

**Animal Husbandry and Veterinary Sciences and Fisheries (Subject Code-02)**

**PAPER – I**

(Part-A is compulsory for all candidates. In addition to Part-A. each candidate shall choose either Part-B or Part-C)

**Part – A:**

Dairy Production and Management, Comparison of Dairy Farming in India, with advanced countries, Economic Dairy Farming-housing, feeding, breeding and management of dairy animals.

Animal Nutrition-sources of energy, protein, minerals, vitamins and their metabolism. Deficiency of nutrients and their effect on the production performance of cattle, pig and poultry.

Semen collection, processing, preservation and artificial insemination in cattle and buffaloes.

Marketing of animal products in India, production, processing, packaging of milk, milk products and meat.

Major fish producing countries in the world, India's fish production, Types of water bodies-marine, brackishwater and freshwater, Aquatic resources of India-seas, estuaries, rivers, lakes, reservoirs, tanks and ponds, Importance of fisheries in the economy of the country, Fisheries planning and administration, Export of marine products, Exclusive economic zone and fisheries legislation.

**Part - B :**

Animal nutrition-energy sources, metabolism and requirements for maintenance and production of milk, meat, egg and wool, evaluation of feed as a source of energy, Sources of protein, metabolism and requirements, Energy protein ratio, Vitamins, hormones and growth stimulating substances – sources, requirements and inter-relationship with minerals.

Advanced animal nutrition, dairy cattle, nutrients and their metabolism with reference to milk production and its composition, Nutrient requirements for calves, heifer, dry and milking cows and buffaloes.

Nutrients and their metabolism with reference to poultry, meat and egg production. Nutrient requirements and feed formulation in poultry. Non-ruminant nutrition, nutrients and their metabolism with special reference to growth and quality of meat production, Nutrient requirements and feed formulation for pigs.

Growth and animal production – prenatal and postnatal growth, maturation, measures of growth factors affecting growth, conformation, body composition.

Hormonal control of mammary gland development, milk secretion and milk ejection, composition of milk of cows and buffaloes.

Male and female reproductive systems and their functions, Semen quality, preservation and artificial insemination, Factors affecting semen preservation, composition of diluents, sperm concentration, transport of diluted semen, Frozen semen production, preservation and utilization, Embryo transfer technology, Dairy farming-dairying under mixed farming and as a specialized farming, economic dairy farming. Capital and land requirement for dairy farm.

Sheep, goat, pig and poultry farming problems and prospects of sheep, goat, pig and poultry farming in India, Economic meat and egg production, General problems of sheep, goat, pig and poultry management.

Organisation of rural milk procurement, collection and transport of raw milk, quality testing, grading raw milk, quality storage, grades of whole milk, skimmed milk and cream, legal standards, sanitation requirements for clean and safe milk and for milk plant equipment.

#### **Part – C :**

Taxonomy, anatomy and biology of commercially important finfish and shellfish, Major marine fisheries, sardines, mackerel, Bombay-duck, tunas, elasmobranchs, penaeid and nonpenaeid prawns, lobsters and molluscs, Fisheries of rivers, reservoirs, brackishwater lakes and estuaries and their management, Fish population biology, Physical, chemical and biological oceanography; upwelling, Limnology; nutrient cycle; food cycle.

Freshwater aquaculture, Carp seed production-induced breeding and bundh breeding; different kinds of hatcheries, Carp seed transportation, Preparation and management of nurseries rearing and stocking ponds, Common aquatic weeds and their control, Eradication of predatory fishes and aquatic insects, Liming and fertilization, Supplementary feeding, Nutritional requirements of carps and prawns, Composite culture, Culture of cold water species, Fish diseases & treatment, Culture of penaeid and non-penaeid prawns, Life-history, Hatchery production of seed, Induced maturation, Seed transportation, preparation and management of production ponds, Common diseases and their treatment, Economics of carp and shrimp farming, Mariculture, culture of finfish in cages, Mussel, edible oysters, pearl oyster, clam and seaweed culture.

**Paper – II**

**Part-A is compulsory for all candidates. In addition to Part-A, each candidate shall choose either Part-B or Part-C**

**Part-A :**

Dairy Co-operative movement in India. Status of cross-breeding of cattle, sheep and pig in India, Draft animal power in India, important draft breed of Karnataka, their characters, utilization and preservation.

Fodder requirement in dairy cattle, fodder production and preservation, Feeding regime for young stock, bulls, heifers, breeding animals and pigs.

Extension methods adopted to educate farmers on dairy production, piggery, sheep and poultry production under rural conditions, Different possibilities and methods to provide self-employment to educated youth in rural areas.

Fish and snellfish, Protein nutritive aspects, Nutritive aspect of fish oil, vitamins and minerals, Fish in animal nutrition, Food poisoning caused by fish and fishery products, Polluted waters-contamination of fish, Salmonella problem in sea foods, Proximate composition of fish, Non-protein nitrogenous compounds, Important bacteria responsible for fish spoilage, products of spoilage, E. Coil as indicator of pollution and their significance in sea foods.

**Part – B :**

Genetics and Animal breeding, Probability applied to Mendelian inheritance, Concept and measurement of inbreeding and heterozygosity. Polygenic systems and laboritance of quantitative traits, heritability and reneatability, genetic and environmental Correlations, Gene frequency and its estimation and forces changing the gene frequency, Hardy Weinberg's law, Genetic nature of difference between species, races and breeds, Resemblance between Breeding systems and mating systems, inbreeding, outbreeding, crossbreeding and its uses, Phenotypic assortative mating, Breeding for threshold traits, different types and methods of selection, their effectiveness and limitations, Evaluation of genetic gains through selection, General and specific combining ability.

Physiology of blood and circulation, respiration and excretion, Endocrine glands in health and diseases.

Most common cattle, sheep, goat, poultry and pig diseases, their etiology, symptoms, treatment and prevention.

Milk product technology-selection of raw materials and assembly, Production, processing, storing, distributing and marketing of milk products.

Testing, grading and judging milk products, ISI and Agmark specifications, legal standards, quality control and nutritive properties.

Meat hygiene : General principles and problems of meat inspection in India, diseases transmitted from animals to man, By-products from slaughter houses and their economic utilization, Jurisprudence of veterinary practice.

**Part - C :**

Post-mortem, changes in fish biochemical and microbiological spoilage of fish, Handling of fresh fish, on-board the vessel and at landing centers, sealing methods used for fresh fish-principles and importance.

Freezing of fish, historical developments, difference between chilling and freezing, methods of freezing, Freezents used in commerce, freezing curves, depression of freezing point, eutectic point. Mechanism of ice crystal formation and cell damage, rate of freezing, slow freezing versus quick freezing; advantages and quick freezing, Production styles of frozen fish, methods of thawing, thawing curve, glazing and packaging of frozen fish, quality of raw material and its effect on final products, Quality control method during processing and cold storage of sea foods.

Canning of fish – historical developments, advantages of canning compared to other methods, Raw material and submaterial characteristics and their suitability, General canning procedures, principles, of thermal processing, Method of canning, problems related to fish canning, Spoilage during storage, quality standard, plant sanitation and waste disposal.

Fish products technology – principles and methods of preparation of various fish paste products like fish sausage, fish ham, etc., Importance of elasticity in fish paste products, Fish muscle proteins and their role in elasticity formation, Suitability of different varieties of fish for the preparation of fish paste products, additives and preservatives used and their role, Role of nitrites in meat curing, Production of minced meat-method of preparation, preservation and uses, marienading of fish, method of preparation, preservation and uses. Differences between marienading and pickling.

Fish meal production raw material, handling and preservation of raw material, preparation of fish meal, storage, its use in animal nutrition, Fish oil and its use in foods, Fish silage and its use in animal nutrition, Fish hydrolysates, fish protein concentrate, insulin, pearl essence, leather, fish glue, gelatin, chitin, chitosan, shark fin rays and fish maws – methods of preparation and uses, non-edible uses of fish oil. Seaweeds-processing and utilization.

Indigenous and mechanized fishing crafts in India, Types of fishing gears, Properties of fishing gear materials and their identification, Construction of net webbing – types of mesh and webbing, shaping of webbing, hanging ratios, hung depth, net mounting, mending of webbing, model testing methods for fishing gears, Types of otter boards used in trawling, Floats, buoys, hooks and sinkers-types and materials used, Deck equipments-winch, towing blocks, gallows, Net handling devices-power blocks, triplex drums, net reels, rollers, line hauler and gurdies, Commercial fishing methods-traveling, line fishing, seining, gill-netting, trap fishing.

Principles of refrigeration, uses of refrigeration, refrigeration tone, sensible heat, latent heat, specific heat, simple vapour compression refrigeration system, Different types of freezers and their uses, different types of icemaking plants and their uses, Refrigerants used in commercial refrigeration systems; properties of refrigerants; leak detection of refrigerants.