

**ANNEXURE-II**  
**Paper –I [ SYLLABUS FOR WRITTEN EXAMINATION ]**  
**FISHERIES SCIENCE (P.G DEGREE STANDARD)**

**SUBJECT CODE: 329**

**UNIT- I: FISH TAXONOMY, ANATOMY, BIOLOGY, CAPTURE FISHERIES, FISH STOCK ASSESSMENT & POPULATION DYNAMICS**

Systematics – Commercially important aquatic fauna and flora – marine plants, corals, crustaceans, molluscs, echinoderms, finfishes, turtles and marine mammals - external morphology – Biochemical taxonomy – Anatomy of finfish, shrimps, crabs, bivalves, gastropods and cephalopods - circulatory, respiratory, nerves, urinogenital, endocrine and skeletal systems- sensory organs- reproductive biology, maturity stages, gonado somatic index, ponderal index, fecundity, sex ratio and spawning - eggs and larval stages and developmental biology -Fish biology – food and feeding habits – age and growth length/weight relationship – reproduction, maturation, breeding, spawning, fecundity, eggs and larvae and development – fish physiology, functions of different organ systems of finfish and shellfish- GIS and remote sensing in marine capture Fisheries, Fisheries laws and legislation ; Fisheries resources – important capture fisheries of the world, India, Tamil Nadu – Distribution, population dynamics, stock assessment, modeling, MSY, MEY – conservation of aquatic organisms – endangered aquatic animals and their conservation migration of fishes.

**UNIT-II: INLAND AQUACULTURE, COASTAL AQUACULTURE**

**MARICULTURE & AQUACULTURE ENGINEERING**

Freshwater aquaculture – site selection – construction of fish farms – cultivable species, carp, tilapia, murrel, catfish, freshwater prawn – culture techniques, monoculture, composite fish culture, - pre-stocking and post/stocking management – integrated fish farming – polyculture - sewage – fed fish culture - Role of cage and pen culture in enhancement of fish production from reservoirs - principles of organic cycling & detritus food chain,- use of agro - industrial waste & biofertilizer in aquaculture - cultivation of aquatic macrophytes in aquaculture - ornamental fish culture and breeding techniques of live bearers -barbs, gold fish, tetras, cichlids, Gouramis, fighter fishes and indigenous ornamental fishes – water recirculation system – commercial fish feed formulation, feeding methods –

Fish food organisms - green algae, blue green algae, spirulina, diatoms, infusoria, rotifers, cladocerans tubifex, artemia & earthworms; Coastal aquaculture- site selection – construction of fish farm – cultivable species, finfish- seabass, mullet, milk fish, grouper, cobia, snappers, Ayu, pearl spot; shellfish - tiger shrimp, white shrimp, mud crab, lobster, mussel, oyster, clam; seaweeds – culture techniques – cages and pens – Management of coastal aquaculture farms – sea ranching; Mariculture -open water cages- candidate species for mariculture; Aquaculture Engineering- land survey, survey equipments-types of dykes- types of ponds-types of canals-aerators – pumps.

### **UNIT-III: FISH GENETICS. FISH BIOTECHNOLOGY. FISH PATHOLOGY & AQUATIC HEALTH MANAGEMENT**

Modern trends in fish genetics – hybridization cryopreservation of fish gametes – pleiotropism, lethal genes- mutation-sex linked genes-chromosomal structure - aberrations- manipulation techniques- genetically and environmentally induced abnormalities -androgenesis - gynogenesis - polyploidy – genetic engineering – sex reversal – cloning – transgenic fishes – sex determination - cross breeding - cryopreservation of gametes; Fish pathology - Prognosis and diagnosis – bioremediation -probiotics- importance of biofilm, biofloc and periphyton in aquatic health management prophylactic measures – Molecular and immunological Techniques; Pharmacology- Drugs - principles of drugs action - adverse drugs effect- anti bacterial agents - antibiotics - antiseptics and disinfectants parasites – bacterial, fungal and viral diseases – therapeutants in aquaculture -pesticides, fungicides, algicides, hormones, anesthetics, flesh colour enhancer; Fish toxicology- phytotoxins -myco toxins - maximum residual limits; Fish immunology- antigensantibody interactions, defense mechanisms in fin fish and shell fish- vaccine development - whole cell vaccine - purified macro molecules - DNA vaccines- immuno - stimulants – ELISA.

### **UNIT- IV: FISH HATCHERY MANAGEMENT**

Brood stock management of finfish and shellfish –induced breeding – hypophysation of fishes - fish pituitary glands in breeding technique - synthetic hormones - sexual maturity and breeding season of different species – breeding techniques for IMC, exotic craps, mahaseers, trouts, tilapia, catfishes, grey mullets, milk fish, pearl spot, seabass, seahorse, groupers, pacu, cobia and pompanos - off season breeding of carps -shrimp hatchery management – carp

hatchery management – food and feeding of larval stages of important shellfishes  
 – culture of fish food organisms- water quality management in hatcheries –  
 nursery management – seed transport techniques.

## **UNIT-V:LIMNOLOGY,AQUATIC ECOLOGY & BIODIVERSITY, OCEANOGRAPHY AND AQUATIC POLLUTION & COASTAL ZONE MANAGEMENT**

Physico – chemical features of freshwater systems – ponds-lakes- streams -rivers  
 - indices of productivity of lakes - estimation of primary productivity - fresh water  
 aquatic plants ; Aquatic ecology: Energy flow - food chain - nutrient cycle -animal  
 relationships: symbiosis, commensalism , parasitism prey predator relationship,  
 host parasite relationship; Aquatic biodiversity: species diversity – genetic  
 diversity- habitat diversity - diversity indices -ecological niches - lagoons ,  
 estuaries, mangroves, coral reefs, flood plains, coastal wet lands, conservation of  
 marine habitats; Oceanography: Physico – chemical characteristics of sea water -  
 SST- TS- diagrams - waves, tides, currents - drift currents- Ekman spirals,  
 upwelling - gradient currents - thermocline - Major oceanic currents of the world  
 - EL Nino, tsunami -- oceanic sediments – manganese nodules; Aquatic pollution  
 – sewage & domestic wastes - sewage treatment - BOD - COD - Eutrophication -  
 red tides - pesticide pollution - organo chlorine and organo phosphate pesticides -  
 PCB - bioaccumulation- heavy metal pollution - bioremediation and phyto-  
 remediation - oil pollution - beach cleaning, microbial pollution - Bio-corrosion -  
 thermal pollution - radioactive pollution; Integrated coastal zone management -  
 GIS – impacts of human activities on costal and ocean area.

## **UNIT- VI: FISHING GEAR AND CRAFT TECHNOLOGY & EQUIPMENT ENGINEERING**

FAO classification of fishing gears – gear materials - properties of netting material  
 - twist -breaking strength - tensile strength -yarn numbering systems - direct and  
 indirect - tex -denier -metric - runnage -selection of gear materials for different  
 gears- Designing and fabrication of gears: gill nets, trawls, longlines, purse seines,  
 fish traps, trolling lines, light fishing, electrical fishing, fishing gear accessories -  
 floats, sinkers, buoys and anchors -shakles, thimbles - otter boards -G link-  
 killey's eye -shaping of webbing by braiding, cutting - all bar cut -T cut , N cut,  
 selvedge; Craft technology: Law of floatation- Archimedes principle- form co-  
 efficient - Simpson's rule, ships equilibrium, trim, list, TTC, moment of change of

trim by 1 cm, gross tonnage, net tonnage, backbone assembly of wooden board, steel board construction, FRP boat construction, deck layout of trawler, gill netter, longliner, purse seiner, views of boat- profile view-half breadth plan view, sectional view, off set table -water plane area, bulk head, stern tube, types of propeller, types of rudder, facilities required for boat building yard. Equipment engineering: deck equipments, winch, power block, net hauler, longline hauler, squid jigger; Electronic equipments: echo sounder, SONAR, RADAR, Radio telephone & GPS.

### **UNIT – VII: MARINE ENGINES. NAVIGATION AND SEAMANSHIP**

Types of diesel engines – two stroke and four stroke engine; starting, ignition, fuel supply, cooling, lubrication systems - Operation and maintenance; Navigational charts - Mercator projections- earth co-ordinates - Chart reading and fixing position - bearing , position , fix, light house - chart symbols- dead reckoning - piloting - parts of magnetic compass - magnetic errors - sextant - rules of the road applicable to fishing vessels- navigational lights - life saving devices- life jacket, life buoy, life buoyant apparatus, life raft and life boat - weather warning signals - storm signals- man over board procedures, distress signals -fog signals - navigational code flags- IALA buoyage system, cardinal and lateral marks, colours.

### **UNIT- VIII: FISH BIOCHEMISTRY AND FISHERIES MICROBIOLOGY**

Fish biochemistry – proximate composition of fish - protein metabolism- de-amination - de-carboxylation - free amino acids - essential amino acids -types of fish protein - non- protein nitrogen in fishes - fatty acids -PUFA - oxidation of fatty acids -Millard reaction; Fisheries Microbiology: microbial spoilage of fresh fish- indicators of microbiological quality- food borne pathogens- *Vibrio cholerae*, *V.parahaemolyticus*, *E.coli*, *Salmonella*, *Listeria monocytogenes*, *Clostridium botulinum*, *C perfringens*, *Campylobacter* and *staphylococcus aureus* - their occurrence, growth, survival, pathogenicity and toxins , Scombroid toxin, ciguatera toxin and puffer fish toxin , mycotoxin; microbial spoilage of canned & frozen products.

## **UNIT- IX: FISH PROCESSING, FISH BY PRODUCTS, FISH PROCESSING EQUIPMENTS & FISH QUALITY ASSURANCE**

Hygienic handling of fish –freshness testing- Rigor Mortis –fish processing methods: Drying, salt curing, smoking, icing, RSW, freezing, glazing, thawing, types of freezers - contact plate freezers - freeze drying, transportation of frozen fish – canning -Fish by products: fermented fish products, Fish sausage, Extruded products, battered and braided products; fish waste utilization: chitin, chitosan, fish hydrolysate, FPC, fish ensilage, fish maws, isinglass, shark fin rays, fish gelatin, seaweeds, agar agar, algin, carageenan, fish meal, fish oil; application of microwave technology in product development; Fish processing equipments: deboner, deskinner, fish sausage machine, canning machineries; Fish quality assurance: Application of HACCP concept in surveillance and quality assurance programmes for raw, frozen, canned, cured, irradiated, cooked and chilled, MAP and freeze dried products; Fish packaging technology: Types of packages and packing materials, Testing, labeling– packaging for retail sale and storage. Transport and handling devices – safety and legislation aspects of packing, labeling and bar coding.

## **UNIT- X: FISHERIES ECONOMICS, MARKETING & EXTENSION**

Economics of marine capture fisheries and fish production systems –domestic and export marketing – Contribution of fisheries to GDP-marine fishery regulations – importance of cooperatives – fishermen associations, NGOs and SHGs in fisheries development – Fisheries Co - management -types of primary and secondary data for statistical analysis for policy making – fisheries investment projects, finance and project planning – socio-economics of fisherfolk. Fisheries extension methods -Extension service for fisheries development – important fisheries development schemes and organizations – training follow up programmes – entrepreneurship development.

PAPER –I  
**ZOOLOGY**

(PG DEGREE STANDARD) CODE NO: 271

**UNIT I**

Non-chordate: General Organization - classification upto class level, Modern taxonomy. Shelled Protozoans, Economic Importance, Fossil Protozoans and their importance, Neuromotor system in ciliates. Origin of Metazoa - Theories and Evolution, Economic importance of Porifera, Polymorphism in Hydrozoa. Coral reefs - structure, formation and theories. Origin and evolution of Coelenterates. Origin and types of coelom in Bilateria. Effects of parasitism on the parasites and hosts in Helminthes and larval forms. Coelom and metamerism in Annelida, Mode of life in polychaetes. Larval forms and parasitism in Crustacea. Adaptive radiation in Gastropods. Larval forms of Echinodermata and their Significance. Retrogressive Metamorphosis, Neotany and affinities of Ascidian.

**UNIT II**

Chordate: Migration in Fishes, Accessory respiration in fishes. Adaptation in deep sea fishes. Electric Organs and electro-receptors in fishes. Origin and evolution of Amphibia. Conquest of Land - Adaptations to live on land - evolutionary significance of crocodiles. Adaptive radiation in birds - Migration in Birds. Evolution: Origin of life - Bio-chemical evolution - cultural evolution. Present status of Natural Selection. Adaptation and evolution in mammals. Wild life mammals in India and Conservation measures. Endanger species and current status. Wild life Act.

**UNIT III**

Cell and Molecular Biology: Cellular organization-Membrane, intercellular-structure and function-cellular organelles. Chromosomes, types and Organization of genes. Cell division, cell cycle and regulation. Cell communication and cell signaling. Structure of DNA and RNA. Genetic code, Replication and protein synthesis. Bio-Chemistry: Structure of carbohydrates, amino acids, proteins, lipids - Glycolysis and Krebs' cycle - oxidation, reduction - oxidative phosphorylation energy conservation and release - cyclic AMP-ATP - saturated and unsaturated fatty acids - cholesterol - enzymes, mechanism, action and kinetics. Vitamins, trace elements and micronutrients and coenzymes. Antioxidant enzymes. Hormones-classification, biosynthesis and functions.

**UNIT IV**

Bio-Physics: Microscopy-Principles of Phase, Electron Microscope, Polarising, Fluorescent, Interference Microscope. Photo – Electric Calorimetry, Freeze drying - freezing, Microtome, Fixation, staining techniques. X-ray - Diffraction, Ultra - Violet and infrared, Spectroscopy and Autoradiography. Instrumentation methods: Centrifugation, Electrophoretic and Chromatographic techniques. PCR, DNA finger printing, RFLP, RAPD, AFLP, FISH and GISH.

**UNIT V**

Genetics: Gene concept, one Gene - one polypeptide - concept, Enzyme regulation - Operon concept - GAL and LAC - Operon System. Population Genetics - Hardy - Weinberg Law Genetic Equilibrium. Radiation Genetics - mechanisms of Chromosomal breakage - Mutagens and Mutagenesis - Carcinogens and carcinogenesis - Human Genetics. Karyotype - Variation in Karyotypes with special reference to syndromes, Genetic counseling. Genetic Engineering - Present Status and it uses. Human genome project.

**UNIT VI**

Bio-Statics: Collection of data. Primary and secondary - compiling and sampling methods - frequency distribution, frequency tables - diagrammatic representation - variables - measures of control tendency. Standard deviation, Standard error - Correlation, regression, regression analysis - student's "t" test and *chi*-square test. Bio-informatics: DNA and Protein sequence analysis, Prediction functional structure, protein folding, Molecular docking, Metabolic and regulatory networks, General challenges and applications. SwissProt, NCBI: GENBANK, BLAST; Multiple Sequence Alignments.

**UNIT VII**

Physiology: With reference to mammals digestion, role of salivary gland liver, pancreas and intestinal glands in digestion, nutrition, balanced diet in man- assimilation, intermediary metabolism. Composition of blood- coagulation - Transport of oxygen, carbon dioxide, blood pigments-mechanism of respiration. Muscles, mechanism of muscle contraction, temperature regulation, acid, base balance and homeostasis. Nerve impulse conduction, neurotransmitters - receptors, photo, phono and chemo reception. Nephron and urine formation. Kidney stone formation. Comparison of excretion in fish, reptiles and mammals. Endocrine glands-testis, ovary and hypothalamo-hypophyseal gonadal relationship. Pheromones and reproduction. Bioluminescence, biological rhythms.

**UNIT VIII**

Immuno-Biology: Immune responses - Primary, Secondary and Theories. Immunity types - Innate - Acquired- cell mediated and Humoral immunity- Autoimmunity, Types of Antigens and immuno globulins. Vaccinations - ELISA, RIA Techniques. Developmental Biology: Gametogenesis, Fertilization: Significance, polyspermy Gynogenesis, Androgenesis, Parthenogenesis, Polarity, Symmetry, Radiant, Embryonic fields, Differentiation - Nuclear and Chemical factors, Inductors and organisers, Genes and organizers, Regeneration - Polarity and Gradient in regeneration. ART. Stem cell biology-sources, types and applications.

**UNIT IX**

Resource Ecology and Management, Renewable and Non-Renewable natural resources. Energy resources - conventional and non-conventional. Bioremediation. Habitat ecology. Wild Life conservation, Management and Acts. Air, Water, Soil, Soundpollutions. Laws related to Environment and Environmental Protection Act. Spaceecology and Radiation ecology. Climate changes and Global warming.

**UNIT X**

Economic Zoology: Parasitism and commensalism - protozoan parasites and diseases- helminthes parasites and diseases on man and domestic animals; Beneficial and harmful insects - insect pests on crops and stored products. Control methods. Pheromones and IPM. Sericulture, apiculture, lac culture, sea weed culture, poultry, pisciculture and induced breeding. Shell fisheries - fin and shells. Aqua culture practices in Tamil Nadu and their impact on the environment and on agriculture.

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**PAPER –I**  
**MARINE BIOLOGY**  
**(PG DEGREE STANDARD)**

**SUBJECT CODE: 294**

**UNIT – I: TAXONOMY AND BIOLOGY OF MARINE ORGANISMS**

Classification of marine fin and shell fishes - Important fishes of the world – Their identification; sea turtle and mammals – Classification and diagnostic characters. Food and feeding; age and growth and reproductive biology; fish eggs and larvae and developmental biology. Functional morphology of digestive, respiratory, circulatory, excretory and reproductive systems in fin and shellfish. Principles of immunology and Endocrine system.

**UNIT – II: MARINE CAPTURE FISHERY AND STOCK ASSESSMENT**

Classification, definitions of fishery zones and fishery resources – Neritic, benthic, demersal, pelagic & deep sea systems; world and Indian fishery resources; potential marine fishery resources of Indian EEZ. Population dynamics; mortality – Natality - theory of fishing - Catch Per Unit Effort (CPUE) - Maximum Sustainable Yield (MSY)- Maximum Economic Yield (MEY) - Fishery Maximum Economic Yield (FMEY) – Overfishing.

**UNIT – III: METEOROLOGY AND GEOGRAPHY**

Structure of atmosphere; weather and climate – Definition and concepts, characteristics and laws of black body radiation; solar radiations, its characteristics; vertical and horizontal heat balances; air temperature – Horizontal distribution; explanation of DALR, SALR and isotherms; general circulation – Monsoon characteristics, water in atmosphere, condensation; clouds and its classification; weather systems – FAO classification of fishery zones of world oceans.

**UNIT – IV: OCEANOGRAPHY (PHYSICAL, CHEMICAL AND BIOLOGICAL)**

Major divisions of marine environment; Physical properties of seawater -Thermal properties of seawater; concepts of sonar, channel and shadow zone; heat budget; T-S diagram; properties of Waves: types of waves and properties of ocean waves; Tides: Origin of the tides; Wind and Ocean circulation – Types of currents. Chemical properties of seawater: Concept of chlorinity and salinity of seawater; gases, organic and particulate matter. Origin, distribution of nutrients cycle and their

significance. Upwelling; manganese nodules. Primary and Secondary productivity of the coastal environment; Phytoplankton and Zooplankton: Classification, distribution, their role in coastal ecosystems and adaptations. Primary production and factors affecting primary production. Seaweed, seagrass, mangrove and coral ecosystems; Fouling and boring organisms.

#### **UNIT – V: MARINE POLLUTION AND COASTAL ZONE MANAGEMENT**

Types of pollution – Organic (domestic, municipal and industrial), heavy metals, radioactive, pesticide, oil and thermal; Treatment methods (primary, secondary and tertiary); Pollution indicators; role of pollution control board and prevention of pollution. Goals and purposes of coastal zone management; methods of coastal zone management and policies involved; Coastal Regulation Zone Act, Integrated Coastal Zone Management; International treaties and conventions.

#### **UNIT – VI: CULTURE OF COMMERCIALLY IMPORTANT MARINE FISH AND SHELL FISHES**

Present status of aquaculture in the world, in general and India, in particular; important cultivable species of fin and shell fishes; criteria for species selection; site selection for culture systems; components of aquaculture farms – Water intake and filtration systems; preparation of ponds – Water culture – Water quality parameters – Stocking – Feeding - Aquaculture systems – Land-based and open sea farming. Artificial feed formulation. Pond management; disease management; harvest and post-harvest technology. Marine Ornamental fishes – Setting up of aquarium - maintenance – Export potential and marketing.

#### **UNIT – VII: HATCHERY SEED PRODUCTION TECHNOLOGY**

Hatchery seed production of commercially important fin and shell fishes; collection and transport of seeds from natural environment; criteria for site selection and construction of hatcheries – Different components of hatcheries; operation and management; induced breeding and broodstock maintenance; cryopreservation; larval rearing and culture of live feed – Chlorella, nanoflagellates, Artemia, Rotifers and Daphnia; nursery rearing.

### **UNIT – VIII: NAVIGATION AND SEAMANSHIP**

Coastal navigation, distance and direction in navigation – Rules of the roads for fishing vessels; Navigational types and importance – Magnetic compass, Gyro compass, Sextant, bearing instruments; chart abbreviations and symbols; types of charts and chart reading; sounding instruments – Echo sounder; lead lines; electronic navigation and communication; radio-transmitters and receivers, VHF, SONAR, block diagram, Radio telephones, RADAR and GPS; bad weather conditions and warning signals.

### **UNIT – IX: DISASTER MANAGEMENT**

Global warming – Types of natural and man-made hazards in fisheries and aquaculture – Cyclones, floods, droughts, tsunami, El-Nino, algal blooms, avalanches, pollution destructions; Introduction of alien / invasive species; epidemics, landslides and laws of biodiversity; management strategies – Pre-disaster, during disaster and post-disaster – Prevention, preparedness and mitigation; post-disaster – Different ways of detecting and predicting of disasters, methods for assessment of initial and long-term damages, reconstruction and rehabilitation; prevalent national and global management practices in disaster management; agencies involved in monitoring and early warning – District, state, national and global level; uses of communication channels and media, disaster case studies.

### **UNIT – X: REMOTE SENSING, MARKETING AND CO-OPERATION**

Remote sensing satellites – Application of INCOIS data in capture fisheries; introduction of marketing – Market structure and functions – Fish markets – Demand and supply of fish – Price fixation in marine fish markets, hygienic handling of fishes, cold chain marketing – Resources, availability for marketing; principles and objectives of cooperation; cooperative movement in India, problem of fisheries cooperative management in relation to resources, production and marketing; role of fishermen cooperative societies in the upliftment of marine fishers

**PAPER -II**  
**SYLLABUS FOR WRITTEN EXAMINATION**  
**Part-A**

**கட்டாய தமிழ் மொழி தகுதித் தேர்விற்கான பாடத்திட்டம்**

**(கொள்குறி வினாவிற்கான தலைப்புகள்)**

**பத்தாம் வகுப்பு தரம்**

1. பிரித்தெழுதுதல் / சேர்த்தெழுதுதல்.
2. எதிர்ச்சொல்லை எடுத்தெழுதுதல்.
3. பொருந்தாச் சொல்லைக் கண்டறிதல்.
4. பிழை திருத்தம் (i) சந்திப்பிழையை நீக்குதல் ( ii) மரபுப் பிழைகள், வழுவச் சொற்களை நீக்குதல் / பிறமொழிச் சொற்களை நீக்குதல்.
5. ஆங்கிலச் சொல்லுக்கு நேரான தமிழ்ச் சொல்லை அறிதல்.
6. ஒலி மற்றும் பொருள் வேறுபாடறிந்து சரியான பொருளையறிதல்.
7. ஒரு பொருள் தரும் பல சொற்கள்.
8. வேர்ச்சொல்லைத் தேர்வு செய்தல்.
9. வேர்ச்சொல்லைக் கொடுத்து / வினைமுற்று, வினையெச்சம், வினையாலணையும் பெயர், தொழிற் பெயரை / உருவாக்கல்.
10. அகர வரிசைப்படி சொற்களை சீர் செய்தல்.
11. சொற்களை ஒழுங்குப்படுத்தி சொற்றொடராக்குதல்.
12. இருவினைகளின் பொருள் வேறுபாடு அறிதல்.  
(எ.கா.) குவிந்து-குவித்து
13. விடைக்கேற்ற வினாவைத் தேர்ந்தெடுத்தல்.
14. எவ்வகை வாக்கியம் எனக் கண்டெழுதுதல் - தன்வினை, பிறவினை, செய்வினை, செயப்பாட்டு வினை வாக்கியங்களைக் கண்டெழுதுதல்.
15. உவமையால் விளக்கப்பெறும் பொருத்தமான பொருளைத் தேர்ந்தெழுதுதல்
16. அலுவல் சார்ந்த சொற்கள் (கலைச் சொல்)
17. விடை வகைகள்.

18. பிறமொழிச் சொற்களுக்கு இணையான தமிழ்ச் சொற்களைக் கண்டறிதல் (எ.கா.) கோல்டு பிஸ்கட் - தங்கக் கட்டி.
19. ஊர்ப் பெயர்களின் மருஉவை எழுதுக (எ.கா.) தஞ்சாவூர் - தஞ்சை
20. நிறுத்தற்குறிகளை அறிதல்.
21. பேச்சு வழக்கு, எழுத்து வழக்கு (வாரான் - வருகிறான்).
22. சொற்களை இணைத்து புதிய சொல் உருவாக்கல்.
23. பொருத்தமான காலம் அமைத்தல்  
(இறந்தகாலம், நிகழ்காலம், எதிர்காலம்).
24. சரியான வினாச் சொல்லைத் தேர்ந்தெடு.
25. சரியான இணைப்புச் சொல்  
(எனவே, ஏனெனில், ஆகையால், அதனால், அதுபோல).
26. அடைப்புக்குள் உள்ள சொல்லைத் தகுந்த இடத்தில் சேர்க்க.
27. இருபொருள் தருக.
28. குறில் - நெடில் மாற்றம், பொருள் வேறுபாடு.
29. கூற்று, காரணம் - சரியா? தவறா?
30. கலைச் சொற்களை அறிதல் :-  
எ.கா.- Artificial Intelligence - செயற்கை நுண்ணறிவு  
Super Computer - மீத்திறன் கணினி
31. பொருத்தமான பொருளைத் தெரிவு செய்தல்
32. சொற்களின் கூட்டுப் பெயர்கள் (எ.கா.) புல் - புற்கள்
33. சரியான தொடரைத் தேர்ந்தெடுத்தல்
34. பிழை திருத்துதல் (ஒரு-ஓர்)
35. சொல் - பொருள் - பொருத்துக
36. ஒருமை-பன்மை பிழை
37. பத்தியிலிருந்து வினாவிற்கான சரியான விடையைத் தேர்ந்தெடு.

**Part – B**  
**GENERAL STUDIES (DEGREE STANDARD)**

**CODE NO.003**

**UNIT-I : GENERAL SCIENCE**

- (i) Scientific Knowledge and Scientific temper - Power of Reasoning - Rote Learning Vs Conceptual Learning - Science as a tool to understand the past, present and future.
- (ii) Nature of Universe - General Scientific Laws – Mechanics - Properties of Matter, Force, Motion and Energy - Everyday application of the basic principles of Mechanics, Electricity and Magnetism, Light, Sound, Heat, Nuclear Physics, Laser, Electronics and Communications.
- (iii) Elements and Compounds, Acids, Bases, Salts, Petroleum Products, Fertilizers, Pesticides.
- (iv) Main concepts of Life Science, Classification of Living Organisms, Evolution, Genetics, Physiology, Nutrition, Health and Hygiene, Human diseases.
- (v) Environment and Ecology.

**UNIT-II: CURRENT EVENTS**

- (i) History - Latest diary of events - National symbols - Profile of States – Eminent personalities and places in news – Sports - Books and authors.
- (ii) Polity - Political parties and political system in India - Public awareness and General administration - Welfare oriented Government schemes and their utility, Problems in Public Delivery Systems.
- (iii) Geography - Geographical landmarks.
- (iv) Economics - Current socio - economic issues.
- (v) Science - Latest inventions in Science and Technology.

### **UNIT- III: GEOGRAPHY OF INDIA**

- (i) Location – Physical features - Monsoon, rainfall, weather and climate - Water resources - Rivers in India - Soil, minerals and natural resources - Forest and wildlife - Agricultural pattern.
- (ii) Transport - Communication.
- (iii) Social geography – Population density and distribution - Racial, linguistic groups and major tribes.
- (iv) Natural calamity – Disaster Management – Environmental pollution: Reasons and preventive measures – Climate change – Green energy.

### **UNIT – IV: HISTORY AND CULTURE OF INDIA**

- (i) Indus valley civilization - Guptas, Delhi Sultans, Mughals and Marathas - Age of Vijayanagaram and Bahmani Kingdoms - South Indian history.
- (ii) Change and Continuity in the Socio - Cultural History of India.
- (iii) Characteristics of Indian culture, Unity in diversity – Race, language, custom.
- (iv) India as a Secular State, Social Harmony.

### **UNIT-V: INDIAN POLITY**

- (i) Constitution of India - Preamble to the Constitution - Salient features of the Constitution - Union, State and Union Territory.
- (ii) Citizenship, Fundamental rights, Fundamental duties, Directive Principles of State Policy.
- (iii) Union Executive, Union legislature – State Executive, State Legislature – Local governments, Panchayat Raj.
- (iv) Spirit of Federalism: Centre - State Relationships.
- (v) Election - Judiciary in India – Rule of law.
- (vi) Corruption in public life – Anti-corruption measures – Lokpal and LokAyukta - Right to Information - Empowerment of women - Consumer protection forums, Human rights charter.

### **UNIT-VI: INDIAN ECONOMY**

- (i) Nature of Indian economy – Five year plan models - an assessment – Planning Commission and Niti Ayog.
- (ii) Sources of revenue – Reserve Bank of India – Fiscal Policy and Monetary Policy - Finance Commission – Resource sharing between Union and State Governments - Goods and Services Tax.
- (iii) Structure of Indian Economy and Employment Generation, Land reforms and Agriculture - Application of Science and Technology in agriculture - Industrial growth - Rural welfare oriented programmes – Social problems – Population, education, health, employment, poverty.

### **UNIT-VII: INDIAN NATIONAL MOVEMENT**

- (i) National renaissance – Early uprising against British rule - Indian National Congress - Emergence of leaders – B.R.Ambedkar, Bhagat Singh, Bharathiar, V.O.Chidambaranar, Jawaharlal Nehru, Kamarajar, Mahatma Gandhi, Maulana Abul Kalam Azad, Thanthai Periyar, Rajaji, Subash Chandra Bose and others.
- (ii) Different modes of Agitation: Growth of Satyagraha and Militant movements.
- (iii) Communalism and partition.

### **UNIT- VIII : History, Culture, Heritage and Socio - Political Movements in Tamil Nadu**

- (i) History of Tamil Society, related Archaeological discoveries, Tamil Literature from Sangam age till contemporary times.
- (ii) Thirukkural :
  - (a) Significance as a Secular literature
  - (b) Relevance to Everyday Life
  - (c) Impact of Thirukkural on Humanity
  - (d) Thirukkural and Universal Values - Equality, Humanism, etc
  - (e) Relevance to Socio - Politico - Economic affairs
  - (f) Philosophical content in Thirukkural



- (iii) Role of Tamil Nadu in freedom struggle - Early agitations against British Rule - Role of women in freedom struggle.
- (iv) Evolution of 19th and 20th Century Socio-Political movements in Tamil Nadu - Justice Party, Growth of Rationalism - Self Respect Movement, Dravidian movement and Principles underlying both these movements, Contributions of Thanthai Periyar and Perarignar Anna.

### **UNIT – IX : Development Administration in Tamil Nadu**

- (i) Human Development Indicators in Tamil Nadu and a comparative assessment across the Country – Impact of Social Reform movements in the Socio - Economic Development of Tamil Nadu.
- (ii) Political parties and Welfare schemes for various sections of people – Rationale behind Reservation Policy and access to Social Resources - Economic trends in Tamil Nadu – Role and impact of social welfare schemes in the Socio - economic development of Tamil Nadu.
- (iii) Social Justice and Social Harmony as the Cornerstones of Socio - Economic development.
- (iv) Education and Health systems in Tamil Nadu.
- (v) Geography of Tamil Nadu and its impact on Economic growth.
- (vi) Achievements of Tamil Nadu in various fields.
- (vii) e-governance in Tamil Nadu.

### **UNIT-X: APTITUDE AND MENTAL ABILITY**

- (i) Simplification – Percentage - Highest Common Factor (HCF) - Lowest Common Multiple (LCM).
- (ii) Ratio and Proportion.
- (iii) Simple interest - Compound interest - Area - Volume - Time and Work.
- (iv) Logical Reasoning - Puzzles-Dice - Visual Reasoning - Alpha numeric Reasoning – Number Series.