMAHENDRAVARAM

# **DEPARTMENT OF BOTANY**

# CERTIFICATE COURSE IN PLANT PROPAGATION & NURSERY MANAGEMENT THEORY PAPER

Time : 3 Hrs.

### Max. Marks : 75

# **SECTION - A**

Answer the following questions. Essay questions. Draw diagrams wherever necessary.  $|\downarrow \downarrow \uparrow + \psi \Box \leftrightarrow \delta \Box \sigma \Im \sqrt{|\Box|} |\Box \Xi / \Box \therefore \oplus \le \Box \delta \Box \epsilon \sqrt{<} (\Box \theta \epsilon TT \therefore T | \psi \Box \phi \langle TT \epsilon TT. \nu \epsilon \delta \Box \sigma \Im \psi [T \rightarrow \theta \# \varsigma > \upsilon (">\bullet \epsilon TT \therefore T > \bullet T] | += \theta U [\Box \ge \epsilon TT \therefore T \perp \phi \langle TT \epsilon TT.$  1. (a) Write about Seed Structure and Seed Viability.

$$\exists^{TM} \langle |\theta + \Box \sigma \Box \Delta + \varepsilon T ] \phi \langle TT \exists^{TM} \langle |\theta \nu + \oplus \leq \Box \sigma \Im \Delta \Xi \rangle \downarrow (|\theta T \Rightarrow T] + \equiv |\psi \Box \phi \langle TT \varepsilon TT.$$

### (**OR**)

(b) What is Seed Dormancy ? Write about causes and breaking of Seed Dormancy.

$$\exists^{\mathsf{TM}} \langle |\theta \, \delta \Box T\beta \subseteq | \epsilon \delta \Box \Box \nu + \phi \rangle \cong \exists T \{ \left( ? \, \exists^{\mathsf{TM}} \langle |\theta \, \delta \Box T\beta \subseteq | \epsilon \delta \Box \Box \right) \\ \oplus \leq \Box > \bullet \therefore \downarrow \pm \sigma \Im \Delta'' \therefore T \epsilon T ] \phi \langle TT$$

$$\begin{split} \delta \Box T\beta &\subseteq \mid \epsilon \delta \Box \Box \theta T \; \nu \sim \int >\bullet \exists T + \# \langle T \; \exists < \int \Box H \Box \therefore T > \bullet T ] + \equiv \mid \psi \Box \\ \phi \langle TT\epsilon TT. \end{split}$$

2. (a) Describe various types of cutting and layering methods in vegetative propagation.

$$\Xi(\Phi \varphi \langle T \psi \Box \leftrightarrow | - | \exists < \cap \Box \Box \Box : \rangle \not\subset \# \cap \exists < \Box \Box \Box \Box \Box \Box \varphi \langle TT \nu + \ge T^{TM} = \bigoplus \le \Box \neg | \Box < \Box \varnothing^{TM} \langle T : \Theta T \exists \varepsilon ] + \# \langle T\varepsilon TT.$$

$$(OR)$$

(b) Describe various types of grafting methods in vegetative propagation.

$$\begin{split} \Xi \left( \Phi \phi \langle T \psi \Box \leftrightarrow \mid - \mid \exists < \int \Box H \Box \therefore \rangle \not\subset \nu + \ge T \downarrow \le \ge T \dots \mid \Box < \Box \varnothing^{TM} \\ \langle T \therefore \theta T \exists \varepsilon ] + \# \langle T \varepsilon T T . \end{split}$$

3. (a) Explain the Micro irrigation systems in Horticulture.

$$\begin{split} & \epsilon \Box \sim \emptyset \ \Box \varphi \langle T + \big| \ {}^{TM} \langle \downarrow \pm \therefore T \cong \exists \ ? \ \psi \Box \{ \left( \ \Xi \right) \downarrow \sigma \Im < \int \Box \sigma \Im \Box \ \big| \ \Box \right) \\ & \downarrow \left[ \varphi \langle T \therefore T \ \epsilon T \right] \varphi \langle TT \ \Box < \Box \leftrightarrow \theta \downarrow \leq \Box \omega \longrightarrow \} \not\subset \psi \Box \{ \left( \ \beta \underline{\subseteq} \right) \downarrow \pi \langle \theta T \ \exists \epsilon ] + \# \langle T \epsilon T T. \end{split}$$

# (**OR**)

(b) Describe the tools, equipment, structures used in Nursery Management.

$$\begin{array}{l} \theta \sigma \Im \Diamond \downarrow \Box \sigma \Im \cap \varsigma \Box'' \Delta \big\} \not \sqsubset \Box \Box \phi \big[ \sqrt{\angle + \# \langle T \mid \Box ]} \downarrow \leq \sigma \Box \therefore T, \ \mu \downarrow \big[ \cap \mid \tau \psi \big[ \\ T + \{ \land \Box \sigma \Box \Box \Delta'' \therefore \theta T > \bullet T ] + \equiv \\ \exists \epsilon ] + \# \langle T \epsilon T T. \end{array}$$

4. (a) Discuss about the problems and their control in Nursery Management.

 $\begin{array}{l} \theta \sigma \mathfrak{I} \Diamond \downarrow \Box \sigma \mathfrak{I} \cap \varsigma \Box'' \Delta \not\models \not \mu < \Box T \sigma \mathfrak{I} \phi \not\downarrow T \leftrightarrow \delta \Box \epsilon T \delta \Box \leftrightarrow \therefore T \epsilon T \end{bmatrix} \\ \phi \langle TT \psi \Box \{ \left[ \Box \psi \Box \sigma \mathfrak{I} \Delta \# \langle \sigma \mathfrak{I} \leftrightarrow \therefore \theta T > \bullet T \right] + \equiv \\ \# \langle ] \Box + \# \langle T \epsilon T T. \end{array}$ 

- (**OR**)
- (b) Discuss about Soil Preparation Potting, Repotting and Transplantation in Nursery Management.

$$\begin{split} \epsilon T & \Leftarrow \mid \exists \varphi T \mathsf{TM} \langle \varphi \langle \sqrt{\sigma} \mathfrak{T} \mathsf{T} \# \rfloor \varphi \langle \mathsf{TT} \geq, \oplus \leq \square + \& \square \therefore \rangle \not\subset \square + | \square \lor \\ & \geq \epsilon T ] \varphi \langle \mathsf{TT} \Leftarrow ] \angle \oplus \leq \square + \& \square \therefore \rangle \not\subset \\ & \square + | \square \lor \geq \epsilon T ] \varphi \langle \mathsf{TT} \mid \{ "H \square \Diamond \beta \subseteq' + \varphi \rangle \omega \square H \square \therefore \theta \mathsf{T} \exists \epsilon ] + \# \langle \mathsf{T} \epsilon \mathsf{TT}. \end{split}$$

### **SECTION - B**

Answer any <u>FOUR</u> questions from the following.  $4 \ge 5 = 20 M$  $\Box \mid \downarrow \uparrow + \sim \psi \Box \Box \not \models \not \equiv \psi \mid \Box H \Box : T > \bullet T \mid \Box \Xi \not \Box : \oplus \leq \Box \delta \Box \varepsilon \sqrt{< f}$  $\Box \theta \epsilon TT : T | \psi \Box \phi \langle TT \epsilon TT.$  $\exists TM \langle | \theta \vee + \bigoplus \leq \Box \sigma \Im \Delta$ Seed Germination 5. Stock Scion Relationship -  $\kappa \subseteq \ldots \downarrow ] \delta - \phi \langle \sqrt{H} \Box \therefore \delta \Box + \Box + \langle \Box + \rangle$ 6. -  $\Box \delta + B \phi \langle T \mu \sigma \Im T \varepsilon \vee \therefore T$ Organic Manures 7. Bonsai Technique 8.  $\upsilon \not\subset H \Box \kappa \subseteq \phi \Psi T \kappa \subseteq + \neq \downarrow \not\subset \downarrow \subseteq | \Box | \downarrow | \phi \langle T \rangle$ -  $\exists^{\mathrm{TM}}\langle |\mathrm{H}\square :: \rangle \not\subset \sigma \mathfrak{I} \downarrow \pm :: \mathrm{T}$ Classes of Seeds 9.  $\delta = \sqrt{1} \leq \psi = \langle \psi = \langle \psi = \langle \psi = \psi \rangle \rangle$ -10. Micropropagation 11. Watering, weeding in Nursery Management  $\theta \sigma \mathfrak{I} = \sigma \mathfrak{I} \cap \mathfrak{I} = \mathfrak{I} \cap \mathfrak{I} = \mathfrak$ 12. Plant packing & Loading  $\psi$   $TT_{J} \leq \neg : \beta \subset \leftrightarrow J$   $+>\times \epsilon T \phi TT \mu > \bullet T \epsilon T \in$ 

### **SECTION - C**

Answer <u>ALL</u> questions from the following.

 $7 \ge 1 = 7 M$ 

# $\Box \mid \Box \mid \neg \downarrow \mid \neg \Box \Box \mid \Box \Box \Box \downarrow \Box \therefore \oplus \leq \Box \delta \Box \epsilon \sqrt{< \int \Box \theta \epsilon T T \therefore T \mid \psi \Box \phi \langle T T \epsilon T T \rangle}$

 $\exists \mathsf{TM} \langle \left| \theta \right| \exists \mathsf{TM} \langle \left| \theta \right| \rangle \langle \mathsf{TM} \rangle \langle \mathsf{TM$ 13. Seed Testing \_ -  $\Box |\Box \tau \Box \delta \{ \land \therefore T \}$ 14. Offsets  $+\theta \,|\,\rangle^{\rm MT} \mathsf{E} \, \mathsf{T} \exists \Rightarrow |\Box \geq \mathsf{L}$ \_ 15. Artificial Seed □ς□Θψ□]Ì₊J≤+ 16. Perennial - - θεμσℑΤε∨ 17. Biofertilizer - }"+&□ □δ¬|-+>× 18. Land scaping -  $\rangle v \varepsilon \vee \{ \land$ 19. Layout

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