

PAPER III SYLLABUS FOR COMBINED STAFF RECRUITMENT EXAMINATION

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1	Agriculture Field Assistant	Agriculture	2-11
2	Baking & Confectionery	Women Resources Development	12-14
3	Draughtsman-II	Works & Housing (NPWD)	15
4	Electrician	<ol style="list-style-type: none"> 1. Chief Engineer, Police Engineering Project. 2. Employment, Skill Development & Entrepreneurship. 3. SIRD. 4. Tourism 	16-18
5	Fashion Designing Instructor	Women Resources Development	19-20
6	Hairstyling Instructor	Women Resources Development	21-24
7	Horticulture Extension Assistant	Horticulture	25-28
8	Pharmacist	<ol style="list-style-type: none"> 1. Geology & Mining. 2. Prison 	29
9	Physical Education Teacher	School Education	30
10	Plumber	Works & Housing (NPWD)	31-33
11	Sectional Overseer	Water Resources	34-35
12	Soft Skills Instructor	Women Resources Development	36-37
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14	Surveyor	<ol style="list-style-type: none"> 1. Land Records & Survey 2. Water Resources 	39-40
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16	Assistant Fishery Inspector	Fisheries and Aquatic Resources	44-48
17	LDA-cum-Computer Assistant(GIS)	Border Affairs	49

1. AGRICULTURE FIELD ASSISTANT

- Principles of agronomy – Agriculture: definition, its branches and scope. Classification of field crops-botanical, commercial, seasons, agronomic and objectives. Factor affecting crop production, Agricultural crop zone of North East and India. Tillage: definition of tillage and tith. Classification of tillage: Influence of tillage on physical properties of soil. Zero tillage and its application. Planting geometry and its effect on growth and yield. Cropping system: definition and types of cropping systems. Difference between dry land farming and rain fed farming. Watershed: definition and management aspects. Problems of dry land agriculture and improvement. Land Use System, Alternate land use system in the state context with examples.
- Weather and Agriculture, Agro climatic zones of the North East & India, Earth's atmosphere, Composition and structure. Climate change: causes, effect on ecosystem and on crop production, climate resilient practices, issues and strategies. Global warming and its impact on agriculture, green house effect, greenhouse gas emission from Agriculture sources, Agriculture Waste Management. Introduction to Indian Monsoon, Agriculture and environment, climatic factors effecting crop production. Meteorological service to Agriculture, Weather forecasting and its significance in Agriculture.
- Soil- definition and components of soil, Soil profile, physical properties of soil - Soil texture, soil structure, density of soil, porosity of soil, soil colour, soil temperature and the role of soil fertility. Soil air- definition and its importance, factors affecting the composition of soil air. Soil water- importance of soil water, physical and biological classification of soil. Soil ph and its effect on availability of nutrients and plant growth. Soil health management and soil health card (SCH). Problematic soils, Salt affected soils: - Nature and classification, characteristics, detrimental effects of soil acidity, salinity and alkalinity and their reclamation. Soil amendments, Soils types of Nagaland. Soil organic matter. C: N ratio, Soil biota (organisms) and its role in Fertility, Role of soil organic matter in crop production.
- Economic importance of Plant Pathology. General morphological characteristics of Fungi, Bacteria, Virus, Mycoplasma and plant parasitic Nematodes. Feedings habits of nematodes. Classification of Plant diseases. Principles of plant disease management. Methods of plant disease management- cultural methods, legal methods, biological methods, chemical methods and use of resistant 'variety. Mushroom cultivation techniques- Oyster and button mushroom technologies. Preparation of some common fungicides- Bordeaux mixture and paste, tobacco concoction, Neem kernel suspension and Kerosene emulsion.

- Genetics: Definition. Plant cell- Structure and functions. Chromosomes and cell division i.e. Mitosis and Meiosis. Mendel's principles and Mendel's law of Inheritance. Gene interactions, quantitative inheritance, linkage and crossing overs. Sex determination and recombination
- Mutation and its importance in agriculture. Plant breeding: Definition, Principles or plant breeding. Modes of reproduction in field crops- self and Cross pollinated crops. Methods of breeding in self and cross pollinated crops. Crop improvement, open pollinated variety, composite and synthetic variety, multilines, hybrids. Crops and cultivars in the context of climate change. Hybridization, Heterosis, Biotechnology and its importance in agriculture. IPR on plant varieties and different forms of IPR & FR(Farmers Rights) & Traditional knowledge, plant tissue culture and its application in agriculture.
- Principles of Horticulture: Introduction, definition, branches of horticulture and importance of fruits and vegetables in human diet. Scope, current situation and importance of horticulture in India. Propagation methods of horticultural crops, definition, types, classification, merits and demerits. Principles of pruning and training, need, objectives and scope. GAP (Good Agricultural Practices) in major horticultural crops, Choice of trees and plants for various afro-climatic zones. Protected cultivation and its use. Off-Season crops and economic importance. Mushroom Cultivation techniques-oyster and button mushroom cultivation. PHM (Post Harvest Management) techniques of some commercial fruits and vegetable crops.
- Fundamentals of Entomology, Apiculture and Insect Control: Introduction, important character of phylum Arthropoda and its classification up to class insect. Dominance of insects in animal kingdom, Economic importance of insect in agriculture. General organization of an insect body, Moulting, Metamorphosis. Classification of insect. Various systems of insect. Bee keeping types of species, rearing techniques and their management. Control measure-mechanical, chemical, biological. IPM approaches, Predators and parasites. Indigenous insect pest control practices and preparations. Rodents, its life cycle and control measures. Bamboo flowering and its relation to rodent pest.
- Agricultural Statistics: Statistics-its meaning, definition and importance in agriculture. Frequency distribution. Measures of Central tendency-Arithmetic mean. Measures of dispersion Standard deviation, Standard error of mean, *co*- efficient of variation. Test of significance- Student't' test and 'F' test. Experimental design-Basic principles of experimental design. Concept of ANOVA, CRD and RBD
- Field Crops (Kharif)
- Name of crop, Common name, Scientific name and family. Origin, economic importance, Classification of crops -botanical, commercial, seasonal, agronomic and objectives. Soil and climatic requirements, cultural practices viz., selection of seeds, seed treatment, sowing method seed rate, Fertilizer recommendations, time and

- method of application of manures, fertilizers and bio-fertilizers. Thinning, gap filling, earthing up, inter-culturing, weed control measures, irrigation, crop rotation, inter-mixed/relay cropping. Major insect-pests and diseases, Bio-control measure, harvesting, threshing, winnowing, cleaning, drying, storage and yield. Recommended high yielding, improved and hybrid varieties.
- Cereals Major crops: Rice-upland jhum paddy, Irrigated paddy (I RC/WI:RC, SRI), Maize,
 - Sorghum, Pearl millet (Bairn) and Minor crops: Finger millet, Foxtail millet, Pearl millet and
 - Job's tears. Pulses: Soya bean, Pigeon pea Mung/Green gram, Black gram, Bengal gram/Chick pea,
 - French Bean Rajmash, urad bean, Cluster bean, Rice bean and Cowpea. Oilseeds: Groundnut, Sunflower and Sesame. Fibre crops: cotton, Jute and Ramie Root/Tuber crops: Potato, Colocasia, Sweet potato, Tapioca, Yam, Ginger. Commercial crop: Coffee, Tea, Rubber, Agar, Jatropha, Tung and broom (*Thysalolaena Ma: Vilna*) Forage and grasses crops: Jowar, Maize, Napier grass etc
 - Manures and fertilizers: Introduction-Manures-types of manures-Bulky and concentrated-FYM, Composts-Different composting methods. Mechanical compost plants. Vermi-composting, Green manures: types and its application mode, oil cakes, sewage and sludge-Biogas plant slurry, plant and animal refuges, Types and roles of organic manures. Fertilizers- classification with nutrient content. Manufacturing processes and properties of major nitrogenous (ammonium sulphate, urea, calcium ammonium nitrate, ammonium nitrate, ammonium sulphate nitrate), Phosphatic (single super phosphate, enriched super phosphate, di-ammonium phosphate, ammonium poly phosphate), Potassic and complex fertilizers, their fate in the soil, Secondary and micronutrients fertilizers, Amendments. Methods of fertilizer application. Fertilizer storage. Fertilizer control order. Bio-fertilizers and advantages. Type of bio-fertilizers and their potential. Merits and constraints of bio-fertilizer use. Precautions for the use of bio-fertilizers.
 - Post-Harvest Technology: Introduction to post harvest technology. Post-harvest technology and operations process for cereal, pulse and oil seed crops. PHM of fruits and vegetables, potato, spices and plantation crops. Post-harvest study of sugarcane. Postharvest losses, operations and value addition. Study of cold storage methods and ware house for major crops.
 - Crop Physiology Theory: Definition. Photosynthesis: Significance-site of photo synthesis-light and dark reaction. Photorespiration-factors affecting photosynthesis-respiration- glycolysis-Krebs cycle anaerobic respiration-respiratory quotient-compensation point. Water relations: Importance of water, active and passive absorption, ascent of sap. Transpiration: Definition, significance, anti-transpirants. Factors affecting to transpiration. Plant growth and development. Plant hormones-

auxins-gibberellins-cytokinins-ethylene and abscisic acid and their modification. Photoperiodism and vernalization.

- Production technology of Fruit crops: Importance and scope of fruit crops. Orchard-planning – layout and management practices. Selection of site, fencing, and wind break for fruit crops. Planting system, high density planting, and establishment. Principles of canopy management. Propagation methods and use of root stocks. Method of training, pruning and grafting and objectives. Package of practices of fruit crop; viz., Mango, banana, pineapple. Jackfruit, kiwi, citrus fruits- limes, lemons and orange; Stone fruits - peach, pear, apple, papaya, Guava, Pomegranate, Passion fruit, Persimmon and strawberry.
- Principles of Livestock and Poultry Production: Origin, domestication and utility of farm animals and their role in Indian economy, Animal husbandry methods in India, common terms pertaining to different species of livestock, Utility classification of breeds of cattle. Familiarization with different breeds of cattle (indigenous and exotic) and buffaloes. Classification of breeds of sheep and goat. Introduction to common feeds and, fodders, their classification and utility, Introduction to poultry industry in. Common terms pertaining to poultry production and management. Concept of mixed farming and its relevance to socio-economic conditions of farmers in India. Technologies for sustainable livestock development. Best management practices for sustainable livestock production. Piggery farming and management, Common diseases and symptoms in poultry, sheep, goat, pig, Cattle -care and management. An introduction to Turkey, quail and Rabbit farming, Livestock vaccination schedule. Milk production technology and value addition. Fodder Production and pasteurization technologies.
- Introduction to: Sericulture status in India and North east. Economic aspect of Silk industry. Types/varieties of silk and its habitat, Type of host-plant species. Cultivation aspects or host plants. Mulberry silk rearing and cultivation, disease and pest management. Silkworm improvement and rearing practices, Preparation of Silkworm eggs, Major Silkworm diseases, control and management practices. Oak Tasar Culture. Eri (Castor) culture, Muga culture, Rearing technique for Mulberry silkworm, post production and management aspects. Cocoon marketing, Eri Silk reeling and spinning. Value addition and marketing.
- Water Management: definition, Water and its importance to crop production. Physical and Biological classification of water Soil Moisture and forms of soil moisture. Irrigation definition and objectives. Types and classification of Irrigation system (only names). Advantages and disadvantages of irrigation. Water resources and Irrigation development. Critical stages of crops for irrigation. Approaches for scheduling irrigation: Systems and Methods of irrigation in detail surface methods (only definition and examples), flooding, check basin method, Basin method, Borderstrip method,

Furrow irrigation, Sprinkler and drip irrigation (definition, advantages and disadvantages only). Quality of irrigation water, Salinity hazards, Sodium hazards. Salinity and Sodium management process. Water and its management in different crops (rice, wheat, maize, groundnut, sugarcane, banana and tomato). Drainage and types of drainage (names only). Construction of water harvesting structures in various soil conditions.

- Principles of Agricultural Economics : Definition of Economics, Scope and importance of economics, Difference between Micro and Macro Economics. Basic terms and concepts used in economics. Economic principles applied to financial management of farm, law of diminishing returns, principle of marginalism, principle of combining enterprises or product-product, principle of comparative advantage. Production and supply: Nature and factors of production, Short-run and long run production function, Theory of cost, Short-run and Long-run cost curves. Characteristics of perfect and various imperfect market and their equilibrium conditions.
- Demand and supply of money, Inflation, monetary and fiscal policy, Importance and function of public finance, public revenue, expenditure and taxation (in brief), Cash management and entrepreneurial skills (concepts only)
- Field Crops (Rabi) II Name of crop, Common name, botanical name and family. Origin, economic importance, soil and climatic requirements, cultural practices viz., selection of seeds, seed treatment, sowing, method, seed rate, Fertilizer recommendation, time and method of application of manures. Fertilizers and bio-Fertilizers, thinning, gap tilling, earthing up, interculturing, weed control measures including (INM) integrated weed management, irrigation. Crop rotation, inter-mixed/relay cropping major insect-pests and diseases, Bio-control measures, harvesting, post-harvest managements, value addition, recommended high yielding, improved and hybrid varieties, yield.
- Cereals and major crop: Wheat, Pulses : French bean, lentil, Field Pea, Oilseeds : Mustard, Toria Rapeseed, Sunflower and linseed. Sugar crops Major crop: Sugarcane and Sugar beet.
- Commercial crops : Potatos, TPS, Rabi Forage crops: Lucerne or Alfafa, Cowpea or Lobia .
- Perennial grass fodder:Hybrid Napier, Guinea Grass.
- Plant Nutrition: Definition of plant nutrients. Criteria of essentiality of an element, Classification of plant nutrients. Available forms of the nutrients in soil. Macro nutrients: Nitrogen, Phosphorus, Potassium. Secondary nutrients: Calcium, Magnesium, Sulphur. Micro-nutrients: Iron, Copper, Zinc, Magnesium, Boron and Molybdenum. Sources of nutrients- functions/role and deficiency symptoms (in brief). Integrated Nutrient Management (INM), Concept, components and constraints in adoption.

- Production Technology of Vegetable Crops: Definition of vegetable and importance or vegetable crops. Types of vegetable garden. Layout of Kitchen garden and objectives. Package of practices for vegetable crops viz, tomato, brinjal, Chilli, Capsicum, King chilli, ladies finger, Chow chow (Squash), Cucurbits viz., cucumber, bottle gourd, bitter gourd, small gourd, pointed gourd, pumpkin, watermelon. Cole crops viz., cabbage, cauliflower, broccoli, chinese cabbage. Bulbs viz., onion, leek and garlic. Tuber Crops viz., potato and sweet potato; root crops viz, carrot, radish and beet root. Leafy vegetable viz., lettuce, spinach, Kale, Methi Pulse vegetable viz, pea, cowpea, Rice bean, French bean and cluster bean, Spices: Ginger, Turmeric, Black pepper, cardamom (large). Cultivation techniques of off season crops.
- Diseases of Fruit and Vegetable Crops and their Management. Symptoms, favourable weather conditions and management of
 1. Potato: Early blight, Late blight, Common scab
 2. Tomato: Early and late blight, Leaf curl, Root knot
 3. Brinjal: Damping off, wilt, fruit rot, little leaf, Alternaria leaf spot.
 4. Chilli & King Chilli: Leaf curl, Anthracnose, Fruit rot.
 5. Okra: Powdery mildew, Yellow vein mosaic virus
 6. Onion: Purple blotch
 7. Cruciferous: Blight, Alternaria leaf spot, damping off, powdery mildew, club root
 8. Cucurbits: Powdery mildew, Downy mildew
 9. Mango: Anthracnose, powdery mildew, Malformation
 10. Citrus: Canker, Gummosis, citrus die back
 11. Banana: Panama, Sigatoka, Bunchy top
 12. Papaya: Foot rot, leaf curl
 13. Ginger & Turmeric: Stem rot, leaf spot
 14. Pineapple: Fruit rot
 15. Passion fruit: Canker
 16. Carrot: Split root, Root rot.
 17. Litchi: Fruit cracking
 18. Stone fruits: Flower & fruit drop
- Farming Systems and Farm Management: Cropping systems and cropping scheme. Farming systems: definition, principles and components. Classification of farming system. Models of Integrated Farming Systems. Hill Agriculture and characterization. Production systems of hilly Agriculture and constraints, Farming systems of NE Regions. Jhum system of farming/Shifting cultivation- Jhum intensification methods. Soil conservation practices in Jhum farming system. Fallow Management in hill agriculture. Technologies for enhancing sustainability of production systems.
- Farm Management- Definition and objective of farm management. Types and systems of farm and farm structure, advantage and disadvantages. Study of farm records and registers. Farm planning and budget. Characteristics of a good farm. Managing farm problems. Agriculture labour- definition, Classifications (names only) and problems.

- Pests of Fruits and Vegetable crops and their management: Details of marks or identification, host, nature of damage, life history and management of important pests of horticultural crops-viz., Vegetables (okra, brinjal, tomato, potato, cabbage, cauliflower, broccoli, chilli, king chilli, cucurbits, cruciferous & onion). Fruit crop- (mango, banana, citrus, guava, pomegranate, stone fruits, citrus spp, papaya, kiwi, strawberry, pineapple and passion fruit.)
- Farm Power and Agriculture Machinery: Importance of Agriculture machineries, traditional vs. improved farm machinery. Land development and tillage machinery. Equipments for seed bed preparation-Primary (Mould board plough, Disc plough) and secondary tillage (Cultivator and harrows) implements, Field operation of line sowing equipment (Seed drill, transplanter), SRI method of planting with marker, power tiller and matching implements, Plant protection equipments -Operation, use and maintenance of sprayers and dusters, Operation and maintenance of harvesting tools (improved sickle, power reaper), Harvesting and threshing machines. Farm equipment for dry land farming-tillage, seeding, fertilizer application, interculture and weeding equipment, harvesting equipment. Improved farm equipment for farmwomen. Energy in Agriculture, use and sources-renewable energy and conservation technologies.
- FISHERY & MANAGEMENT: Importance of fisheries in India, Common terms pertaining to fish production, Study of some important local and exotic fish species and their feeding habits. Culture and seed production of fresh water fin fishes and shell fishes. Technologies on Composite fish culture, fish seed production and management. Integrated fish farming, Integrated farming system-paddy cum fish culture, Diseases of fish, their control and management. Pond culture
- and management. Study of different sources of fisheries, its advantages and disadvantages. Feed manual and types of feeds. Processing, post-harvest technologies, by-products and value addition in fishes.
- Fundamentals of Extension Education and Communication and New Extension Reforms: Extension Education: Definition, importance, objectives and principles of Extension Education. Teaching-learning process, learning situations. Extension Teaching methods and its classification. Projected and non projected audio visual aid. Method and result demonstration, field trip. Motivation and personality development, Team building, managing farmers interest groups. Communication-Meaning, definition and importance. Elements of communication process and adoption process, on-communication techniques. Extension Management, Introduction to New Extension Reforms concept and objectives, ATMA, FO's (Farmers organizations), Sociometry and its use in managing SHG's definition and function, criteria for selection of SHG's, PRA techniques and its salient features, PPP (Public-private partnership), ICT in agriculture, Handling of Internet-mails and video conferencing. NeGP-A, Kisan call centre, Agribusiness and Agri clinic.

- **Weed Management:** definition and characterization of weeds, harmful effects and usefulness of weeds. Classification of weeds and propagation of weeds, Crop-weed competition and allelopathy, Principles of weed management. Preventive methods of weed control, Physical, cultural and biological methods for weed control, Herbicidal (chemical) control of weeds. Benefits and limitation of herbicide. Methods of application of soil and foliage active herbicide treatments. Type of herbicide treatments on the basis of time of application. Formulation of herbicides. Precautionary measures in application of herbicide. Weed control in major field and horticultural crops. Parasitic and problematic weeds and their control. IWM (Integrated Weed Management) in major crops.
- **Organic Farming and Sustainable Agriculture:** Organic farming, definition, Principles and concept of organic farming. Objectives of organic farming. Basic steps of organic farming. Components of organic farming and their role in sustainable crop production. Organic farming in relation to soil health and quality production. Nutrient management in organic farming. Disease and pest management in organic farming. Promotion, certification, inspection and accreditation process of organic product. Organic farming scenario in India. National Standards of Organic farming. Vermiculture technology. Sustainable Agriculture: Introduction, definition, goal and concepts. Differences between Modern Agriculture and Sustainable Agriculture. Land degradation and conservation of natural resources. Technologies for conservation of natural resources in arable and non-arable land. Biodiversity and its role in food security.
- **Seed Production Technology:** Importance of seed production, goals and role of seed industry in India. Principles of seed production. Types of seed, seed structure and morphology. Classes of seed Characteristics of good quality seed. The Seeds Act and salient features of the seeds act. Types of seed sold in the market, (Labelled/TF, Hybrid and certified seeds). Maintenance of varieties and seed multiplication. Minimum isolation distance for seed production of some major field crops. Minimum seed standards for TL/Certified seeds prescribed as per the Indian Seeds Act. Seed production stages in TL/Certified seeds. Seed testing, seed processing, drying and storage for seed certification. Seed dormancy, Factors and method of breaking seed dormancy. Introduction to seed pelleting.
- **Production Technology of Ornamentals, Medicinal and Aromatics :** Ornamentals-annuals, biennials and perennials, shrubs and trees (definition and examples only) - scope and economic value. Commercial flowers-its scope, value addition and market aspects in North East . Production technologies of some commercially viable flowers viz. Anthurium, Chrysanthemum, Orchids, Carnation, Rose, lily, Heliconia and cut flowers Introduction to green house technology and maintenance. Scope and importance of Medicinal and aromatic plants, study of general principles of climate and soil for cultivation of medicinal and aromatic plants, production technology of some suitable MAP of NE and Nagaland and uses viz., Sugandhmantri, lemon grass, citronella, patchouli, aswagandha, rose geranium, Stevia and Aloe vera etc

- Pests of Field Crops and their Management : Details of marks of identification, host, nature of damage, life history and management of important pests of field crops Cereals- rice, maize, pearl millet/bajra, sorghum and wheat, Pulses-(pigeon pea, Soyabean, chickpea, green gram, French bean, Rice bean), Oilseeds- (groundnut, mustard, sunflower, linseed and sesamum), Cash crops potato, sweet potato, cotton, Tea, Coffee, Ginger, Turmeric, King Chilli, Rubber, Jute and Sugarcane.
- Diseases of Field Crops and their Management: Symptoms, favourable weather conditions and management of millets: Downy mildew, Ergot, Smuts, Anthracnose. Wheat: Rusts, Loose smut. Rice: Blast, Bacterial blight, Brown leaf spot False smut, sheath blight, Maize: brown stripe, leaf spot, bacterial rot stalk, downy mildew, brown leaf rust. Groundnut: Tikka disease, Rust, collar rot, stem rot. Cotton: Angular leaf spot, Wilt. Sesamum: Phyllody, Phytophthora blight, Pulses: Anthracnose, powdery mildews, downy mildews, bacterial leaf spot, Wilt, Sterility mosaic, Stunt virus; wilt and root rot. Mustard: Damping off, white rust, powdery mildew, downy mildew. Potato; late blight, bacterial blight, soft rot, leaf blight. Ginger: rhizome rot, yellow disease, bacterial wilt. Tea: red rust, brown blight, abnormal leaf fall. Coffee: Leaf rust, die back Rubber: stem or shoot rot, powdery mildew, patch or bark canker.
- Agricultural Finance, Agricultural Marketing and Agricultural Crop Insurance :
- Agriculture Finance- Concept and scope, Importance of Agricultural Finance, Problems agricultural credit in India, Requisites of good credit system, Five C's of credit, Seven P's of credit. Classification of credit and loan, Institutional agencies in agricultural credit, test of farm credit proposal, tools of farm financial analysis, agricultural projects definition and concept and types(name only).Benefit-cost ratio.
- Agriculture Crop Insurance- Definition and objectives of crop insurance, Approaches in crop insurance, Types of insurance, Crop insurance products, New crop insurance products, NAIS (National Agricultural Crop Insurance Scheme), WBCIS (Weather Based Crop Insurance Scheme), RKBY (Rashtriya Krishi Bima Yojana)-objectives of the scheme and crops covered, farmers covered, risk covered. Sum insured and premium rates, subsidy. How to buy insurance and benefits expected.
- Agriculture Trade & Marketing- Definitions, importance of agricultural trade ,export and imports composition of agricultural products(names only),Marketing management in Agri business .Rural marketing, Risk management, Future trading /emerging trade scenario(concept only). Role and scope of agricultural marketing, classification of markets, producer's surplus, p, problems in agricultural marketing, marketing channels, agricultural prices. Role of government in agricultural marketing, Marketing efficiency marketing margin, price spread (definition only), cooperative marketing, FCI (food corporation of India), quality control of agricultural products, contract farming-concept study of few successful cases.
- Legal instruments: APMA (Agriculture Market Produce Regulation Act), APMC, ECA

- (Essential Commodities Act), Prevention of Food Adulteration Act, Consumer Protection
- Act, AGMARK (Agriculture Product and Marketing Act)
- Fundamentals of Soil Water Conservation and Engineering: Surveying-survey equipment, chain survey, cross staff survey, plotting procedure, calculation of area of regular and irregular fields. Levelling- levelling equipment, terminology, methods of calculation of reduced levels, types of levelling, contouring. Soil and water conservation- soil erosion types and engineering control measures.

2. BAKING AND CONFECTIONERY

- Introduction to Baker & confectioner industry.
- An orientation programme on the course and related job Career opportunities in Bakery & Confectionery.
- Organizational hierarchy of Baker & Confectioner Department.
- Attributes of Baker & Confectioner services personnel.
- Duties and responsibilities of Baker & Confectioner service Personnel.
- Constituents of flour, PH value of flour, Water absorption power of flour, Gluten formation, Capacity of flour, Grade by flour.
- Milling of wheat a role of bran and germs.
- Classification of Raw material seasoning & flavouring agents.
- Basic Principle of food storage according to type
- flavouring agents of commodities.
- Different cereal & flour for the bakery products
- Quality of flour
- **Starch:**
 - Availability of starch indifferent cereals.
 - Uses of starch, Extraction of starch, Different products of grain starch.
- Calculation:
 - Simple table, Weight & measures,
 - Measurements of liquid, Different measures used in the bakery & confectionary.
 - Aims and objective of baking food.
 - Raw material required for Bread making.
 - Role of flour, Water, Yeast, Salt, Sugar, Milk & fats.
- Bread:-
 - Principals involved for bread preparation
 - Different types of breads and their properties, ingredients used.
 - Method of Bread Making. Straight dough method, No-time dough method, Sponge and dough method.
 - Factors affecting the quality of the bread.
 - Characteristic of Good Bread:
 - External Characteristics
 - Internal Characteristics.
 - Bread diseases: -
 - Rope and Mould causes & its prevention.
 - Staling of bread
 - Bread Improvers, Improving physical quality.
- First-aid for cuts/ burns and its importance.
- Fire hazards, contents of first aid.
- Personal safety and industrial safety.

- Personal hygiene & Care of Skin, Hand, Feet, Food handlers. Hygienic protective clothing.
- Grooming and Etiquettes. Working area hygiene and its importance.
- Preparedness for emergency situations.
- Waste management
- Structure of wheat grain.
- Different types of flour available.

- **Oven Baking: -**
 - Elementary Knowledge of oven
 - Types of oven
- Temperature Chart
- Bakery Lay-out:
- The required approval for setting up a bakery.
- Government Procedures & e-bylaws.
- Selection of Site.
- Selection of equipment.
- Quality Control of raw material.
- Quality Control of finished product.

- **Cakes: -**
 - Methods for the production of cakes.
 - Raw Material required for cake Making.
 - Role of ingredients like flour, sugar, shortening and egg for cake production.
 - Machinery involved in cake production.
 - Types of icings.

- Introduction to various icing equipment:
 - Piping bags
 - Nozzles
 - Platte knife
 - Different types of designing cutters.
- Cake making method:
 - Sugar Batter Process, Flour batter Process, Genoese Method, Blending and Rubbing Method.
 - Correct temperatures for baking various varieties of cake.
 - Factors affecting the quality of cake.
 - Characteristic of Cakes-Internal & External.
 - Balancing of Cake Formula. Cake faults and their remedies.
- Knowledge of Genoese making.
- Correct temperature and time.
- Proper knowledge of equipment.
- Faults in pastry making Internal & external.

- Cookies & biscuits:-
 - Preparation of cookies and Biscuits.
 - Factors affecting the quality of Biscuits & cookies.
 - Raw material required for cookies making.
- Faults – Internal & External causes of cookies & Biscuits making & their remedies

3. DRAUGHTSMAN

- Drawing instruments, equipment and materials; their use, care and maintenance. Introduction to Bureau of Indian Standards (BIS). Code of Practice for general and architectural drawings.
- Geometrical drawings:- definition, construction of plain geometrical figures. Orthographic projections:- Principles, representation and construction of different types Scales, graphic scales, recommended scales for drawings with reference to BIS codes.
- Brick Masonry-bricks and brick tiles, principles of construction, bonds in brick masonry
- Principles of stone masonry construction, classification, terms used. Types of rubble masonry, ashlar masonry.
- Different components of building-foundation and footing, walls, doors, windows, roofing.
- Introduction to RCC structure, materials used in RCC construction.
- Computer- Introduction and general terms used. Windows command and their uses. Autocad commands and use of different tools in the tool bar.
- Construction of plain geometrical figures (lines, angles, triangles, rhombus, quadrilaterals, Polygons, ellipses, hyperbola, etc.)
- Drawing Plan, elevation of points, lines, surfaces, solids.
- Orthographic projection of furniture- table, chairs, desk, stool, etc.
- Reducing and enlarging of drawing objects by graphical method and by instrument method. Measured drawing of any object.
- Free hand lettering. Sketching of set of objects, landscape, mountains.
- Applied trade problems-involving multiplication, division, common fraction, addition, subtraction, multiplication and division. Application of fractions and decimals to trade problems. Ratio and proportion. Conversion of different units.
- Algebra-simple equation, problems involving trade.
- Problems related to triangles, rectangles, square, circle, regular polygons etc.

4. ELECTRICIAN

- Scope of the electrician trade.
- Safety rules and safety signs. Types and working of fire extinguishers.
- First aid safety practice. Hazard identification and prevention.
- Personal safety and factory safety.
- Response to emergencies
-e.g. power failure, system failure and fire etc.
- Concept of Standards and advantages of BIS/ISI.
- Trade tools specifications.
- Introduction to National Electrical Code-2011.
- Allied trades: Introduction to fitting tools, safety precautions. Description of files, hammers, chisels hacksaw frames, blades, their specification and grades.
- Marking tools description and use.
- Types of drills, description & drilling machines.
- Various wooden joints.
- Marking tools; calipers Dividers, Surface plates, Angle plates, Scribers, punches, Surface gauges Types, Uses, Care and maintenance.
- Sheet metal tools: Description of marking & cutting tools.
- Types of rivets and riveted joints. Use of thread gauge.
- Description of carpenter's tools Care and maintenance of tools.
- Fundamentals of electricity, definitions, units & effects of electric current.
- Conductors and insulators.
- Conducting materials and their comparison.
- Joints in electrical conductors.
- Techniques of soldering. Types of solders and flux.
- Underground cables: Description, types, various joints and testing procedure. Cable insulation & voltage grades.
- Precautions in using various types of cables.
- Ohm's Law; Simple electrical circuits and problems.
- Kirchoff's Laws and applications.
- Series and parallel circuits.
- Open and short circuits in series and parallel networks.
- Laws of Resistance and various types of resistors.
- Wheatstone bridge; principle and its applications.
- Effect of variation of temperature on resistance.
- Different methods of measuring the values of resistance.

- Series and parallel combinations of resistors.
- Magnetic terms, magnetic materials and properties of magnet.
- Principles and laws of electro-magnetism.
- Self and mutually induced EMFs.
- Electrostatics: Capacitor- Different types, functions, grouping and uses.
- Inductive and capacitive reactance, their effect on AC circuit and related vector concepts.
- Comparison and Advantages of DC and AC systems.
- Related terms frequency, Instantaneous value, R.M.S. value Average value, Peak factor, form factor, power factor and Impedance etc.
- Sine wave, phase and phase difference.
- Active and Reactive power. Single Phase and three-phase system.
- Problems on A.C. circuits.
- Advantages of AC poly-phase system.
- Concept of three-phase Star and Delta connection.
- Line and phase voltage, current and power in a 3 phase circuits with balanced and unbalanced load.
- Phase sequence meter.
- current and Laws of electrolysis.
- Explanation of Anodes and cathodes.
- Types of cells, advantages / disadvantages and their applications.
- Lead acid cell; Principle of operation and components. Types of battery charging, Safety precautions, test equipment and maintenance. Basic principles of Electro- plating and cathodic protection
- Grouping of cells for specified voltage and current.
- Principle and operation of solar cell.
- I.E. rules on electrical wiring. Types of domestic and industrial wirings.
- Study of wiring accessories
- Switches, fuses, relays, MCB, ELCB, MCCB etc.
- Grading of cables and current ratings.
- Principle of laying out of domestic wiring.
- Voltage drop concept.
- PVC conduit and Casing- capping wiring system.
- Different types of wiring - Power, control, Communication and entertainment wiring.
- Wiring circuits planning, permissible load in sub- circuit and main circuit.
- Estimation of load, cable size, bill of material and cost.
- Inspection and testing of wiring installations.
- Special wiring circuit e.g. godown, tunnel and workshop etc.
- Importance of Earthing.

- Plate earthing and pipe.
- Earthing methods and IEE regulations.
- Earth resistance and earth leakage circuit breaker.
- Laws of Illuminations.
- Types of illumination system. Illumination factors, intensity of light.
- Type of lamps, advantages/ disadvantages and their applications.
- Calculations of lumens and efficiency.
- Classification of electrical instruments and essential forces required in indicating instruments.
- PMMC and Moving iron instruments.
- Measurement of various electrical parameters using different analog and digital instruments.
- Measurement of energy in three phase circuit.
- Errors and corrections in measurement.
- Loading effect of voltmeter and voltage drop effect of ammeter in circuits.
- Extension of range and calibration of measuring instruments.
- Working principles and circuits of common domestic equipment and appliances.
- Concept of Neutral and Earth
- Working principle, construction and classification of transformer. Single phase and three phase transformers.
- Turn ratio and e. m. f equation.
- Series and parallel operation of transformer.
- Voltage Regulation and efficiency.
- Auto Transformer and instrument transformers (CT & PT).
- Method of connecting three single phase transformers for three phase operation.
- Types of Cooling, protective devices, bushings and termination etc.
- Testing of transformer oil. Materials used for winding and winding wires in small transformer.

5. FASHION DESIGNING INSTRUCTOR

- **Introduction to Fashion Studies**
 - Definition of fashion
 - Terminologies of fashion
 - Fashion Life cycle
 - Fashion Markets
 - Theories of Fashion
 - Fashion Forecasting
- **Introduction to elements of design**
 - Depicting Principles of design
 - Fundamental& basics of color
 - Color wheel
 - Grey scale
 - Tints And Shades
 - Gradation
 - Color Schemes
 - Color Interaction
 - Concept and mood board development
 - Swatch Board Development based on concept and mood board
 - Specification sheet
- **Introduction to CAD (Pattern Making) in APPAREL**
 - Pattern drafting
 - Layout planning(markermaking)
 - Grading
 - Digitizing
- Introduction to CAD software like FASHION Studio
- **Fabric Embellishment Techniques:**
 - Tie and dye
 - Batik
 - Stencil Printing
 - Block printing
 - Hand Painting
 - Quilting
 - Patch Work
 - Appliqué
 - Fabric Styling
- **Basic knowledge of :**Necklines, collars, sleeves, Yokes, bows & ties, Caps and hats, pockets, belts
- **Fashion illustration**
- **Introduction to traditional textiles**
- **Introduction of portfolio.**

-Basic knowledge of portfolio making, flatsketches, mood board, storyboard, color story, presentation techniques.

- Introduction to draping, terminology
- **Dart manipulation:** Single/doubledart series
- Skirt Variations
- Necklines and armhole variations
- Style lines
- Cowls
- Fitted midriffs
- Collars
- Bias Cut Dresses
- Grading : Basic bodice ,skirt, trouser
- Creating designs/manipulating using bodice block/sleeve block and draping method
- Preparation of basic child and ladies bodice block, sleeve block, hip block
- Fitting problem and alteration in children garment and ladies garment

- Sizing and taking measurements specific to Men's wear
- Drafting Of Basic Shirt Block
 - Variation Of Shirts:Classic/slim fit shirt
 - Variations of cuffs collarsetc
- Drafting of Basic Trouser Block with Variations

- Introduction Cutting technology
- Introduction to Fusing technology
- Introduction to Sewing technology
- Introduction of Pressing technology

- Classification of cutting machines
- Classification of sewing machines
- Feed mechanism
- Classification of finishing equipment and their application of purpose of pressing, categories of pressing, pressing equipment and methods, stain removal, packaging
- Introduction to sewing machines attachments.

- Introduction to Fashion styling
- Brief knowledge of various events and their dressing styles
- Fashion marketing and management

6. HAIRSTYLING INSTRUCTOR

PART 1

I. PERSONALITY DEVELOPMENT

- Personal grooming
- Hygiene rules
- Professional ethics
- Communication skills (Different types of communication techniques in salon-Verbal-language, English knowledge. Non- verbal- visual poise, body language, gesture, Client consultation, telephone etiquettes)

II. SERILIZATION& SANITIZATION

- Purpose
- definition
- Methods
- Safety precaution/dos and donts

III. HAIR :

- Hair growth cycle
- Purpose of removing superfluous hair
- Definition and methods of epilation depilation
- Product knowledge
- Allergy test
- Client consultation
- Procedure
- Contra-actions
- Contra-indications
- Safety precautions/dos & donts
- After care/home care

IV BASIC HAIRSTYLING

- Purpose
- Selection of tools equipments & cosmetics
- Client consultation
- Knowledge of hairstyling techniques as:
 - Rolls
 - Twisting
 - Braiding
 - Curls
- Safety precautions
- After care

V. THERMAL HAIRSTYLING

- Purpose
- Selection of tools, equipments & cosmetics

- Client consultation
- Types of thermal styling equipments :
 - Hairdryer
 - Crimping rods
 - Straightening rods
 - Electric rollers
 - Curling rods
- Safety precautions
- After care

VI. SCALP MASSAGE, SHAMPOOIN/CONDITIONING, RINSING

- Purpose
- Client consultation
- Scalp analysis
- Knowledge of different gadgets for scalp treatment
- Product knowledge
- Scalp manipulations
- Benefits
- Safety precaution
- After care

VII. HAIRCUTS

Hair texture

- Sectioning
- Facial shapes
- Hair cutting techniques
- Elevation
- Selection of tools and equipments
- Product knowledge
- Client consultation
- Knowledge of types of basic haircuts as:
 - One length
 - 'U' cut
 - Blunt cut
- Client consultation
- Procedure
- Safety precaution
- After care

VIII. HAIR PROBLEMS AND TREATMENTS

- Hair structure
- Types of hair
- Hair and scalp disorders & causes for:
 - Dandruff
 - Oily hair
 - Split ends
 - Dry hair

- Falling hair
- Chemically treated hairs
- Damaged hair

- Product knowledge
- Client consultation
- Procedures with use of various equipment
- Safety precautions
- Aftercare

IX. ADVANCE HAIR STYLING

- Purpose
- Knowledge of advance hair styling according to facial shapes, length, density and texture
- Product knowledge
- Selection of tools, equipment & styling products.
- Client consultation
- Knowledge of styling with the help of hair extension, hair accessories & electrical equipment.
- Safety precautions
- After care

X. ADVANCED HAIR CUTS

- Sterilization & sanitation
- Hair texture
- Sectioning
- Facial shapes
- Special cutting techniques as:
 - Precision hair cutting
 - Notching
 - Slicing
 - Elevation
 - Selection of tools & equipment
- Client consultation
- Procedures of all types of advance haircuts as:
 - Forward graduation
 - Reverse graduation
 - Razor cut
 - Layer cut
 - Inversion layers/ variations
 - Graduated bob
 - Classical bob
 - Round layers
- Gents barbering-scissors over comb/ clipper
- Safety precautions
- After care

XI. HAIR CHEMICAL SERVICES

- Hair texture
- Client consultation
- Product knowledge
- Purpose of rebounding
- Patch test

- Strand test
- Precautions to be taken before giving all chemical services
- Purpose of perming
- Preparation
- Techniques of perming
- Purpose of hair coloring
- Principles of colour
- Classification of colors
- Benefits of coloring
- Special effects of coloring techniques as:
 - Frosting
 - Tipping
 - Slicing
 - Foil technique
 - Comb technique
 - Global coloring
- Safety precautions
- After care

7. HORTICULTURE EXTENSION ASSISTANT

- Scope and importance of Horticulture and Horticultural crops, area and production, imports and exports, nutritive value of horticultural crops. Classification of Horticultural crops. Agro-climatic Zones of India and Nagaland in relation to Horticultural crops. Scope for Horticultural development in Nagaland and factors limiting horticultural crop production.
- Nursery techniques; different propagating structures; Bud wood certification, nursery registration Act. Orchard management, pollination & fruit set problems in orchard, Principles, planning and layout of Orchards, fencing, wind breaks, spacing, systems of planting and planting densities, propagation; training and pruning of fruit crops- principles and methods, plant growth regulators; method of irrigation and fertilizer application; cropping systems, crop regulation in relation to cropping system; rejuvenation of old orchard and top working. Methods of plant propagation-Sexual & Asexual – their advantages and disadvantages; Incompatibility; seed dormancy; seed treatment, specialized parts of propagation, micro-propagation.
- Production Technology of major Fruit crops, pre and post-harvest management of major tropical, subtropical and temperate fruit crop, value addition and processing, marketing. Crop improvement, pest and disease management in Fruit crops.
- Vegetable crop- role in human nutrition. Production technology of important tropical and temperate vegetable crops. Vegetables seeds production, techniques of raising nursery in different vegetable crops; Breeding methods and crop improvement of vegetable crops; Physiological disorder; Pests and disease of vegetables.
- Scope and importance of commercial Floriculture. Production technology of major loose flower crops. Production technology and post-harvest management of major cut flowers. Physiological disorders; postharvest management of cut flowers; Techniques for flower drying; landscaping- Basic principles and elements of land scape design, principle of gardening. Gardens- Special types, components, structures, adornments, methods of designing, lawn making and plants for landscaping. Flower arrangement; Bio aesthetic planning; Bonsai culture. Herbal gardens, Aeroponics, Hydroponics, terrace gardening, urban and Peri-urban Horticulture. Protected cultivation of flowers and vegetables.
- Production technology, Post harvest management and value addition of major Spices, condiments and plantation crops. Medicinal and aromatic crops cultivation in India and

Nagaland- Production Technology, harvesting and processing, chemical composition, extraction, use of important medicinal and Aromatic crops.

- Post harvest technology in horticultural crops, maturity indices, harvesting, handling, grading of fruits, vegetables, cut flowers, plantation crops, medicinal and aromatic plants. Pre harvest factors; deterioration-Physiological and biochemical changes. Post-harvest treatments; quality parameters and specifications; Storage, packaging and transport; Food Processing techniques. Principles and methods of preservation of fruits and vegetables, Preparation of various products from fruits and vegetables; Food spoilage; Quality control of processed products, govt. policy on import and export of processed fruits and vegetables.
- Insects Pest of fruits, plantation, medicinal, Aromatic crops, vegetable, Ornamental and spice crops. Integrated Pest Management. Nematode pests and their management, Apiculture, Sericulture, lac culture.
- Plant diseases, pathogens, their survival and spread, disease symptoms, etiology and plant disease management. Integrated Disease management practices in Fruits, vegetables, Flower crops, medicinal and Plantation crops. Mushroom cultivation- Pest and disease management.
- Importance of soil, soil genesis, classification and morphology, soil sampling and testing, Plant nutrients- macro and micro nutrients, nutrient accumulation, nutrient uptake and nutrient removal, Stout criteria of essentiality, essential elements- classification, functions. Deficiency symptoms and remedial measure. Organic matter and their importance, humus – Types, importance of humus, manures (organic & inorganic) and manuring. Fertilizers- definition and classification, difference between organic manures and fertilizers, classification of fertilizers, fertilizer scheduled- time and method of application, fertilizer use efficiency. Problem soils- causes and their reclamation. Biofertilizers and Bioagents, Integrated Plant Nutrient management.
- Structure of plant cells and organs; Principles of plant genetics; Mendel laws; gene action, mutations; chromosomes; cell division, DNA, RNA and protein synthesis; linkage and crossing over; Chromosomal aberrations. Plant Bleeding – Scope and importance; floral biology, emasculation and pollination techniques in horticultural crops.
- Plant genetic resources- application in crop improvement; modes of pollination and reproduction. Methods of breeding in self, cross and vegetatively propagated crops. Self incompatibility and male sterility. Breeding objectives, methods and important concepts

- of breeding, procedures of varietal and hybrid development in major fruit, vegetables, ornamental and plantation crops. Breeding for insect, disease and drought resistance.
- Plant biotechnology-sterilization techniques; Plant tissue culture and genetic engineering methods and application in crop improvement. Gene transfer methods, transgenic plants; molecular markers; marker assisted selection. Seed technology, seed quality-seed classes-Deterioration of crop varieties. Seed production of major horticulture crop. Seed Certification seed act etc, IPRs; Seed storage, Seed treatment; drying and processing of seeds.
 - Classification of weeds, propagation and dissemination; concept of weed prevention, control and eradication; Integrated Weed Management in major horticultural crops, Organic production requirements, Biological intensive Nutrient Management, integrated disease and Pest Management in Horticultural crops. Classification of Agro/Horti-Forestry systems. Water management-water requirement of different horticultural crops, various irrigation methods – drip, sprinkler, fogging etc water use efficiency, Evapo-transpiration, water stress, life-saving irrigation, scheduling of irrigation. Plastic culture and mulching. Organic Farming, Precision Farming, Integrated Farming Systems.
 - Plant Bio Chemistry-Proteins, lipids, carbohydrates, enzymes and plant pigments- their physical and chemical properties. Mode of action and metabolism of carbohydrates, seed Physiology, structure and development, physiological maturity, harvestable Maturity, seed viability and vigour; water relations in plants; Plant nutrition, Physiological role of plant nutrients; Photosynthesis, Seed Dormancy; Physiology of flowering, pollination, fruit set, fruit drop- Causes and Prevention, unfruitfulness associated with external and internal factors; Plant growth regulators, Role of plant growth regulators and their commercial application in Horticulture. Micro-biology- General properties of micro-organisms. Biogas production, Microbial inoculants, Micro bio pesticides; microbial agency for control of plant disease.
 - Farm power – sources, implements and equipment used in farm operations. Surveying and levelling; soil erosion; drip and sprinkler irrigation systems, water harvesting structures and water shed development. Natural resources, ecosystem, biodiversity, environmental pollution and global warming. Horticultural waste management, climate change, Environmental protection Act.
 - Statistics; frequency; measures of central tendency, dispersion; testing of hypothesis; correlation and regression; experimental designs. Computers-anatomy operating systems;

WINDOWS-MS OFFICE-MS ACCESS-MS WORD-MS POWER POINT-MS EXCEL.

- Division of economics; economic systems; classification of goods, utility, Demand & supply; factors of production; Theories of population; capital, theories of interest. Farm management; various economic principle applied to farm management, cost and income measures, types of farming, farm planning; farm records, capital budgeting techniques. WTO.
- Extension education-teaching and learning; Audio-visual aids; rural development; sociology; rural sociology-education psychology-transfer of technology-farm women and rural youth-programme planning process-participatory rural appraisal-leadership management and administration-human resource development. Forms and methods of communication, group communication methods; entrepreneurship development, small and medium enterprise (SMEs/SSIs), SWOT analysis, Public and private partnerships. Export and import policies relevant to Horticultural sector, Globalization and emerging entrepreneur environment.

8. PHARMACIST

- Human Anatomy and Physiology I– Theory
- Pharmaceutical Analysis I
- Pharmaceutics I
- Pharmaceutical Inorganic Chemistry
- Communication skills
- Remedial Biology/ Remedial Mathematics
- Human Anatomy and Physiology II
- Pharmaceutical Organic Chemistry I
- Biochemistry
- Pathophysiology
- Computer Applications in Pharmacy
- Environmental sciences
- Pharmaceutical Organic Chemistry II
- Physical Pharmaceutics I
- Pharmaceutical Microbiology
- Pharmaceutical Engineering
- Pharmaceutical Organic Chemistry III
- Medicinal Chemistry I
- Physical Pharmaceutics II
- Pharmacology
- Pharmacognosy and Phytochemistry I
- Medicinal Chemistry II
- Industrial Pharmacy I
- Pharmacology II
- Pharmacognosy and Phytochemistry II
- Pharmaceutical Jurisprudence

9. PHYSICAL EDUCATION TEACHER

- History, Principles and foundation of Physical Education
- Yoga Education
- Anatomy and Physiology
- Educational Technology and Methods of Teaching
- Health Education and Environmental Studies
- Organization and Administration
- Officiating and Coaching
- Contemporary issues in physical education, fitness
- Sports Nutrition and Weight Management
- Sports Medicine, Physiotherapy and Rehabilitation
- Measurement and Evaluation in Physical Education
- Theory of sports and game

10. PLUMBER TRADE

- Importance of safety and general precautions required for the trade.
- Importance of the trade.
- Types of work to be done by trainees in the institute.
- Scope of a plumbing work.
- Types of services have to plan.
- Basic Bench fitting.
- Plumber's common hand tools - names, description and material from which they are made.
- Description, types and uses of holding device, hammers & cold chisels, cutting tools.
- Description of simple fitting operations hacksawing, punching and filing.
- Types of files used commonly.
- Marking instruments and their use of simple drilling machine.
- Method of using drills.
- Description of simple bench drilling Machine.
- Description of Grinding and Chisel.
- Description of different types of locking and fastening devices.
- About different types of pipes - GI, CI, DI, PVC/CPVC, PPR, AC and HDPE etc.
- About different Types of
Pipe Fittings :- Socket, Elbow, Tee, Union, Bend, Cap, Plug, Cross, Ferrule etc.
- About different types of Thread cutting.

Carpenter works :-

- Description and uses of Carpenter's hand tools used for simple operations such as marking, sawing, planing and making simple joints.
- Common types of wood - their description and use.

Gas Welding :-

- Purpose of Gas welding.
- Method of gas welding.
Safety precautions to be observed - Methods of soldering and brazing - fluxes used &
- Types of fluxes precautions to be observed.
- Hard & soft solders - their properties, composition and uses.

Mason's works :-

- Names and description of Mason's hand tools and their uses.
- Method of making holes in walls and floors.
- Types of tools used and various Processes.
- Concept of bricks, lime and cement.
- Preparation of mortars with various materials of varying composition.
- Common brick joints.
- Description of bonds.

- Scaffolding & plastering.
- Define Plain cement concrete, RCC and its proportion,
- Grades of coarse aggregate and fine aggregate.
- Knowledge of water proofing compound.
- Knowledge of Building Plan and Cross section of wall.
- Identify plumbing services required for each type of building according to usage.
- Description of plumber tools and Equipment-Ratchet brace, Threading die, Pipe wrench, Sliding wrench, Spanner set, Chain Wrench etc. and their safety.
- Care & use of tools.
- Pipes of different kinds
- Method of Pipe bending in different dia.
- Plumbing Symbols and Code for Tools & Materials on water line.
- Equipment and tools for hot gas welding and electric hot plate for PPR pipe joints.
- Equipment and tools for hot gas welding and electric hot plate for PPR pipe joints.
- Types of fittings for different joints & different pipes:- CI, HCl, AC, AC Pressure, DI, GI Pipes.
- Joints :- Flange joint, Socket joint with lead, Detachable joint, Socket & Spigot joints etc.
- Description of pipe fittings.
- Methods of joining and their uses.
- Precautions to be taken while fixing
- Different kinds of Joints, Fittings and Materials in joining pipes :- PVC/CPVC, PPR and HDPE etc.

Composition of Water :-

- Sources of water: Hard & Soft water, temporary hardness & permanent hardness.
- Impurities of water – Organic and inorganic impurities.
- Water purification stages and methods.
- Static water pressures and measurement of pressures. Bursting pressure,
- Expansion of water on freezing and heating.
- Bernoulli's principles
- Pascal's law.
- Pressure of water on the sides of cistern or tank.
- Water hammer in pipes.
- Use of hummed and asbestos pipes of different sizes.
- Method of laying out pipes alignment and joining.
- Description of various pipe joints- straight, Branch, Taft and blow, Expansion joints. Solders and fluxes used in joints.
- Description of Plumber's materials Lead, tin, Zinc, solder, copper, red lead etc. and their uses.
- Water supply system of a small town.
- Description and types of pumps viz. suction pump, Centrifugal pump etc. Contamination of water in a well.
- Description of pipe dies, their uses, care and precaution.
- Metric specification of various pipes.
- Standard pipe threads.

- Method employed for bending, Joining and fixing PVC pipe.
- Joining material for water and gas pipes.
- Use of blow lamp.
- Inspection chamber, septic tank, description of drains, cesspools, soak pits etc.
- Types of traps
- layout of drainage system
- Method of bending pipes by hot and cold process.
- Method of bending pipes by hot and cold process.
- Method of testing drainage lines.
- Method of dismantling and renewal of the valves and pipes. Leaks in pipes and noises in plumbing.
- Installation of water meters. Air lock in pipes and its removal.
- Description of cocks & valves-their types, materials & advantages for particular work.
- Erecting rain water and drainage pipe system,
- Installation of sanitary fittings, inspection and testing of water supply system.
- Pipe alignment and slope. -Prevention of water hammer.
- Storage tanks for general water supply propose.
- Test for water supply pipes.
- Description of sanitary fittings,
- general points to be observed when choosing sanitary.
- Method of bending galvanized and other heavy pipes.

Domestic drainage system:

- General layout, one pipe system, specifications of Materials required.
- Method of testing leakage. Different types of traps, ventilation, anti syphonage and sinks.
- About Fire hydrants and their fittings.
- Concept of heat and Temperature.
- Method of transmission of heat.
- Heating system by different thermal units. Domestic hot and cold water. General layout, specification of materials required and Connection of pipes to mains. Tracing leakage.
- Repairs to service main. Domestic boilers and Geysers.
- Method of ventilating pipe. Precaution against air Poisoning.
- Fixing of solar water system.
- Plumbing and sanitary symbols and plumbing codes for all tools and materials
- Sensor system for urinals and was basin, etc.
 - Corrosion - causes and remedies, prevention.
 - Corrosion due to electrolytic action.
 - Effect of water and frost on materials.
 - Layout of pipes as per drawing.
 - Analysis quantity measurement and abstract rate of plumbing and sanitary work.

Bill of Quantity and Estimation :-

- Preparation of bill of quantity.
- Preparation of Estimation.

11. SECTIONAL OVERSEER

BUILDING MATERIALS:

- Brick: Composition, Classification, manufacturing process and uses.
- Concrete: Composition & promotion of ingredients, mixing and placing, water cement ration.
- Timber: Classification & structure, defects, disease & decay, seasoning & use.
- Paint, Varnished & Distemper: Purpose of painting, ingredients of paint & varnished, purpose of applying distemper & process of distempering.

BUILDING CONSTRUCTION:

- Bearing Capacity of Soil: Determination of bearing capacity of soil, method improving bearing capacity of soil.
- Foundation: Definition, load on building, types of building foundation.
- Stair Case: Location, types of stair case & importance of stair case with reference to building construction.
- Roof.
- Details of Doors & Windows.

SURVEYING:

- Chain Survey: Definition, principles of chain survey, error due to incorrect ranging, error in length. Numerical problems.
- Compass Survey: Definition, basis difference between chain & compass survey, bearing of lines, types of meridians, whole circles & quadrantal bearing. Numerical problems.
- Leveling: Definition of different terms in leveling methods of finding out reduced level, fields book recording, effects of curvetion & refraction. Numerical problems.
- Contouring: Definition, uses and characteristics of contour, methods of contouring.
- Plane Table Surveying: General description, accessories of place table, setting up of place table, orientation, two point & three point problem.

HYDRAULICS:

- Hydrostatics: Density, specific gravity, surface tension viscosity & their units, definition of pressure, intensity of pressure, atmospheric pressure, gauge pressure, total pressure, centre of pressure, buoyancy, centre of buoyancy, metacentre & metacentric height. Numerical problems.
- Hydrodynamics: Basic equation of fluid flow & application, equation of continuity of liquid flow, Bernoulli's theorem & its application, venturimetre, orifice meter, pitot tube. Numerical problems.
 - a. Definition of various hydraulic co-efficients and their relationship. Numerical problems.
 - b. Difference between notches and weirs deduction of discharge formula for different types of notches. Numerical problems.
 - c. Flow of water through pipes, various losses in flow through pipes, derivation of formula. Numerical problems.
- Hydraulics Machines: turbine-general classification & principles. Types of pump-centrifugal pump & reciprocating pump.

IRRIGATION AND HYDRAULIC STRUCTURES:

- Introduction: Definition necessity for irrigation, types of irrigation in India.
- Rainfall and Run off: Measurement of rain, rain gauge, run off, factors effecting run off, characteristics of catchment area, factors effecting run off.
- Water Requirement of Crops: River, lake, well, tube well, yield from these sources, river head work.
- Storage Dam: concrete dam and earth dam, materials used for construction, advantages and disadvantages, construction of dams.
- Lift Irrigation: Wells, dupe wells and tube wells.

DESIGNING, DRAWING AND DETAILING:

- Introduction: Details of R.C.C. beam, slab, column, lintel, footing and stair case.
- Design of R.C.C. Member: beam, slab, column, column footing, numerical problems.
- Design of simple Steel Structure: types of joints, permissible stresses in rivets, design of joints, framed connection & seat connection. Numerical problems.

ESTIMATING:

- Introduction: General idea of estimating, use of standard estimating forms, use of schedule of rates.
 10. Earthwork: Unit of measurement, different methods of calculating quantity of earth. Numerical problems.
 11. Road Work: Unit of measurement, method of estimating various items of works.
 12. Masonry Work: Units of measurement, method of estimating brick masonry & reinforces brick masonry.
 13. Concrete Work: Unit of measurement, method of estimating mass-concrete and reinforced concrete work and shuttering.
 14. Rate Analysis: analysis of rates of brick, plain cement concrete work, R.C.C. work, door, window, plastering, R.C.C. floor, white washing, shuttering, D.P.C. & carriage of materials.
 15. Types of Estimate: Plinth area estimate, cubic rate estimate, detailed estimate, revised estimate, supplementary estimate, annual repair estimate, contingency and work charged establishment, departmental charge, bill of quantities & costing. Numerical problems.

12. SOFT SKILL INSTRUCTOR

UNIT – I

1. Soft Skills: An Introduction – Definition and Significance of Soft Skills; Process, Importance and Measurement of Soft Skill Development.
2. Self-Discovery: Discovering the Self; Setting Goals; Beliefs, Values, Attitude, Virtue.
3. Positivity and Motivation: Developing Positive Thinking and Attitude; Driving out Negativity; Meaning and Theories of Motivation; Enhancing Motivation Levels.

UNIT -2

1. Interpersonal Communication: Interpersonal relations; communication models, process and barriers; team communication; developing interpersonal relationship through effective communication; listening skills; essential formal writing skills; corporate communication styles – assertion, persuasion, negotiation.
2. Public Speaking: Skills, Methods, Strategies and Essential tips for effective public speaking.
3. Group Discussion: Importance, Planning, Elements, Skills assessed; Effectively disagreeing, Initiating, Summarizing and Attaining the Objective.
4. Non-Verbal Communication: Importance and Elements; Body Language.
5. Teamwork and Leadership Skills: Concept of Teams; Building effective teams; Concept of Leadership and honing Leadership skills.

UNIT -3

1. Interview Skills: Interviewer and Interviewee – in-depth perspectives-Before, During and After the Interview. Tips for Success.
2. Presentation Skills: Types, Content, Audience Analysis, Essential Tips – Before, During and After, Overcoming Nervousness.
3. Etiquette and Manners – Social and Business.
4. Time Management – Concept, Essentials, Tips.
5. Personality Development – Meaning, Nature, Features, Stages, Models; Learning Skills; Adaptability Skills.

UNIT – 4

1. Decision-Making and Problem-Solving Skills: Meaning, Types and Models, Group and Ethical Decision-Making, Problems and Dilemmas in application of these skills.
2. Conflict Management: Conflict - Definition, Nature, Types and Causes; Methods of Conflict Resolution.
3. Stress Management: Stress - Definition, Nature, Types, Symptoms and Causes; Stress Analysis Models and Impact of Stress; Measurement and Management of Stress
4. Leadership and Assertiveness Skills: A Good Leader; Leaders and Managers; Leadership Theories; Types of Leaders; Leadership Behaviour; Assertiveness Skills.
5. Emotional Intelligence: Meaning, History, Features, Components, Intrapersonal and Management Excellence; Strategies to enhance Emotional Intelligence.

13. UNDER GRADUATE HINDI TEACHER

1. Hindi Literature portion which includes class 12 level prose , poetry & history.

(हिंदी साहित्य भाग जिसमें 12वीं कक्षा स्तरीय गद्य, पद्य एवं साहित्य।)

2. Hindi Grammar. Includes language, dialect, types of language, letter, word, sentences and parts of speech like noun, pronoun, verb, adjective, adverb, preposition, conjunction and interjection, case, tense, prefix, suffix, voice, compound, coalescence, translation, idioms & phrases, letter writing, comprehension, précis writing, essay writing . punctuation etc,

(हिंदी व्याकरण: जिसमें भाषा, बोली, भाषा के प्रकार, वर्ण, शब्द, वाक्य तथा व्याकरण के प्रकार संज्ञा, सर्वनाम, क्रिया, विशिष्टण, क्रियाविशेषण, संबंधबोधक, समुच्चय बोधक, विस्मयाधि बोधक, कारक, काल, उपसर्ग, प्रत्यय, वच्य, समास, संधि, साथ ही अनुवाद, मुहावरी और कहावती, पत्र लेखन, सार लेखन, संक्षेपण लेखन, निबंध लेखन, विराम चिह्न आदि

3. General Knowledge.

सामान्य ज्ञान।

- a) Literature:

(साहित्य)

Prose section :

(गद्य भाग)

1. 'गबन' – लेखक, प्रेमचंद (Gaban – author, Prem chand)
2. पुरस्कार – लेखक, जय शंकर प्रसाद (Puruskar- author, Jay Shankar Prasad)
3. दो कलाकार– लेखक, मन्नु भंडारी (do kalaakaar- author, Mannu Bhandari)
4. नाखून क्यों बढ़ते हैं – लेखक, डॉ. हजारीप्रसाद द्विवेदी (Naakhoon khyung barte hain – author, Dr. Hajaariprasad twevedi.

- b) Poetry section

(पद्य भाग)

1. साखी – लेखक, कबीरदास (saakhi by kabir Das)
2. रहीम के दोहे – लेखक, रहीम (Rahim ke tohe by Rahim)
3. अधिकार – लेखक, महादेवी वर्मा (adhikaar by mahaadevi varma)
4. दोनों ओर प्रेम पलता है – मैथिलीशरण गुप्त (dono aur prem palta hain by Maithilisharan gupta)

14. SURVEYOR

- **Letter and Numbering:** Details layout of lettering, lines & dimensioning system.
- **Introduction of surveying,** types of surveying, use, application principal.
- **Scales:** Knowledge of different type of scale, determine of R. F. & uses of scales.
- **Different types of projection** views orthographic, sectional, isometric view.
- Use & application of conventional sign & symbol
- Uses of chain/ tape, testing of a chain & correction. Ranging (direct & indirect). Principle of chain survey, application. Terms used in chain Survey, Offset – types of offset, limit of offset, Field book – types of field book, entry of field book method of chaining in slopping ground. Calculation of area (regular & irregular figure), knowledge of site plan.
- Basic terms used in compass survey, Instrument & setting up. Conversion of bearing web to R. B. Calculation of included angle from bearing local attraction, magnetic declination and true bearing, closing error. Adjustment of closing error, precaution in using prismatic compass.
- **Plane table survey,** principle, merits and demerits, instruments used in plane table, survey setting up the plane table. (Centering, levelling, orientation), Methods of plane table survey (radiation, intersection, resection, traversing), error in plane table survey.
- **Introduction to Theodolite.** Types of theodolite, parts of Theodolite, terms used in Theodolite survey. Temporary adjustment of Theodolite, Angle measurement process. Reading of angels, field book entry of measured angles. Permanent adjustment to Theodolite . Traversing using theodolite (closed & open), traverse computation, determination of consecutive coordinates, independent coordinates, checking & balancing of traverse, preparation of gales, traverse table, computation of area using co-ordinates, calculation of omitted measurements.
- **Introduction to levelling** – Types of levelling instrument. Technical terms used in levelling. Temporary & permanent adjustment. Different types of levelling Entry of level book. (Reduced level calculation method) Curvature & refraction effect sensitivity of bubble tube. Common error and their elimination. Degree of accuracy.
- **Introduction of tachometry** & terms advantages & disadvantages. Tachometric constants & its determination of horizontal & vertical distances by various methods.
- **Contouring,** contour interval selection of contour interval, characteristics of contour, uses of contour, contouring by various method. Interpolation of contour by various methods, drawing of contours, computation of volume establishment of gradient by abney level.
- **Curves,** purposes, Types of curves- simple, compound, reverse, transition, vertical. Elements of simple curve. Various methods for setting out simple, compound, reverse, transition & vertical curve.
- Familiarisation with modern survey instruments. Parts of Total station, temporary adjustment of T. S., working procedure of T. S.
- Familiarisation with cadastral map, terms used in cadastral survey, preliminary knowledge for prepare a site plan. Calculation of area by digital planimeter.
- Types of Surveys for location of a road. Points to be considered during reconnaissance survey. Classification of roads and terms used in road engineering, alignment of roads, relative importance of length of road, height of embankment, depth of cutting and filling, road gradients, super elevation etc

PAPER III SYLLABUS FOR COMBINED STAFF RECRUITMENT EXAMINATION

- Knowledge for preparation of topographical map. Knowledge for preparation of cadastral map. Knowledge for preparation of a road project.
- Importance of cartographic projection. Uses of various types of cartographic projection for mapping.
- Introduction of GIS & GPS. Elements of GPS/DGPS. Observation principles. Sources of error & handling of error in GPS. Various types of GPS application. Concept and uses of survey software.
- Introduction to hydrographic survey, practice various methods of water depth measurement process, flow velocity measurement & determination of cross-sectional area of a river. Handling of echo sounder, current meter.
- Basic terms used in transmission line survey, justification criteria for constructing new line, marking process of tentative alignment, selection process of a good alignment. Process of detail survey and final location survey. Use of sag template, various type of tower, construction of tower foundation.
- Basic terms used in railway line project survey, justification criteria for constructing new line, marking process of tentative alignment, selection process of a good alignment. Process of detail survey and final location survey.
- Specification & uses of various types of building materials, types of foundation, knowledge of RCC works & other construction related items. Procedure to prepare a detail estimate.
- Basic knowledge of Auto CAD

15. VETERINARY FIELD ASSISTANT

- Specified Anatomy : Bodily Structure.
- Animal Physiology : Body system in Animal and Birds.
- Animal Production and Management-I
- Poultry Production and Management
- Animal Reproduction
- Animal Production and Management-II
- Minor Surgery
- Diseases of Animal-I
- Basics of Animal Nutrition
- Basics of Meat Inspection
- Parasites in Animal and Birds
- Diseases of Animal-II
- Anatomical terminology : Anatomy, Body structure, Osteology, Neurology, Angiology, Urology, Physiology, Haematology.
- Classification of Bones : Functions of skeletal system; skeletal of forelimb & hindlimb; vertebral formula; joints of forelimbs & hindlimbs.
- Myology : types of muscles.
- Digestive system : different organs of digestive system and their important functions.
- Urology : organs of urinary system.
- Angiology : Heart, Important arteries & veins, blood, serum.
- Anatomy of respiratory organs.
- Sense organs.
- Introduction to veterinary Physiology
- Digestion in domestic animals
- Avian digestion.
- Excretory system
- The mammary gland and lactation.

- Terminologies and definitions.
- Breeds of different species of farm animals.
- Breeds of dogs.
- Age of puberty and gestation period of different species of animals.
- Casting and Restraining of farm animals.
- Terminologies and definitions
- Different breeds of poultry viz : Chicken, Duck and Quail
- Different systems of poultry housing, its advantages and disadvantages.
- Vaccination schedule of poultry birds
- Incubation period of different poultry birds and ducks
- Common poultry diseases of economic importance.

- Male and Female reproductive organs and its functions
 - Fertilization, Oestrus cycle and oestrus period in different animals
 - Gestation periods in different animals
 - Parturition – stages of labour
 - Care of pregnant animals and new born animals
 - Anoestrus
 - Prolapse of uterus
 - Repeat breeding
 - Dystokia
 - Mastitis
 - Assisting a veterinary Surgeon during gynaecological operations.
 - Artificial Insemination in cows/pigs
 - Reproduction in birds
-
- Different housing systems of farm animals
 - Record keeping in farms
 - Definition of Pasteurized milk and skimmed milk
 - Management of farm animals
 - Transportation of farm animals
 - To perform branding, tattooing, tagging, grooming and brushing.
-
- Definition of surgery: Basic surgical instruments: simple sutures
 - Sterilization: importance, different methods
 - Wounds: close wounds, open wounds, maggoted wounds, bite wounds
 - Abscess: yoke gall, bedsore, gangrene, ulcer.
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- Anaesthesia
 - Fracture : causes, classification and first aid
 - Castration (Orchiectomy), Cryptorchidism
 - Hernia: causes, symptoms, differential diagnosis
 - Disease condition under different systems:

A .Digestive system	:	1.	Stomatitis
		2.	Diarrhea
		3.	Dysentery
		4.	Bloat
		5.	Constipation
B. Respiratory system	:		Pneumonia
C. Circulatory system	:		Anaemia

D. Urinary system	:	Cystitis
E. Skin	:	1. Ringworm, abscess
		2. Manage
F. Metabolic diseases	:	1. Milk fever
		2. Jaundice

- Feeds classification. Concentrates and roughages.
- Digestion of feeds in non-ruminants and ruminants.
- Feeding of calves, importance of colostrum feeding.
- Weaning practices and weaning age in different livestock.
- Importance of nutrients in animal health and production.
- Feeding of animals: Cattle/Pig/Goat/Poultry.
- Fodder Development:
Silage and Hay/Pasture Management/ Cultivate fodder crops like maize/oats/para-grass, hybrid-napier, cowpea, lucerne, sorghum, tree leaves.
- Tree leaves and crop residues for feeding animals.
- Commonly used indigenous fodder.
- Physical and biological examination (ante-mortem inspection).
- Humane killing of animals, objectives and methods, emergency slaughter.
- Cleaning and cutting of carcass.
- Disposal of inedible parts of the carcass hygiene and sanitation.
- Post mortem examination of edible parts of the carcass.
- Slaughter house managements – Different components and management aspects.
- Rigor mortis.
- Diseases : Economically important diseases of farm animals and pets.
- Vaccines : Uses, storage and transportation, vaccination Schedule.
- Definition : Antibiotics/Antipyretic/Analgesic/Anti diarrhoea etc.
- Introduction to veterinary parasitology.
- Type of parasites
 - a). Endoparasites.
 - b). Ectoparasites.

A. ENDOPARASITES

- Trematodes (Flatworms).
- Cestodes (Tapeworms).
- Nematodes (Roundworm).

B. ECTOPARASITES

- Lice, ticks and fleas: common ectoparasites of livestock and birds.

C. SOME IMPORTANT ZOOONOTIC DISEASES.

16. ASSISTANT FISHERY INSPECTOR**1. Fish Biology:****1.1. Classification, Structure and Physiology of Freshwater fish.**

1.1.1. Introduction & brief account of External and Internal anatomy of typical freshwater fish.

1.1.2. Taxonomy and classification of fishes and brief account on the identification of commercially important fishes, special emphasis on characters for easy field identification.

1.1.3. Brief account of the physiology of locomotion, digestion, respiration, Circulation, excretion and reproduction of fishes.

1.1.4. Study hard parts- scale, spine & otolith for determination of age.

1.2. Brief account of natural habitat, distribution, food and feeding habit, growth, maturity, fecundity, breeding and economic importance of the following species.

Indian major carps: Catlacatla, Labeorohita, Labeocalbasu and Chirrhinamrigala.

1.2.1. Exotic carps: -Hypophthalmichthys molitrix (Silver carp), Ctenopharyngodon Idella (Grass carp), Cyprinus carpio (Common carp).

1.2.2. Game fishes: Tor putitora, Tor tor.

1.2.3. Air breathing fishes: Clariasbatrachus, Heteropneustesfossilis, Channa sps., Anabas testudineus, Notopteruschitala, Notopterusnotopterus.

1.2.4. Cat fishes: Wallago attu

1.2.5. Other local varieties of fish: Osteobramabelangeri, Monopterus alba, Schizothoraxspp etc.

2. Inland Capture Fisheries:

2.1. Riverine fisheries: Present production and potential of major river System of India, conservation, improvement, exploitation and problem of riverine fisheries.

2.2. Cold water fisheries of hill streams: Principal species, suitable indigenous fish fauna - lines of development.

2.3. Reservoir Fisheries Development of reservoir and lacustrine fisheries, under exploitation and commercial exploitation, management and problem of reservoir fisheries, Dams, Weirs and passer type of passes, behaviour of fish in relation to migration.

3. Fishery Engineering:

3.1. Selection of fish farm site, their objectives & significance, typography landscape & contour survey, catchment area, source of water, soil classification & properties, high flood level, low

level, measurement of length, breadth, area & volume, erosion, seepage loss, evaporation loss, Surface run off communication, transportation & marketing facility, storage facility.

3.2. Designing: Pond- Types of ponds, Design of Fish Farm, Map Drawing, Design of Bundh, interbundh, approach road, protection, fencing, watchmen tower cum garage office cum godown, net drying hall, dewatering & rewatering by gravitational force of water.

3.3. Construction: Pond Dyke, Free board, Berm, Turfing, stone pitching, Feeding channel, ring bundh, cemented pond, overhead tank, drains, siphons, inlet, outlet, Fish screens, Sluice gate, siltation, boring, filtration, waste weir, anicut, Dam, Mini barrage or earthen dam, cross section of pond, Bund & Dyke, Levelling instruments in Fish Farm Engineering

3.4. Renovation of Pond, side slopes dressing & pitching, dewatering, desiltation, Annual repair, Major repair.

3.5 Reclamation of swamp: Line fixation, staking of Dykes, preparation of bund with locally available materials, preparation of pond and water exchange.

PART- II

Inland Culture Fisheries and Technique of Fish Seed Production

1. Inland Culture Fisheries:

1.1. Management

1.1.1. Nursery Pond Management

1.1.1.1. Technique, shape and size, nursery pond, pre-stocking management.

1.1.1.2. Control of Aquatic weeds- weed types, identification, de-weeding & control methods, etc.

1.1.1.3. Liming & manuring dose, method of application, etc., plankton identification, assessment of plankton, production etc.

1.1.1.4. Control of Aquatic insects- identification of harmful insects, control methods, material & doses etc.

1.1.1.5. Spawn stocking and supplementary feeding, spawn transfer & duration or stocking, different types of feed and dose, etc. Post stocking management.

1.1.1.6. Harvesting of Fry and transfer, duration of stocking.

1.1.2. Rearing Pond Management.

1.1.2.1. Shape and size of rearing pond, pre & post stocking management of rearing pond.

1.1.2.2. Pre- stocking and duration of stocking, supplementary feeding and doses etc.

1.1.2.3. Harvesting of fingerlings, methods of packing & transportation, acclimatization.

1.1.3. Stocking Pond Management

1.1.3.1. Fingerling stocking, duration of stocking, supplementary feeding and dose, etc.

1.1.3.2. Harvesting of fingerlings, transportation of live fish and stock transfer.

1.2. Fish Pathology-Common fish diseases and their preventive and remedial measures.

1.3. Different Culture Types.

1.3.1. Monoculture & polyculture, advantage & disadvantage, stock density, manipulation etc, harvesting and economics.

1.3.2. Intensive or composite Fish culture, principle, species cultures & specific characters, stocking density, specie ratio, manipulation etc, harvesting and economics.

1.3.3. Integrated fish farming, principle, species cultured & packing ratio, manipulation etc, harvesting etc.

1.3.3.1. Fish cum paddy culture

1.3.3.2. Fish cum duck rearing

1.3.3.3. Fish cum pig rearing

1.3.3.4. Culture of air breathing fishes

1.3.3.5. Cage culture

1.3.3.6. Fresh water prawn culture

1.3.3.7. Eel culture

PART- III

1. Technique of Fish seed production:

1.1. Natural spawning of Indian major carps, factors responsible for breeding, location of breeding ground, collection of spawn, net & technique, transport technology, wild breeding & controlled breeding.

1.2. Bundh breeding technique, wet and dry bundh, construction and preparation techniques, breeding and method of egg/spawn collection.

1.3. Breeding of common carps (*Cyprinus carpio*), selection of breeding, breeding techniques, preparation of egg, collectors or kakabans etc.

1.4. Induced breeding techniques of Indian major carps and Chinese carps, carp selection and identification of gravid breeders, chronological steps of the breeding techniques, pituitary gland and collection method, preservation, preparation of pituitary gland extract, administration of PG hormone, factors responsible for breeding, etc. breeding hapa, hand net, induced breeding equipment, collection of eggs, transfer of eggs.

1.5. Hatching techniques and hatchery management, identification of viable and dead eggs, fertilization rate, stages of development from egg to spawn, period of hatching, Spawn collection technique, economics of fish seed productions, hatching hapa, hatching in controlled environment, glass jar hatchery and other modern hatcheries.

2. Aquaculture:

2.1. Present status, prospects, perspective and limitation for future developments.

2.2. Commercially viable schemes for aquaculture.

PART-IV

FISHERY TECHNOLOGY

1. Inland Fishing crafts:

1.1. General definition of Fishing craft, classification of Fishing craft, principal dimension and terminologies, Indian boat types, Inland Fishing crafts of Manipur,

1.2. Boat building material- Selection of boat building material, seasoning, storage and use of timbers in boat building, treatment of timbers, modern materials used in boat building, type of construction and joints, timbers used in Manipur.

2. Inland Fishing Gears:

2.1. Principles of fishing gear, classification- Main fishing gears used in Inland waters, method of operation, preservation of fishing gears.

2.2. Fishing gear materials and synthetic material, properties of fibers, types of fibers, yarn, and numbering system of yarn.

2.3. Construction of twines and ropes- twist, direction of twist, braided netting twines and ropes.

2.4. Specification of twines and ropes- methods of specification.

2.5. Fishing gears accessories- Floats, sinkers, etc.

PART- V

Fishery Administration, Cooperative, Marketing, Extension

1. Fisheries Administration:

1.1. Objective and organization of fishery administration.

1.2. Fisheries administration in India, machinery at the centre and at the states.

1.3, Fisheries law and legislation.

2. Fishery Cooperative:

2.1. Fishery Cooperative in India, multipurpose and specialization, aim and objective and organization.

2.2. Problems of Fishery cooperative in India and scope for improvement, socio economies.

2.3. Fishermen communities and their socio-economic status, schemes to improve the socio-economic condition of fishermen.

3. Marketing:

3.1. General Principal of Marketing, physical facilities for marketing.

3.2. Problems of marketing practices in vogue and improvement, necessary in transport, handling and distribution.

4. Fishery Extension:

4.1. Aim and objective of extension organization.

4.2. Fisheries Extension programme and extension technique and methods.

17. LDA-cum-Computer Assistant (GIS) under the establishment of Directorate of Border Affairs.

1. **Introduction to Geoinformatics:** Remote Sensing, GIS, GNSS, Geoinformatics and related terms, advantages/limitations of Geoinformatics, applications of geoinformatics.
2. **Concept on remote sensing, platforms and sensor characteristics:** Definition, data (in situ / remote sensing), passive optical remote sensing, remote sensing platforms, passive/active, orbits, swath, nadir, sensor resolutions.
3. **Photographic and digital optical imaging:** Introduction, types of photographic Camera, types of photos, vantage point, digital image, digital sensor, detector, image acquisition, PAN, multispectral, hyperspectral, digital camera.
4. **Visual interpretation of photographic images:** Interpretation elements, interpretation of optical images, interpretation keys, mapping geographic features, practical
5. **Digital image processing (enhancement):** DIP system, digital image (data format, metadata/header file), image display (RGB), image reduction/magnification, colour combinations, transect extraction.
6. **Visual interpretation of digital images (using ERDAS Imagine):** Opening an image, zoom, pan, band combination, image info, pixel inquiry, multilayer arrangement, image co-ordinates, header file, save as, etc. Image profile (choosing appropriate band/s), contrast enhancement
7. **Concepts on co-ordinate system:** Map, scale, coordinate systems, sphere/spheroid, datums, projection, projection parameters.
8. **DIP (pre-processing and enhancement):** Georeferencing, RMS error, transformation and resampling, contrast enhancement, filtering
9. **Pre-processing (using ERDAS Imagine):** i) Georeferencing (image to image, image to ground, image to map) ii) Mosaicking, AOI tools, sub setting (spatial and spectral), filtering.
10. **Overview of GIS:** Introduction to GIS, definition of GIS, Components of GIS, functions and advantages of GIS
11. **Spatial data model and process of GIS:** Dimensions of GIS data, Conceptual (field/object) and logical (raster/vector/object oriented), Data sources, data capture (raster/vector/attribute), Raster and vector data processing.
12. **GIS using ArcGIS:** i) Image Georeferencing (image to image, image to ground), metadata editing, define coordinate system. ii) Geodatabase design, vector (generation/editing), add XY data, external data attachment, create relationship, query. iii) Topological relationships on vector data, georeferencing vector layers, ArcScan: automated R2V conversion.
13. **Image transformation (using ERDAS Imagine):** change detection, index/indices (iron oxide, NDVI), PC transformation, FFT, fusion
14. **Image classification using ERDAS Imagine:** i) Supervised classification, accuracy assessment ii) Unsupervised classification of NDVI image, post-classification filtering, post-classification vectorisation iii) Layer stack, supervised classification using optical bands in addition to PC images and indexed image iv) Classification of change image, pseudo color image preparation, single class classification, import/export.
15. Advance GIS using GEO Media.
16. Global Positioning System (GPS) in its application.

