APPENDIX I

SCHEME AND SYLLABUS OF EXAMINATION FOR THE PURPOSE OF FILLING UP THE POST OF ASSISTANT ENGINEER (AGRICULTURE).

The Examination will consist of 4 papers:-

PAPERS	SUBJECT	FULL MARKS	TIME ALLOWED
PAPER – I	GENERAL ENGLISH	50	1 HOUR
PAPER - II	GENERAL KNOWLEDGE	50	1 HOUR
PAPER - III	AGRICULTURE ENGINEERING-I	300	3 HOURS
PAPER – IV	AGRICULTURE ENGINEERING-II	300	3 HOURS
VIVA-VOCE	80 MARKS		

SYLLABUS

PAPER – I GENERAL ENGLISH

- Comprehension
- Composition and Grammar

PAPER –II GENRAL KNOWLEDGE

- Current events of Local, National & International importance.
- National level Schemes & Projects undertaken by Government of India.

PAPER – III AGRICULTURE ENGINEERING – I

Agricultural Engineering Syllabus Paper I

Section A

1. **Soil and Water Conservation:** Scope of soil and water conservation. Mechanics and types of erosion, their causes. Rainfall, runoff and sedimentation relationships and their measurement. Soil erosion control measures - biological and engineering including stream bank protection-vegetative barriers, contour bunds, contour trenches, contour stone walls,

contour ditches, terraces, outlets and grassed waterways. Gully control structures - temporary and permanent - design of permanent soil conservation structures such as chute, drop and drop inlet spillways. Design of farm ponds and percolation ponds. Principles of flood control-flood routing. Watershed Management - investigation, planning and implementation - selection of priority areas and water shed work plan, water harvesting and moisture conservation. Land development - leveling, estimation of earth volumes and costing. Wind Erosion process - design of shelter belts and wind brakes and their management. Forest (Conservation) Act,

2. **Aerial Photography and Remote Sensing:** Basic characteristics of photographic images, interpretation keys, equipment for interpretation, imagery interpretation for land use, geology, soil and forestry.

Remote sensing - merits and demerits of conventional and remote sensing approaches. Types of satellite images, fundamentals of satellite image interpretation, techniques of visual and digital interpretations for soil, water and land use management. Use of GIS in planning and development of watersheds, forests including forest cover, water resources etc.

Section B

3. **Irrigation and Drainage:** Sources of water for irrigation. Planning and design of minor irrigation projects. Techniques of measuring soil moisture - laboratory and in situ, Soil-water plant relationships. Water requirement of crops. Planning conjunctive use of surface and ground water. Measurement of irrigation water, measuring devices - orifices, weirs and flumes. Methods of irrigation - surface, sprinkler and drip, fertigation. Irrigation efficiencies and their estimation. Design and construction of canals, field channels, underground pipelines, head-gates, diversion boxes and structures for road crossing. Occurrence of ground water, hydraulics of wells, types of wells (tube wells and open wells) and their construction. Well development and testing. Pumps-types, selection and installation. Rehabilitation of sick and failed wells.

Drainage causes of water logging and salt problem. Methods of drainage— drainage of irrigated and unirrigated lands, design of surface, sub-surface and vertical drainage systems. Improvement and utilization of poor quality water. Reclamation of saline and alkali soils. Economics of irrigation and drainage systems. Use of waste water for irrigation — standards of waste water for sustained irrigation, feasibility and economics.

4. **Agricultural Structures :** Site selection, design and construction of farmstead - farm house, cattle shed, dairy bam, poultry shed, hog housing, machinery and implement shed, storage structures for food grains, feed and forage. Design and construction of fences and farm roads. Structures for plant environment - green houses, poly houses and shade houses. Common building materials used in construction - timber, brick, stone, tiles, concrete etc and their properties. Water supply, drainage and sanitation system.

PAPER – IV AGRICULTURE ENGINEERING – II

Agricultural Engineering Syllabus Paper II

Section A

1. **Farm Power and Machinery:** Agricultural mechanization and its scope. Sources of farm power - animate and electro-mechanical. Thermodynamics, construction and working of internal combustion engines. Fuel, ignition, lubrication, cooling and governing system of IC engines. Different types of tractors and power tillers. Power transmission, ground drive, power take off (p.t.o.) and control systems. Operation and maintenance of farm machinery for primary and secondary tillage. Traction theory. Sowing transplanting and intercultural implements and tools. Plant protection equipment - spraying and dusting. Harvesting, threshing and combining equipment. Machinery for earth moving and land development - methods and cost estimation. Ergonomics of man-machine system. Machinery for horticulture and agro-forestry, feeds and forages. Haulage of agricultural and forest produce.

2. **Agro-energy:** Energy requirements of agricultural operations and agro-processing. Selection, installation, safety and maintenance of electric motors for agricultural applications. Solar (thermal and photovoltaic), wind and bio-gas energy and their utilization in agriculture. Gasification of biomass for running IC engines and for electric power generation. Energy efficient cooking stoves and alternate cooking fuels. Distribution of electricity for agricultural and agro-industrial applications.

Section B

3. **Agricultural Process Engineering:** Post harvest technology of crops and its scope. Engineering properties of agricultural produces and by-products. Unit operations - clearing grading, size reduction, densification, concentration, drying/dehydration, evaporation, filtration, freezing and packaging of agricultural produces and by-products. Material handling equipment - belt and screw conveyors, bucket elevators, their capacity and power requirement. Processing of milk and dairy products - homogenization, cream separation, pasteurization, sterilization, spray and roller drying, butter making, ice cream, cheese and shrink hand manufacture. Waste and by-product utilization - rice husk, rice bran, sugarcane bagasse, plant residues and coir pith.

4. **Instrumentation and computer applications in Agricultural Engineering:** Electronic devices and their characteristics - rectifiers, amplifiers, oscillators, multi vibrators. Digital circuits — sequential and combinational system. Application of microprocessors in data acquisition and control of agricultural engineering processes- measurement systems for level, flow, strain, force, torque, power, pressure, vacuum and temperature. Computers — introduction, input/output devices, central processing unit, memory devices, operating systems, processors, keyboards and printers. Algorithms, flowchart specification, programme translation and problem analysis in Agricultural Engineering. Multimedia and Audio-Visual aids.

VIVA – VOCE

The test is intended to judge the mental caliber of candidate. In broad terms this is really an assessment of not only his intellectual qualities but also social traits and his interest in current affairs, mental alertness, critical powers of assimilation, care and logical exposition, balance of judgment, variety and depth of interest.

APPENDIX – II

CONDITIONS OF ELIGIBILITY FOR APPEARING IN THE EXAMINATION.

In order to be eligible to appear in the Competitive Examination, a candidate must satisfy the following conditions, namely:-

(a)Minimum Educational Qualification	: Degree in Agricultural Engineering from a recognized University.
(b) Age	: Should have attained the age of 21 years. But should not have exceeded the age of 30 years (in the case of Govt. servant, not more than 40 years)
	: The maximum age limit is relaxable by five (5) years. In the case of SC/ST/BL candidates and four (4) and three (3) years for MBC/OBC candidates, respectively
(c) Other requisites	(1) Preference will be given to Sikkim Government stipendaries/ seat reserved for State of Sikkim. (2) Should be conversant with the Custom and usages of Sikkim. (3) Should have knowledge of any of the State languages. (4) Should have valid Local Employment Card

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