

Mata Gujri College

Sri Fatehgarh Sahib

(An Autonomous College)

Affiliated to Punjabi University Patiala

Syllabus

For

B. Sc. Agriculture (Honors) Second Year

(IIIrd Semester)



Academic Session 2018-19 & 2019-20

B.Sc. Agriculture (Honors) Syllabus (3rd Semester) for 2018-19 & 2019-20**Outline of the Syllabus for Semester-III**
B.Sc. Agriculture (Hons.) Course (Semester System)
Semester-III

Paper Code	Subject	Periods per week		External Marks		Internal assessment		Total marks		Grand Total
		Theory	Practical	Theory	Practical	Theory	Practical	Theory	Practical	
Agron-301	Principles of Agronomy- I (Kharif Crops)	3	1	30	25	20	0	50	25	75
Bot -302	Crop Physiology	3	1	30	25	20	0	50	25	75
Ent -303	Insect Morphology and Systematics	3	1	30	25	20	0	50	25	75
Extn-304	Extension Methodologies and Communication Skills for Transfer of Technology	2	1	30	25	20	0	50	25	75
Agron-305	Farm Power and Machinery	3	1	30	25	20	0	50	25	75
Soils -306	Manures and Fertilizers	3	1	30	25	20	0	50	25	75
Hort -307	Production Technology of Fruit Crops	3	1	30	25	20	0	50	25	75
Soils -308	Soil Physics and Erosion Management	3	1	30	25	20	0	50	25	75
Path -309	Plant Pathogens and Principles of Plant Pathology	3	1	30	25	20	0	50	25	75
Total		26	9	270	225	180	0	450	225	675

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B.Sc. AGRICULTURE (HONS.) Semester – III

Agron -301: Principles of Agronomy–I (Kharif Corps)

Max. Marks: 75

Theory: 50

External: 30

Internal assessment: 20

Practical: 25

Periods per Week 3+1

Instructions for the Paper Setters

The question paper will consist of three sections A, B and C. Section-A will have four questions from unit-I of the syllabus and section-B will have four questions from unit-II of the syllabus carrying 6 marks each. Student will have to attempt two questions from each section. Section - C will consist of 12 short answer type questions which will cover the entire syllabus uniformly and will carry 1/2 mark for each question. All questions of Section-C are compulsory.

Theory

UNIT-I

Definition, Meaning, Objectives, Scope and Importance of agronomy. Tillage and crops stand establishment. Planting geometry and its effect on growth yield and quality. Cropping systems. Origin, geographic distribution, Botanical description, economic importance, soil and climatic requirement, varieties, cultural practices, yield, major insect pest and diseases of Cereal crops- Rice, Maize, Sorghum, Millet- Pearl millet, Minor millets, Pulses crops - Pigeonpea, Greengram, Blackgram, Cowpea

UNIT-II

Origin, geographic distribution, economic importance, soil and climatic requirement, varieties, cultural practices, yield, major insect pest and diseases of Oil seed crops- Groundnut, Soybean, sunflower, mustard, sesame and Fibre Crop- Cotton, Jute, Forage crops – Sunhemp, Sorghum, Maize, Cowpea, Cluster bean and Napier grass.

Practical

Agron -301: Principles of Agronomy–I (Kharif Corps)

Total marks: 25

Period per week: 1

1. Study of tillage implements.
2. Study of ploughing and puddling.
3. Nursery raising and Seed sowing,
4. Fertilizer application and transplanting of rice

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5. Calculations of quantity of seed for a given area
6. Calculations of quantity fertilizer for a given area.
7. Identification of weeds of *Kharif* crops.
8. Study about application of Fertilizer on rice, maize, sorghum and millets.
9. Determination of yield components.

Suggested Books

1. Chhidda Singh, Prem Singh and Rajbir Singh.(2012) Modern Techniques of Raising Field Crops. Oxford & IBH Publishing, New Delhi.
2. Brain, F Bland , 1971 Crop Production : Cereal and Legumes, academic press London and New York.
3. ICAR, New Delhi, 1980. Handbook of Agriculture, Indian Council of Agricultural Research, New Delhi.
4. Directorate of Extension Education, PAU Ludhiana, 2016, Package of Practices for Kharif crops.
5. Reddy S R and Ramu Y R (2016) Agronomy of field crop, Kalyani Publishers, Ludhiana

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B.Sc. AGRICULTURE (HONS.) Semester – III

Bot -302: Crop Physiology

Max. Marks: 75

Theory: 50

External: 30

Internal assessment: 20

Practical: 25

Periods per Week 3+1

Instructions for the Paper Setters

The question paper will consist of three sections A, B and C. Section-A will have four questions from unit-I of the syllabus and section-B will have four questions from unit-II of the syllabus carrying 6 marks each. Student will have to attempt two questions from each section. Section - C will consist of 12 short answer type questions which will cover the entire syllabus uniformly and will carry 1/2 mark for each question. All questions of Section-C are compulsory.

Theory

UNIT-I

Introduction and importance of crop physiology in agriculture. Seed structures, morphological and biochemical changes during seed development. Physiological and harvestable maturity. Seed germination, Viability and seed dormancy. Growth and development. Crop water relations. Transpiration and its significance in relation to crop productivity. Water use efficiency. Significance of C₃, C₄ and CAM pathways.

UNIT-II

Photorespiration. Photosynthesis and crop productivity. Translocation of assimilates. Source and sink concept. Respiration its types. Mineral nutrition, physiology of nutrient uptake, deficiency and toxicity symptoms of nutrients and hydroponics. Photoperiodism and vernalisation. Plant growth regulators occurrence, biosynthesis, mode of action and commercial application. Senescence and abscission. Fruit ripening and its hormonal regulation.

Practical

Bot -302: Crop Physiology

Total marks: 25

Period per week: 1

1. Study the seed structure of different Agricultural crops
2. Study about seed Germination
3. Study about seed dormancy
4. Study about various growth analysis parameters

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5. Calculation of growth parameters.
6. Methods of measuring water status in roots, stems and leaves.
7. Measurement of water potential.
8. Study about absorption spectrum of chloroplastic pigments.
9. Study about transpiration, photosynthesis and respiration.
10. Study about stomatal frequency and stomata Index.
11. Deficiency symptoms of nutrients.
12. Leaf anatomy of C₃ and C₄ plants.

Suggested Books

1. Mohammad Pessarakli (2014) Handbook of Plant and Crop Physiology. CRC Press
2. Victor O. Sandras & Daniel F. Calderini (2009) Crop Physiology: Applications for Genetic Improvement and Agronomy A.P publication
3. Pandey , S.N and Sinha B.K (2005) Plant Physiology. Vikas Publishing

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B.Sc. AGRICULTURE (HONS.) Semester – III

Ent -303: Insect Morphology and Systematics

Max. Marks: 75

Theory: 50

External: 30

Internal assessment: 20

Practical: 25

Periods per Week 3+1

Instructions for the Paper Setters

The question paper will consist of three sections A, B and C. Section-A will have four questions from unit-I of the syllabus and section-B will have four questions from unit-II of the syllabus carrying 6 marks each. Student will have to attempt two questions from each section. Section - C will consist of 12 short answer type questions which will cover the entire syllabus uniformly and will carry 1/2 mark for each question. All questions of Section-C are compulsory.

Theory

UNIT-I

Entomology- definition and its history. Factors for insect abundance. Integument, moulting, body regions and segmentation. Morphology and anatomy of an insect (Grasshopper/Blister beetle). Modification and function of mouth parts, antennae, legs and wings. Wing venation and wing coupling apparatus. Sense organs. Metamorphosis and diapause. Types of reproduction.

UNIT-II

Taxonomy- its importance, history, development and binomial nomenclature. Definitions of biotype, sub-species, species, genus, family and order. Classification of class Insect up to orders, suborders and important families with special emphasis on distinguishing morphological characters.

Practical

Ent -303: Insect Morphology and Systematics

Total marks: 25

Period per week:1

1. Study about collection and preservation of insects including immature stages.
2. Morphology and anatomy of Grasshopper/ Blister beetle.
3. Study about different types of antennae, mouth parts, legs and wings.
4. Study about wing venation and wing coupling apparatus
5. Types of larvae and pupae.

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6. Study about characteristics of orders - Odonata, Orthoptera, Dictyoptera, Isoptera, Thysanoptera, Hemiptera, Lepidoptera, Neuroptera, Coleoptera, Hymenoptera, Diptera and their families of agricultural importance.

Suggested Books

1. Raghu Moorthy, K. N, Balasubramani, V and Natarajan N (2014) *Insecta An Introduction*. A.E. Publications , Coimbatore
2. Chapman, R.F. (2012) *The Insects: Structure and Function* Cambridge University Press, London
3. Mathur, Y.K , Upadhyay, K.D (2012) *A textbook of Entomology*. Aman Publishing House, Meerut.
4. Cedric Gillott (2005) *Entomology* Springer Publication Netherlands

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B.Sc. AGRICULTURE (HONS.) Semester – III

Extn-304: Extension Methodologies and Communication Skills for Transfer of Technology

Max. Marks: 75

Theory: 50

External: 30

Internal assessment: 20

Practical: 25

Periods per Week 3+1

Instructions for the Paper Setters

The question paper will consist of three sections A, B and C. Section-A will have four questions from unit-I of the syllabus and section-B will have four questions from unit-II of the syllabus carrying 6 marks each. Student will have to attempt two questions from each section. Section - C will consist of 12 short answer type questions which will cover the entire syllabus uniformly and will carry 1/2 mark for each question. All questions of Section-C are compulsory.

Theory

UNIT-I

Meaning, nature, importance, elements, models and barriers in communication. Extension programme planning. Principles and steps in programme development process. Monitoring and evaluation of extension programmes. Extension teaching methods and factors influencing their selection and use. Combination (Media Mix) of teaching methods. Innovative information sources. Audio visual aids; selection, preparation, use and evaluation.

UNIT-II

Meaning, scope and importance of agricultural journalism. Diffusion and adoption of technologies. Models of adoption process. Factors influencing adoption process. Capacity building of extension personnel and farmers for rural development. Communication skills for effective transfer of technology. Methods for organizing seminars and conferences.

Practical

Extn-304: Extension Methodologies and Communication Skills for Transfer of Technology

Total marks: 25

Period per week: 1

1. Simulated exercises on communication.
2. Developing a project based on identified problems in a selected village.
3. Organization of group discussion and method demonstration.
4. Visit to Krishi Vigyan Kendra for improving agricultural knowledge of students.
5. Planning and script writing for radio and television talks.
6. Planning and preparation of visual aids and agricultural information materials.

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7. Handling of public address system.

Suggested Books

1. Ray G. L (2013) Extension communication and management, Naya Prakashani
2. Ray G. L and Mandal S. (2013) Entrepreneurship development and rural Development. Kalayani publishers
3. Kumar A. (2008) Entrepreneurship development. New age international publishers
4. Singh K. (2008) Rural Development Sage International Publishers

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B.Sc. AGRICULTURE (HONS.) Semester – III

Agron -305: Farm Power and Machinery

Max. Marks: 75

Theory: 50

External: 30

Internal assessment: 20

Practical: 25

Periods per Week 3+1

Instructions for the Paper Setters

The question paper will consist of three sections A, B and C. Section-A will have four questions from unit-I of the syllabus and section-B will have four questions from unit-II of the syllabus carrying 6 marks each. Student will have to attempt two questions from each section. Section - C will consist of 12 short answer type questions which will cover the entire syllabus uniformly and will carry 1/2 mark for each question. All questions of Section-C are compulsory.

Theory

UNIT-I

Farm power in India-sources, Internal Combustion (IC) engines and terminology. Working principles of two stroke and four stroke engines. Different systems of tractors, types and selection. Primary and secondary tillage implements. Different types of pumps and tubewells.

UNIT-II

Implements for intercultural operations, seed drills, paddy transplanters, their calibrations. Plant protection. harvesting and threshing equipment. Cost of operation of tractor and machinery.

Practical

Agron -305: Farm Power and Machinery

Total

Marks: 25

Periods per week: 1

1. Study of different components of IC engine,
2. Working of two stroke and four stroke engines.
3. Various, systems of taractors.
4. Study of tillage implements and pumps,
5. Calibration of seed-cum-fertilizer drills and furrow opener.
6. Study of different parts, alignment and operation of mowers.
7. Registration procedures.

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8. Studies of different intercultural equipments, paddy transplanters and threshing systems.
9. Repair adjustment and operation of sprayers and dusters.

Suggested Books

1. Barger E L, Liljedahl J B and McKibben E C. 1967. *Tractors and their Power Units*. Wiley Eastern.
2. Brnacki C, Haman J and Kanafajski C Z.1972. *Agricultural Machines*. Oxford & IBH.
3. Bindra O S and Singh H.1971. *Pesticides Application Equipments*. Oxford & IBH.
4. Bosoi E S, Verniaev O V and Sultan-Shakh E G. 1990. *Theory, Construction and Calculations of Agricultural Machinery*. Vol. I. Oxonian Press.
5. Klenin NI, Popov IF & Sakoon VA. 1987. *Agricultural Machines. Theory of Operations, Computing and Controlling Parameters and the Condition of Operation*. Amrind Publ.

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B.Sc. AGRICULTURE (HONS.) Semester – III

Soils -306: Manures and Fertilizers

Max. Marks: 75

Theory: 50

External: 30

Internal assessment: 20

Practical: 25

Periods per week: 3+1

Instructions for the Paper Setters

The question paper will consist of three sections A, B and C. Section-A will have four questions from unit-I of the syllabus and section-B will have four questions from unit-II of the syllabus carrying 6 marks each. Student will have to attempt two questions from each section. Section - C will consist of 12 short answer type questions which will cover the entire syllabus uniformly and will carry 1/2 mark for each question. All questions of Section-C are compulsory.

Theory

UNIT-I

Fertilizers classification, manufacturing processes and properties of major nitrogenous (ammonium sulphate, urea, calcium ammonium nitrate, ammonium nitrate, ammonium sulphate nitrate), phosphatic (single super phosphate, enriched super phosphate, diammonium phosphate, ammonium poly phosphate), potassic and complex fertilizers, their fate and reactions in the soil. Secondary and micronutrient fertilizers and amendments.

UNIT-II

Fertilizer control order. Fertilizer storage. Biofertilizers and their advantages. Manures -bulky and concentrated. Farm yard manure. Composting - different methods, mechanical compost plants, vermin-composting, green manuring, oil cakes. Sewage and sludge, biogas plant slurry, plant and animal refuse.

Practical

Soils -306: Manures and Fertilizers

Total marks: 25

Period per week: 1

1. Identification of different fertilizers.
2. Identification of different bio-fertilizers.
3. Identification of different manures.
4. Estimation of nitrogen, phosphorus and potassium in farm yard manure

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5. Determination of nitrogen content of urea, phosphorus content of SSP and potassium content of MOP.
6. Visit to commercial compost, fertilizers and bio-fertilizers units.

Suggested Books

1. FAI. 1999. Fertilizer (Control) Order, 1985 and the Essential Commodities Act. 1955. FAI, New Delhi, pp.203.
2. Mortved, J.J. et al. Micronutrients in Agriculture. SSSA Madison pp.760.
3. Olsen, R.A. 1981. Fertilizer Theory and Practice (eds). ICAR, New Delhi pp.583.
4. Prasad, R. and Power, J.F. 1997. Soil Fertility Management for Sustainable Agriculture, CRC Lewis, Boca Raton, Florida, USA.
5. Tisdale, S.L. and Nelson, W.L. 1990. Soil fertility and fertilizers. McMillan Pub. Co. N.Y. pp.754.
6. Yawalkar, K.S., Agarwal, J.P. and Bokde, S. (1996) Manures and Fertilizers, 8th revised Edn, Agri-Horticultural Publishing House, Nagpur, India.
7. Kanwar J S (1976). Soil fertility: theory and practice (eds). Indian Council of Agricultural Research, New Delhi pp.583

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B.Sc. AGRICULTURE (HONS.) Semester – III

Hort -307: Production Technology of Fruit Crops

Max. Marks: 75

Theory: 50

External: 30

Internal assessment: 20

Practical: 25

Periods per Week 3+1

Instructions for the Paper Setters

The question paper will consist of three sections A, B and C. Section-A will have four questions from unit-I of the syllabus and section-B will have four questions from unit-II of the syllabus carrying 6 marks each. Student will have to attempt two questions from each section. Section - C will consist of 12 short answer type questions which will cover the entire syllabus uniformly and will carry 1/2 mark for each question. All questions of Section-C are compulsory.

Theory

UNIT-I

Definition, importance and divisions of horticulture. Agro-climatic zones, area and production of different fruit crops. Selection of site, fencing and wind break. Planting systems, high density planting, planning and establishment. Propagation methods and use of rootstocks. Methods of training and pruning. Use of growth regulators in fruit production.

UNIT-II

Package of practices for the cultivation of major fruits (mango, banana, citrus, grapes, guava, sapota, apple, litchi and papaya). Minor fruits (pineapple, annonaceous fruits, pomegranate, ber, fig, loquat, phalsa, jackfruit, pear, plum, peaches, apricot and cherry).

Practical

Hort -307: Production Technology of Fruit Crops

Total marks: 25

Period per week: 1

1. Study about different horticultural tools and their uses.
2. Containers and potting mixtures.
3. Plant and seed propagation.
4. Scarification and stratification.
5. Layout and planting systems.
6. Methods of pruning and training.
7. Training of ber, grape and pomegranate.
8. Pruning of ber, grape, phalsa, fig, apple, pear, peach.

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9. Identification of important species and varieties of fruits.
10. Irrigation methods including drip and micro irrigation.
11. Methods of fertilizer application.
12. Preparation of growth regulators, powder, solution and lanolin paste for propagation.
13. Application of growth regulators for improving fruit set, fruit size, quality, delaying and hastening ripening.
14. Visit to local commercial orchards.

Suggested Books

1. Bose TK, Mitra SK and Rathore DS. (Eds.). 1988. *Temperate Fruits -Horticulture*. Allied Publ.
2. Bose TK, Mitra SK and Sanyal D. 2001. (Eds.). *Fruits -Tropical and Subtropical*. NayaUdyog.
3. Chadha KL and Pareek OP. 1996. (Eds.). *Advances in Horticulture*. Vols. IIIIV. Malhotra Publ. House.
4. Nakasone HY and Paul RE. 1998. *Tropical Fruits*. CABI.
5. Peter KV. 2008. (Ed.). *Basics of Horticulture*. New India Publ. Agency.
6. Pradeep Kumar T, Suma B, Jyothibhaskar and Satheesan KN. 2008. *Management of Horticultural Crops*. Parts I, II. New India Publ. Agency.
7. Radha T and Mathew L. 2007. *Fruit Crops*. New India Publ. Agency.
8. Singh HP, Negi JP and Samuel JC. (Eds.). 2002. *Approaches for Sustainable Development of Horticulture*. National Horticultural Board.
9. Singh HP, Singh G, Samuel JC and Pathak RK. (Eds.). 2003. *Precision Farming in Horticulture*. NCPAH, DAC/PFDC, CISH, Lucknow.
10. Bose TK, Mitra SK and Sanyol D. (Ed.). 2002. *Fruits of India – Tropical and Sub-tropical*. 3rd Ed. Vols. I, II. Naya Udyog.
11. Chadha KL and Pareek OP. 1996. (Eds.). *Advances in Horticulture*. Vol. I. Malhotra Publ. House.

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B.Sc. AGRICULTURE (HONS.) Semester – III

Soils -308: Soil Physics and Erosion Management

Max. Marks: 75

Theory: 50

External: 30

Internal assessment: 20

Practical: 25

Periods per Week: 3+1

Instructions for the Paper Setters

The question paper will consist of three sections A, B and C. Section-A will have four questions from unit-I of the syllabus and section-B will have four questions from unit-II of the syllabus carrying 6 marks each. Student will have to attempt two questions from each section. Section - C will consist of 12 short answer type questions which will cover the entire syllabus uniformly and will carry 1/2 mark for each question. All questions of Section-C are compulsory.

Theory

UNIT-I

Soil a water reservoir, role in water cycle. Computation of depletion and accretion of profile water. Forces of water retention. Soil water potential. Components and distribution above and below water table. Soil-plant-atmosphere continuum. Indices of plant water status.

UNIT-II

Soil moisture characteristics, Evaporation in the presence and absence of water table, components of water balance and their computation. Soil erosion by water - types, effects, mechanics. Rainfall erosivity and soil erodibility. Runoff methods of measurement, factors and, runoff farming. Soil conservation measures.

Practical

Soils -308: Soil Physics and Erosion Management

Total marks: 25

Period per week: 1

1. Measurement and analysis of rainfall data.
2. Determination of soil moisture, infiltration and drainage characteristics in the field.
3. In situ determination of soil moisture by neutron probe and tensiometry.
4. Soil moisture characteristics.
5. Advancement of wetting front in homogeneous and layered soil columns.
6. Measurement of soil evaporation under differential surface conditions.
7. Estimation of erosivity and erodibility indices.

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8. Measurement and estimation of runoff and soil loss.

Suggested Books

1. Ghildyal BP & Tripathi RP. 2001. Soil Physics. New Age International.
2. Kohnke H. 1968. Soil Physics. McGraw Hill.
3. Hillel D. 1980. Fundamentals of Soil Physics. Academic Press.
4. Hillel D. 1982. Introduction to soil Physics. Academic Press.
5. Jackson, M.L., 1958. Soil chemical analysis. Verlag: Prentice Hall, Inc.,

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B.Sc. AGRICULTURE (HONS.) Semester – III

Path -309: Plant Pathogens and Principles of Plant Pathology

Max. Marks: 75

Theory: 50

External: 30

Internal assessment: 20

Practical: 25

Periods per Week 3+1

Instructions for the Paper Setters

The question paper will consist of three sections A, B and C. Section-A will have four questions from unit-I of the syllabus and section-B will have four questions from unit-II of the syllabus carrying 6 marks each. Student will have to attempt two questions from each section. Section - C will consist of 12 short answer type questions which will cover the entire syllabus uniformly and will carry 1/2 mark for each question. All questions of Section-C are compulsory.

Theory

UNIT-I

Introduction, importance and general characters of fungi, bacteria, fastidious bacteria, nematodes, hytoplasmas, spiroplasmas, viruses, viroids, algae, protozoa and phanerogamic parasites. Definition, objectives, history, terms and concept of plant pathology. Survival and dispersal of plant pathogens. Phenomenon of infection. Defence mechanisms in plants.

UNIT-II

Plant disease epidemiology and forecasting. General principles of plant disease management. Plant quarantine and inspection. Genetic, cultural, biological, physical and chemical methods of plant disease management. Integrated plant disease management.

Practical

Path -309: Plant Pathogens and Principles of Plant Pathology

Total marks: 25

Period per week: 1

1. Acquaintance to plant pathology laboratory equipments.
2. Preparation of culture media for fungi and bacteria.
3. Isolation techniques and preservation of plant disease samples.
4. Study of important plant pathogenic genera.
5. Demonstration of Koch's postulates.
6. Study of different groups of fungicides and antibiotics.
7. Bio-control of plant pathogens.
8. Visit to remote sensing laboratory and experimental area.

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Suggested Books

1. Kumar S. 2016. Plant pathogens and principles of plant pathology. New India Publishing Agency
2. Singh R S. 1982. Plant Pathogens: The Fungi. Oxford & IBH Publishing Co
3. Dubey H. C. 2013. An Introduction to Fungi, 4th Edition. Scientific Publisher
4. Singh R. S. Introduction to Principles of Plant Pathology. Oxford &IBH-Pubs company, New Delhi