

ಮೈಸೂರು



ವಿಶ್ವವಿದ್ಯಾನಿಲಯ

ವಿಶ್ವವಿದ್ಯಾನಿಲಯ ಕಾರ್ಯಸೌಧ  
ಕ್ರಾಫರ್ಡ್ ಭವನ, ಮೈಸೂರು-5

ದಿನಾಂಕ 10-12-2020

ಸಂಖ್ಯೆ:ಯುಎ.2/379(29)/2016-2017

ಗೆ:

ಸಸ್ಯಶಾಸ್ತ್ರ ಅಧ್ಯಯನ ಮಂಡಳಿ(ಸ್ನಾತಕೋತ್ತರ)ಯ  
ಅಧ್ಯಕ್ಷರು ಮತ್ತು ಸದಸ್ಯರುಗಳಿಗೆ.

ಮಾನ್ಯರೇ,

ವಿಷಯ: ದಿನಾಂಕ 30-11-2020ರಂದು ನಡೆದ ಸಸ್ಯಶಾಸ್ತ್ರ ಅಧ್ಯಯನ  
ಮಂಡಳಿ(ಸ್ನಾತಕೋತ್ತರ)ಯ ವಾರ್ಷಿಕ ಸಭೆಯ ನಡವಳಿಯನ್ನು  
ಕಳುಹಿಸುತ್ತಿರುವ ಬಗ್ಗೆ.

\* \* \* \* \*

ದಿನಾಂಕ 30-11-2020ರಂದು ನಡೆದ ಸಸ್ಯಶಾಸ್ತ್ರ ಅಧ್ಯಯನ ಮಂಡಳಿ(ಸ್ನಾತಕೋತ್ತರ)ಯ  
ವಾರ್ಷಿಕ ಸಭೆಯ ನಡವಳಿಯನ್ನು ಈ ಪತ್ರದ ಜೊತೆ ಲಗತ್ತಿಸಿ ಕಳುಹಿಸಲಾಗಿದೆ.

Lingappa, 10/12/2020  
ಉಪ ಕುಲಸಚಿವ (ಪ್ರಾಧಿಕಾರ)

ಪ್ರತಿ:

1. ಅಧ್ಯಕ್ಷರು, ಸಸ್ಯಶಾಸ್ತ್ರ ಅಧ್ಯಯನ ವಿಭಾಗ, ಮಾನಸಗಂಗೋತ್ರಿ, ಮೈಸೂರು
2. ಪ್ರೊ. ಜಿ.ವೆಂಕಟೇಶ್ ಕುಮಾರ್, ಡೀನರು, ವಿಜ್ಞಾನ ಮತ್ತು ತಂತ್ರಜ್ಞಾನ ನಿಕಾಯ, ಮನೋವಿಜ್ಞಾನ ಅಧ್ಯಯನ ವಿಭಾಗ, ಮಾನಸಗಂಗೋತ್ರಿ, ಮೈಸೂರು
3. ಕುಲಸಚಿವ(ಪರೀಕ್ಷಾಂಗ), ಮೈಸೂರು ವಿಶ್ವವಿದ್ಯಾನಿಲಯ, ಮೈಸೂರು.
4. ಉಪಕುಲಸಚಿವರು (ಶೈಕ್ಷಣಿಕ), ಆಡಳಿತ ವಿಭಾಗ, ಮೈವಿವಿ ನಿಲಯ, ಮೈಸೂರು-ಅಧ್ಯಯನ ಮಂಡಳಿಯು ಶಿಫಾರಸ್ಸು ಮಾಡಿರುವಂತೆ ಸೂಕ್ತ ಕ್ರಮಕೈಗೊಳ್ಳಬೇಕಾಗಿ ಕೋರಿದೆ.
5. ಸಹಾಯಕ ಕುಲಸಚಿವರು/ಅಧೀಕ್ಷಕರು (ಶೈಕ್ಷಣಿಕ), ಆಡಳಿತವಿಭಾಗ, ಮೈಸೂರು ವಿಶ್ವವಿದ್ಯಾನಿಲಯ, ಮೈಸೂರು
6. ಕುಲಪತಿ/ಕುಲಸಚಿವ/ಕುಲಸಚಿವ(ಪರೀಕ್ಷಾಂಗ) ಅವರ ಆಪ್ತ ಸಹಾಯಕರು, ಮೈವಿವಿ ನಿಲಯ, ಮೈಸೂರು.
7. ಕಾರ್ಯನಿರ್ವಾಹಕರು, ಎಸಿ2(ಎಸ್), ಆಡಳಿತ ವಿಭಾಗ, ಮೈವಿವಿ ನಿಲಯ, ಮೈಸೂರು.

**Proceedings of the Meeting of the Board of Studies in Botany (PG) held on  
30-11-2020 at 11.00 AM at the DOS in Botany, Manasagangotri, Mysore- 570006.**

**Ref: No. UA 2/379 /2016-17 dated 5.11.2020.**

**Members present - 06**

1. Prof. Shobha Jagannath - Chairperson  
DOS in Botany  
Manasagangotri, Mysore
  2. Prof. M.S. Sharada - Member  
DOS in Botany  
Manasagangotri, Mysore
  3. Prof. S. Leelavathi - Member  
DOS in Botany  
Manasagangotri, Mysore
  4. Prof. K.N. Amruthesh - Member  
DOS in Botany  
Manasagangotri, Mysore
  5. Prof. Gopal Marate - Member  
DOS in Biochemistry  
Manasagangotri, Mysore
  6. Prof. T.G. Umesh - External Member  
Chairman, Department of Botany  
Bangalore University  
Bangalore
- Members Absent:**
- 1 Prof. G.R. Janardhana - Member  
Manasagangotri, Mysore
  2. Prof. A Gangaprasad - External Member  
Department of Botany  
University of Kerala  
Thiruvananthapuram
  3. Prof. Y.L. Krishnamurthy - External Member  
Department of Applied Botany  
Kumvempu University  
Shimoga

The Chairperson welcomed the members of the Board of Studies and briefed the agenda of the meeting

**AGENDA:**

**1. Changes if any in the Regulation/Scheme of Examination/Syllabus of existing Botany (PG) course**

A minor change for the following courses was made and approved by the Board  
HC 1.3: Systematics of Angiosperms, HC 3.1: Biochemistry and Plant Physiology,  
HC 3.2: Molecular Biology and HC 3.3 Plant Breeding and Evolutionary Biology (Annexure I)

**2. Changes if any in the syllabus to be introduced during the year 2021-22**

NIL

**3. Introduction of new Degree Diploma/Certificate courses if any for the year 2021-22**

NIL

**4. Preparation of Panel of names of Examiners for M.Sc. Botany for the year 2021-22**

The existing panel of examiners for M.Sc. Botany for the year 2021-22 was revised and approved by the Board (Annexure – II).

**5. Any other subject with the permission of the chair**

The current syllabus of PG Botany is completing 3 years, In view of the current advances in the field of Botany it is decided to revise the syllabus by conducting the workshop inviting Board members and Experts.

**Members Present:**

**Signature**

1. Prof. M.S. Sharada

MSSharada 30/11/2020

2. Prof. S. Leelavathi

30/11/20

3. Prof. K.N. Amruthesh

30/11/2020

4. Prof. Gopal Marate

30/11/2020

5. Prof. T.G. Umesh

Umesh

Shobha Jagannath

(Prof. Shobha Jagannath)  
CHAIRPERSON, BOS IN BOTANY

**Chairman**  
Board of Studies in Botany  
University of Mysore  
Manasaqangotri  
MYSORE-570 006

## ANNEXURE –I

### Minor changes in the course content:

#### **BOTANY: III- SEMESTER - HARD CORE 3.1 TAXONOMY OF ANGIOSPERMS**

**UNIT-I:** Introduction to plant systematics; Plant classification systems-artificial, natural and phylogenetic systems; Contributions of Carolus Linnaeus, Michel Adanson, de Jussieu, de Candolle to plant classification; Concepts of taxonomic hierarchy; Taxonomic Categories- Genus concept; Species concept; Intraspecific categories; subspecies; varieties and forms; History of botanical nomenclature; ICBN and ICN aims and principles; Rules and recommendations; Rule of priority; Typification; Author citation, Legitimate and illegitimate names; Name changes and synonyms; Effective and valid publication; Herbarium and its significance; Botanical gardens.

**UNIT-II: Taxonomic Literature:** General taxonomic indices, world floras and manuals; Monographs and revisions; Bibliographies, catalogues and reviews; Periodicals, glossaries and dictionaries; Hortus Malabaricus; Taxonomic websites- IPNI, Plant List, Tropicos, Botanicum-Periodicum-Huntianum (BPH); Biodiversity Heritage Library (BHL); Botanicus, Index Herbariorum; Taxonomic Keys- bracketed keys, indented keys, numbered keys, edge punched and body punched keys.

**UNIT-III:** Study of plant classification Systems; Broad outlines of Bentham and Hooker's system, Engler and Prantl's system, Hutchinson's system, Takhtajan's system, and Cronquist's system; Numerical Taxonomy-principles, selection of characters, merits and demerits; Angiosperm Phylogeny Group (APG) III & IV classification; Study of angiosperm families-Magnoliaceae, Nymphaeaceae, Urticaceae, Droseraceae, Podostemaceae, Orobanchaceae, Balanophoraceae, Loranthaceae, Alismataceae, Cyperaceae, Commelinaceae, Dioscoreaceae and Orchidaceae.

**UNIT-IV: Molecular Systematics:** Nuclear, mitochondrial and chloroplast genes. Genesequencing, analysis of molecular data, alignment of sequences; Phylogenetic tree Construction-Maximum Likelihood and Neighbour Joining Methods; Phylogenetic analysis- rooted and unrooted trees; Data analysis- alignment, substitution, model building; Phylogenetic softwares-CLUSTAL W, MEGA, Mesquite, PAUP, PHYLIP, Treefinder, TreeBase.

#### **Practicals**

1. Methods of preparation and maintenance of Herbaria.
- 2-4) A field trip of three days to a floristically rich area to study plants belonging to different families (Every student shall submit a report for evaluation for two credits).
- 5-10) Identification of the flowering plants in and around Mysore using keys, floras and monographs.
- 11-12) Construction of phylogenetic tree based on molecular data of plant species retrieved from GenBank.

## References

1. Cronquist, A. 1981. An Integrated system of classification of flowering plants. Columbia University Press, New York.
2. Simpson, M.G. 2006. Plant Systematics. Elsevier, Amsterdam.
3. Gamble, J.S. 2016. Flora of the Presidency of Madras. Neeraj Publishing House, New Delhi
4. Bhat, K. G., 2014. Flora of South Kanara. Akrithi Prints, Mangalore
5. Swafford, D.L. 2001. PUAP. Phylogenetic Analysis Using Parsimony, version 4. Sinauer Associates, Sunderland.
6. Judd, W.S., Campbell, C.S., Kellogg, E.A., Stevens, P.A. and Donoghue, M.J. 2002. Plant Systematics: A phylogenetic Approach. Sinauer Associates, Inc., Massachusetts.
7. Gurucharan Singh. 2004. Plant Systematics: Theory and Practice, Oxford and IBH Publishing Co. Pvt. Ltd., New Delhi.
8. Jeffrey, C. 1982. An introduction to Plant Taxonomy. II Edn., Cambridge Uni. Press.
9. Mondal, A.K. 2009. Advanced Plant Taxonomy. New Central Book Agency Pvt. Ltd., Kolkata, WB.
10. Pullaiah, T. 1998. Taxonomy of Angiosperms. Regency Publications, New Delhi.
11. Johri, B.M. and Bhattacharjee, S.P. 1994. Taxonomy of Angiosperms. Narosa Publishers, New Delhi.
12. Lawrence, G.H.M. 191. Taxonomy of Vascular Plants. MacMillan, London.
13. Sinha, R. K., 2010. Practical Taxonomy of Angiosperms. IK International Publishing House, New Delhi.
14. Chase, M.W. and Reveal, J.L. 2009. A phylogenetic classification of the land plants to accompany APG III. Botanical Journal of Linnaean Society, 161: 122-127.
15. Nei, M. and Kumar, S. 2000. Molecular Evolution and Phylogenetics. Oxford Univ. Press, New York
16. APG-IV. 2016. An update of the Angiosperm Phylogeny Group classification for the orders and families of flowering plants APG-IV. Botanical Journal of Linnaean Society, 181: 1-20.
17. San Mauro, D., Agorreta, A., 2010. Molecular systematics: A synthesis of the common methods and the state of knowledge. Cell Mol Biol Lett 15, 311-341.
18. Martin, W., Lydiate, D., Brinkmann, H., Forkmann, G., Saedler, H. and Cerff, R., 1993. Molecular Phylogenies in Angiosperm Evolution. Molecular Biology and Evolution, 10(1): 140-162. Doi: 10.1093/oxfordjournals.molbev.a039989

## ANNEXURE I

### BOTANY: III- SEMESTER - HARD CORE 3.1 BIOCHEMISTRY AND PLANT PHYSIOLOGY

#### Theory -32 Hrs

**Unit-1: Biochemistry-** Brief account of plant structural and functional molecules- carbohydrates, proteins, lipids and nucleic acids; classification, structural and functional properties of biomolecules; Biochemistry of cell membranes; **Lipids-** building and storage molecules, classification and significance; **Proteins-** classification, structure- primary, secondary, tertiary and quaternary structure; properties of proteins; **Enzymes-** Nomenclature, nature and properties of enzymes, active sites, co-enzymes, kinetics of enzyme action, catalysis, specificity and inhibition, allosteric enzymes, ribozyme and abzyme.

**Unit-2: Solute transport:** Transport of solutes across the membranes Transmembrane proteins, Transport of ions, solutes and macro-molecules, Mechanism of translocations in phloem; Role played in signal transduction pathway stomatal physiology; **Phytosynthesis in higher plants** (i) Photophosphorylation – Calvin cycle; **Photorespiration** - C4 – Pathway, CAM in plants; Oxidative Phosphorylations; Glycolysis -TCA – Cycle and terminal oxidation.

**Unit-3: Plant Hormones-** plant hormones-discovery, biosynthesis, metabolism, transport and physiological effects of plant hormones and their applications; **Nitrogen metabolism** -(i) Molecular mechanism of N<sub>2</sub> fixation (ii) Biosynthesis of amino acids (iii) Assimilation of nitrate and ammonium; **Lipid metabolism-** fats and oils biosynthesis and oxidation of lipids; Physiology of seed germination and flowering.

**Unit -4: Stress Physiology:** Water deficit and its physiological consequences; Drought tolerance mechanisms, Salinity stress and plant responses. Heat stress and heat shock proteins; Metal toxicity in plants. Biotic stress, HR and SAR mechanisms; **Mineral nutrition-** in plants and deficiency diseases; **Plant development-** physiology of flowering; Phytochrome photochemical and biochemical properties of phytochrome; Concept of photoperiodism and vernalization and its influence on flowering;

#### Practicals-32 Hrs

- 1) Estimation of protein by Lowry's method
- 2) Determination of water potential of tissue by plasmolytic method
- 3) Determination of water potential by Gravimetric method
- 4) Quantitative estimation of chlorophyll a, chlorophyll b and total chlorophyll in plant tissue
- 5) Determination of diurnal fluctuation of acid content of CAM plants (TAN)
- 6) Determination of temperature quotient (Q<sub>10</sub>) of water uptake
- 7) Separation of chlorophyll pigments/Anthocyanin by TLC
- 8) Protein analysis by SDS PAGE method.

- 9) Estimation of Alpha-amylase activity in germinating seedling.
- 10) Silver staining of proteins.
- 11-12) Visit to Molecular Biology Laboratories.

### References:

- 1) Barkla, B.J., and Pantajo, O. 1996. Physiology of ion transport across the tonoplast of higher plants. *Ann. Rev. Plant Physiol.* 47: 159-184.
- 2) Clayton, R.K. 1980. *Photosynthesis: Physical mechanisms and chemical patterns.* Cambridge Uni. Press, Cambridge.
- 3) Cohn, E.E., and Stumpf, P.K. 1992. *Outlines of Biochemistry.* Wiley Eastern Pvt. Ltd.
- 4) Kozaki, A., and Takeba, G. 1996. Photorespiration protects C3 plants from photooxidation. *Nature* 384: 557- 560.
- 5) Taiz, L., and Zeiger, E. 1998. *Plant Physiology.* Sinaur Associates Inc. Publishers, Sunderland Massachusetts.
- 6) Mukherji, S., and GHosh, A.K. 1996. *Plant Physiology.* New Central Book Agency Pvt. Ltd. Kolkatta, India.
- 7) Rabinowithc, E., and Jee, G. 1969. *Photosynthesis.* Willey Press, New York.
- 8) Rudier, W., and Thummlar, K. 1994. *The Phytochrome, Chromophore I. Photomorphogenesis in Plants, II Edition, Netherlands, 51-69.*
- 9) Spanswick, R.M. 1981. Electrogenic ion pumps. *Ann. Rev. Plant Physiol.* 32: 267-389
- 10) Mc Elroy, W.D. 1995. *Cell Physiology and Biochemistry.* Prantice Hall of India.
- 11) Walsh, C.T. 1979. *Enzymatic reaction mechanisms.* Editors: W.H. Freeman, New York.
- 12) Webb, E. 1984. *Enzyme nomenclature.* Academic Press, Orlando Fla.
- 13) Zimmermann, M.H., and Milburn, J.A. *Transport in Plants. 1. Phloem transport (Encyclopedia of Plant Physiology. New Series Vol. 1), Springer, New York.*
- 14) Devline and Witham, 1986. *Plant Physiology.* CBS Publs. and Distributors, New Delhi.
- 15) Hopkins, W.G. 1995. *Introduction to Plant Physiology,* John Wiley & Sons. Inc., NewYork, USA.
- 16) Moore, T.C. 1989. *Biochemistry and Physiology of Plant Hormones.* Springer Verlag, New York, USA.
- 17) Singhal et al. 1999. *Concepts in Photobiology, Photosynthesis and Phytomorphogenesis,* Narosa Pub. House, New Delhi.
- 18) Satish C Bhatla, 2018. Plant Physiology, Development and Metabolism. Springer Nature Singapore ISBN 978-981-13-2022-4**
- 19) Hans-Walter Heldt Birgit Piechulla-4<sup>th</sup> Edition ISBN 978=-0-12-384986-1**

**BOTANY: III- SEMESTER - HARD CORE 3.2**  
**MOLECULAR BIOLOGY**

**Theory-32 Hrs**

**Unit-1: Organization of chromosomes and genes in prokaryotes and eukaryotes -**

Operon, interrupted genes, gene families, unique and repetitive DNA, heterochromatin, euchromatin, transposons, mitochondrial and chloroplast genome organization, Transposable elements in prokaryotes and eukaryotes, genetic and evolutionary significance, **DNA replication-** patterns, Messelson and Stahl's and Taylor's experiment, enzymes of replication, mechanism of DNA replication in prokaryotes and Eukaryotes, proof reading and error correction mechanisms.

**Unit-2: Molecular mechanism of mutation, repair and recombination:- Mutation-**

DNA Damage by spontaneous mutations, physical and chemical mutagens and their molecular mechanisms, **Repair mechanisms-** direct reversal of damage, base and excision repair, mismatch repair recombinational repair, SOS repair, translation repair synthesis, transcription coupled repair, **Recombination-** homologous recombination, models of recombination, mechanisms, protein machinery of homologous recombination, genetic consequence of homologous recombination, gene conversion, site specific recombination, mechanism and biological significance, nonhomologous recombination- transposition, molecular mechanisms of transposition conservative, replicative and retro-transposition.

**Unit-3: RNA synthesis, processing and translation:** transcription activators and

repressors, promoters, RNA polymerases and transcription factors, mechanism of transcription in prokaryotes and eukaryotes, RNA processing- capping, polyadenylation, splicing, alternative splicing, RNA editing, exon shuffling and RNA transport, Translation and processing ribosomes, tRNA aminoacylation, aminoacyl tRNA synthetase, genetic code, wobble hypothesis, deciphering of the code, translation mechanism, translation proof reading, translation inhibitors and post translational modifications.

**Unit-4: Regulation of gene expression in Prokaryotes:** Operon concept, regulation at

transcription initiation- lac and trp operon control, regulation of lytic and lysogenic cycles in lambda phage, regulation beyond transcription initiation-premature termination- trp operon, ribosomal proteins as translational repressors, riboswitches, **Regulation of gene expression in eukaryotes-**transcription activators and repressors, regulation after transcription initiation alternative splicing, translational control in ferritin and transferrin mRNA, RNA interference, role of chromatin in regulation of gene expression and gene silencing.

**Practicals-32 Hr**

- 1) Isolation of DNA from CTAB method.
- 2) Isolation of DNA from Onion.
- 3) Isolation of DNA from mulberry leaves.

**4) Isolation of DNA from cauliflower**

**5) Isolation of DNA from coconut endosperm**



**6) Estimation of RNA by Orcinol method**

- 7) Estimation of DNA by DPA method.
- 8) Extraction of RNA by trizol/ phenol-chloroform methods.
- 9) Estimation of proteins by Biuret method.
- 10) Estimation of protein by Bradford method.
- 11) Determination of T<sub>m</sub> value of DNA.
- 12) Photo graphs/ charts related to Molecular biology/Molecular Biologists.

**References:**

- 1) Bruce Alberts, Alexander Johnson, Julian Lewis, Martin Rafi, Keith Roberts, and Peter Walter. 2008. Molecular biology of the cell, 5th edn., Garland science, Taylor & Francis Group, LLC, 270 Madison Avenue, New York, USA.
- 2) Alberts, B., Bray, D., Lewis, J., Raff, M., Roberts, K and Watson, J.D. 1999 . Molecular biology of the cell. Garland Publishing, Inc., New York
- 3) Kleinsmith, L.J. and Kish, V.M. 1995 .Principles of Cell and Molecular Biology 2nd Edition Harper Collins College Publishers, New York, USA.
- 4) Lodish, H. Berk, A., Zipursky, S.L., Matsudaira, P., Baltimore, D. and Darnell, J. 2000. Molecular Cell Biology 4th Edition. W.H. Freeman and Co. New York, USA
- 5) Malacinski, G.M. and Freidfelder, D. 1998. Essentials of Molecular Biology 3rd Edition. Jones and Bartlett Publishers, Inc., London.
- 6) Gunning.B.E.S. and Steer, M.W.1996. Plant Cell Biology; Structure and Function. Jones and Bartlett Publishers, Boston, Massachusetts.
- 7) Harris,Nand Oparka, K.J. 1994. Plant Cell Biology A Practical Approach. IRL Press, Oxford University Press, U.K.
- 8) F.M. Ausubel, R.Brent, R.E. Kingston, D.D. Moore, J.G. Seidman, J.A. Smith, K. Struhl, (Current Edition) (2005). Current Protocols in Molecular Biology.
- 9) B.B. Buchanan, W.Gruissem and R.L. Jones . USA (2000) .Biochemistry and Molecular Biology of Plants. Ed. ASPP Press.
- 10) T.A. Brown, 2000. Essential of Molecular Biology, Vol-I & 2 Oxford University Press.
- 11)James D. Watson, Tania,. A. Baker, Stephen, P. Bell, Alexander ,Gannm, Michael Levine.2004. Molecular Biology of the gene. 5th Edition, Pearson Education.Philip M Gilmartin and Chris.
- 12)Bowle.2002. Molecular Biology of Plants. Vol 1 & 2 Oxford University Press.

**BOTANY: II SEMESTER HARD CORE 2.3**  
**PLANT BREEDING AND EVOLUTIONARY BIOLOGY**

**Theory-32 Hrs**

**Unit-1: Introduction:** Evolution of plant breeding, Objective and role of plant breeding; Scope of plant breeding, Sciences related to plant breeding; Recent trends in plant breeding. Vavilov's concept of origin of centers of origin of crop plants; Plant introduction and acclimatization; Domestication and agriculture. **Breeding Methods-Self pollinated crops:** Mass, Pure line, Pedigree, Bulk and Back cross methods. **Cross pollinated crops:** Progeny, Recurrent selection, Heterosis breeding synthetic and composite varieties and Clonal selections. **Breeding Techniques-**Mutation breeding, Polyploidy, hybridization, Tissue culture techniques in crop improvement, protoplast fusion, electrophoration, electro-fusion, biolistics, somatic hybridization, transgenic plants (GMO's); The role of Gene technology in plant breeding.

**Unit-2: Breeding for Specific Purposes:** Breeding for Disease resistance, Insect resistance, Drought and Salinity, Quality trait, Multiple cropping systems, Ideotype breeding, breeding for Adaptation; **Crop breeding and seed production-** Breeding field crops, seed production techniques, release of new varieties, intellectual property rights, computer application in plant breeding, crop breeding Institutes/Centers; Genetic resources and germplasm conservation; Scientific Plant breeding; Green revolution; The elite crop (Golden rice); Contributions of **Dr. M.S. Swaminathan, Dr. Norman E. Borlaug and N.I. Vavilov.**

**Unit-3: Nature of Evolution :** The origin, theories of evolution of life, earth and the universe; Conditions of the early earth, emergence of the first living cell, origin of prokaryotic and eukaryotic cells, life in the Palaeozoic, Mesozoic and Coenozoic era. **Development of Evolutionary thoughts;** Ecological context, before Darwin, Darwinism, Darwin's evolutionary theory, Neo – Darwinism, modern synthesis: **Fossil evidence of Ancient life,** fossilization; Interpreting geological time scale and fossil records; Evidences from comparative, morphology, patterns of development, comparative physiology and biochemistry, biogeography, palaeontology, taxonomy, anatomy and embryology, plant and animal breeding; Evidence from changing earth and sea; Extinctions; Evolutionary ecology.

**Unit-4: Natural Selection :** Types of natural selection, selective forces, selection models, sexual selection, selection and non adaptive characters, Adaptive radiation, artificial selection, **Variation-** gene flow, genetic drift, gene mutation - Mendelian concept, chromosomal mutation, architectural changes in chromosomes; The Hardy – Weinberg law, polyploidy in plant evolution; Speciation and origin of higher categories -Types of speciation, models of speciation,

pattern of speciation, isolating mechanism and species formation, signification of speciation; Molecular evolution. **Cooperation and conflicts in evolutionary biology. Uses and implications of evolutionary sciences**

### **Practicals-32 Hrs**

- (1) Study of floral biology of crops - typical examples of self and cross pollinated plants.
- (2) Selfing and hybridization techniques - Bagging and emasculation.
- (3) Pollen viability: germination test and TTC test.
- (4) Studying of centre's of origin of cultivated crops - N.I. Vavilov Concept.
- (5) Mode of pollination study in different crops.
- (6) Identification of crop breeding institutes/ centers and logos.
- (7) Studying and identification of contributors of plant breeding - M.S. Swaminathan, N.I. Vavilov, Norman . E. Borlaug .
- (8) Study of contributions of scientists to evolutionary biology.
- (9)-12) Study of models and photographs related to evolution.

### **References**

- 1) Atherly, A.G. Girton, J.R. Donald, J.R. 1999. The Science of Genetics. Saunders College Publishers. Fortworth.
- 3) Griffith, A.J.F., Gelbart, W.M. Muller, J.H. and Lewintin, R.C. 1999. Modern Genetic analysis. W.H. Freeman and co. New York.
- 4) Hartl. D. 1991. Basic Genetics. II edn. Jones and Barlett Publishers Inc. Boston. .
- 5) Fairbanks, D.J. and W.R. Anderson. 1999. Genetics the continuity of life. Brooks's/Cole publishing company. California.
- 6) Brooker, R.J. 1999. Genetics –analysis and principles. Addison Wesley Longman Inc. California.
- 7) Snustad, D.P., Simmons, M.J. and Jenkins, J.R. 1997. Principles of Genetics. Hohn Wiley & son's inc. New York.
- 8) Brown, T.A.1989. Genetics a molecular approach. Van Nostrand Reinhold (intn) Co., Ltd. London.
- 10) Winchester, A.M. 1969. Genetics. III edn. Oxford and IBH, New Delhi.
- 11) Strickberger, Monroe W. 2000. Evolution. 3rd Ed., Jones & Bartlett Publishers, Inc. 40 Tall PineDrive Sudbury, MA 01776, United States of America
- 12) Futuyma, Douglas J. 2005. Evolution. Sinauer Associates, Inc., 23 Plumtree Road, Sunderland, MA 01375, United States of America
- 13) Dodson E. O. and Dodson P. 1976. Evolution: Process and Product. 2nd Ed., D. Van Nostrand Company, 450 West 33rd Street, New York, N.Y. 10001
- 14) Chopra, V.L. 2000. Plant Breeding- theory and practices. Oxford and IBH Publishing Co.Pvt. Ltd., Oxford.
- 15) Chahal, G.S. and Gosal, S.S. 2002. Principles and procedures of Plant Breeding. Narosa Publishing House, New Delhi.
- 16) **Douglas J. Futuyma, Mark Kirkpatrick. 2017. Evolution. Sinauer Associates, Inc. Publishers, Sunderland, Massachusetts U. S. A.**
- 17) **Michel Hutchins. 2011.Grzimek's Animals Life Encyclopedia Evolution Michael Hutchins. GALE Cengage Learning. London.**
- 18) **Alison M. Smith. 2010. Plant Biology. Garland Science. U.S.A**