Name of Programme: M.Sc. (Ag.) Plant Pathology

Academic eligibility for admission: - B.Sc. (Ag.)

Curriculum and Syllabus

Semester	Course Code & No.	Course Title	Credit Hrs.	Mid Exam.	Final Exam		Total
					Theory	Practical	
I[st] Sem.	PPA-6421	INTRODUCTORY MYCOLOGY	3 (2+1)	20	40	40	100
	PPA-6422	INTRODUCTORY BACTERIOLOGY	3 (2+1)	20	40	40	100
	PPA-6423	INTODUCTORY VIROLOGY	3 (2+1)	20	40	40	100
	AST-6424	Statistical Methods	3 (2+1)	20	40	40	100
		Total	12				
II[nd] Sem	PPA-6425	PRINCIPLES OF PLANT PATHOLOGY	3 (2+1)	20	40	40	100
	PPA-6426	PLANT PATHOLOGICAL TECHNIQUES	3(2+1)	20	40	40	100
	PPA-6427	DISEASES OF FIELD CROPS	3 (2+1)	20	40	40	100
	AST-6428	Design of Experiments	3(2+1)	20	40	40	100
		Total	12				
III[rd] Sem	PPA-7421	PLANT DISEASE MANAGEMENT	3(2+1)	20	40	40	100
	PPA-7422	DISEASE OF VEGETABLE CROPS	3(2+1)	20	40	40	100
	PPA-7423	SEED PATHOLOGY	3(2+1)	20	40	40	100
	PPA-7424	NON PARASITIC DISEASES AND PHANEROGAMIC PARASITES	3(2+1)	20	40	40	100
			12				
IV[th] Sem	PPA-7425	DISEASES OF SPICES MEDICINAL AND FRUIT CROPS	3(2+1)	20	40	40	100
	PPA-7426	EPIDEMIOLOGY AND FORCASTING OF PLANT DISEASES	3(2+1)	20	40	40	100
	PPA-599	Seminar	1	Satisfactory/Unsatisfactory			
	Optional (any one from two)						
	PPA-7427	MUSROOM PRODUCTION	12(9+3)	20	40	40	100
	or						
	PPA-598	Thesis Research	12	40 % Internal +60% External)			100
		Total	19				
		Grand Total	55				

Ist Semester, Plant Pathology

PPA 6421 - INTRODUCTORY MYCOLOGY

(Credit Hours: 2 + 1 = 3) **(MARKS: MID 20 + THE 40 + PRA. 40 = 100)**

Introduction - Milestones in mycology, fungal systematics, general characteristics and classification of kingdom fungi phylum: Cytridiomycota - *Synchytrium endobioticum, Allomyces, Chytriomyces,* phylum: Zygomycota- , *Rhizopus, Mucor, Endogone* and *Glomus,* phylum: Ascomycota - *Saccharomyces* spp.; *Taphrina Aspergillus, Penicillium, Claviceps purpurea, Neurospora sitophila, Monilinia, venturia,* phylum: Basidiomycota - *Agaricus, pleurotus, Puccinia, Melampsora, Uromyces, Tilleiia, - Ustilago,* Imperfect fungi,- *Colletotrichum, Phoma, A scochyta, helmmthosporiurn, Cercospora, Botrytis, Fusarium* and *Rhizoctonia.* General characteristics and classification of kingdom Straminopila with special emphasis of life cycle of following of genera-Pythium, *Phy toph thora, Albugo, Peronospora, Achlya* and *Saprolegnia.* General characteristics and classification of ProtistsPlasmodiophora, Dictyostelium and life cycles of typical Myxomycetes, Asco and Basidio-lichens. Fungal genetics, sexuality and variability in fungi.

Practical: Related with the Course.

PPA 6422 - INTRODUCTORY BACTERIOLOGY

(Credit Hours: 2 + 1 = 3) **(MARKS: MID 20 + THE 40 + PRA. 40 = 100)**

Bacteria : History and development, origin of bacteria, fossil bacteria, classification, morphology, structure, metabolism and Reproduction. Classification and identification of phytopathogenic bacteria. Nutrition: autotrophic and heterotrophic. Comparison of Prokaryote, Eukaryote and Archeabacteria. Bacterial toxins and enzymes, elementary bacterial genetics and mechanism of variability. Bacteriophages. General characteristics of rickettsia, bdellobrios and L-form bacteria.

Mollecutes - Introduction, history and milestones, definition, characteristics cell morphology and replication, classification, differences between Mycoplasma, Phytoplasma and Spiroplasma.

Practical: Related with the Course.

PPA 6423 - INTODUCTORY VIROLOGY

(Credit Hours: 2 + 1 = 3) (MARKS: MID 20 + THE 40 + PRA. 40 = 100)

Brief history and economic importance of viruses, plant viruses morphology and structure, composition, replication, nomenclature and classification of plant viruses. Induction of disease symptoms caused by viruses. and transmission. Physiology of virus infected plants. Detection of isolation, purification and serology of plant viruses.

Bacteriophase.

Practical: Related with the Course.

IInd Semester

PPA 6425 - PRINCIPLES OF PLANT PATHOLOGY

(Credit Hours: 2 + 1 = 3) **(MARKS: MID 20 + THE 40 + PRA. 40 = 100)**

Importance of plant diseases, scope & objective of plant pathology, Brief history of plant pathology. Classification of plants diseases, Symptoms and sings of plant's diseases. Environmental effects on the development of infectious plants disease. Physiologic specialization anti variation in plant pathogens. Parasitism and disease development, role of enzymes and toxins during infections. General principles of plant disease managements.

Practical: Related with the Course.

PPA 6426 - PLANT PATHOLOGICAL TECHNIQUES

(Credit Hours: 2 + 1 = 3) **(MARKS: MID 20 + THE 40 + PRA. 40 = 100)**

Microscopy: Calibration and measurement of spore, camera Iucida drawing, microtomes and microtomy procedures (paraffin embedding and freeze microtome), Preparation of mount, preservation of fungi, cleaning and sterilization of glassware and culture media (natural, semi synthetic and synthetic). Determination. of pH. Inoculation and isolation of pathogens, purification of fungal culture, Koch's postulates. Methods of spore germination. Demonstration of appresoria and houstoria in plant pathogenic fungi. Stains and staining, detection of plant pathogens. In vitro evaluation of fungicides and bactricides. Field experiments, and collection of data and references. Laboratory Equipments and their use _ Autoclave, hot air oven, laminar air flow, pH meter, spectrophotometer micro tomes and B.O.D. Incubator.

Practical: Related with the Course.

PPA 6427 - DISEASES OF FIELD CROPS

(Credit Hours: 2 + 1 = 3) **(MARKS: MID 20 + THE 40 + PRA. 40 = 100)**

Symptoms, etiology, transmission and control of important disease of field and oil seed crops.

Disease of wheat - Rust, Loose smut, Hill bunt, Karnal bunt, Leaf smut, Alternaria blight, Ear cockle.

Diseases of paddy – Blast, Helminthosporium leaf spot, Stem rot, Kernal bunt, Leaf smut, False smut, Bakanae disease, Sheath blight, Bacterial blight, Khaira disease.

Diseases of jowar - Downy mildew, Loose, covered, head and long smuts Diseases of bajra - Downy mildew or Green ear, Leaf rust, Grain smut and Ergot.

Disease of maize - Smut Brown spots, Pythium .stalk rots. Diseases, tobacco - Damping off, Mosaic.

Diseases of barley - Covered smut.

Disease of sugarcane - Red Rot, Wilt, Smut.

Diseases of pigeon pea - wilt, Sterility mosaic, Phytophthora blight.

Diseases of gram - Wilt and blight.

Diseases of mung and urd - Cercospora leaf spots.

Symptoms, etiology, transmission and control of important d iscases of oil seed crops.

Ground nut	–	Tikka disease, rust, wilt and collar rot.
Linseed	–	Rust, Blight & wilt
Mustard	–	White rust, Leaf blight
Sunflower	–	Rust Leaf spot and wilt
Sesamum	–	Leaf spot and Phyllody
Castor	–	Seedling blight, rust, blight, leaf spot.

Practical: Related with the Course.

IIIrd Semester

PPA 7421 - PLANT DISEASE MANAGEMENT

(Credit Hours: 2 + 1 = 3) (MARKS: MID 20 + THE 40 + PRA. 40 = 100)

Methods and practices of plant disease management - Regulatory methods - plant quarantine, inspection and certification, seed certification.

Physical method - sanitation, hot water, solar heat, steam and aerated steam treatments to kill pathogens burning of infested crop debris moisture alternation of soil and alteration of soil pH. Biological control - Antagonists. Mode of action of antagonists, Efficacy of bio-control agents, cross protection and induced resistance, organic amendments, protection of plant surfaces. Cultural practices-Production and use of disease free propagating materials, adjustment of crop culture to minimize disease incidence, field and plant sanitation, Host resistance - Methods of screening of disease resistance breeding methods and genetic resistance for disease management.

Toxic chemicals: Definition and classification of fungicides, formulation of fungicides, methods of fungicidal application, fungicidal toxicity, test, use of foliar and post harvest

fungicides, seed and soil treatments. Systemic fungicides and Antibiotics, mode of their action movement and distribution. Integrated diseases management.

Practical: Related with the Course.

PPA 7422 - DISEASE OF VEGETABLE CROPS

(Credit Hours: 2 + 1 = 3) (MARKS: MID 20 + THE 40 + PRA. 40 = 100)

Symptoms etiology transmission and control of the following disease of vegetable crops.

Disease of potato: Early blight, late blight, Rhizoctonia, Black & Scurf, Dry rot of tubers, Snchytrium wart, Corrunon scab, Bacterialring rot, Soft rot of tubers virus diseases (leaf roll, mosaic)

Diseases of brinjal- Phomosis, Fruit rot, Little leaf.

Diseases of pea - Downy mildew, powdery mildew, rust.

Diseases of coriander - Stern gall.

Diseases of cabbage and cauliflower - Club root, Damping Off, Black rot.

Diseases of okra - Yellow vein mosaic.

Diseases of onion - Smut.

Diseases of garlic - Garlic blotch.

Diseases of chillies - Anthracnose, Fruit rot, Virus diseases'.

Disease of tomato - Early blight, Leaf curl, Root - knot.

Diseases of cucurbits - Powdery mildew, Downy mildew. Practical - Related with the course.

PPA 7423 - SEED PATHOLOGY

(Credit Hours: 2 + 1 = 3) (MARKS: MID 20 + THE 40 + PRA. 40 = 100)

History and importance of seed pathology. International seed testing association its role and functions. Morphology and anatomy of seed; Entry points of seed infection. Plant-seed and seed-plant transillission. Establishment of infection and Course of disease. Environment affecting establishment, seed crop management. Seed treatment, quarantine for seed certification. Detection of seed borne pathogen. Seed health testing methods. Important seed transmitted disease, their symptoms and disease cycles. Storage fungi. Impact of storage fungi on stored grains seeds. Factors influencing invasion of stored grain seed by fungi. Management of seed brone pathogens.

Practical: Related with the Course.

PPA 7424 - NON PARASITIC DISEASES AND PHANEROGAMIC PARASITES

(Credit Hours: 2 + 1 = 3) **(MARKS: MID 20 + THE 40 + PRA. 40 = 100)**

Historical review, interaction of biotic and abiotic stress: predisposition, stress strain, injury to tree, decline, disease spiral, interaction of biotic and abiotic stresses (I).Effect of air pollution: primary air pollutant, secondary air pollutant, smog, air pollutants in relation to rain: health symptoms, ozone, PAN, C02, Sulphur dioxide, nitrogen oxide injury (3). Acid rain : causes and effects of acid rains, symptoms, diseases caused by acidity of alkalinity (2). Disease due to unfavourable temperature and frost damage:

Diseases due to low temperature stress (chilling and freezing injury), cold shock proteins, cold tolerance, frost churning of frozen soil damage, heat injury, sunscald, Scorch. Girdling of heat shock protein (2). Diseases due to unfavourable moisture : drought, flooding symptoms of plants under drought, and flooding stress (3). Nutritional deficiencies and toxicities: Macro elements microelements nutritional balance, importance of nutrients in plant health, diseases caused by mineral deficiency or toxicity, characteristics of deficiency diseases in. corps. Effect of global warming : climate change on disease incidence, latrogenic disease. Disease due to phanerogarnic parasites : Classification and control of phanerogarnic parasites like Striga, Cascuta, Orobanche, Arceuthobium.

Practical: Related with the Course.

IVth Semester

PPA 7425 - DISEASES OF SPICES MEDICINAL AND FRUIT CROPS

(Credit Hours: 2 + 1 = 3) **(MARKS: MID 20 + THE 40 + PRA. 40 = 100)**

Symptoms etiology, transmission and control of the following disease of fruits crops.

Mango - Anthracnose, scab malformation, Loranthus, black tip, powdery mildew.

Apple - Scab, powdery mildew, soft rot.

Citrus - Canker, Fruit rots, Greening & Tristeza, Die-back. Root rots.

Guava - Wilt and Fruit blotch.

Papaya - Foot rot, mosaic, Leaf curl.

Grapes - Downy mildew and powdery Mildew

Jack fruit - Brown leaf spot & Rhizopus rot

Banana - Panama disease & bunchy top.

Disease of forest trees including neem and stored timber.

Turmeric - Rhizome rot, soft rot

Ginger - Rhhizome rot, soft rot, wilt/yellow diseases

Coriander- stem gall, wilt and powdery mildew

Cumin - Powdery mildew, damping off,

Cardamom: Rhizome rot, leaf rust, leaf spot

Practical: Related with the Course.

PPA 7426 - EPIDEMIOLOGY AND FORCASTING OF PLANT DISEASES

Credit Hours: 2 + 1 = 3) **(MARKS: MID 20 + THE 40 + PRA. 40 = 100)**

History, host pathogen, environmental and other factor in relation to disease development. Epidemic growth and analysis. Disease progress cure, and resistance phenomena, principles and pre requisite of forecasting systems and factors affecting various - components. Forecasting, procedures, modeling concepts and disease production. Crop loss assessment importance kinds of losses and assessment methods. Implementation of crops loss assessment programme. Disease assessment of their methods. Remote sensing and yield component analysis.

PPA 7427 – MUSHROOM PRODUCTION TECHNOLOGY

(Credit Hours: 2+1 = 3) **(MARKS: MID 20 + THE 40 + PRA. 40 = 100)**

Introduction, history and economic importance of mushrooms. Morphology and taxonomy. Edible and poisonous mushrooms. Cultivation system and farm design, compost and composting, .spawn & spawning, Casing materials and. case running. Cultivation of mushrooms. Diseases of mushrooms, post harvest handling and processing.

Practical: Related with the Course.

AST 6364: STATISTICAL METHODS

(Credit Hours: 2+1 = 3) **(MARKS: MID 20 + THE 40 + PRA. 40 = 100)**

Frequency distribution, classification and tabulation of data; graphical and diagramatic representation of data, measures of central tendency, measures of despersian, coefficient of variance, standard error, skewness

& kurtosis.

Consus & sample survey, population and sample, probability concept of random sampling, simple random sample, statified sampling systematic & cluster sampling parameter & sample value. Testing of hypothesis. test of signification based on Z t and F test x^2 - test f01; goodness of fit and independence of attributes.

Scattered diagram. Linear regression & correlation, regression and correlation coefficient.

Practical: Related with the Course.

AST 6368: DESIGN OF EXPERIMENTS

(Credit Hours: 2+1 = 3) **(MARKS: MID 20 + THE 40 + PRA. 40 = 100)**

Analysis of variance. Basic principal of experimental design, CRD, RBO, LSD with their analysis mission plot techniques in R.B.D. and L.S.D.

Factorial experiment its concepts and analysis of 2^3, factorial. Confounding in symmetrical factorial (in 2^3 experiments), split plot design, strip plot design, uniformity trials. Progeny row trials. Complect family black design, with over trials & simple rotational experiments. Statistical organization, statistics of livestock & fistrics source of livestock and agriculture in general. Source of official statistician. Crop cutting experiments.