Agrotechnology Discipline
Khulna University, Khulna
3rd Year Term-II, Examination 2026
0811 08 AT 3201: Principles of Plant Pathology and Diseases of Field Crops
Full Marks: 60, Time: 3 hours, Credit: 03

- The FIGURES in the right margin indicate full marks. The questions are of equal value.
- Use separate sheets for each section.
- There are **FOUR** questions in each section, answer any **THREE** questions from each.

Section A

1. (a) List the major chemical weapons used by plant pathogens in causing disease. [L2; CLO1] 2.0
   (b) 'Nutrient uptake by pathogens from their host is equivalent to the damage caused by the pathogen.' Justify this statement. [L5; CLO6] 3.0
   (c) Define inoculum potential and discuss its role in the successful establishment and parasitism of plant pathogens. [L3; CLO1] 3.0
   (d) Draw the structure and function of a haustorium. Which group of plant pathogens typically produces haustoria, and how do they contribute to successful parasitism in host plants? [L2; CLO1] 2.0

2. (a) Differentiate between primary inoculum and secondary inoculum in plant disease development. Which type of inoculum is mainly responsible for the rapid spread of a disease epidemic within a single growing season? Explain your answer. [L4; CLO2] 3.0
   (b) 'Successful infections always result in the appearance of symptoms.' Judge this critically. [L5; CLO2] 3.0
   (c) List which organelle is the primary target for toxins that inhibit photosynthesis, such as Tentoxin? [L2; CLO1] 2.0
   (d) Victorin, a host-specific toxin (HST) produced by *Cochliobolus victoriae*, causes disease in oats. What determines whether an oat plant is susceptible or resistant to this toxin? Explain your answer with appropriate reasoning. [L4; CLO1] 2.0

3. (a) Why is free moisture (leaf wetness) considered one of the most critical environmental factors for fungal pathogens? Discuss. [L2; CLO2] 2.0
   (b) A greenhouse manager reduces temperature and increases ventilation to control an outbreak of *Botrytis* spp. disease. Which component of the disease triangle is being manipulated, and how does this action help suppress disease development? Explain your answer. [L4; CLO2] 3.0
   (c) How does host age or growth stage influence disease development? Explain. [L3; CLO3] 3.0
   (d) What is monoculture and why is it considered a host factor that increases disease risk? [L3; CLO3] 2.0

4. (a) For which type of plant pathogens monocyclic or polycyclic is crop rotation most effective? Justify your answer. [L4; CLO4] 2.0
   (b) Discuss how the following cultural practices help reduce plant disease incidence: 2.0
       i) Switching from overhead irrigation to drip irrigation
       ii) Modifying soil pH [L3; CLO4]
   (c) Trichoderma species are widely used as biological control agents against soil-borne plant pathogens. Which of the following is a key mechanism by which they suppress pathogen activity? Explain your answer. [L3; CLO4] 3.0
   (d) What do mean by symplastic, apoplastic, and amphimobile movement of fungicides? [L3; CLO4] 3.0

[L1-Remember, L2-Understand, L3-Apply, L4-Analyze, L5-Evaluate, L6-Create]

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Section B

5.	(a)	Compare and contrast between the symptoms of: i. Narrow brown leaf spot and bacterial leaf streak of rice ii. Nitrogen deficiency and tungro disease of rice. [L3; CLO4]	2+2=4.0
	(b)	Draw and describe the symptoms of blast and sheath blight of rice. [L3; CLO2]	3.0
	(c)	Diagrammatically show the disease cycle of brown spot of rice. [L2; CLO3]	3.0
6.	(a)	Draw and describe the symptoms of black band and anthracnose of jute. [L3; CLO2]	4.0
	(b)	Describe the disease cycle of stem rot of jute. [L2; CLO3]	3.0
	(c)	Design a judicious control measure schedule for angular leafspot of cotton. [L3; CLO4]	3.0
7.	(a)	List four diseases of sugarcane and four diseases of oil crops along with their causal agents. [L1; CLO4]	3.0
	(b)	Name cause of sugarcane smut. Describe the symptoms of sugarcane smut and explain the procedure of hot water treatment for its control. [L3; CLO4]	4.0
	(c)	Distinguish between symptoms of Cercospora leaf spot and rust of groundnut. [L3; CLO4]	3.0
8.	(a)	Describe the symptoms of tikka disease in groundnut and gray leaf spot of mustard. [L3; CLO2]	4.0
	(b)	Write down the suitable environmental factors for the development of gray leaf spot of mustard. [L1, L3; CLO3]	3.0
	(c)	What control measures should be taken to manage gray leaf spot of mustard in the field? [L3, L5; CLO4]	3.0

[L1-Remember, L2-Understand, L3-Apply, L4-Analyze, L5-Evaluate, L6-Create]

Agrotechnology Discipline
Khulna University, Khulna
3rd Year Term-II, Examination 2026
0811 08 AT 3203: Crop Ecology
Full Marks: 60, Time: 3 hours, Credit: 03

- The FIGURES in the right margin indicate full marks. The questions are of equal value.
- Use separate sheets for each section.
- There are **FOUR** questions in each section, answer any **THREE** questions from each.

Section A

1.	(a)	Point out major sub-division of Ecology and define them. [L1; CLO1]	3.0
	(b)	Explain cardinal temperatures with diagram. [L2; CLO1]	3.0
	(c)	Assess the impact of light intensity variability on crop productivity. [L5; CLO1]	4.0
2.	(a)	Suggest practices to reduce greenhouse gas emissions in Bangladesh. [L5; CLO1, CLO2]	3.0
	(b)	Briefly describe the significances of soil temperature and soil water for crop production. [L5; CLO2]	3.5
	(c)	Define integrated water resource management (UWRM). State the principles of IWRM for maximize water use efficiency. [L3; CLO1].	3.5
3.	(a)	Define biogeochemical cycle. Show diagrammatically phosphorus cycle in agroecosystem with significances. [L4; CLOI]	4.0
	(b)	Formulate the impacts of wind on crop production. [L2; CLO2]	3.0
	(c)	'Ozone layer has great significances on human health and crop health.' Explain. [L2; CLO2]	3.0
4.	(a)	'Beneficial relationship between microbes and crop plants is called symbiosis.' Assess the statement. [L6; CLO1]	3.0
	(b)	'Acid rain significantly influences soil fertility and productivity of agroecosystem.' Justify the statement. [L5; CLO1]	3.0
	(c)	Differentiate between i) climate change and climate variation; ii) epiphytes and parasites. [L4; CLO3]	4.0

Section B

5.	(a)	Enumerate the components of ecosystem in wheat field. [L2; CLO3]	3.0
	(b)	Briefly describe different types of ecological pyramid. [L4; CLO3]	4.0
	(c)	Distinguish between food chain and food web. [L2; CLO3]	3.0
6.	(a)	Differentiate primary productivity from secondary productivity. [L2; CLO3]	2.0
	(b)	Discuss the various types of crop associations practiced by the farmers of Bangladesh. [L2; CLO3]	3.0
	(c)	Propose some guidelines of selecting crops for intercropping. [L6; CLO3]	3.0
	(d)	Clarify LER. [L2; CLO3]	2.0
7.	(a)	Describe different pollutant types based on disposal behavior. [L2; CLO4]	2.0
	(b)	Assess environmental risks of excessive pesticide use. [L5; CLO4]	3.0
	(c)	Design a management plan to reduce environmental pollution caused by agrochemicals. [L4; CLO4]	3.0
	(d)	What is 'itai-itai' disease? [L2; CLO4]	2.0
8.	(a)	Write a short note on bioremediation for controlling environmental pollution. [L2; CLO4]	3.0
	(b)	'Mangrove vegetation has great significances on environmental stability in the coastal area of Bangladesh.' Explain. [L3; CLO4]	4.0
	(c)	Point out the morphological characteristics of mangrove vegetation. [L2; CLO4]	3.0

[L1-Remember, L2-Understand, L3-Apply, L4-Analyze, L5-Evaluate, L6-Create]

Agrotechnology Discipline
Khulna University, Khulna
3rd Year Term-II, Examination 2026
0811 08 AT 3205: Fundamentals of Extension, Communication and Leadership
Full Marks: 60, Time: 3 hours, Credit: 03

- The FIGURES in the right margin indicate full marks. The questions are of equal value.
- Use separate sheets for each section.
- There are **FOUR** questions in each section, answer any **THREE** questions from each.

Section A

1.	(a)	'Extension is a two-way channel.' Explain. [L2; CLO1]	3.0
	(b)	'Helping people/farmers to help themselves' is the root philosophy of agricultural extension but not to help the farmers directly. Why? [L4; CLO1]	2.0
	(c)	How could we increase agricultural production in Bangladesh provided there are some limitations of horizontal expansion of land for agricultural production? [L3; CLO1]	2.0
	(d)	Explain principle of cultural difference. [L2; CLO1]	3.0
2.	(a)	Discuss the extension teaching methods that are suitable for the adverse pandemic situation. [L2; CLO1]	3.0
	(b)	Sketch the neat flow-chart of the flow of information structure of the DAE. [L3; CLO1]	3.0
	(c)	Describe the NARS concept in Bangladesh, and illustrate it with a neat diagram showing the full names of all the research organizations. [L4; CLO1]	4.0
3.	(a)	Explain the steps in extension teaching with a figure. [L2; CLO2]	3.0
	(b)	Differentiate the online-based teaching-learning techniques from the conventional extension. [L5; CLO2]	4.0
	(c)	Which learning theories are the best for agricultural extension and why? [L5; CLO2]	3.0
4.	(a)	Discuss 'Pedagogy', 'Andragogy', 'Heutagogy' and 'Cyborgogy'. [L2; CLO2]	2.0
	(b)	Describe the Bloom's taxonomy of learning assessment for cognitive domain. [L2; CLO2]	4.0
	(c)	Draw and describe Maslow's open-ended and close-ended need pyramids with examples from each of the need types. [L3; CLO2]	4.0

Section B

5.	(a)	State the types of communication based on personnel to be contacted. [L2; CLO3]	2.0
	(b)	Compare between encoding and decoding. [L5; CLO3]	2.0
	(c)	How could a communicator play an effective role in technology transfer process? [L4; CLO3]	3.0
	(d)	Differentiate between interpersonal and mass communication channels. [L5; CLO3]	3.0
6.	(a)	What are ways to be followed for treatment of a message? [L2; CLO3]	3.0
	(b)	What is feedback? What are the factors that hinder in getting feedback? [L1, L2; CLO3]	3.0
	(c)	State the critical factors in communication. [L2; CLO3]	4.0
7.	(a)	When coercive and reward power are used? [L4; CLO3]	3.0
	(b)	Differentiate between autocratic and democratic leadership. [L5; CLO3]	3.0
	(c)	Which of the method is suitable for selection of local leaders when an extension agent is new in an area? State that method. [L2; CLO3]	2.0
	(d)	Point out the ways through which we can recognize the local leaders? [L2; CLO3]	2.0
8.	(a)	Why do we need to study population education? [L2; CLO4]	3.0
	(b)	How could we integrate population education into agricultural extension program & why? [L2; CLO4]	2.0
	(c)	Estate the efforts of different agencies in controlling the population growth in Bangladesh. [L4; CLO4]	2.0
	(d)	Explain the key components and structures of extension education system in India. [L4; CLO4]	3.0

[L1-Remember, L2-Understand, L3-Apply, L4-Analyze, L5-Evaluate, L6-Create]

Agrotechnology Discipline
Khulna University, Khulna
3rd Year Term-II, Examination 2026
0811 08 AT 3207: Olericulture
Full Marks: 60, Time: 3 hours, Credit: 03

- The FIGURES in the right margin indicate full marks. The questions are of equal value.
- Use separate sheets for each section.
- There are **FOUR** questions in each section, answer any **THREE** questions from each.

Section A

1.	(a)	Define 'vegetables' and 'olericulture'. Draw a pen picture on present status of production and export of vegetables in Bangladesh. [L1; CLO1]	1+3=4.0
	(b)	Discuss the factors affecting amounts of nutrients present in vegetables. [L3; CLO1]	3.0
	(c)	Classify vegetables based on salt and heat tolerance. [L4; CLO2]	3.0
2.	(a)	Write down the botanical name and family of swamp cabbage, knolkhol, snake gourd, yam, teasel gourd, and okra. [L2; CLO1]	3.0
	(b)	'Vegetables plays an important role as a source of income and self-employment.' Justify. [L5; CLO1]	4.0
	(c)	Analyze the role of water and temperature on vegetables cultivation. [L4; CLO2]	3.0
3.	(a)	Describe the soil and climate requirements for brinjal and potato. [L2; CLO3]	3.0
	(b)	'Soil temperature has effects on vegetables cultivation.' Justify. [L6; CLO3]	4.0
	(c)	Explain the extreme conditions in respect of water as a factor for vegetables cultivation. [L5; CLO3]	3.0
4.	(a)	Explain the scope and climate requirements for cultivation of mushroom and asparagus in Bangladesh. [L5; CLO3]	4.0
	(b)	Is it possible to produce the seeds of cole crops in Bangladesh? Explain. [L5; CLO3]	3.0
	(c)	Analyze the scope of extending drumstick cultivation in Bangladesh. [L4; CLO3]	3.0

Section B

5.	(a)	Classify mineral nutrients according to biochemical function. Why is the requirement of nitrogen for plant higher than any other minerals? Analyze. [L4; CLO 4]	1+2=3.0
	(b)	List the calcium deficiency disorders of vegetables. How can you overcome them? [L2, L4; CLO4]	1+2=3.0
	(c)	Make a SWOT analysis of organic farming in Bangladesh. [L6; CLO4]	4.0
6.	(a)	Appraise the suitability of hydroponic vegetables cultivation in Bangladesh. [L5; CLO4]	2.0
	(b)	Show the gap between the demand and supply of vegetable seed in Bangladesh. Propose five strategies to increase the supply of vegetable seed. [L2, L6; CLO5]	2+3=5.0
	(c)	Describe U's triangle regarding natural evolution of vegetables. [L2; CLO4]	3.0
7.	(a)	How can use of growth regulators affect vegetable production in Bangladesh? Explain. [L4; CLO4]	4.0
	(b)	Which BARI vegetable production model is suitable for Khulna region and why? Describe the model. [L2; CLO4]	1.5+2.5=4.0
	(c)	Differentiate between hydroponics and aeroponics. [L6; CLO4]	2.0
8.	(a)	Describe the seed production procedure for radish. [L2; CLO5]	5.0
	(b)	How is *Bt* brinjal developed? How does it work against the target insect? Is there any ecological concern regarding *Bt* brinjal cultivation? Explain. [L1, L6; CLO5]	1+2+2=5.0

[L1-Remember, L2-Understand, L3-Apply, L4-Analyze, L5-Evaluate, L6-Create]

Agrotechnology Discipline
Khulna University, Khulna
3rd Year Term-II, Examination 2026
0588 08 RM 3255: Research Methodology
Full Marks: 60, Time: 3 hours, Credit: 02

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- Use separate sheets for each section.
- There are **FOUR** questions in each section, answer any **THREE** questions from each.

Section A

1. (a) What is research? Enlist the characteristics of research. [L1; CLO1] 4.0
   (b) Classify research on the basis of objectives. [L4; CLO1] 2.0
   (c) Differentiate between basic research and applied research. [L4; CLO1] 2.0
   (d) Assess the limitations of the research process. [L5; CLO1] 2.0

2. (a) What is a questionnaire? Briefly explain the different types of questionnaires. [L1, L5; CLO2] 4.0
   (b) Illustrate the procedure of preparation of a questionnaire. [L2; CLO2] 3.0
   (c) Analyze interviewer bias and its effects on research outcomes. [L4; CLO2] 3.0

3. (a) Distinguish between i) Population and sample. ii) Sample and sampling. [L4; CLO2] 2.0
   (b) Which of the sampling is used for crop cutting experiment? How is it done? [L1; CLO2] 3.0
   (c) Differentiate between standard deviation and standard error. [L2; CLO2] 2.0
   (d) Assess the impact of sample size on standard error and precision. [L5; CLO2] 3.0

4. (a) Explain the term 'Scientific report.' What should be the characteristics of 'Objective' section of a scientific report? [L2; CLO3] 3.0
   (b) Prepare a format of a Research proposal for hunting fund from KU Research and Innovation Centre. [L4; CLO3] 3.0
   (c) Analyze the relationship between objectives and methodology. [L4; CLO3] 2.0
   (d) Outline the salient features of an abstract. [L2; CLO1, CLO3] 2.0

Section B

5. (a) Differentiate scientific method from mathematical method? [L2; CLO4, CLO5] 2.5
   (b) Identify the characteristics of a well-planned experiment. [L3; CLO4, CLO5] 2.5
   (c) Assess the variability in field experimentation. [L5; CLO4, CLO5] 3.0
   (d) Analyze how does repetition of treatments minimize experimental error. [L4; CLO4, CLO5] 2.0

6. (a) Clarify analysis of variance. [L2; CLO4, CLO5] 1.5
   (b) Judge the importance of plot size and shape in obtaining precision in field experiments. [L5; CLO4, CLO5] 2.5
   (c) Assuming soil fertility as a basis, design the blocking techniques in the field with neat labeled diagram. [L6; CLO4, CLO5] 4.0
   (d) Outline the ANOVA table of Latin Square Design. [L3; CLO4, CLO5] 2.0

7. (a) Summarize the procedure of Least Significant Test (LSD). [L2; CLO4, CLO5] 3.0
   (b) An experiment was conducted to study the effect of five nitrogen doses on the yield of wheat using a Randomized Complete Block Design with four replications. The wheat grain yield (q ha^{-1}) along the treatments are given below: 5.0

Nitrogen doses (kg ha^{-1})	Grain yield (q ha^{-1})			
	R_1	R_2	R_3	R_4
0	20	22	21	23
50	25	27	26	28
100	30	32	31	33
150	34	36	35	37
200	33	35	34	36

[L1-Remember, L2-Understand, L3-Apply, L4-Analyze, L5-Evaluate, L6-Create]

Agrotechnology Discipline
Khulna University, Khulna
3rd Year Term-II, Examination 2026
0588 08 RM 3255: Research Methodology
Full Marks: 60, Time: 3 hours, Credit: 02

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Test the effects of nitrogen on grain yield of wheat. The tabulated value of F with 4 and 12 df is 3.26 and 5.41 at 5% and 1% level of probability, respectively. The tabulated value of F with 3 and 12 df is 3.49 and 5.95, respectively at 5% and 1% level of significance. The value of $t_{(0.05)}$ with 12 df is 2.179. [L3; CLO4, CLO5]

(c) Propose how can you calculate CV (9%) from ANOVA table. [L3; CLO4, CLO5] 2.0

8. (a) Analyze the allocation pattern of main plot and sub-plot treatments in a Split Plot design. [L4; CLO4, CLO5] 3.0

(b) An experiment was conducted to find the combined effect of K and N on rice yield (t ha^{-1}) with a 3 × 3 Factorial RCBD with 3 replications. Factor A: Potassium (K): K_1 = 0 kg K ha^{-1}, K_2= 10 kg K ha^{-1}, K_3 = 20 kg K ha^{-1}. Factor B: Nitrogen (N): N_1 =0 kg N ha^{-1}, N_2 = 60 kg N ha^{-1}, N_3 = 120 kg N ha^{-1}. Test significance of K and N on grain yield of rice. 4.0

Treatment	Rep I	Rep II	Rep III
K_1N_1	3.2	3.3	3.1
K_1N_2	3.8	3.9	3.7
K_1N_3	4.0	4.1	3.9
K_2N_1	3.6	3.7	3.5
K_2N_2	4.4	4.5	4.3
K_2N_3	4.8	4.9	4.7
K_3N_1	3.9	4.0	3.8
K_3N_2	4.6	4.7	4.5
K_3N_3	5.0	5.1	4.9

The tabulated value of F with 2 and 6 df is 3.63 and 6.23, respectively at 5% and 1% level of significance. The tabulated value of F with 4 and16 df is 3.01 and 4.77, respectively at 5% and 1% level of significance. The tabulated value of F with 8 and 16 df is 2.59 and 3.89, respectively at 5% and 1% level of significance. [L3; CLO4, CLO5]

(c) Assess the necessity of data transformation. [L5; CLO4, CLO5] 2.0