

## Khulna University

|                        |                  |                                                |                                      |          |                                           |
|------------------------|------------------|------------------------------------------------|--------------------------------------|----------|-------------------------------------------|
| School:                | Life Science     | Discipline:                                    | Forestry and Wood Technology         | Program: | Bachelor of Science (Honours) in Forestry |
| Year:                  | 3rd              | Term:                                          | 2 <sup>nd</sup>                      | Session: | 2024-2025                                 |
| Course code:           | 0821 05 FWT 3201 | Course Title:                                  | Biocomposite and Adhesion Technology |          |                                           |
| Total marks:           | 60               | Time:                                          | 3 hours                              | Credit:  | 3                                         |
| Instructions (if any): |                  | Use a separate answer script for each section. |                                      |          |                                           |

### SECTION-A

*There are **FOUR** questions in this section. Answer any **THREE** questions.*

1. a) Briefly describe the importance of biocomposites in the context of Bangladesh. [L1; CLO1] 03  
b) "All panel products are wood composites, but not all wood composites are panel products." Justify with an example. [L5; CLO1] 03  
c) "Composite overcomes many of the inherent weaknesses of solid wood." Explain. [L5; CLO1] 02  
d) Distinguish between plywood and laminated wood. [L4; CLO1] 02
2. a) Why should the over-drying of veneers be avoided? [L1; CLO1] 03  
b) Explain why logs are conditioned or soaked before peeling. [L2; CLO1] 03  
c) Why does plywood exhibit less shrinkage and swelling than solid wood? [L4; CLO1] 04
3. a) What is cement-bonded board? Discuss the problems associated with it. [L6; CLO1] 03  
b) Compare cement-bonded boards and binderless boards. [L4; CLO1] 03  
c) Illustrate the flow diagram of particle board manufacturing. [L2; CLO2] 04
4. a) What are the key differences between particleboard and fiberboard? [L1; CLO1] 03  
b) Why is the slenderness ratio important? Explain. [L2; CLO1] 03  
c) What is daylight? Distinguish between single and multiple daylight. [L4; CLO2] 02  
d) Briefly explain the self-bonding mechanism of lignocellulosic materials. [L5; CLO2] 02

### SECTION-B

*There are **FOUR** questions in this section. Answer any **THREE** questions.*

5. a) What is adhesion? List different theories of adhesion for bonding wood. [L1; CLO2] 03  
b) Discuss how the physical properties of wood adherend affect the adhesive bonding of wood. [L6; CLO2] 04  
c) What is wetting? How does wetting affect the adhesive bonding of wood? Explain. [L2; CLO2] 03
6. a) Define adhesive and glue. [L1; CLO3] 03  
b) Explain the functions of fillers and extenders in adhesive mixtures. [L2; CLO3] 03  
c) Evaluate the performance of different adhesives under outdoor conditions. [L5; CLO4] 04
7. a) What is the difference among assembly time, setting time and curing time? [L1; CLO3] 03  
b) Describe the relationship between wood grain orientation and adhesive bonding strength. [L4; CLO2,3] 04  
c) Briefly discuss the mechanical testing method of adhesive-bonded wood assemblies. [L4; CLO3] 03
8. a) Why are thermosets described as "irreversible" while "thermoplastics" are reversible? [L1; CLO3] 02  
b) Define bio-adhesive. Classify bio-adhesives. [L3; CLO2] 02  
c) What are wood finishes? Write the objectives of using finishes on wood. [L2; CLO3] 03  
d) "Natural wood adhesives are obsolete and have no place in modern woodworking". Critique this statement. [L5; CLO3,4] 03

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School Life Science Discipline: Forestry and Wood Technology

Program: Bachelor of Science (Honours) in Forestry

Year: 3<sup>rd</sup>

Term: 2<sup>nd</sup>

Session: 2024-25

Course code: 0821 05 FWT 3203

Course Title: Forest Harvesting and Transportation Engineering

Total marks: 60

Time: 3 hours

Credit: 2

Instructions (if any): Use a separate answer script for each section.

## SECTION-A

*There are FOUR questions in this section. Answer any THREE questions.*

1. a) Describe the preparation required before felling operations. [L3; CLO1,2] 03  
b) Discuss the major causes of timber loss during felling operations. Explain measures to minimize felling losses in forest harvesting [L6; CLO1,2] 03  
c) Briefly describe the procedures of delimbing, topping and bucking operations and the equipment required in these operations. [L5; CLO1,2] 04
2. a) Differentiate conventional vs Humbolt felling methods. [L4; CLO1,2] 04  
b) Suggest proper maintenance steps for a chainsaw in the off-season. [L3; CLO1,2] 03  
c) Explain the procedure for directing the fall of a tree. [L2; CLO1,2] 03
3. a) What is cable yarding in a logging operation? When is this applicable? [L2; CLO1,2] 03  
b) Do you think that mechanical logging would be a better choice than manual logging in Bangladesh? Justify your opinion. [L3; CLO1,2] 03  
c) Analyze factors affecting skidding performance in hilly terrain. [L4; CLO1,2] 04
4. a) Describe different systems of sale and disposal of forest produce. [L5; CLO1,2] 03  
b) Explain the criteria of a good landing. [L2; CLO1,2] 03  
c) Briefly describe the ergonomic problems and safety issues in logging activities. [L4; CLO1,2] 04

## SECTION-B

*There are FOUR questions in this section. Answer any THREE questions.*

5. a) What are the common uses of forest roads? [L5; CLO3,4] 03  
b) Classify forest roads based on speed. Give a brief explanation of each type. [L2; CLO3,4] 03  
c) What are the different components of a typical road cross-section in a hill slope? Describe with a necessary sketch. [L6; CLO3,4] 04
6. a) List the types of bridges commonly used in forest roads. [L1; CLO3,4] 03  
b) What are the criteria for selecting a tree species for slope stabilization? [L2; CLO3,4] 03  
c) Discuss the types of culverts and selection criteria for small culverts. [L3; CLO3,4] 04
7. a) Define road drainage. What are the benefits of a well-designed road drainage system? [L5; CLO3,4] 03  
b) Distinguish between a retaining wall and a breast wall. Discuss the thumb rules for designing a retaining wall. [L2; CLO3,4] 03  
c) Describe the minimum and maximum gradients in road construction. [L4; CLO3,4] 04
8. Write short notes on the following:  
a) Abutment and piers of a bridge [L2; CLO3,4] 2.5  
b) Road maintenance [L2; CLO3,4] 2.5  
c) Road signs [L3; CLO3,4] 2.5  
d) Road curve radius [L3; CLO3,4] 2.5

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| Year:                  | Third            | Term:                                          | 2 <sup>nd</sup>                       | Session: | 2024-2025                                 |
| Course code:           | 0821 05 FWT 3205 | Course Title:                                  | Social Forestry and Rural Development |          |                                           |
| Total marks:           | 60               | Time:                                          | 3 hours                               | Credit:  | 03                                        |
| Instructions (if any): |                  | Use a separate answer script for each section. |                                       |          |                                           |

### SECTION-A

*There are **FOUR** questions in this section. Answer any **THREE** questions.*

1. a) Define social forestry. (L1, CLO 1) 02
- b) The term “social” refers to activities that have a predominantly welfare function. Justify the statement. (L5, CLO 1) 03
- c) Depict the various input and output components of social forestry. (L3, 6, CLO 2) 05
2. a) Narrate the philosophy behind the emergence of the concept of social forestry in Bangladesh. (L2, CLO 3) 04
- b) List the two broad value systems on which the social forestry programs are anchored in Bangladesh. (L3, CLO 3) 04
- c) Analyze the criteria for adopting and/or implementing better social forestry in Bangladesh. (L5, CLO 2) 02
3. a) Mention the key steps in planning a social forestry program. (L1, CLO 1) 03
- b) What are the major forest products produced in social forestry practices? (L5, CLO 3) 03
- c) Discuss how social forestry contributes to poverty alleviation and environmental sustainability in rural Bangladesh. (L4, CLO 3) 04
4. a) What do you understand by the term ‘impact’? Explain the different impacts of social forestry activities in developing countries. (L1, 3, CLO 4) 04
- b) Briefly discuss the monitoring and evaluation procedure of a social forestry program. (L4, CLO 2) 03
- c) Explain the role of institutions such as the Bangladesh Forest Department in promoting the social forestry program. (L3, CLO 1) 03

### SECTION-B

*There are **FOUR** questions in this section. Answer any **THREE** questions.*

5. a) Define rural development. What are the goals of rural development in Bangladesh? (L1, CLO 1) 04
- b) Differentiate between development and economic development. (L1, 2, CLO 1) 03
- c) What are the prerequisites for rural development? (L5, CLO 3) 03
6. a) Define poverty. Briefly describe the indicators of rural poverty. (L1, CLO 2) 03
- b) Discuss the characteristics of the rural society of Bangladesh. (L4, CLO 4) 03
- c) Write in short the major socio-economic problems of rural areas in Bangladesh. (L5, CLO 3) 04
7. a) Describe the structure of the local government institutions of Bangladesh. (L2, CLO 4) 03
- b) What are the functions of the Hill District Local Government Parishad? (L2, CLO 2) 03
- c) Analyze the role of government institutions and NGOs such as BRAC in promoting rural development in Bangladesh. (L2, CLO 4) 04
8. a) Narrate the typical structure of normal bureaucracy in Bangladesh. (L2, CLO 4) 05
- b) Discuss why the tendency of normal bureaucracy in Bangladesh is a hinderance towards the development. (L6, CLO 4) 05

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| Year:                  | Third                                          | Term:         | 2 <sup>nd</sup>              | Session: | 2024-2025                                 |
| Course code:           | 0111 05 FWT 3207                               | Course Title: | Research Methodology         |          |                                           |
| Total marks:           | 60                                             | Time:         | 3 hours                      | Credit:  | 03                                        |
| Instructions (if any): | Use a separate answer script for each section. |               |                              |          |                                           |

### SECTION-A

*There are **FOUR** questions in this section. Answer any **THREE** questions.*

1. a) Discuss the types and purpose of research. [L2; CLO1,2,6] 04
- b) Write the importance of research with particular reference to forestry. [L2; CLO1,2,6] 03
- c) Briefly discuss the criteria for finding a good research problem. [L2,3; CLO1,2,6] 03
2. a) Describe the structure and major components of a research proposal used in scientific research. [L2; CLO6] 05
- b) Discuss the importance of literature review in research. [L3; CLO6] 02
- c) Write references for the following sources using an appropriate referencing style. [L3; CLO6] 03
  - i. A book chapter titled “Vegetation Covering”, pages from 43 to 74 in a book titled “Mangroves of the Sundarbans, Volume Two: Bangladesh” edited by Zakir Hossain and Gias Uddin Acharya, published by IUCN in 2005.
  - ii. An article titled “Understanding the Interactions of Rural People with Ecosystems” was published on pages 630–643 in volume 8, issue 4 of a journal titled “Trees, Forests and People” published in 2010.
3. a) What is mixed methods research? Discuss the combination of qualitative and quantitative research with an example. [L3; CLO2] 03
- b) What are the key factors affecting sample size determination in a research study? [L2; CLO3] 03
- c) Local communities around Sitakunda Reserved Forest depend on forest resources, and it is difficult to identify many of the users. Which sampling method would be suitable to identify and interview such forest-dependent households? Justify your answer. [L5; CLO3] 04
4. a) What are the main types of non-probability sampling methods? [L2; CLO2,3] 02
- b) The Bhawal National Park is ecologically heterogeneous with dense Sal Forest, mixed vegetation, and degraded areas. Which sampling method would you use to estimate tree density and forest structure? Justify your answer. [L5; CLO2,3] 04
- c) What are the sources of sampling errors and non-sampling errors? Suggest methods to minimize these errors. [L4; CLO3,6] 04

## SECTION-B

*There are **FOUR** questions in this section. Answer any **THREE** questions.*

5. a) Why is data transformation important in research? [L2; CLO3,4,5] 02  
b) Briefly discuss the different forms of data presentation with examples. [L2; CLO3,4,5] 04  
c) Explain the construction method with an appropriate sketch for laying out a 30 m x 30 m plot divided into subplots (each subplot: 5 m × 5 m) in a natural forest. [L3; CLO3,4,5] 04
6. a) Why is randomization important in experimental design? [L2; CLO5] 01  
b) Illustrate a plot layout of a CRD with four treatments ( $\alpha$ ,  $\beta$ ,  $\gamma$ ,  $\delta$ ) and four replications of each treatment using the following random numbers: 98, 35, 09, 127, 56, 179, 210, 355, 105, 63, 17, 321, 266, 39, 507, 88. [L4; CLO5] 05  
c) Write a stepwise calculation procedure of factorial design and construct an ANOVA table for it. [L4; CLO5] 04
7. a) Distinguish between correlation and regression. [L2; CLO3,4,5] 02  
b) Compute Pearson's correlation coefficient ( $r$ ) and test its significance and coefficient values for simple linear regression from the following 10 trees' DBH and Height data. [L4; CLO3,4,5] 08

| Tree No.   | 1   | 2   | 3   | 4   | 5   | 6   | 7   | 8   | 9   | 10  |
|------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| DBH (cm)   | 1.1 | 1.3 | 0.6 | 0.9 | 0.6 | 1.2 | 1.2 | 0.9 | 0.7 | 1.8 |
| Height (m) | 2.8 | 2.4 | 2.2 | 1.5 | 1.4 | 1.6 | 2.1 | 3.5 | 2.3 | 3.8 |

8. a) Where should we use the Paired t-test? [L4; CLO4] 02  
b) Using the following data, run a one-way analysis of variance using  $\alpha = 0.05$  [L4; CLO5] 05

| Group 1 | Group 2 | Group 3 |
|---------|---------|---------|
| 51      | 23      | 56      |
| 45      | 43      | 76      |
| 33      | 23      | 74      |
| 45      | 43      | 87      |
| 67      | 45      | 56      |

- c) Write short notes on the following: [L2; CLO4] 03  
i) LSD  
ii) SNK  
iii) DMRT

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| Year:                  | Third                                          | Term:         | 2 <sup>nd</sup>                              | Session: | 2024-2025                                 |
| Course code:           | 0821 05 FWT 3209                               | Course Title: | Wildlife Management and Nature-Based Tourism |          |                                           |
| Total marks:           | 60                                             | Time:         | 3 hours                                      | Credit:  | 03                                        |
| Instructions (if any): | Use a separate answer script for each section. |               |                                              |          |                                           |

### SECTION-A

*There are **FOUR** questions in this section. Answer any **THREE** questions.*

1. a) What is the taxonomic classification of wildlife? (L1; CLO 1, 2) 01  
b) Briefly describe the morphology of reptilia and mammalia. (L2; CLO 1, 2) 04  
c) Write a short note about the status and distribution of two common crocodiles, snakes, birds, tigers and deer species with their scientific names. (L1; CLO 1, 2) 05
2. a) Discuss in short the age composition of wildlife. (L2; CLO 1, 2) 04  
b) Write different types of wildlife adaptation with examples. (L2; CLO 1, 2) 04  
c) What are the general adaptations of birds? (L3; CLO 1, 2) 02
3. a) How can protected area management facilitate biodiversity conservation in Bangladesh? (L1; CLO 3) 05  
b) Briefly discuss various strategies of protected area management in Bangladesh. (L6; CLO 3) 05
4. a) How can the IUCN Red List help to conserve Bangladesh's wildlife? (L1; CLO 3) 04  
b) Differentiate between wildlife conservation and wildlife management using relevant examples. (L4; CLO 3) 03  
c) Briefly discuss the strategies for addressing human-wildlife conflict in Bangladesh. (L6; CLO 3) 03

### SECTION-B

*There are **FOUR** questions in this section. Answer any **THREE** questions.*

5. a) What is nature-based tourism (NBT)? (L2; CLO 3, 4) 02  
b) Briefly discuss the types and forms of NBT. (L1; 2, CLO 3, 4) 04  
c) What are the benefits of NBT and ecotourism? Discuss in short. (L2; CLO 3, 4) 04
6. a) Distinguish between visitors and tourists. (L2; CLO 3, 4) 04  
b) Which code of ethics and conduct should be followed by visitors to visit the Sundarbans? (L1; CLO 3, 4) 02  
c) Write about the importance of protected areas for wildlife habitat and NBT. (L2; CLO 3, 4) 04
7. a) How can NBT benefit nature-based destinations, including forest-based ones? (L1; CLO 4) 04  
b) Differentiate between mass tourism and NBT. (L4; CLO 4) 02  
c) Forests play an important role in providing destinations for recreation and tourism. Justify your answer. (L5; CLO 4) 04
8. a) Briefly discuss how to improve the facilities of a destination. (L6; CLO 4) 04  
b) Briefly discuss the challenges of developing sustainable NBT in Bangladesh with their potential solutions. (L6; CLO 4) 06

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| School                 | Life Science     | Discipline:                                    | Forestry and Wood Technology | Program  | Bachelor of Science (Honours) in Forestry |
| Year:                  | Third            | Term:                                          | 2 <sup>nd</sup>              | Session: | 2024-2025                                 |
| Course code:           | 0720 05 FWT 3211 | Course Title:                                  | Rubber and Tea Science       |          |                                           |
| Total marks:           | 60               | Time:                                          | 3 hours                      | Credit:  | 03                                        |
| Instructions (if any): |                  | Use a separate answer script for each section. |                              |          |                                           |

### SECTION-A

*There are **FOUR** questions in this section. Answer any **THREE** questions.*

1. a) Why is tea called a Divine herb? State briefly the protective effects of tea on human health. [L2; CLO 1,2] 03
- b) Classify the tea zones of Bangladesh, indicating the number of tea gardens in each zone. [L4; CLO 1,2] 02
- c) Classify the agro-types of tea found in Bangladesh. Distinguish the characteristics of Assam, China and Manipuri types. [L6; CLO 1,2] 05
2. a) Discuss the climatic requirements for tea cultivation. How do rainfall, temperature, and humidity influence tea growth and yield? [L6; CLO 1,2] 07
- b) Describe the topography and soil characteristics suitable for tea cultivation in Bangladesh. [L6; CLO 1,2] 03
3. a) List the steps involved in the tea manufacturing process. [L1; CLO 2,3] 03
- b) Explain the significance of land preparation for tea plantations. [L2; CLO 2,3] 03
- c) Discuss the impact of shade trees on tea quality and growth. [L4; CLO 2,3] 04
4. a) Discuss leaf handling and sorting in the tea processing chain. [L2; CLO 2,3] 03
- b) Compare the advantages of vegetative propagation versus seed propagation. [L4; CLO 2,3] 03
- c) Suggest methods to improve tea seedling survival in the nursery bed under adverse conditions. [L3; CLO 2,3] 04

### SECTION-B

*There are **FOUR** questions in this section. Answer any **THREE** questions.*

5. a) Describe the botanical characteristics, flowering habit, and fruiting behaviour of the rubber plant. Explain how flowering and fruiting influence seed production and plantation management. [L6; CLO 3,4] 05
- b) Discuss the major rubber clones cultivated in Bangladesh. Compare their yield performance, disease resistance and adaptability under local climatic conditions. [L6; CLO 3,4] 05
6. a) List five major diseases and insect pests affecting rubber plantations in Bangladesh. Mention their causal organisms, symptoms, and suitable control measures for integrated management. [L6; CLO 4,5] 05
- b) Discuss the climatic and edaphic requirements for successful rubber cultivation in Bangladesh. How do rainfall, temperature, humidity, and soil characteristics affect latex yield? [L6; CLO 3,4] 05
7. a) List the steps of pre-germination seed treatment. [L1; CLO 4,5] 03
- b) Explain why tapping is usually done early in the morning. [L2; CLO 4,5] 03
- c) Compare seed propagation and grafting in terms of time to tapping. [L4; CLO 4,5] 04
8. a) Explain the limitations of natural rubber. How can vulcanization improve it? [L2; CLO 4,5] 03
- b) Compare field latex and concentrated latex in terms of processing and use. [L4; CLO 4,5] 03
- c) Discuss how irrigation planning affects early rubber seedling survival. [L6; CLO 4,5] 04