

Khulna University

School: Life Science Discipline: Agrotechnology Program: MS in Agronomy

Year: 1st Term: 1st Examination Year: 2026 Session: 2025-2026

0811 08 AGR 5101: Crop Physiology

Full Marks: 60 Time: 03 Hours Credit: 03



- There are four questions in each section, answer any three from each.
- Use separate sheet for each section. Sketch and label wherever necessary.

Section A

- Write the main events occur during vegetative phase and reproductive phase of plant growth and development. [L2; CLO1] 3.0
 - Explain CGR (Crop Growth Rate) and LAI (Leaf Area Index) with their significance. [L5; CLO1] 3.0
 - Give two examples of auxin used for promotion of flowering and prevention of premature flower and fruit dropping. Name two growth inhibitors with their beneficial uses. [L1; CLO1] 3.0
 - Why is sound knowledge of crop growth stages important? [L5; CLO1] 1.0
- Mention the fraction of solar radiation reaches to the earth surface and what is the fate of the remaining portion? Explain with diagram. [L1 & L2; CLO2] 4.0
 - Make a comparison between C₃ and C₄ plants regarding the efficiency of conversion of solar radiation into carbohydrate. [L5; CLO2] 3.0
 - What is photoinhibition? "Absorption of too much light can lead to photoinhibition". Support. [L3, CLO5] 3.0
- Explain light compensation point and light saturation point. [L2; CLO2] 2.0
 - 'Light interception varies with leaf angle' – explain. [L4; CLO2] 2.0
 - What is meant by light use efficiency? How is dry matter production calculated? [L2; CLO2] 2.0
 - 'Light interception of crop plants can be improved through agronomic practices' – justify. [L5; CLO2] 4.0
- What are the sources of electron in cyclic and non-cyclic photophosphorylation? What is the fate of H⁺ produced by photolysis of water? [L1 & L5; CLO3] 2.0
 - 'Regeneration of Rubisco is a must to continue the C₃ cycle'. Clarify. [L2; CLO5] 3.0
 - Analyze the effect of CO₂ concentration on photosynthesis of C₃ and C₄ plants. [L4; CLO3] 3.0
 - What is meant by time factor in case of photosynthesis at the temperature above the optimum? [L2; CLO3] 2.0

Section B

- Differentiate between apoplastic and symplastic pathway. [L4; CLO3, 5] 2.0
 - 'Clay particle plays an important role in maintaining soil fertility' – explain. (L4; CLO4) 3.0
 - 'Root pressure is created by secretion of ion into the xylem'. Explain. [L4; CLO2, 4] 3.0
 - What is nutrient use efficiency? Explain why C₄ species exhibit higher nitrogen use efficiency than C₃ species. [L5; CLO5] 2.0
- 'Root hairs substantially contribute to increasing in nutrient absorption surface.' 3.0

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

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- Support the statement. [L5; CLO5]
- (b) 'In both acidic and alkaline soil phosphate ions are adsorbed or fixed.' How? [L6; CLO2] 3.0
- (c) Is there any possibility to make available of soil organic phosphorus by plant? Support your answer. [L5; CLO2, 5] 4.0
7. (a) What are the first- and second-line defense of plant to drought? [L5; CLO6] 2.0
- (b) 'Although EC provides some valuable information of soil salinity, but alone EC is not sufficient to assess the effect of salinity on plant growth'. Support. [L6; CLO5] 3.0
- (c) What is compatible solute? 'Plant has to expense substantial amount of carbon to produce the compatible solutes under salinity and drought.' Argue. [L5; CLO4] 3.0
- (d) Why does soil salinity vary with different seasons? [L2; CLO5] 2.0
8. (a) How is ethylene produced in root cell under waterlogged soil? How does ethylene cause epinasty? [L2; CLO2, 5] 4.0
- (b) Discuss the role of K on the pest resistance of plants. [L2; CLO6] 3.0
- (c) 'Sink strength regulates the product distribution from the source'. Elaborate. [L2; CLO7] 3.0

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0811 08 AGR 5103: Weed Science

Full Marks: 60 Time: 03 Hours Credit: 03



- There are four questions in each section, answer any three from each.
- Use separate sheet for each section. Sketch and label wherever necessary.

Section A

- Compare survival strategies of annual vs perennial weeds. [L4; CLO1] 3.5
 - 'Weeds have evolved in response to human caused disturbances'- justify the statement. [L5; CLO1] 3.0
 - Compare and contrast between species with 'r' and 'k' selection. [L4; CLO1] 3.5
- Explain the various vegetative modes of weed propagation and discuss why they make weeds difficult to control, citing suitable examples. [L2; CLO3] 4.0
 - Analyze how the weed seed bank is the primary source of new weed infestation in a crop field. [L4; CLO3] 2.5
 - Examine the association between seed dormancy and weed persistence. [L4; CLO3] 3.5
- Depict two important causes of competition between crops and weeds. [L2; CLO2] 3.0
 - Explain 'the law of constant final yield'. [L2; CLO2] 3.0
 - Elucidate the substitutive design to assess competitiveness between species. [L4; CLO2] 4.0
- 'Time of weeding a crop is as important as the weeding itself' – analyze. [L4; CLO2] 3.0
 - What are allelochemicals? Illustrate with diagram the general pathways of entry of allelochemicals in nature. [L1, 2; CLO2] 3.0
 - Briefly describe the biology of *Cyperus rotundus* L. with diagram. [L3; CLO3] 4.0

Section B

- Compare between holism and reductionism in weed science. [L4; CLO4] 2.5
 - 'Crop rotation practices may play vital roles in weed management in a crop field'- analyze. [L4; CLO4] 3.0
 - Review the three models of weed succession. [L5; CLO4] 3.0
 - Explain Integrated Weed Management (IWM). [L2; CLO4] 1.5
- Measure the value of crop husbandry methods in maintaining ecological balance. [L5; CLO4] 3.0
 - 'Translocated herbicides are more effective than contact ones'- comment on it. [L4; CLO5] 4.0
 - How can living mulches and intercropping be integrated into modern cropping systems to achieve effective weed management? Explain. [L2; CLO3] 3.0
- 'Granular herbicides have a number of benefits over water soluble concentrates'- evaluate. [L5; CLO5] 4.0
 - Analyze how rainfall and wind alter herbicide activity. [L4; CLO5] 3.0
 - Identify the fate of herbicides in soil with proper diagram. [L3; CLO5] 3.0
- Summarize the value of plant morphology on herbicide selectivity. [L3; CLO5] 3.0
 - Diagrammatically show the different fates of herbicides in soil. [L3; CLO5] 4.0
 - Propose guidelines for managing weeds in aus rice crop. [L6; CLO4, 5] 3.0

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School: Life Science **Discipline:** Agrotechnology **Program:** MS in Agronomy

Year: 1st **Term:** 1st **Examination Year:** 2026 **Session:** 2025-2026

0811 08 AGR 5105: Advanced Crop Ecology

Full Marks: 60 **Time:** 03 Hours **Credit:** 03



- There are four questions in each section, answer any three from each.
- Use separate sheet for each section. Sketch and label wherever necessary.

Section A

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|----|-----|---|-----|
| 1. | (a) | Discuss the plant factors affecting light penetration into crop canopy. [L2; CLO1] | 4.0 |
| | (b) | Apply principles of photoperiodism in crop scheduling. [L3; CLO1] | 3.0 |
| | (c) | Suggest strategies to modify light environment for higher yield of crops. [L6; CLO1] | 4.0 |
| 2. | (a) | Elucidate the role of soil temperature on seed germination and root growth. [L2; CLO1] | 3.0 |
| | (b) | Demonstrate how mulching modifies soil temperature. [L3; CLO1] | 3.0 |
| | (c) | Propose some measures to modify soil temperature in heat prone area [L5; CLO2]. | 4.0 |
| 3. | (a) | Describe atmospheric stability and instability. [L2; CLO1] | 2.0 |
| | (b) | Formulate a short note on farming practices in flooded agroecosystem. [L6; CLO2] | 2.0 |
| | (c) | Articulate an integrated approach to improve crop production under windy conditions. [L6; CLO1] | 3.5 |
| | (d) | Assess the characteristics of a dry land ecosystem. [L5; CLO3] | 2.5 |
| 4. | (a) | Differentiate between drought avoidance and tolerance. [L2; CLO2] | 3.0 |
| | (b) | How would you compute the water requirement for a crop using water balance method? [L3; CLO2] | 3.0 |
| | (c) | Assess the impact of prolonged drought on rice crop production in Bangladesh. [L6; CLO2] | 4.0 |

Section B

- | | | | |
|----|-----|---|-----|
| 5. | (a) | Define ecological pyramid. Illustrate different types of food chain with significances. [L2; CLO3] | 3.5 |
| | (b) | Distinguish between food chain and food web. [L2; CLO4]. | 2.0 |
| | (c) | Critically judge soil conservation practices for sloped lands. [L5; CLO1] | 2.0 |
| | (d) | Compare crop production in plains versus hilly regions. [L4; CLO1] | 2.5 |
| 6. | (a) | Distinguish between grazing and detritus food chains. [L4; CLO4] | 3.0 |
| | (b) | What is crop productivity? "Gross primary productivity is higher in C ₄ plants than C ₃ plants". Explain [L4; CLO4] | 3.0 |
| | (c) | Evaluate the importance of biodiversity in maintaining food webs. [L5; CLO4] | 4.0 |
| 7. | (a) | Distinguish between climate change and climate variation. [L2; CLO4] | 2.0 |
| | (b) | 'Soil pollution is getting major challenge over period in modern agriculture'- justify the statement with control measures. [L5; CLO4] | 3.0 |
| | (c) | How does acid rain form? Formulate the impacts of ozone layer depletion on agroecosystem [L6; CLO4] | 5.0 |
| 8. | (a) | Point out the major sources of greenhouse gases. [L2; CLO4] | 2.0 |
| | (b) | What is global warming? Predict the potential impact of global warming on coastal agriculture of Bangladesh. [L6; CLO4] | 5.0 |
| | (c) | 'Industrial growth coupled with luxurious life style is responsible for air pollution'- interpret the statement. [L5; CLO3] | 3.0 |

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0811 08 AGR 5107: Farm Management

Full Marks: 60 **Time:** 03 Hours **Credit:** 03



- There are four questions in each section, answer any three from each.
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Section A

- What are farming and crop farming? Give the advantages of diversified farming in the context of Bangladesh. [L1 & L4; CLO1] 4.0
 - Compare and evaluate the advantages and disadvantages of subsistence farming and commercial farming in developing countries like Bangladesh. [L5; CLO1] 3.0
 - How does agricultural farming contribute to food security and rural employment in Bangladesh? Explain. [L5; CLO1] 3.0
- What are the main objectives of farm management? Briefly explain. [L1 & L2; CLO1] 3.0
 - Define farm planning and mention its main objectives. [L1; CLO2] 3.0
 - Explain how farm planning supports the efficient use of land, labor, capital, and other farm resources. [L4; CLO1] 4.0
- Write down the bases of farm planning. [L2; CLO2] 3.0
 - 'Maximizing net income and enhancing resource utilization are the main objectives of farm planning'. Justify. [L4; CLO2] 3.0
 - Clarify how farm budgeting aids farmers in the effective distribution of resources and profit maximization. [L5; CLO1] 4.0
- Define farm budgeting. Differentiate between partial and complete budgeting. [L1 & L2; CLO2] 3.0
 - Explain the advantages of farm budgeting. [L2; CLO2] 3.0
 - Prepare a partial budget for capsicum cultivation in 0.5 ha of land. It is expected that, the production will be 4 t/ha and the market price of capsicum will be 350 Tk/Kg. [L6; CLO2] 4.0

Section B

- Define farm and farm management? "Efficient farm management may improve farm productivity and profitability even under similar investment" - explain. [L1 & L5; CLO2] 4.0
 - Classify farming types with clarification according to methods and intensity. [L2; CLO2] 3.0
 - Mention three key factors to be considered during site selection for establishing an integrated agricultural farm with logical justification. [L2 & L4; CLO2] 3.0
- Differentiate between farm layout and field layout. "Farm productivity and profitability largely depend on the rational farm layout" - support the statement. [L1, L4 & L5; CLO2] 4.0
 - Mention the function of muster roll register. List the symbols used in muster roll with clarification. [L2; CLO3] 3.0
 - Explain the terms: i) issue register, ii) overseer's diary and iii) dead stock. [L2; CLO3] 3.0
- Discuss different stages of law of variable proportions with examples in tabular form. [L5; CLO4] 5.0
 - Explicate the relationship among TPP, MPP and APP with a neat labeled diagram. [L2 & L4; CLO4] 5.0
- Graphically explain different types of input and output relations. [L2; CLO4] 5.0
 - Graphically draw a linear and polynomial regression model with interpretation from the data given below: Yield of sunflower is 0.75, 1.85, 2.64, 3.24, 3.54, 3.58, 3.31, and 3.03 t ha⁻¹ from the application of nitrogen @ 0, 50, 75, 100, 125, 150, 175, and 200 kg ha⁻¹, respectively. [L6; CLO5] 5.0

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Year: 1st Term: 1st Examination Year: 2026 Session: 2025-2026
0588 08 RM 5159: Research Methodology
Full Marks: 60 Time: 03 Hours Credit: 03



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Section A

- Classify research on the basis of application. [L4; CLO1] 3.0
 - Enlist the steps in research process. Explain the 'review of literature part' of a research process. [L2; CLO1] 3.0
 - Classify questionnaire? Prepare a questionnaire of combined type for social research. [L2; CLO1] 4.0
- Illustrate the procedure of selecting research objectives. [L2; CLO1] 4.0
 - Discuss the process of selection and prioritization of a researchable problem. [L6; CLO1] 3.0
 - Classify sampling with clarification. [L4; CLO1] 3.0
- Explain the term "research proposal". What should be the procedure of "Introduction" section of a scientific report? [L5; CLO2] 3.0
 - Develop a format of a Research proposal for hunting fund from Ministry of Science and Technology (MoST). [L6; CLO2] 4.0
 - Briefly describe the sections of a thesis. [L1; CLO2] 3.0
- Develop pen picture of historical background of research in Bangladesh. [L2; CLO3] 4.0
 - Enlist the mission, vision and function of BARI. [L1; CLO3] 3.0
 - Critically judge the contribution of BARC in coordinating research activities in Bangladesh. [L5; CLO3] 3.0

Section B

- Enlist the characteristics of a well-planned experiment. [L1; CLO4] 3.0
 - Explain the basic principles of experimental design. [L2; CLO4] 2.0
 - How can the error of an experiment be minimized? [L1; CLO4] 2.0
 - Assess the sources of variation in field experimentation. [L5; CLO4] 3.0
- Describe briefly the selection criteria of variations of experimental designs. 3.0
 - Assuming insect migration as a basis, design the blocking techniques in the field with a neat labelled diagram. 3.0
 - A sample of 6 persons was selected; the value of their age and their weight is demonstrated in the data below. Find the regression equation and predict the weight when age is 8.5 years. 4.0

Serial No	Age (X)	Weight (Y)
1	5	10
2	6	8
3	8	12
4	7	12
5	6	11
6	9	13

- Summarize the procedure of Least Significant Difference Test (LSD). [L3; CLO5 & 6] 3.0
 - An experiment was conducted to study the effect of five nitrogen doses on the yield of rice [L1-Remember, L2-Understand, L3-Apply, L4-Analyze, L5-Evaluate, L6-Create] 5.0

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0588 08 RM 5159: Research Methodology

Full Marks: 60 Time: 03 Hours Credit: 03



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using a Randomized Complete Block Design (RCBD) with four replications.

Nitrogen doses (kg ha ⁻¹)	Grain yield (q ha ⁻¹)			
	R ₁	R ₂	R ₃	R ₄
0	2.0	2.2	2.1	2.3
50	2.5	2.7	2.6	2.8
100	3.0	3.2	3.1	3.3
150	3.4	3.6	3.5	3.7
200	3.3	3.5	3.4	3.6

Test the effects of nitrogen on grain yield of rice.

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; CLO5 & 6]

- (c) Suggest how can you calculate CV (%) from the ANOVA table relating the original formula of CV (%). [L3; CLO5 & 6] 2.0

8. (a) Explain various types of scientific papers. [L2; CLO7] 2.0

- (b) An experiment was conducted to find the combined effect of P and N on rice yield (t ha⁻¹) with a 3x3 Factorial RCBD with 3 replications. Factor A (Phosphorus): P₁=0 kg P ha⁻¹, P₂=30 kg P ha⁻¹, P₃=60 kg P ha⁻¹. Factor B (Nitrogen): N₁=0 kg N ha⁻¹, N₂=60 kg N ha⁻¹, N₃=120 kg N ha⁻¹. 4.0

Test significance of P and N on grain yield of rice.

Treatment	Rep I	Rep II	Rep III
P ₁ N ₁	3.2	3.3	3.1
P ₁ N ₂	3.8	3.9	3.7
P ₁ N ₃	4.0	4.1	3.9
P ₂ N ₁	3.6	3.7	3.5
P ₂ N ₂	4.4	4.5	4.3
P ₂ N ₃	4.8	4.9	4.7
P ₃ N ₁	3.9	4.0	3.8
P ₃ N ₂	4.6	4.7	4.5
P ₃ N ₃	5.0	5.1	4.9

The tabulated value of F with 2 and 16 df is 3.63 and 6.23, respectively at 5% and 1% level of significance. The tabulated value of F with 4 and 16 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; CLO5 & 6]

- (c) Assess the characteristics of the discussion section in a manuscript. [L5; CLO7] 4.0