DO NOT BREAK THE SEAL OF THE BOOKLET UNTIL YOU ARE TOLD TO DO SO

QUESTION BOOKLET
(Descriptive Type Only)

BOOKLET SERIAL NO.	114	Marks : 100 Time : 2 (two) hours

Read the following instructions carefully before you
begin to answer the questions.

INSTRUCTIONS TO CANDIDATES

1. This booklet contains **Non-Engineering Subjects and Engineering Subjects**.

    PART-A : Non-Engineering background candidates may choose **ONE** from the following:

    Agriculture - 100 Marks

    Horticulture- 100 Marks

    Forestry- 100 Marks

    OR

    PART-B : Engineering background candidates may choose **ONE** from the following:

    Agriculture Engineering- 100 Marks

    Civil Engineering- 100 Marks

Note:

(CANDIDATES HAS TO CHOOSE ONLY ONE SUBJECT OUT OF FIVE ABOVE MENTIONED SUBJECTS CATERING TO THEIR BACK-GROUND)

2. You will be supplied the Answer Booklet by the invigilator. You must complete the details of particulars asked for.

3. The Answer Booklet must be handed over to the invigilator before you leave the Examination Hall.

4. No rough work is to be done on the Answer Booklet.

PART - A : NON ENGINEERING BACKGROUND
AGRICULTURE
(OPTIONAL)
Marks :100

(Answer any FIVE questions. Questions carry 20 marks each)

1. What are the factors of Soil formation ? Describe in detail processes of Soil formation.

2. Describe in detail the principles of Soil fertility and Integrated Nutrient Management.

3. What is Integrated Pest and Disease Management ? Describe in detail the Biological Control of pests in paddy.

4. Describe in detail the important features and scope of Forest plantations namely, Social forestry and Agro-forestry.

5. What is the role and importance of Agriculture Extension ? Describe the role of Krishi Vigyan Kendra (KVK) in dissemination of agricultural technologies.

6. Discuss the issues and problems of Acid soil and its reclamation.

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PART - A : NON ENGINEERING BACKGROUND
HORTICULTURE
(OPTIONAL)
Marks :100

(Answer any FIVE questions. Questions carry 20 marks each)

1. What are the scope and importance of Horticulture with special emphasis to the agro-ecological conditions of Meghalaya ? Write in brief about the constraints and strategies for sustainable development of Horticulture in Meghalaya.

2. Potato is one of the most important horticultural produce of Meghalaya and most of the losses are due to poor handling and storage after harvesting of the crop. So describe the different post-harvest management of potato to counter this problem.

3. What is Vegetative propagation ? Name and describe in short the propagation by grafting both the 'attached method' of grafting or approach grafting and the 'detached method' of grafting.

4. An Orchard is a long-time investment and with proper planning, maximum benefit can be obtained from an orchard. So describe in detail the critical components needed in the proper planning of an orchard.

5. Describe in short the cultivation, propagation, manuring, after-care and post-harvest management of Black Pepper-a very important spice crop in India.

6. Discuss the importance and scope of Processing Industry of horticulture produce in Meghalaya. What are the general principles of fruit and vegetable preservation ?

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PART - A : NON ENGINEERING BACKGROUND

FORESTRY

(OPTIONAL)

Marks :100

Attempt total FIVE questions. Question No. 1 in Section A is compulsory. Attempt any TWO questions from section B and any TWO questions from section C

(The figures in the margin indicate marks for the questions)

Section-A

1. Write short notes on :   2x10
a) Grading and hardening of seedlings.
b) Coppice system.
c) Objectives and necessity of Urban Forestry.
d) Role of micro-organisms in ameliorating soils.
e) Acid rain.
f) Seed production areas and seed orchards.
g) Working plans and working schemes.
h) Mean annual increment.
i) Yield and stand tables.
j) Effect of air pollution on forests.

Section-B

2. a) What are the factors of locality ? Explain how site factors influence the growth and development of vegetation.   6

b) **Write a short note on :**   4x2
i) Methods of artificial regeneration of forests.
ii) Essential factors to be considered for establishment of a nursery.

c) **Write a short note on :**   2x3
i) Clear felling.
ii) Uniform shelter wood selection system of forest management.
iii) Aerial seeding.

3. a) Explain in brief the Silviculture of : 2x4
i) Alnus nepalensis
ii) Chukrasia tabularis

iii) Gmelina arborea
iv) Shorea robusta

b) Write a detailed note on various agro-forestry system under different agro-climatic zones.   4

c) **Write a short note on :**   2x4
i) VAM
ii) Physical properties of soil
iii) Wind brakes
iv) River channel stabilization

4. a) What is role of trees and forests in environmental conservation ?   6

b) **Write a short note on :**   2x4
i) Global warming
ii) Greenhouse effect
iii) Ozone layer depletion
iv) Environmental Impact Assessment

c) Explain the meaning of :   2x3
i) In situ conservation
ii) Progeny test
iii) Genetic base

Section-C

5. a) What are the important objectives and principles of forest management ? Write a note on Forest protection measures.   3x2

b) **Write a short note on :**   2x4
i) Role of working plans and working schemes in nature conservation.
ii) Rotation period.
iii) Forest cover monitoring through remote sensing.

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iv) Applications of Geographical Information System in forest management.

c) i) List different methods of Surveying.
ii) Explain the basic quality requirements for good building stones and bricks.   3x2

6. a) Explain Biotic and abiotic components of Forest ecology.   6

b) **Write a short note on :**   2x4
i) General principles of seasoning.
ii) Anatomical structure of wood.
iii) Definition of Non-Timber Forest Products (NTFPs).
iv) Properties of particle boards.

c) **Write a short note on :**   3x2
i) Role of Ethnobotany in Indian System of Medicine.
ii) Factor affecting actions and toxicity of drug plants.

7. a) Explain in brief the steps involved in constitution of Wildlife Sanctuary under the Wild Life (Protection) Act, 1972.   6

b) **Write a short note on :**   2x4
i) Rotational and controlled grazing
ii) Valuation of forest goods and services.
iii) Role of private sectors and co-operatives in forest management.
iv) Objectives of forest inventory.

c) What are the basic objectives of National Forest Policy, 1988.   6

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PART - B : ENGINEERING BACKGROUND
AGRICULTURAL ENGINEERING
(OPTIONAL)
Marks :100

Question in Section A is compulsory. Answer any two questions from Section B and C.

(The figures in the margin indicate marks for the questions)

Assume suitable data, if necessary and indicate them clearly.

Section- A :(20 marks)

The Section contains one question which is compulsory.

1. a) Give brief accounts of soil and water conservation problems in Meghalaya. Write the scope of soil and water conservation measures to handle the issues under various programmes adopted by the Government of Meghalaya. 10

b) Discuss agricultural mechanization status in Meghalaya. Give a brief account of major impacts of agricultural mechanization in India. 10

Section- B :(40 marks)

The Section contains three questions. Answer any TWO questions.

1. a) What does watershed management imply ? Write the procedures to determine the priority watershed in a cluster of watersheds along with work plan. 10

b) Define water erosion and explain the mechanics of splash erosion, rill, sheet, gully erosion. 5

c) What is micro-irrigation ? List the advantages and limitations of micro irrigation

systems. 5

2. a) What is sick well ? How it is different from failed well ? Discuss rehabilitation methods for recovery of sick and failed wells. 10

b) Write briefly the suitability, scope and limitations of contour bund, contour trench, contour stone walls, contour ditches and contour farming emphasing on rainfall, soil slope, soil depth and soil type. 5

c) Whats are the common structures for protected cultivation ? Discuss in detail the structural components of a green house for preparation of protected plant environment. 5

3. a) What is the importance of the cooling system of a tractor ? Explain the most important system of cooling used for modern tractors. 10

b) What are the limitations of using tractor and tractor drawn weeding implements / machines for inter-cultural operation ? 5

c) What are the different types of poultry houses being use in India ? Which particular type can be popularized in rural areas and why ? 5

Section- C :(40 marks)

The Section contains three questions. Answer any TWO questions.

1. a) What do you mean by areal photography? Write the advantages and limitation of areal photo-interpretation over satellite remote sensing. 10

b) Discuss the techniques of visual and digital satellite images interpretations for soil, water and land use management.   5

c) Differentiate sun drying and mechanical drying methods. Discuss various factors that affect drying of agricultural produces.   5

2. a) What is a flow chart in computer programming ? Discuss the types and uses of flow chart with specification of flow chart.   10

b) How are wind and bio-gas energy systems exploited for energy use in agriculture ?   5

c) Differentiate between solar thermal device and photo voltaic device.   5

3. a) What do you mean by sterilization of milk? Discuss in detail the parameters associated with sterilization of milk .   10

b) **Write short notes on** :   5
(i) belt conveyor
(ii) screw conveyer
(iii) cream separation in milk
(iv) pasteurization and
(v) Spray and roller drying

c) Enlist applications of micro processor in data acquisition and control of different processes. Give a brief account of measurement systems for force torque, pressure, vacuum and temperature.   5

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PART - B : ENGINEERING BACKGROUND
CIVIL ENGINEERING
(OPTIONAL)
Marks :100

Candidate must give their answers in their own words as far as practicable

Figures in the margin indicate full marks for the questions

Instructions - Answer Question no 1 and any two questions from Group A & Group B
**Assume any missing data suitably**

1. a) Differentiate between Plane and Geodetic Surveying. 3
b) What is a bar chart ? Differentiate between an activity and event in a network diagram. 3
c) Define the terms : Buoyancy, bearing capacity, hydrological cycle, local attraction, camber and datum. 1.5 x 6=9
d) What is simple bending ? State the assumptions in the theory of simple bending. 5

GROUP : A
(Answer any TWO questions)

2. a) Find the maximum torque that can be safely applied to a shaft of 300 mm diameter. The permissible angle is 1.5 degree in a length of 7.5 m and the shearing stress is not to exceed 42 N/mm². Take G = 84.4 KN/mm². 10

b) The following staff reading were recorded for a certain work levelling - 3.460, 2.734, 2.161, 2.405, 3.512, 1.907, 0.720, 1.156, 3.210, 2.146, 1.786 and 2.768. The first reading was taken on a BM 'A' and the level was shifted after the fourth and eighth readings. Rule out a page of level book, enter the readings and find out the RL of all points by both methods, if RL of BM was given as 249.500. If the distance between the BM and last station is 1500m, what is the average slope between these points ? 10

3. a) A continuous beam ABC is loaded as shown in fig. below. It carries a u.d.l of 50 KN/m on AB and BC. The support B sinks by 5 mm below A and C and the value of EI is con-

stant throughout the beam. Take E = 200 KN/mm² and I = 332x10⁶, find the bending moments at support A and B using moment distribution method and draw the bending moment diagram. 10
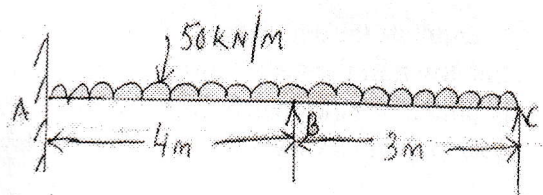
b) Design an irrigation channel in alluvial soil according to Lacey's silt theory for the following data.
Full supply discharge 50 m³/sec
Lacey's silt factor 1.0
Site slope of channel ¹/₂ (H) : 1(V). 10

4. a) A venturimeter is installed in a pipeline 400 mm in diameter. The throat-pipe diameter. The throat-pipe diameter ratio is 1/3. Water flows through the installation. The pressure in the pipeline is 1.405 kg/cm² and the vacuum in the throat is 37.5 cm of mercury. If 4% of the differential head is lost between the gauges, find the flow in the pipeline. 10

b) Define Contour and horizontal equivalent. What do you understand by contour interval and on what factors does it depend. 10

GROUP : B
(Answer any TWO questions)

5. a) With neat sketches, show various types

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of traffic sign, classifying them in proper groups.
6

b) Define quick sand conditions and critical hydraulic gradient.
4

c) The total unit weight of soil is 18.8 KN/m³, the specific gravity of the solid particles of the soil is 2.67 and water content of the soil is 12%. Calculate the dry unit weight, void ratio and the degree of saturation.
10

6. a) What are the important considerations, which govern the selection of site of an intake ?
5

b) Write a short note on global positioning systems.
5

c) Estimate the domestic water requirement of this town in the year 2000 by projecting the population of the town by incremental method. Take per capita water demand = 200 I/c/day.10

YEAR	POPULATION
1940	2,37,98,624
1950	4,69,78,325
1960	5,47,86,437
1970	6,34,67,823
1980	6,90,77,421

7. a) Describe the construction procedure for a water bound macadam road.
8

b) A single reinforced concrete beam has rectangular section 230 mm wide X 460 mm effective depth. At a section under consideration there are two 16 mm diameter bent up bars at 45 degree and 6mm diameter two legged stirrups at a spacing of 200 mm centre to centre. The grade of concrete is M20. The reinforcement is HYSD415. The design shear strength of concrete is 0.6 N/mm² and maximum shear stress is 2.8 N/mm². Using limit state method, determine the value of factored shear force to be permitted in the section.
12

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