

Annexure III

Syllabus

Paper I

தமிழ் மொழி தகுதித் தேர்வு (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, செய்ப்பாட்டு 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.

GENERAL STUDIES
(Degree Standard)

CODE: 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, Fertilisers, 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.
- (vi) Prominent Personalities in various spheres – Arts, Science, Literature and Philosophy.

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 Lok Ayukta - 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, Rabindranath Tagore 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.

Paper II - Subject Paper

1. ANIMAL HUSBANDRY AND VETERINARY SCIENCE (Degree Standard)

CODE: 396

UNIT I: GENERAL

Livestock Population Census in the nation and state, - Role of livestock and their products in the Indian economy and human health, current livestock programs and policies of State and Nation Policy note on Animal Husbandry, Government of Tamil Nadu – Economics of dairy, sheep, goat, poultry, pig and rabbit farming; Livestock project preparation, constraints to the livestock development programs, common offenses against animals – SPCA, Animal Welfare Board of India, NGOs. Livestock marketing and Livestock entrepreneurship.

UNIT II: LIVESTOCK PRODUCTION MANAGEMENT

Common terms used in Animal Husbandry – Dentition and ageing of animals – Livestock and poultry breeds and breed characters, housing systems for different classes of livestock, and requirements of space, ventilation, water, sanitation, and waste disposal. Management of milk, meat, egg, and wool-producing livestock, management of calves and heifers, management of breeding bulls, draught animal power, rearing buffaloes for meat, organic livestock production, small ruminant production systems, economic traits of cattle, sheep and goat. Farm records and their maintenance, strategies for livestock improvement for enhancing productivity. Systems of swine production in India, Exotic and indigenous breeds of pigs, Housing condition requirements for different classes of swine, feeding management for different classes of swine, breeding sow and boar management, piglet management, fatterer management. Indian breeds of horses, Equine housing, feeding and breeding management. Importance and significance of laboratory animal production and management, Wild animals in captivity and management.

UNIT III: ANIMAL NUTRITION

Nutritional terms and definitions – Role of nutrition in health and production- Feeds and fodder classification, composition, anti-nutritional factors, and toxins- Requirements of nutrients for different categories of livestock/poultry and formulation of least cost rations- Feeding of pet animals- BIS specifications for livestock and poultry feeds -Nutritional deficiency and its influence on livestock performance -Feed supplements and additives- Conservation and preservation of feed and fodders - Economic utilization of agro-industrial by-products for feeding livestock – Utilization of unconventional feeds – Feeding of captive wild animals and birds - Quality control of feed - Feed milling technology- Feed block/baling- By-Pass Proteins and by-pass Fat - Feeding livestock during scarcity - Metabolic disorders in Livestock and Poultry- Processing of feeds and forage to improve nutritive value - Use of NPN compounds for ruminants.

UNIT IV: LIVESTOCK BREEDING AND GENETICS

Important breeds of cattle, buffalo, sheep, goat, pig, and poultry with special reference to economic characters - Principles of Genetics, Cytogenetics, and Basis of Population Genetics, Genetic parameters - Nature of DNA and RNA, their models and functions - Selection of livestock for production, reproduction, and disease resistance traits – Response to selection - Mating systems including Nucleus Breeding Schemes - Current livestock and poultry breeding policies and programs in the state and country - Applications of Recombinant DNA technology, Cloning, Transgenesis, and Marker-Assisted Selection - Conservation of Animal Genetic Resources.

UNIT V: VETERINARY ANATOMY, PHYSIOLOGY AND BIOCHEMISTRY

Gross study of bones of Ox and differences in Horse, Dog, Pig and Fowl, Joints and Muscles of Skeleton of Ox, Gross study of Heart and Conduction system, General plan of Pulmonary and systemic circulation, Gross anatomy of Brain and Spinal cord, the Gross study of organs of the digestive, respiratory, urinary and reproductive system of Ox, Horse, Dog, Pig and Fowl, Systemic histology.

Mechanism of respiration. General functions of blood (blood cells, plasma & serum) coagulation, cardiac cycle, Blood circulation, Blood pressure, renal function Hormonal control of Lactogenesis. Environmental factors affecting animal production – Environmental stress on animal performance – Green Houses Gases – Role of ruminants. Endocrine System-Functional aspects of hormones in Systemic Physiology. Renal system-Counter Current Mechanism-AcidBase Balance.

Enzymes: Definition and classification. Clinical Enzymology - Diagnostic importance of non-functional plasma enzymes and Isoenzymes; Carbohydrate metabolism and its disorders: Glycolysis, Krebs cycle, Carbohydrate fermentation pathway. Disorders - Diabetes mellitus, Bovine Ketosis, Pregnancy toxemia, Lactic acidosis and Bloat in ruminants; Lipid metabolism and its disorders: Beta oxidation of fatty acids, ketone body formation, Disorders- Bovine Ketosis, Pregnancy toxemia; Lipid Profile in disease diagnosis; Protein metabolism and its disorders: Urea cycle and Urea poisoning in ruminants. Utilization of NPN compounds by ruminants; Organ Function tests: Liver function and Renal function tests - Biochemical tests for differential diagnosis.

UNIT VI: VETERINARY MICROBIOLOGY, PUBLIC HEALTH AND PREVENTIVE MEDICINE

General and Systematic Veterinary Bacteriology – Bacterial Diseases of Veterinary Importance in relation to Isolation, Culture, Morphology, Biochemical and Antigenic Characteristics, Pathogenesis, Diagnosis, and control. Veterinary Mycology – Important Pathogenic Fungi in relation to Isolation, Culture, Morphology, Biochemical and Antigenic Characteristics, Pathogenesis, Diagnosis, Prevention, and Control. General and Systematic Veterinary Virology – Structure, Viral Replication, Viral Pathogenesis, Viral Interaction, and Oncogenesis – Important Veterinary Viral Diseases – RNA and DNA Viruses, Cultivation, Pathogenesis, Clinical Sciences, and Diagnosis. Veterinary Immunology – Antigen – Types of Immunity, Antigen and Antibody, Concepts of Immunity and Microbes, Vaccine and other Biologicals – Antigen and Antibody-based Diagnostic Test and Microbial Biotechnology.

Epidemiology – definitions, terms, triad, concept, scope, objectives, and uses. Monitoring and surveillance, epidemiological disciplines, methods, mode and route of disease transmission, rates, ratios, the occurrence of disease, properties of diagnostic tests, the gradient of infection, and pattern of diseases. Epidemiology, treatment, prevention, and control of common bacterial, viral, fungal, rickettsial, protozoan, ectoparasitic and endoparasitic diseases() of livestock, poultry, companion animals, and wildlife species, regional - emerging and re-emerging important diseases. Allergic skin tests, modern diagnostic techniques, and vaccination protocol for infectious diseases.

Role of Veterinarians in public health, one health concept - Milk Hygiene, Meat Hygiene - Foodborne diseases and Food Safety, Zoonoses - Classification, Zoonotic diseases of bacterial, viral, fungal, parasitic and rickettsial origin - Prevention and control of Zoonotic Diseases - Emerging and Re-Emerging Zoonoses -Biodiversity -Environmental contaminants in the food chain - Air, water, Thermal, radiation and land pollution - water purification, Chlorination - Sanitation and disinfection of farm and hospital - Management of waste from animal industries - Role of Pollution Control Board in India - Disaster Management - Vector control and reservoir control.

UNIT VII: PATHOLOGY, PARASITOLOGY AND PHARMACOLOGY

General concepts and etiology of diseases in animals; Common pathological conditions seen in domestic, wild, zoo, and laboratory animals and birds. Veterinary clinical pathology methods (with special reference to hematology, urinalysis, biopsy, and cytology) as rapid diagnostic methods. General oncology and pathology of various types of tumors in domestic animals. General principles and procedures of necropsy; Collection, preservation, and dispatch of morbid materials for laboratory diagnosis; Veterinary legal necropsy procedures.

Classification of Parasites – Parasite and parasitism in animals; important morphological features, life-cycles, mode of transmission, pathogenesis, diagnosis, chemotherapy, prophylaxis, and general control measures of parasites associated with disease in animals, birds, captive and free range wild animals.

Drug action – Pharmacokinetics (absorption, distribution, metabolism, and excretion), Pharmacodynamics – (types and structure of receptors. Dose-response curve)- Anaesthetics(local and general), analgesics, sedatives – drugs for euthanasia of animals - Chemotherapy (general principles including resistance, antibacterials, anthelmintics, antiprotozoals) – Toxicology (toxicity of pesticides, herbs, venoms, and toxins) – pharmacy (pharmaceutical calculations, prescription writing) – useful herbal preparations.

UNIT VIII: EXTENSION EDUCATION

Farming and types of farming in India. Early extension efforts in India. Extension Education – Principles, philosophy, objectives, dimensions. Extension Educational Process. Teaching and learning process. Rural development programs. Panchayati Raj. Sociology and Rural sociology in animal husbandry extension – culture, tribal, rural and urban communities, social control, social stratification, social institutions, social change, leadership. Adoption and diffusion of innovations – innovation-decision process, attributes of innovations, adopter categories, factors affecting adoption and diffusion process,

and the role of change agents. Extension program planning and evaluation. Livestock and poultry development programs in India. TOT Projects of ICAR. Communication – Process, elements, theories, and methods. ICTs and their application in the livestock sector. Gender and animal husbandry. Sustainable livestock production.

UNIT IX: VETERINARY CLINICAL MEDICINE, VETERINARY GYNAECOLOGY AND OBSTETRICS AND VETERINARY SURGERY AND RADIOLOGY

General and special clinical examination - General systemic state - etiology, clinical signs, pathogenesis, diagnosis and differential diagnosis, treatment and management of diseases of the digestive system, cardiovascular, respiratory, urinary, nervous, musculoskeletal, hemopoietic, Mammary gland, skin and sense organs - zoo and wild animal diseases - etiology, clinical signs, pathogenesis, diagnosis, prevention and control of metabolic, deficiency diseases - Ethics and jurisprudence and animal welfare in domestic and wild animals.

Female reproductive physiology, Puberty and sexual maturity, Aberrations of estrus and their clinical management, Problems in estrus detection and estrus detection aids, Follicular dynamics, Ovulation and its aberrations, Fertilization, Embryonic mortality, Anoestrus and repeat breeding syndrome, Diagnostic procedures in infertility investigation in female animals, Clinical uses of hormones and drugs in the management of infertility, Assisted reproductive techniques – Synchronization of estrus and ovulation, Multiple ovulation and embryo transfer technology in livestock and zoo animals, *In vitro* fertilization, Maternal recognition of pregnancy, Pregnancy diagnosis and factors affecting gestation length, Implantation, Placentation and its classification, Abortion, Accidents of gestation, Pre, peri and postpartum complications, Parturition and its stages, Dystocia and obstetrical interventions, Obstetrical anesthesia, Male sexual behavior and libido, semen collection techniques, semen evaluation, semen extenders and cryopreservation, Artificial insemination techniques in farm and pet animals, Forms of male infertility, Breeding soundness evaluation of bull, Medical and surgical procedures for population control of the reproduction.

Reproductive physiology; hormones and reproduction; Accidents of gestation, livestock fertility and infertility; artificial insemination; semen characteristics of different species of livestock and cryopreservation. Multiple ovulation and embryo transfer technology in livestock and zoo animals Reproductive disorders and their management.

General surgical principles – pre-and post-operative considerations, anesthesia, asepsis and anti-sepsis and sterilization; scope, history and development of veterinary radiology; Imaging pathology of different parts of body-surgical emergencies – Intensive care – Physiotherapy – Diathermy. Aural Hematoma in dogs-Small Animal GI tract surgical affections- Esophageal foreign Body- GDV-Intussusception-Foreign body syndrome- Megacolon-Ophthalmic affections in small animals-Amputation of tail-Large Animal GI tract affections-Choke-Rumenotomy-Abomasal Affections-Cecal Dilation and Torsion- Atresia Ani-Urogenital affections in small and large animals-Cystotomy-Urethrotomy-Pernieal Urethrostomy-Tube Cystotomy. Orthopaedic Examination of Small Animals-Principles of Internal Fixation- Osteoarthritis and Hip Dysplasia-Patellar luxation in small animals. Conformation of Horses-Lameness examination in large animals-Hoof affections on horses and cattle- musculoskeletal diseases.

UNIT X: LIVESTOCK PRODUCTS TECHNOLOGY

Layout and management of rural, urban, and modern abattoirs. HACCP concepts in abattoir management. Animal welfare and pre-slaughter care of meat animals. Significance of Meat Inspection in Wholesome Meat Production Procedures of antemortem and post-mortem examination of meat animals. Slaughtering and dressing of meat animals and birds. Importance of evaluation of meat animals and grading their carcasses. Utilization of abattoir byproducts, rendering, and treatment of condemned meat and carcasses. Management of effluent emanating from abattoir. The prospect of the meat industry in India. Structure and composition of muscle. Conversion of muscle to meat. Nutritive value of meat. Fraudulent substitution of meat. Preservation of meat and poultry; drying, salting, curing, smoking, chilling, freezing, canning, irradiation, and chemicals. Aging of meat. Modern processing technologies of meat and meat products. Concept of value addition – Importance of value addition in the meat industry. Physico-chemical and microbiological quality of meat and its products. Nutritive value of egg. FSSAI, Codex Alimentarius Commission rules, and regulations pertaining to meat.

Retrospect and prospects of milk industry in India - Layout of milk processing plant and its management - Composition and nutritive value of milk - factors affecting milk composition. Physico-chemical properties of milk. Collection, chilling, standardization, pasteurization, UHT treatment, homogenization,

and bactofugation. Preparation of cream, butter, ghee, channa, paneer, khoa, ice cream, dahi, lassi, mozzarella cheese, and dairy by-products - Dried, dehydrated and fermented milk - Introduction to functional milk products - Organic milk products. Common defects of milk products and their remedial measures - Microbiological deterioration of milk and milk products - - Packaging, transportation, storage and distribution of milk and milk products - Good manufacturing practices and implementation of HACCP in milk plant - Food safety standards for milk and milk products - Cleaning and sanitation in milk plant - Dairy effluent management - Sampling of milk - Platform tests - Estimation of fat, solid not fat (SNF) and total solids - Cream separation - Detection of adulteration of milk - Determination of efficiency of pasteurization.

2. AUTOMOBILE ENGINEERING (Degree Standard)

CODE: 404

UNIT I: ENGINES

Working principle and constructional details of petrol and diesel engines, four stroke and two stroke engines. Fuel supply system in SI engines – Carburettors, types, working principle, different circuits, compensation circuits, TBFI, MPFI, GDI. Fuel Injection system in diesel engines – Mechanical injection, CRDI. Dual fuel engines. Engine Accessories - Cooling system, air and water cooling system, forced circulation and pressure cooling system. Lubrication system – pressure lubrication – splash lubrication – wet and dry sump lubrication. Properties of lubricants and coolants. Combustion in SI and CI engines – stages of combustion – flame propagation – detonation in SI engine and knocking in CI engines. Combustion chambers – Turbo and super chargers. Fuels for IC engines, Desirable Properties of IC engine fuels, Gaseous fuels, LPG, CNG, Hydrogen, Alcoholic fuels, Flexi fuel engines. Advanced engine technologies - VVT, HCCI, Lean burn engines. Engine testing – Performance parameter calculations.

UNIT II: AUTOMOTIVE CHASSIS

Types of chassis layout – various types of frames – front axles – types, stub axle, front wheel geometry – Condition for true rolling motion - Ackermann and Davis steering mechanism – steering gear boxes – Under steer, Neutral steer and Over steer - Hydraulic and Electric Power Assisted Steering. Hotchkiss and torque tube drive. Propeller shaft – Universal Joint and Constant Velocity joint - Final drive – types. Differential – principle and construction details – Differential housing - Limited Slip Differential – Rear axle - types. Wheels – types and construction. Tyres – types and construction details.

UNIT III: SUSPENSION AND BRAKING SYSTEM

Suspension system – requirements – types - construction details of leaf spring, coil spring and torsion bar. Rubber and air suspension systems. Front and rear independent suspension systems – shock absorbers. Braking system – need, stopping distance, classification of brakes. Constructional details of drum brake and disc brakes - Power assisted braking systems. Retarders, ABS, TCS, EBD, ESP.

UNIT IV: AUTOMOTIVE TRANSMISSION

Clutches – coils spring, diaphragm clutches – centrifugal and semi centrifugal clutches – multiplate clutches. Electromagnetic clutch - Gear box – sliding mesh, constant mesh and synchromesh – construction and operation. Automated Manual Transmission - Automatic transmission – fluid coupling, torque converter, epicyclic gear box, CVT, Dual Clutch Transmission – Hydrostatic transmission, Electric Vehicle powertrain.

UNIT V: AUTOMOTIVE ELECTRICAL AND ELECTRONICS

Lead acid battery – types, battery charging, rating, and testing. Lithium Ion battery. Ignition system – principle and operation of coil, magneto and electronic ignition system. Spark plug. Starting system – types of drives - bendix drive, solenoid drive system. Charging system – generator system – types – alternator, principle and operation of cut-out and regulators. Engine sensors and actuators – types, principle and operation. Recent Trends - Navigation system, ADAS, TPS, Rain sensing wipers, micro-hybrid, keyless entry, antitheft technologies, V2V communication, CAN, LIN, OBD, Climate control system, Power windows and central locking system.

UNIT VI: VEHICLE BODY ENGINEERING

Classification of cars, buses, HCVs and LCVs – Driver visibility – forward and rearward visibility – Vehicle Safety – Passive and Active Safety systems. Car Body terminology - Constructional details of cars body panels. Construction of buses – conventional and integral construction. Driver's seat design considerations – compactness of driver's cab – segmental design – modern painting processes for car bodies. Body trim items. Body mechanisms – window winding, door locking and seat height adjustment – Body repair – hand and power tools - Aerodynamics of vehicles – different types of drags – optimization techniques - Wind tunnel testing to measure aerodynamic coefficients.

UNIT VII: VEHICLE DYNAMICS

Concept of vibration –Types of vibration. Response analysis of single DOF, Two DOF and multi DOF. Magnification factor and Transmissibility factor. Vibration absorbers. Tyre forces and moments – longitudinal and lateral forces. Rolling resistance. Tractive and cornering properties of tyres. Tire Testing. Human response to vehicle vibration. Design and analysis of passive, semi active and active suspension using quarter car, half car and full car models. Load distribution. Vehicle Resistances to motion, vehicle performance characteristics. Steady state and transient state handling characteristics – direction control of vehicle. Stability of vehicle under various conditions.

UNIT VIII: VEHICLE CONTROL SYSTEMS

Degree of freedom for vehicle control – calculation of the control - degree of freedom. Selection of control, manipulator and measured disturbances variables. General types of vehicle controllers configuration. Dynamic behaviour of first order and second order vehicle system – dynamic responses characteristics of vehicle systems. Basic control modes – proportional control – integral control. PID controls. Lambda control – knock control – adaptive knock control – drive line modelling – active suspension control. Adaptive cruise control. Lane Departure Warning System. Adaptive Headlamps.

UNIT IX: AUTOMOTIVE POLLUTION AND CONTROL

Pollutants – sources, formation and effects on environment and human beings. Emission standards. HC, CO and NO_x formation in SI and CI engines. Smoke formation and NO_x emission and its types from diesel engine, Particulate emissions. Control techniques – EGR, SCR, LNT, Secondary air induction, Positive crankcase ventilation system particulate trap and catalytic converters. Test procedures CVS1, CVS3 – Test cycles – SHED test. NDIR analyser – Flame ionization detectors – Chemiluminescent analyser – dilution tunnels – gas chromatograph – smoke meters.

UNIT X: MOTOR VEHICLE ACT, MAINTENANCE AND SERVICING

Motor vehicle act – registration, driving licence, insurance, pollution and control. organization and management of workshop - Scheduled and unscheduled maintenance – Workshop stores – inventory management – 5S Principles in workshops – Cost estimation for maintenance and servicing – Different forms and registers for workshop – Workshop Safety - Trouble shooting and servicing of clutch, gear box, brakes, suspension and steering systems. Trouble shooting and servicing of engine and its auxiliary systems – Servicing of vehicle air conditioning system – Manual, power tools and equipment required for servicing and maintenance.

3. BUSINESS ADMINISTRATION (PG Degree Standard)

CODE: 385

UNIT I: MANAGEMENT CONCEPTS

The development of Management thought-Pre scientific management era – Human relation era – Social sciences era – Management sciences era. Definitions of Administration and Management – Basic Principles and Process of Management. Functions of Management Planning, Organising, Staffing, Directing, Coordination and Controlling. Management by objectives – Process of MBO – Management by Exception.

UNIT II: MANAGERIAL ECONOMICS

Introduction to Economics; Nature and Scope of Managerial Economics – Significance in Decision-Making and Fundamental Concepts - Objectives of a Firm - Role of Economic Analysis in managerial decisions. The Concept of Profit. Nature and Measurement of Profits - Profit Maximization - Profit

Planning and control – Profit Policies – Cost Volume Profit Analysis. National Income – Definition, Concepts and Various Methods of its Measurement– Inflation, Types and Causes - National Income and Economic Welfare - Business Cycles and Business Forecasting – Measuring Business Cycles Using Trend Analysis

UNIT III: ORGANISATIONAL BEHAVIOUR

Organisational Behaviour : Importance – Historical Development of Organisation Behaviour- Understanding Individual Personality- Perception-Learning-Values-Attitude- Job Involvement – Organisational Commitment – Job Satisfaction – Emotions – Emotional Intelligence – Spiritual Quotient. Understanding groups: Meaning of group and group dynamics – Theories of Group Dynamics – Group Cohesiveness – Team Building- Management of change-Organisational Culture-Management of Conflict-Organizational Citizenship Behaviour.

UNIT IV: HUMAN RESOURCE MANAGEMENT

Functions of HRM – Managerial Functions and Operative functions – Organisation of HRM Department – Qualities and Qualification of HR Managers – HR Policies - Environmental influences of HRM – HRM Challenges – HRM Strategies. Recruitment and Selection- Job Analysis- Job Evaluation- Performance Appraisal-Training and Development- Quality of Working Life-e HRM

UNIT V: RESEARCH METHODOLOGY AND STATISTICS

Research – Meaning – Types – Nature and scope of research – Review of Literature - Problem formulation – Statement of research Objective – Value and cost of information – Research Questions – Research Gap - Decision theory –Research process – Research designs – Experimental Research. Methods of data collection-Sampling – Measure of Central Tendency-Measure of Dispersion-Testing of Hypothesis- Correlations- Regression- Multivariate Analysis-Research Report

UNIT VI: OPERATIONS MANAGEMENT

Operations Management concept, objectives and types –Characteristics of Modern Operation Management – Differences between Services and Goods – Operation Strategy – Supply Chain Management – Warehousing and Supply Chain Strategies – Supply Chain Dynamics. Operations Planning- Work study: Objectives, Procedures – Method Study and Motion Study - Work Measurement and Productivity. Total Productive Maintenance- Materials management and Purchase Management- Project management-Quality Control – Quality Movement – Continuous Improvement – Tools – Total Quality Management (TQM) concepts – ISO Quality Certification – Quality Assurance.

UNIT VII: MARKETING MANAGEMENT

Marketing – Definition – Importance – Concepts in Marketing, Marketing Concepts – Traditional and Modern Concepts – Marketing Environment, Marketing Strategies – Kinds of Marketing Strategies – Marketing Mix Concept – Marketing Research and Information – Objectives and Process. Consumerism – Problems of consumer protection – Developments in Consumer Protection in India - Government and Marketing – Neo Marketing Trends – e-Marketing – Tele-marketing – Green Marketing – Event Marketing – Viral Marketing – Direct Marketing- Ethics in Marketing & Advertisement.

UNIT VIII: MANAGEMENT INFORMATION SYSTEM AND E-COMMERCE

Data, Information, Intelligence, Information Technology, Information System, Functional Information Systems, DSS, EIS, KMS, GIS, International Information System-Data Base Management System- Role of information management in ERP, e-governance, Data Mining, Business Intelligence, Pervasive Computing, Cloud computing, CMM. Electronic Commerce: Technical Components of E-Commerce Functions of E-Commerce - Advantages and disadvantages of E- Commerce - Electronic Commerce and Electronic Business- Electronic Commerce Technology - Building the E-Business application- Avoiding legal issues- Web strategy: Attracting and retaining visitors - Search Engines and Portals - Cyber service -Online Banking.

UNIT IX: ACCOUNTS AND AUDITING

Basic Accounting concepts - Kinds of Accounts. Double Entry Book Keeping - Journal and Ledger Accounts- Subsidiary books- Trial balance - Errors – Types of errors - Rectification of errors – Bank reconciliation statement – Manufacturing - Trading - Profit & Loss Account - Balance sheet. – Accounting

for non-trading Institutions-Income & Expenditure Account- Receipts and Payment Accounts and Balance sheet – Accounting for depreciation – methods of depreciation – Preparation of accounts from incomplete records. Auditing-Origin-Objectives-Types- qualities of an Auditor- Audit programmes- verification and valuation of Assets and Liabilities. Investigation-objectives of investigation-Audit of computerized-Accounts-electronic auditing

UNIT X: FINANCIAL MANAGEMENT

Finance Functions – Nature And Scope – Evolution Of Finance Function – Its New Role in The Contemporary Scenario – Goals Of Finance Function – Maximising Profit Vs Wealth – Cost – Risk – Return- Trade Off – Concept Of Time Value Of Money – Future Value And Present Value And The Basic Valuation Model - Sources Of Short Term Financing – The Management Of Working Capital- Cash Management Strategies- Receivables Management- Sources Of Long Term Finance- Cost Of Capital And Capital Structure- Economic Value Added (EVA) -Risk & Uncertainty -Risk Management- Return on Investment.

4. CHEMISTRY (PG Degree Standard)

CODE.244

UNIT I:

Reaction Kinetics:- Rate laws - rates constant for first, second, third and zero order reaction - Half life period - Arrhenius theory - collision theory - Absolute reaction rate theory - ionic reaction - salt effect - catalysis – Laws of photo chemistry, quantum efficiency - photo physical processes of electronic excited molecules. Green Chemistry – reactions and reagents

Chemical Equilibrium:- partial molar quantities, gibbs - Duhem equation, Equilibrium constant - temperature dependence of equilibrium constant - phase rule and its applications to two and three components systems.

UNIT II:

Solid State:- crystal systems - designation of crystal faces, lattice structure and unit cell - law of rational indices - Bragg's law and x rays diffraction by crystals - Schottky and Frenkel defects - Electrical properties - Insulators and semiconductors - band theory of solids – Superconductors – nano materials preparations and properties.

Electrochemistry:- Types of Reversible electrodes - Nernst equation - calculation of thermodynamic quantities of cell reactions - overpotential and hydrogen over voltage - Determination of pKa of acids by potentiometric methods - Kohlrausch's law - Ostwald's dilution law - Debye - Huckel Onsager equation for Strong electrolytes - (no derivation required) - Primary and Secondary fuel cells - corrosion and prevention – dry cells and storage batteries

UNIT III:

Structure and Bonding:- Electronic configuration of atoms, Term symbols and periodic properties of elements, Ionic radii, ionisation potential electron affinity, electronegativity, concept of Hybridization, molecular orbitals and electronic configuration of homonuclear and heteronuclear diatomic molecules, shapes of polyatomic molecules VSEPR theory, symmetry elements and point groups for simple molecules, Bond lengths, Bond angles, bond order and bond energies Types of chemical bond (weak and strong) inter molecular forces, structure of simple and covalent bonds – covalent character in ionic bond and partial ionic character – lattice energy.

Acids and Bases:- Bronsted and Lewis acids and bases - pH and pKa acid - base concept in non - aqueous media – HSAB concept - Buffer Solutions. Redox Reactions:- Oxidation numbers, Redox potential, Electro chemical series – application of EMF measurements - Redox indicators.

Chemistry of Non - transition elements:- General characteristics, structure and reaction of simple compounds - boranes - silicates Oxoacids of N,P,S and halogens - xenon compounds - interhalogens, Pseudohalides and noble gas compounds – metal clusters – S,N ring and chain compounds - inorganic Polymers such as silicones, Borazines and phosphonitrilic compounds. IUPAC Nomenclature of simple organic and Inorganic compounds.

UNIT IV:

Organic reaction mechanism:- General methods (Kinetic and non Kinetic) of study of reaction mechanisms Methods of determining reaction mechanism. – isotopic labelling SN1, SN2 mechanisms - addition substitution, elimination and rearrangements -free radical mechanism - aromatic substitution - and stability of reactive intermediate (Carbocations, Carbanion's free radicals, nitrates and benzyne) - Polar effects - Hammett's equation and its modification.

Chemistry of important organic reaction:- Aldol condensation - Claisen condensation - perkin reactions - cannizzaro reaction - Fridel craft reaction - Favorski reaction - Stork enamine reaction - Michael addition - Baeyer - villiger reaction - Chichibabin reaction - Asymmetric synthesis pericyclic reactions - classification and examples - Woodward and Hoffmann rules. - use of OsO₄, NBS, diborane, NaBH₄, LiAlH₄ in organic Synthesis.

UNIT V:

Quantum Chemistry:- Planck's quantum theory wave - particle duality, uncertainty principle, operators and commutation relations, postulates of quantum mechanics, Schrodinger wave equation, particle in one dimensional box and three dimensional box - harmonic oscillator, rigid rotator and hydrogen atom, angular momentum, spin - orbit coupling.

Classical thermodynamics and elements of statistical thermodynamics:- First law of thermodynamics:- heat capacity - isothermal adiabatic processes - Thermo chemical laws - Kirchoff's equation second law of thermodynamics, entropy, in reversible and irreversible processes - Gibe's free energy and Helmholtz free energy - Third law of thermodynamics

UNIT VI:

Spectroscopy:-

Rotational spectra of diatomic molecules - Isotopic substitution and rotational constants - vibrations spectra of linear symmetric, linear asymmetric and bent triatomic molecules - electronic spectra - selection rules - nuclear magnetic resonance - chemical shifts - spin - spin coupling - electron spin resonance and hyperfine splitting theoretical principles of mass spectroscopy. Application's of UV, IR, NMR, ESR and mass spectroscopy for structural elucidation of organic compounds, inorganic complexes and free radicals.

UNIT VII:

Chemistry of Co-ordination Compounds:- structural aspects, isomerism - octahedral and tetrahedral, crystal - splitting of orbitals - CFSE - magnetism and colour of transition metal ions - charge transfer spectra - crystal field theory and ligand field theory – MO theory complexes of pi acceptor ligands - stereochemistry of inorganic co-ordination compounds – ORD and CD Techniques.

Chemistry of lanthanides and actinides:- Electronic configuration - occurrence and Separation techniques -oxidation states, colour. magnetic and spectroscopic properties – lanthanide contraction, use of lanthanide compounds as shift reagents.

UNIT VIII:

Organometallic compounds and bio inorganic chemistry:- Metal carbonyls, Metal nitrosyls, metal alkyl, alkenes and arene compounds - organo metallic compounds in catalysis - Chemistry of porphyrins - chlorophyll hemoglobin, myoglobin, ferredoxin, rubredoxin, and cytochromes, copper proteins, enzymes, zinc enzymes, toxicity of metals and the effect of excess and deficient levels, metal complexes in therapy

UNIT IX:

Stereochemistry:- Elements of symmetry - optical and geometric isomerism E. Z and R.S notation's - Conformational analysis of simple cyclic and acyclic systems - Effects of conformation on reactivity in acyclic compounds and cyclohexanes.

Carbohydrates:- Classification - configuration and general reactions of monosaccharides - Chemistry of glucose, fructose, Sucrose and Maltose, Important compounds in chemistry - Dyes - aze, triphenylmethane, and phthalin groups - indigo - alizarin vitamins, hormones - antibiotics - proteins. Polymers: Preparation and uses of polyethylene, poly butylenes PVC, Nylon - Ziegler - Natta catalysts

UNIT X:

Instrumental methods of analysis:- Adsorption, partition chromatography - Gas chromatography - HPLC - Solvent extraction and ion turlaexchange methods - atomic absorption spectroscopy - Eletroanalytical techniques voltammetry, cyclic voltammetry, polarogaphy, amperometry, Coulometry and conductometry, ion - Selective elctrodes- TGA, DTA, DSC and ICPU. Analysis of industrial products such as ores and Minerals, Coal, Water, Soaps & Detergents, Metals & Alloys, Manures & fertilizer, cement, Aggregate, Bricks, petroleum products, food & products, plastics.

5. CHEMICAL ENGINEERING (Degree Standard)

CODE: 405

UNIT I: CHEMICAL PROCESS CALCULATIONS AND CHEMICAL ENGINEERING THERMODYNAMICS

Properties of gases, liquids and solids, Humidity and saturation, Gas laws, steady and unsteady state material and Energy balances including multiphase- involving recycle, by-pass and purge systems, Material and Energy balance with reactions, use of tie components, Gibbs Phase rule and degree of freedom analysis. Laws of Thermodynamics and its applications- Thermodynamics functions - Chemical and Phase Equilibrium -Ideal and non-ideal gases and solutions – Equation of state and residual properties, compression of fluids, Second law and entropy, Chemical potentials, properties of mixtures- fugacity, partial molal properties, excess properties and activity coefficient. Predicting VLE of systems, Free Energy Change and Chemical Reaction Equilibrium.

UNIT II: MECHANICAL OPERATIONS AND ENGINEERING MATERIALS

Characteristics of solids, laws of size Reduction, free and hindered settling, centrifuge and cyclone, thickeners and classifiers, Mixing and agitation, Filtration, Sedimentation. Conveying of solids. Materials of construction for chemical Industries, Metallic, Non-metallic, Polymeric and composite materials, Refractory, corrosion -prevention and control. Smart materials for Chemical Engineering applications- Nano and biomaterials.

UNIT III: CHEMICAL TECHNOLOGY AND RENEWABLE ENERGY SOURCES

Acids, Fertilizers, marine Chemicals, Cement, Glass, Ceramic and Refractories, Petroleum Refining Products, Fermentation Products, Oils, Soaps and Detergents, Pulp and paper, Dyes, sugar, leather and rubber, polymer, pharmaceutical and food industries. Sustainable energy resources- solar, thermal, photoelectric, tidal, geothermal, nuclear, wind, bio-energy, sources, energy storage and conversion- battery and fuel Cells, Energy efficiency estimation.

UNIT IV: FLUID MECHANICS AND HEAT TRANSFER OPERATIONS

Fluid Statics, Newtonian and Non-Newtonian fluids, Types of Manometers, Equation of continuity, Equation of motion, Bernoulli equation, Friction Factor, Dimensional analysis and similitude, Flow through pipes, velocity profiles, flow through fixed and fluidized beds, flow meters, Fans, blowers, pumps and compressors, Energy Equations, Modes of Heat transfers, Heat transfer with phase change, thermal insulation, thermal boundary layer and heat transfer coefficient. Design of heat exchangers- Double pipe, Shell and tube, single and multiple effect evaporators

UNIT V: MASS TRANSFER AND SEPARATION OPERATIONS

Fick's Laws, Diffusion, Mass Transfer Coefficient and theories of Mass Transfer, Momentum, heat and mass transfer analogies, Inter phase Mass transfer operations, HTU, NTU and HETP concepts, Design of equipment -Distillation column, Extraction, Adsorption, Absorption, Drying, humidification and de-humidification. Crystallization, Membrane separation processes - frame, tubular, spiral wound and hollow fibre membrane reactors, dialysis, reverse osmosis, nano/ultra filtration, microfiltration. Ion Exchange chromatography and electro dialysis, Separations involving pervaporation and permeation techniques for solids, liquids and gases, supercritical fluid extraction.

UNIT VI: CHEMICAL REACTION ENGINEERING

Reaction rates - laws - theories and analysis, homogeneous and heterogeneous reactions, single and multiple reactions in ideal reactors. Kinetics of enzyme reactions. Non ideal reactors - Residence time

distribution, Single parameter model. Design of reactors- Isothermal and adiabatic fixed bed reactors, non-isothermal and non-adiabatic fixed bed reactors, fluidized bed reactors. Kinetics of heterogeneous catalytic reactions. Diffusion effects in catalysis- rate and performance equations for Catalyst deactivation.

UNIT VII: PROCESS DESIGN, INSTRUMENTATION AND CONTROL

Problem formulation, degree of freedom analysis, objective functions, Simplex method, Barrier method, sensitivity analysis, Convex and concave functions, unconstrained NLP, Newton's method, Quasi-Newton's method, Direct substitution, Quadratic programming, Cost estimation, Plant utilities, Heat exchanger networks, Pinch technology. Principles of measurements and classification of process instruments, measurement of process variables - Laplace transformation, application to solve ODEs. Open-loop systems, first order systems, first order systems in series, linearization and its application in process control, second order systems and their dynamics; transportation lag. Closed loop control systems, feed-back control systems, BODE diagram, stability criterion, frequency response, tuning of controller settings, cascade control, feed forward control, control of distillation towers and heat exchangers.

UNIT VIII: NUMERICAL AND COMPUTATIONAL METHODS

Curve fitting, Equations with real and rational Coefficients, Imaginary roots and irrational roots, Transformation of equations. Numerical solutions of linear and non linear algebraic equations- solution of initial value and boundary value, ordinary and non-linear differential equations, Integration of trapezoidal and Simpson rule. Solution of partial differential equations. Partial Differential equation – finite element, finite difference method - Matrix, determinants and properties – Elementary Row transformations algebraic equations; ordinary differential equations and non homogeneous first order ordinary differential equations, rank of Matrix, Eigen value problems, Orthogonal and ortho normal vectors; Gram-Schmidt orthogonalization; Theorem for Eigen values and Eigen functions.

UNIT IX: ENVIRONMENTAL ENGINEERING, OCCUPATIONAL SAFETY AND HEALTH IN CHEMICAL INDUSTRIES

Air, Water and soil pollution, causes, effects and remedies, Nuclear waste disposal, Noise control. Wastewater treatment by various methods: Chemical, biochemical and advanced oxidation process. Industrial hygiene, occupational safety & health in chemical industries, Industrial safety principles, site selection and plant layout, chemical hazards identification & classification, Safety in operations and processes, fire safety, hazard identification techniques, disposal of hazardous and toxic wastes, onsite and offsite emergency preparedness plan, safety audit, work permit system, roles and responsibilities of safety officers and welfare officers, occupational diseases.

UNIT X: PROFESSIONAL ETHICS, LAWS AND LEGISLATIONS

Morals, values and Ethics – Integrity – Work ethic - Valuing time – Cooperation – Commitment – Empathy – Senses of Engineering Ethics – Variety of moral issues – Types of inquiry – Moral dilemmas – Moral Autonomy – Kohlberg's theory – Gilligan's theory – Consensus and Controversy – Models of professional roles – Theories about right action - Engineering as Experimentation – Engineers as responsible Experimenters – Codes of Ethics – A Balanced Outlook on Law. Safety and Risk – Assessment of Safety and Risk – Risk Benefit Analysis and Reducing Risk – Respect for Authority – Collective Bargaining – Confidentiality – Conflicts of Interest – Occupational Crime – Professional Rights – Employee Rights. Intellectual Property Rights (IPR), Employee Discrimination. Multinational Corporations, Environmental Ethics & legislation – Engineers as Managers, Expert Witnesses and Advisors. Moral Leadership, Code of Conduct, Corporate Social Responsibility. Labour laws and legislations – Criminal procedure code – Indian Penal Code.

6. CIVIL ENGINEERING (Degree Standard)

CODE: 398

UNIT I: BUILDING MATERIALS AND CONSTRUCTION PRACTICES

Properties and testing of engineering materials-brick, stones, M-sand, aggregates, cement, timber, recycled and modern materials-glass, plastic FRP, ceramic- concrete – properties and testing- mix

design-admixtures, Self-compacting concrete steel construction practice-stone masonry, brick masonry, R.C.C. and block masonry – construction equipment - building bye-laws and development regulations practiced in Tamil Nadu - Provisions for fire safety, lighting and ventilation- Acoustics.

UNIT II: ENGINEERING SURVEY

Survey - Chain- Compass - Plane table - levelling - Theodolite - computation of area and volume-L.S. and C.S. – Contour - Traversing – traverse adjustment - Heights and Distances - Tacheometry and Triangulation - total station and GPS and Remote sensing techniques for surveying.

UNIT III: ENGINEERING MECHANICS AND STRENGTH OF MATERIALS

Forces- types-laws - centre of gravity-moment of inertia-friction-Stresses and strains -Thermal stress - elastic constants - Beams - Bending moment and shear force in beams - Theory of simple bending - deflection of beams - torsion - Combined stresses – stresses on inclined planes - Principal stresses and principal planes - Theories of Failure – Analysis of plane trusses.

UNIT IV: STRUCTURAL ANALYSIS

Indeterminate beams - Stiffness and flexibility methods of structural analysis - Slope deflection - Moment Distribution method – Arches and suspension cables - Theory of columns - moving loads and influence lines – Matrix method - Stability of retaining walls – plastic theory - Seismic analysis of high rise building

UNIT V: GEOTECHNICAL ENGINEERING

Formation of soils - types of soils - classification of soils for engineering practice - Field identification of soils - Physical properties and testing of soils - Three phase diagram - permeability characteristics of soils - stress distribution in soils - Theory of consolidation, shear strength parameters of soils – stabilization of soil - Compaction of soils- Stability analysis of slope - Soil exploration - Soil sampling techniques – SPT - Borelog profile - shallow foundations - Terzaghi's bearing capacity theory - Pile foundation –pile load test- Group action of piles - settlement of foundations- Ground Improvement techniques.

UNIT VI: ENVIRONMENTAL ENGINEERING AND POLLUTION CONTROL

Sources of water - Water Demand -- Characteristics and analysis of water – hydraulics for conveyance and transmission - water borne diseases – Functional design of water treatment plant – desalination plant - water distribution system – pipe network analysis- characteristics and composition of sewage - Planning and design of sewerage system - sewer appurtenances - Pumping of sewage - sewage treatment and disposal - Design of storm water drain- plumbing system in high rise building - industrial waste treatment - solid waste management – Air and Noise pollution control – E-Waste management.

UNIT VII: DESIGN OF REINFORCED CONCRETE, PRESTRESSED CONCRETE AND STEEL STRUCTURES

Design of concrete members - limit state and working stress design concepts - design of slabs - one way, two way and flat slabs - Design of singly and doubly reinforced sections and flanged sections - design of columns and footings – pre- stressing - systems and methods- post tensioning slabs - Design of pre-stressed members for flexure. Design of tension and compression members - Design of bolted and welded connections design of members of truss - designs of columns and bases - design of beams, plate girders and gantry girder- design of liquid storage structures –elevated and underground- design of retaining wall.

UNIT VIII: HYDRAULICS AND WATER RESOURCES ENGINEERING

Hydrostatics-applications of Bernoulli equation – losses in pipes - flow measurement in channels - open channel flow- types of pumps and characteristics - Applications of Momentum equation, Kinematics of flow. Water resources in Tamil Nadu - Water resource planning - Master plan for water management - flood control – Runoff estimation – hydrograph – flood routing - Soil plant water relationship - Water requirement for crops - Irrigation methods – Design of alluvial canal and design of headworks. Water logging and land reclamation - cross drainage works.

UNIT IX: URBAN AND TRANSPORTATION ENGINEERING

Urbanization trend and impact - Slum clearance and slum improvement programmes - Different modes of transport and their characteristics. Geometric design of highways. – Pavement materials and testing – alternate pavement materials- modified binders - Design and Construction of bituminous and concrete roads – pavement distress and evaluation - Maintenance of roads – Railways - Components of permanent way - Signalling, Interlocking and train control - drainage in roads and railways. Airport planning - Components of Airport - Site selection – Runways – Planning of terminal buildings Harbours & Ports - Layout of a harbour - Docks - Breakwaters.

UNIT X: PROJECT MANAGEMENT AND ESTIMATION

Construction management - Construction planning - Scheduling and monitoring - Cost control, Quality control and inspection - Network analysis - CPM and PERT -methods of project management - Resources planning and resource management - Types of estimates - Preparation of technical specifications and tender documents – e-tender - Building valuation - law relating to contracts and arbitration.

7. ELECTRICAL ENGINEERING / ELECTRICAL AND ELECTRONICS ENGINEERING (Degree Standard)

CODE: 400

UNIT I: ELECTRICAL CIRCUITS

Circuit elements – Kirchoff's Laws – Mesh and Nodal Analysis - Network Theorems and Applications for DC and AC circuits: Thevenin's Theorem, Norton's Theorem, Superposition Theorem, Maximum Power Transfer Theorem – Sinusoidal Steady State Analysis of RL-RC-RLC Circuits- Resonant Circuits - Natural and Forced Response – Transient Response of RL-RC-RLC Circuits-Two-port networks – Three Phase Circuits-Star-delta transformation-real and reactive power-powerfactor

UNIT II: ELECTRIC AND MAGNETIC FIELDS

Coulomb's Law-Electric Field Intensity-Electric Flux Density-Gauss's Law- Divergence - Electric Field and Potential due to Point, Line, Plane and Spherical Charge Distributions - Effect of Dielectric Medium - Capacitance of Simple Configurations- Magnetic Circuits- Magnetomotive force - Reluctance-Faraday's laws-Lenz's law-Biot-Savart's law - Ampere's law - Fleming's Left and Right Hand Rule-Lorentz force - Inductance - Self and Mutual Inductance-Dot Convention-Coupled Circuits

UNIT III: MEASUREMENTS AND INSTRUMENTATION

Units and Standards – Static and Dynamic Characteristics-Types of Errors-Error Analysis – Measurement of Current, Voltage, Power, Power-factor and Energy – Indicating instruments – Measurement of Resistance, Inductance, Capacitance and Frequency – Bridge Measurements – Instrument Transformers-Electronic Measuring Instruments – Multi meters-True RMS meter-Spectrum Analyzer-Power Quality Analyser- Recording Instruments-X-Y Recorder-Magnetic Recorders-Digital Data Recorder-Oscilloscopes-DSO-LED and LCD Display-Transducers and their applications to the Measurement of Non-Electrical Quantities like Temperature, Pressure, Flow-rate, Displacement, Acceleration, Noise level — Data Acquisition Systems – A/D and D/A Converters- Data Transmission Systems-PLC –smart meters

UNIT IV: CONTROL SYSTEMS

Mathematical Modelling of Physical Systems – Transfer Function - Block Diagrams and Signal Flow Graphs and their Reduction using Mason's Rule – Time Domain and Frequency Domain Analysis of Linear Time Invariant (LTI) System – Errors for Different Type of Inputs and Stability Criteria for Feedback Systems – Stability Analysis Using Routh-Hurwitz Array – Nyquist Plot and Bode Plot – Root Locus – Gain and Phase Margin – Basic Concepts of Compensator Design – PI,PD and PID Controllers-State Variable formulation-state transition matrix- Eigen values and Eigen vectors-free and forced responses of Time Invariant systems-controllability and observability.

UNIT V: ELECTRICAL MACHINES

D.C. Machines – Construction, Excitation methods – Armature Reaction and Commutation – Characteristics and Performance Analysis – Generators and Motors – Starting ,Speed Control and braking – Testing – Losses and Efficiency. Transformers-Types-Construction and Operation- Testing –

Equivalent Circuits – Losses and Efficiency-All day efficiency – Regulation – Parallel Operation – Three Phase Transformers – Auto-transformer. Induction Machines – Construction, Principle of operation – Rotating Magnetic Field – Performance, Torque-Speed Characteristics, No-load and Blocked Rotor tests, Equivalent Circuit, – Starting ,Speed Control and braking – Single-Phase Induction Motors – Linear Induction Motors – Hysteresis Motors – Reluctance Motors. Synchronous Machines – Construction – Operating characteristics and Performance analysis – Efficiency and Voltage regulation – Parallel operation – V and inverted V curves of synchronous motors – Power factor improvement-permanent magnet synchronous motor-Permanent magnet brushless dc motor – stepper motor

UNIT VI: POWER SYSTEMS

Single Line Diagram of Power System-Per Unit Quantities-Power Generation Types- Hydro, Thermal and Nuclear Stations – Pumped storage plants – Co generation– Economic and operating factors – Modelling and performance characteristics of Power transmission lines and Cables-HVDC transmission– Mechanical Design of Transmission Lines-Sag-Insulators - Z_{BUS} and Y_{BUS} formulation - Load flow studies – Shunt and Series Compensation- Symmetrical and Un symmetrical Faults Analysis - Transient and Steady-State Stability of Power Systems – Equal Area Criterion-Voltage and Frequency Control – Power System Transients – Power System Protection – Circuit Breakers – Relays classification of protection schemes-overcurrent, distance, differential and carrier-Equipment protection-transformer, generator, motor, busbars and transmission line –AC and DC Distribution-deregulation-energy conservation and energy auditing

UNIT VII: ANALOG AND DIGITAL ELECTRONICS

Semiconductor Devices – PN junctions – Transistors – FET – Zener, Photo diodes and their applications – Rectifier circuits – Voltage regulators – Multipliers. Biasing circuits – Small signal amplifiers – Frequency response – Multistage amplifiers – Coupling methods – Large signal amplifiers – Push-pull amplifiers – Feedback amplifiers – Oscillators – Operational amplifiers and its applications – Precision rectifiers – Multivibrators - Voltage Controlled Oscillator-Timer. Digital logic gate families (DTL,TTL,ECL,MOS,CMOS) – Logic gates - Simplification of Logic Functions- Design of Combinational circuits - Sequential logic circuits-latch–Flipflops– Counters – Registers – multiplexers and demultiplexers- Schmitt triggers-Memories(ROM,PLA and FPGA).

UNIT VIII: POWER ELECTRONICS AND DRIVES

Principle of Operation and Static and dynamic behaviour of Power Semiconductor devices -- Power Diode, DIAC, SCR, TRIAC, GTO, MOSFET and IGBT- - Single and Three Phase AC to DC Converters – uncontrolled and controlled rectifiers -performance parameters – Single and Three Phase AC to AC converters - Switched Mode Power Supplies – buck ,boost and buck-boost converter topologies - switching losses-Inverters-Single and Three Phase Inverters – Voltage control- Pulse Width Modulation techniques-harmonic elimination techniques– Uninterrupted Power Supplies- Electrical drives-motor load dynamics-load torque characteristics-Speed Control of DC Drives– Converter/Chopper fed dc motor drives- Speed control of AC drives- induction motor drives –stator voltage control and V/f control - synchronous motor drives-V/f control, self control, margin angle control and power factor control

UNIT IX: DIGITAL PROCESSORS AND COMMUNICATION

Architecture of 8085, 8086 and 8051 – Instruction Sets – Assembly Language Programming – Interfacing for memory and I/O: 8255 Programmable Peripheral Interface – 8253 Programmable Timer Interface – 8279 Programmable Keyboard and Display Interface – 8257 Direct Memory Access Interface - Embedded processors (ARM and PIC basics only). Classification of Signals and systems – Properties of Discrete Fourier Transforms - FFT Computation – FIR Filters – IIR Filters: Butterworth Filters – Chebyshev Filters.

Digital Communication Systems: Pulse Code Modulation and Demodulation – Adaptive Delta Modulation - Frequency Division and Time Division Multiplexing – Data Communication Network Topologies - 7-layer OSI Protocol-IoT concepts

UNIT X: RENEWABLE ENERGY SOURCES AND STORAGE DEVICES

Renewable Energy – Sources and Features - Solar Radiation Spectrum- Radiation Measurement-Solar Photovoltaic Cell –principle of operation-types-MPPT - Microhydel- Operating principle- Wind Energy – components- wind power turbine types-MPPT- Site Selection-Types of Wind Generators-smart grid - Electric vehicles -V2G and G2V- Fuel Cells- Batteries-types and characteristics- Super Capacitors.

8. ELECTRONICS AND INSTRUMENTATION ENGINEERING (Degree Standard)

CODE : 402

UNIT I: ANALOG ELECTRONICS

Characteristics and Applications of Diode, BJT, JFET, SCR, UJT, MOSFET- Small Signal Analysis of BJT and JFET amplifiers, Feedback Amplifiers, RC and LC Oscillators – Characteristics and Applications of Operational Amplifier, Differentiator, Integrator, Instrumentation Amplifier, Precision Rectifier, V to I and I to V Converter, Active Filters, Oscillators and Signal Generators.

UNIT II: DIGITAL ELECTRONICS

Digital Logic Theory:

Number Systems – Combinational Logic Circuits – Minimization of Boolean Functions – IC Families: TTL and CMOS – Arithmetic Circuits, Multiplexer & Decoders – Sequential Circuits: Flipflops, Counters, Shift Registers, Schmitt Trigger, Timers, Multivibrators, S/H Circuit, – Analog to Digital Converter (Successive approximation, Integrating and Sigma Delta) – Digital to Analog Converters (Binary Weighted Resistor, R-2R, Inverted R-2R) – Characteristics of ADC and DAC.

Embedded Systems:

Microprocessor and Microcontroller Applications, RISC and CISC Processors, Memory and Input-Output Interfacing, Embedded C Programming, Multiprocessors, Scheduling, Power Optimization Strategies, I²C and CAN Buses.

UNIT III: DIGITAL SIGNAL PROCESSING AND COMMUNICATION ENGINEERING

Discrete Time Signals and Systems:

Sampling Theorem, Characteristics and Classifications of DT Signals and Systems - LTI System Characteristics, Convolution and Correlation, Time Domain and Frequency Domain Analysis – ZT, DTFT, DFT - FFT Algorithms – IIR and FIR Filters.

Communication Engineering:

Amplitude and Frequency Modulation and Demodulation – Shannon's Sampling Theorem, Pulse Code Modulation, Frequency and Time Division Multiplexing. Digital Communication System (ASK, FSK, PSK and QAM) - Digital Communication Concepts – Network Protocols – ISO/OSI reference model – Fiber Optic Communication.

UNIT IV: TRANSDUCER ENGINEERING

Units and Standards - Calibration Methods – Errors in Measurement and Uncertainty analysis – Static and Dynamic Characteristics of First and Second Order Transducers - Resistive, Capacitive, Inductive, Piezoelectric, Magnetostrictive, Hall Effect and Smart Sensors and Associated Signal Conditioning Circuits.

UNIT V: ELECTRICAL AND ELECTRONIC MEASUREMENTS

Measurement of Resistance, Capacitance, Inductance and Frequency using Bridges (Wheatstone, Kelvin, Megohm, Maxwell, Anderson, Schering and Wien Bridge) - Q-meter– Galvanometer, Measurement of Voltage and Current - Power and Energy Measurements – Potentiometers, and Instrument Transformers - Digital Voltmeter, Digital Multimeter, Time, Phase and Frequency Measurements – Oscilloscopes – Digital and Recording Devices.

UNIT VI: INDUSTRIAL INSTRUMENTATION

Measurement of Displacement (Linear and Angular), Force, Torque, Velocity, Acceleration, Vibration, Density, Viscosity, Humidity and Moisture, Measurement of Flow (Variable Head, Variable Area, Mass, Electromagnetic, Ultrasonic, Turbine and Open Channel Flow Meters) – Measurement of Level, pH, Temperature (Thermocouple, Bolometer, RTD, Thermistor, Pyrometer and Semiconductor) and Pressure – Universal Smart Transmitter.

UNIT VII: ANALYTICAL AND BIO-MEDICAL INSTRUMENTATION

Analytical Instruments: Spectrophotometers – Spectral Methods of Analysis – Source, Detectors and Applications – Ion Conductivity: Sampling System, Ion Selective Electrodes, Conductivity and pH meters – Gas Analyzers – Chromatography – NMR Spectroscopy – Mass Spectrometers – Dust and Smoke Measurements – Water Quality Analyzer.

Biomedical Instruments: Bio-potentials and their Measurement Techniques & Signal Conditioning Circuits – ECG, EEG, EMG and ERG - Medical Imaging Systems: X-Ray, Computed Tomography (CT), Magnetic Resonance Imaging (MRI), Positron Emission Tomography (PET), Ultrasound.

UNIT VIII: CONTROL SYSTEMS

Modeling of Mechanical and Electrical Systems (First Principle, Transfer Function and State Space Models) -Block Diagram Reduction-Signal Flow Graphs-Time and Frequency Domain Analysis - Stability Analysis (Root Locus, Routh Hurwitz Criterion, Nyquist Stability Criterion) -Lead/Lag Compensators-Controllability and Observability.

UNIT IX: PROCESS CONTROL

Process Modeling: Level and Thermal Processes-Interacting and Non-Interacting Systems- Self regulation - Degrees of freedom - Characteristics of ON/OFF, PID Control Modes-PID Controller Tuning (Z-N, Cohen-Coon and Continuous Cycling)- PID Implementation Issues (Bumpless Transfer and Anti-reset Windup)- Control Valve Characteristics and Sizing- Control Schemes: Cascade, Feed-Forward, Ratio, Adaptive, Internal Model Controller and Model Predictive Control.

UNIT X: PLC, SCADA AND DCS

PLC: Architecture, I/O Modules, Programming Languages (Ladder Logic, Instruction List and Functional Block Diagram) -Internet of Things.

SCADA: RTU, Master Station and Communication Architectures.

DCS: Architecture, Local Control Unit, Field Control Unit, Operator and Engineering Human Interface Station, Displays – HART and Field Bus Communication Protocols.

9. FINANCIAL AND COST ACCOUNTANCY (Final)

CODE: 434

UNIT I: ACCOUNTING

- (i) Accounting Standards – GAAP - AS - applicability, interpretation, scope and compliance-IFRS- Ind AS 2, 10, 115, 16, 21, 20, 23, 37 & 38.
- (ii) Company Accounts - Presentation of Financial Statements as per Schedule III of Companies Act 2013 - Statement of Profit or Loss, Balance Sheet, Change in Equity, Cash flow statement
- (iii) Accounting of Banking, Electricity and Insurance Companies
- (iv) Accounting for Cooperative Societies
- (v) Branch and Departmental Accounts (including foreign branches)
- (vi) Accounting for non-profit organisations and incomplete records
- (vii) Computerised Accounting System (ERP features and advantages)

UNIT II: AUDITING

- (i) Nature and scope and significance of auditing
- (ii) Audit Engagement, Audit Programme, Audit working papers , Audit note book audit evidence and audit report
- (iii) Internal check, internal control and internal audit- industry specific
- (iv) Reporting requirements under companies act - report vs certificate, contents of the report and qualifications in the report.
- (v) Cost audit and Secretarial audit
- (vi) Auditing of different types of undertaking - education, hospitals, cooperative societies, trusts.

UNIT III: FINANCIAL MANAGEMENT

- (i) Meaning-objectives -scope of financial management
- (ii) Sources of Funds- Introduction of Financial Markets- Capital & Money Markets
- (iii) Tools for Financial Analysis - Ratio, Funds flow analysis, Cash flow analysis
- (iv) Cost of Capital, Capital Structure and Leverages
- (v) Working Capital Management- Financing - Cash, Inventory, Receivables and Payables
- (vi) Capital Budgeting.
- (vii) Risk Management - risk measurement- risk analysis- Value at Risk(VAR)- Capital Adequacy Norms & Income Recognition Norms (NPA) in NBFCs.

UNIT IV: TAXATION

- (i) Direct Taxation- Residential Status- Heads of Income and Computation of Total Income under various heads- assessment of income of different persons - TDS/TCS/Advance Tax- Income Computation and Disclosure standards (Basic Concepts only) - Taxation as applicable to Government undertaking and Cooperative Societies. Due dates and compliances. Effects of non compliance and penalty. Tax audit provisions under I.T. Act
- (ii) Indirect Taxation- Canons of Taxation- Customs Law - Goods and Services Tax (GST) - CGST- SGST-IGST- Cess - Registration - Supply- Time of Supply- Value of Supply- Place of Supply- E-Invoicing, E-Way Bill, Input tax credit- Reverse Charge Mechanism (RCM) - Payment of Taxes, Penalties.

UNIT V: COMMERCIAL LAW, INDUSTRIAL LAW AND COMPANY LAW

- (i) MSMED Act 2006.
- (ii) Laws and Regulations relating to Cyber Security and Data Protection.
- (iii) Factories Act
- (iv) Payment of Gratuity Act
- (v) Employees Provident Fund Act 1952
- (vi) Employees State Insurance Act 1948
- (vii) Payment of Bonus Act 1965
- (viii) Minimum Wages Act 1948
- (ix) Companies Act 2013-Promotion - Formation and related procedures – Types – Appointment and duties of Directors, Loans and Deposits, CSR, Salient features of Insolvency and Bankruptcy Code.

UNIT VI: MANAGEMENT ACCOUNTING

- (i) Introduction to Management Accounting - Relationship between Management accounting and cost accounting- Decision Making tools
- (ii) Analysis and Interpretation of Financial Statements
- (iii) Learning Curve - concepts and its application

UNIT VII: COST MANAGEMENT

- (i) Life Cycle costing
- (ii) Target Costing
- (iii) Kaizen Costing
- (iv) Value analysis and Engineering
- (v) Throughput Costing
- (vi) Business Process Re-engineering
- (vii) Back flush costing
- (viii) Activity Based Costing (ABC).

UNIT VIII: DECISION MAKING TECHNIQUES

- (i) Marginal Costing - CVP analysis - Profit Volume Graph- Decision involving alternative choices - Make or Buy; Evaluation of Orders; Multiple scarce: Product sales
- (ii) Pricing Decisions - New Product pricing- use of costs in pricing - sensitivity analysis - monopoly pricing - competitive pricing- Transfer pricing - Costing of Service Sectors
- (iii) Variance Analysis and Reporting- Material, Labour, Overheads, Turnover and Profit.

UNIT IX: PERFORMANCE EVALUATION AND IMPROVEMENT TOOLS

- (i) Balanced Score Card
- (ii) Supply Chain Management
- (iii) Key Performance Indicators (KPI) like ROI, Economic Value Added (EVA).
- (iv) Bench Marking
- (v) Six sigma, Statistical Quality Control
- (vi) Plan-Do-Check Action
- (vii) Management Information Systems (MIS)
- (viii) Total Productivity Management (TPM) and Total Quality Management (TQM)
- (ix) SWOT analysis
- (x) Profitability Analysis.

UNIT X: BUSINESS VALUATION

- (i) Meaning of Value, Valuation and Business Valuation
- (ii) Valuation Methods - Non Discounted cash flow method- Discounted Cash Flow Method - Free Cashflow Method, Net Present Value Method (NPV)- Profitability Index Method(PI) - Internal Rate of Return Method (IRR)
- (iii) Valuation of Inventory
- (iv) Valuation of Investments
- (v) Valuation of Intangibles
- (vi) Valuation of Human Resources
- (vii) Valuation of Equity

10. LIBRARY AND INFORMATION SCIENCE (PG Degree Standard)

CODE: 267

UNIT I: INFORMATION AND COMMUNICATION

- (i) Data, Information and Knowledge; Information – Notions; Information Theories
- (ii) Library – Social relevance; Types; Functions, Legislation.
- (iii) Information Transfer Cycle; Diffusion pattern; Communication – Theories and Models; Channels and Barriers to Communication
- (iv) Information / Memory institution of different kinds: Libraries, Archives, Documentation Centers, Information Analysis Centers, Museums and respective roles and functions.
- (v) Professional bodies and Association – UNESCO, IFLA, ALA, CILIP, ILA, IASLIC, IATLIS, etc

UNIT II: MANAGEMENT OF INFORMATION CENTRES

- (i) Management - Concept, Definition; Schools of Management Thought, functions of Management (POSDCORB).
- (ii) Human Resource Management - Organisation models; job description and job Analysis; selection, recruitment, training
- (iii) Financial Management: Planning and Control; Resource generation; Budget and Budgeting; Budgetary control techniques; Cost Benefit, Cost Effective analysis
- (iv) Materials Management: Collection development Policy; Issues – selection, acquisition; Library routines, Circulation, Preservation and conservation, Physical facilities - building and equipments, Marketing of information.
- (v) Planning – Concept, Definition Types; Systems Analysis and Design; Knowledge Management, total quality management, MBO and MIS

UNIT III: KNOWLEDGE ORGANISATION

- (i) Universe of Subjects; Modes of formation of Subjects; Knowledge Organization
- (ii) Classification- Various Schemes of Classification - CC, UDC, LC and DDC – Overview; BSO; General theory of classification; CRG; Cannons and Principles - Idea, Verbal and Notation planes; Facet analysis;
- (iii) Cataloguing - Purpose, Structure, Types – Inner and Physical forms; Normative Principles, Canons & Laws; Standards – ISBDs, AACR, RDA; FRBR
- (iv) Subject Cataloguing – Principles; Subject heading lists; Thesauri and Vocabulary control

- (v) Bibliographic formats – International Standards - ISO 2709, MARC21, UNIMARC, CCF and National formats. Metadata – Standards: Dublin Core, Mark up languages – HTML, XML, RDF

UNIT IV: INFORMATION SOURCES

- (i) Information Sources – Types – Documentary and Non documentary; Primary, Secondary and Tertiary; Electronic Sources of Information; Human and Institutional Sources; Invisible Colleges; Tehnological Gatekeepers
- (ii) Reference Sources - Ready Reference Sources – Types - Dictionaries, Encyclopedias, Annuals, Biographical sources, Handbooks and Manuals, Geographical Sources.
- (iii) Bibliographical Sources – Bibliographies; Union Catalogues; Indexing and Abstracting sources; News summaries;
- (iv) Web Resources - Subject Gateways and Portals; Databases – Bibliographical, Abstracting and Indexing; Full-text databases; Citation Databases
- (v) Evaluation of Information sources - Print and Web Resources; Multimedia; Open Access Resources

UNIT V: INFORMATION SYSTEM, PRODUCTS AND SERVICES

- (i) Information Systems - Concept, Purpose, and Types; Global & National Information Systems; MEDLARS, INIS, AGRIS, INSPEC, OCLC, ERONAT, NISCAIR, NASSDOC, Library Networks: INFLIBNET, DELNET, etc.
- (ii) Information Services- Users Education and Information Literacy; Douments Delivery, Translation; Current Awareness, SDI, E-Alert & Webbased Services
- (iii) Users of Information- Understanding the users; Categories of users and their needs; Information use contexts; Information seeking behaviour of users; Theories of Information seeking behaviour.
- (iv) Information Analysis and Consolidation Products and Services.
- (v) Use Studies; Methods of Users studies; Major information users and use studies and their findings

UNIT VI: INFORMATION STORAGE AND RETRIEVAL

- (i) Information Retrieval System – Concept, Definition, and Components
- (ii) Indexing systems – Pre-coordinate and Post-coordinate; General Theory of Subject Indexing; Keyword Indexing; Citation Indexing
- (iii) Information Retrieval Models – Boolean, Probabilistic, Cognitive and Vector Models; Alternative IR Models: algebraic and probabilistic models (Bayesian networks)
- (iv) Search and Searching - Search Process; Search strategies; Search engines
- (v) Evaluation of Information Retrieval Systems - Purpose, Criteria – Recall and Precision; Major Evaluation Studies – MEDLARS; SMART Retrieval; STAIRS, Project TREC.

UNIT VII: RESEARCH METHODS

- (i) Research - Concept, Definition, Objectives and Significance; Types; Research Problems
- (ii) Research Design – Definition, Need; Sampling; Hypothesis – Types and Testing
- (iii) Methods and Tools - Data collection - Survey, Experimental, Case-study, Observation, Questionnaire, Interview schedules.
- (iv) Introduction to Statistics; definition of statistical terms-population, sample, data and variables; frequency distributions; scales of measurement; presentation of data- graphical and tabular; frequency tables, histogram, frequency curves; correlation and regression analysis; measures of central tendency.
- (v) Report Writing – Components of a Research Report; Style manuals – MLA, APA, Chicago, Turabian.

UNIT VIII: INFORMATION TECHNOLOGY (IT) AND LIBRARY AUTOMATION

- (i) Information Technology – Concept – Definition - Evolution of Digital Computers; Introduction to Telecommunications; Number Systems: Binary, Octal, Hexadecimal, Representation of Numbers in Computers; Character Representation: ASCII, ISCII and UNICODE; File formats
- (ii) Basic components of a Computer – Arithmetic Logic Unit; Control Unit; Memory Unit – Static and Dynamic RAM, ROM, Cache memory; Input / Output devices
- (iii) Operating System- Linux, Windows; Fundamentals of Programming; Introduction to C programming; Object Oriented programming; Java, PHP
- (iv) Database Management System– Concepts, Functions; Integrity and Security issues
- (v) Library Automation - Overview of library automation software; Criteria for selection of software; and Hardware (including differently-abled); Open and Commercial LMS

UNIT IX: DIGITAL LIBRARIES

- (i) Digital Libraries - Concept and Definition; Historical development of Digital Libraries. Copyright and license issues.
- (ii) Digitization Process - Software, Hardware and Best practices; Scanners and Scanner types; OCR and OCR software
- (iii) Technology for DLs - Open source software - Open Standards and File formats; Harvesting metadata, OAI-PMH and DL Interoperability;
- (iv) Digital Library Architecture - Grid architecture; Open URL integration;
- (v) Digital Resources Management - Digital Preservation- Persistent identifiers – DOI and CNRI Handles; Multilingual digital repositories and Cross- language information retrieval

UNIT X: QUANTITATIVE TECHNIQUES AND INFORMETRICS

- (i) Informetrics - Genesis, Scope and Definition; Librametry, Bibliometrics, Scientometrics and Wbometrics
- (ii) Classical Bibliometrics laws - Zip's Law, Lotka's Law, Bradford's Law of Scattering; Generalized Bibliometrics distributions. 80-20 rule, Price's Law relating to scientific productivity; Analysis of use statistics.
- (iii) Growth and Obsolescence of literature - Various growth models; Aging factor and half-life: real vs. apparent; synchronous vs. diachronous.
- (iv) Citation analysis - Bibliographic Coupling and Co-citation Analysis
- (v) Bibliometric indicators: Impact factor, h-index, g-index,i-10;Mapping of Science; Citation Index.

11. MECHANICAL ENGINEERING / PRODUCTION ENGINEERING / MANUFACTURING ENGINEERING (Degree Standard)

CODE: 399

UNIT I: MECHANICS, KINETICS AND DYNAMICS

Statics of Particles, Equilibrium of Rigid bodies, Mechanism of Deformable Bodies, Properties of Surfaces and Solids, Centroid, Centre of Gravity, Dynamics of Particles, Elements of Rigid Body Dynamics, Basics of Mechanisms, Kinematics of mechanisms, gyroscope, Gears and Gear Trains, Fly Wheels and Governors, Balancing of Rotating and Reciprocating Masses, Friction in Machine Elements, Force Analysis, Balancing, Single Degree Free Vibration, Forced Vibration, mechanisms for Vibration Control, Effect of Damping, Vibration Isolation, Resonance, Critical Speed of Shaft.

UNIT II: STRENGTH OF MATERIALS AND DESIGN

Stress, Strain and Deformation of Solids, Combined Stresses, Theories of Failures, Transverse Loading on Beams, Stresses in Beams, Torsion, Deflection of Beams, Energy Principles, Thin Cylinders and Thick Cylinders, Spherical Shells, Fundamentals of Design for Strength and Stiffness of Machine Members, Design of Shafts and Couplings, Design for Static and Dynamic Loading, Design of Fasteners and Welded Joints, Reverted Joints, Design of Springs, Design of Bearings, Design of Flywheels, Design of Transmission Systems for Flexible Elements, Spur Gears and Parallel Axis Helical Gears, Bevel Gears, Worm Gears and Crossed Helical Gears, Design of single and two stage speed reducers, Design of cam, Clutches and Brakes, Design of Piston and Connecting Rods.

UNIT - III: FLUID MECHANICS AND TURBO MACHINERY

Fluid properties, fluid statics, manometry, buoyancy, control volume analysis of mass, momentum and energy, fluid acceleration, differential equations of continuity and momentum, Bernoulli's equation, Dimensional Analysis, viscous flow of incompressible fluids, boundary layer, elementary turbulent flow, flow through pipes, head losses in pipes, bends. Turbomachinery: Pelton wheel, Francis and Kaplan turbines - impulse and reaction principles – velocity diagrams, pumps and its applications-Valves and Types - Theory of Jet Propulsion- Pulse Jet – Ram Jet Engines, Online Continuous Flow Monitoring System.

UNIT IV: THERMAL ENGINEERING AND THERMODYNAMICS

Basic concepts, Zeroth, First and Second laws of thermodynamics, thermodynamic system and processes, Carnot cycle. irreversibility and availability, behaviour of ideal and real gases, thermodynamic

relations, properties of pure substances, calculation of work and heat in ideal processes, analysis of thermodynamic cycles related to energy conversion, Fuel and combustion, Fuels Characteristics, Emissions and Controls, Testing of IC Engine-Renewable sources of Energy.

Power Engineering: Steam Tables, Rankine, Brayton cycles with regeneration and reheat. I.C. Engines: air-standard Otto, Diesel cycles. Refrigeration and air-conditioning: Vapour refrigeration cycle, heat pumps, gas refrigeration, Reverse Brayton cycle; moist air: psychometric chart, basic psychometric processes.

UNIT V: HEAT AND MASS TRANSFER

Modes of heat transfer - one dimensional heat conduction, resistance concept, electrical analogy, unsteady heat conduction, fins dimensionless parameters in free and forced convective heat transfer, various correlations for heat transfer in flow over flat plates and through pipes, thermal boundary layer, effect of turbulence, radiative heat transfer, black and grey surfaces, shape factors, network analysis; heat exchanger performance, LMTD and NTU methods.

Basic Concepts of Mass transfer, Diffusion Mass Transfer, Fick's Law of Diffusion Steady state Molecular diffusion, Convective Mass Transfer, Momentum, Heat and Mass Transfer Analogy, Convective Mass Transfer Correlations, Radiative Heat Transfer.

UNIT VI: MATERIALS SCIENCE AND METALLURGY

Constitution of alloys and phase diagrams, Iron – Iron Carbide Phase Diagram - steels, cast iron, phase transformations- diffusion-TTT diagram, ferrous and nonferrous alloys, heat treatment of ferrous and non-ferrous metal, surface modification techniques, powder metallurgy, non-metallic materials, mechanical properties and testing, crystal defects and strengthening mechanisms, conducting and semi conducting materials, magnetic and dielectric materials, Engineering ceramics, Engineering and commodity polymers, composites, nano-materials.

UNIT VII: PRODUCTION TECHNOLOGY

Foundry Technology- types of pattern, cores, moulding and casting methods, Solidification, design of castings, defects, Melting Furnaces, Hot and Cold working, Metal Forming Processes - types, Defects and Remedies, Sheet Metal Operation, metal joining processes, types and design of weldment, welding metallurgy, welding defects, Casting, Welding Inspection (NDT), Manufacturing of Thermo Setting and Thermo Plastic Products, Metal cutting, Cutting Tool Nomenclature, Machinability machine tools - center lathe, drilling, milling, grinding, gear cutting and broaching, Machining Time Calculation, unconventional machining processes, Micro Manufacturing, CNC machine tools, Manual Part Programming - Machining and Turning Centre.

UNIT VIII: METROLOGY AND QUALITY CONTROL

Limits, Fits and Tolerance, Linear and angular measurements, Interferometry, laser interferometers - Types, Computer Aided Inspection, Basic concept of CMM - Types of CMM, Machine vision, Form measurement-Straightness- Flatness, Roundness, Surface finish measurement, contact and non-contact method, Measurement of power, flow and temperature. Statistical quality control, control charts, acceptance sampling, reliability, TQM, 5S, ISO standards.

UNIT IX: CAD / CAM / CIM / FEA

Fundamentals of Computer Graphics, Geometric Modeling, Visual Realism, Assembly of Parts, CAD Standards, Fundamentals of CIM, Production Planning and Control, Computer Aided Process Planning, Cellular Manufacturing, Flexible Manufacturing System and Automated Guided Vehicle System, Group Technology, Production Flow Analysis, Industrial Robotics, Additive Manufacturing, Just in Time(JIT), lean manufacturing, One Dimensional Problems in FEA, Two Dimensional Scalar Variable Problems, Two dimensional vector variable problems, Isometric Parametric Formulation.

UNIT X: INDUSTRIAL ENGINEERING AND MANAGEMENT

Work study - Techniques, Method study and work measurements - objectives - basic procedure, machine loading and scheduling, product sequencing, inventory control - E O Q - quantity discounts, ABC Analysis material handling systems, operations research, Linear Programming, simplex method, Transportation model, Assignment model CPM and PERT, Queuing Models. Management theory and practice, planning - Decision making, Organising, staffing, Motivation, Leadership, controlling, control techniques, Industrial Safety - Standards – OSHA.

12. TAMIL LANGUAGE AND LITERATURE
(PG Degree Standard)

CODE: 331

அலகு 1:

மொழியின் தோற்றமும் வளர்ச்சியும் - பேச்சு வழக்கு எழுத்து வழக்கு, என்னும் மொழியின் இருவகை நிலை - காலம்தோறும் எழுத்து வளர்ச்சி - மொழிக்குடும்பம் - திராவிட மொழிகள் - திருந்திய மொழிகள், திருந்தா மொழிகள் கிளைமொழிகள் தமிழில் பிறமொழிக் கலப்பு -வடமொழி, ஆங்கிலம் பிறமொழிகளில் தமிழின் செல்வாக்கு - தமிழின் தனித்தன்மை.

அலகு 2:

தமிழில் உள்ள எழுத்துக்களும் அவற்றின் வகைகளும் - முதல் எழுத்து, சார்பெழுத்து உயிரெழுத்து, மெய்யெழுத்து அவற்றின் வகைகள் - ஒலியன் - சொல்லும் சொல்லின் வகைகளும் பெயர், வினை, இடை, உரி உருபன் - வேற்றுமை, வேற்றுமை உருபுகள் வினை, வினை வகைகள் - மூவிடம், பால்காட்டும் விசுதிகள் சந்தி இலக்கணம்.

அலகு 3:

பொருளிலக்கணம் - அகப்பொருள், புறப்பொருள் - திணையும் துறையும் - அகத்திணை 7 - புறத்திணை 7 - இருவகை கைகோள்- களவு, கற்பு - முதற்பொருள், கருப்பொருள், உரிப்பொருள் - இரவுக்குறி, பகற்குறி உடன்போக்கு, அறத்தொடு நிறை, வெறியாட்டு - போர்மறம் விழுப்புண்படல் - புறமுதுகிடாமை - கொடை விருந்தோம்பல் - புரவலர், புலவர் உறவு.

அலகு 4:

யாப்பு - பா வடிவங்கள் - ஆசிரியப்பா, வெண்பா, வஞ்சிப்பா, கலிப்பா, பிற - இலக்கணமற்ற புதுக்கவிதைப் போக்கு - அணிநலன் உவமை அணி, உருவக அணி, வஞ்சப்புக்கச்சி அணி, தற்குறிப்பேற்ற அணி, சொற்பொருள் பின்வருநிலை அணி - பொருள்கோள் வகைகள்,

அலகு 5:

இலக்கண நூல்கள் - தொல்காப்பியம் - நன்னூல் - யாப்பருங்கலக்காரிகை - தண்டியலங்காரம் - நம்பியகப்பொருள் - புறப்பொருள் வெண்பாமாலை - வீரசோழியம் நேமிநாதம்.

அலகு 6:

சங்க இலக்கியம் - எட்டுத்தொகை, பத்துப்பாட்டு - அக இலக்கியம், புற இலக்கியம் - ஆற்றுப்படை நூல்கள் - தொகுப்பு முயற்சி முச்சங்கம் குறித்த செய்திகள் - சங்க இலக்கியத் தொன்மையும் சிறப்பும், முத்தொள்ளாயிரம்.

அலகு 7:

அற இலக்கியம் - திருக்குறள், நாலடியார், ஒளவையாரின் நூல்கள் - குமரகுருபரரின் நீதிநெறி விளக்கம் பாரதியாரின் ஆத்திச்சூடி

அலகு 8:

காப்பிய இலக்கியம் - ஐம்பெருங்காப்பியம், ஐஞ்சிறு காப்பியம் - சிலப்பதிகாரம். மணிமேகலை, சீவகசிந்தாமணி, கம்பராமாயணம், பெரியபுராணம், சீராப்புராணம், தேம்பாவணி.

அலகு 9:

பக்தி இலக்கியமும் சிற்றிலக்கியமும் - பன்னிரு திருமுறைகள், நாலாயிர திவ்ய பிரபந்தங்கள் - திருப்புகழ் - நந்திக் கலம்பகம் - மீனாட்சியம்மை பிள்ளைத்தமிழ் - குற்றாலக் குறவஞ்சி - அழகர் கிள்ளைவிடு தூது - முக்கூடற்பள்ளு - திருவருட்பா - மஸ்தான் சாகிப்புடல்கள் - இரட்சணிய யாத்திரிகம்

அலகு 10:

புதினம் - தோற்றம் வளர்ச்சி - மாயூரம் வேதநாயகம் பிள்ளை, நா.பார்த்தசாரதி, தி.ஜானகிராமன், ஜெயகாந்தன், சுந்தர ராமசாமி, பாலகுமாரன், ஆ.மாதவன், இராஜம் கிருஷ்ணன், இந்திரா பார்த்தசாரதி, அசோகமித்திரன், சோ.தர்மன், ஜெயமோகன், எஸ்.இராமகிருஷ்ணன், வண்ணநிலவன், நீலபத்மநாபன், பூ.மணி, நாஞ்சில் நாடன், பிரபஞ்சன், ஆதவன், சுஜாதா, தோப்பில் முகமதுமீரான், மேலாண்மை பொன்னுசாமி, வாஸந்தி, தமிழவன், சாரு நிவேதிதா, சுப்பரபாரதி மணியன், தமிழ்ச்செல்வி, ஜோ.டி.குருஸ்,பாமா உள்ளிட்ட இக்காலப் படைப்பாளர்கள் வரை.

சிறுகதை - தோற்றம், வளர்ச்சி - வ.வே.சு. ஐயர், புதுமைப்பித்தன், கு.பரா., மௌனி, ந.பிச்சமூர்த்தி, அகிலன், கிராஜநாராயணன், ராமாமிர்தம், நகுலன், அசோகமித்திரன், ஜெயகாந்தன், பிரமிள், கோணங்கி, தமிழ்ச்செல்வன், நாஞ்சில் நாடன், பாவண்ணன், பிரேம்ரமேஷ், சா.கந்தசாமி, பிரபஞ்சன், மாலன், இந்திரா பார்த்தசாரதி. கந்தர்வன், அம்பை, சூடாமணி, தமிழ்ச்செல்லி, சிவகாமி, பெருமாள் முருகன், உள்ளிட்ட இக்காலப் படைப்பாளர்கள் வரை.

மரபுக்கவிதை - பாரதியார், பாரதிதாசன், கவிமணி, நாமக்கல் கவிஞர், வாணிதாசன், தமிழ் ஒளி, கம்பதாசன், கண்ணதாசன், சுரதா. பெருஞ்சித்திரனார் உள்ளிட்ட படைப்பாளர்கள் வரை.

புதுக்கவிதை - மீரா, மேத்தா, அப்துல் ரகுமான், ஈரோடு தமிழன்பன், சிற்பி, வைரமுத்து, அறிவுமதி, கலாப்பிரியா, கனிமொழி, தமிழ்ச்சி, புவியரசு, குட்டிரேவதி, மனுஷ்யபுத்திரன் உள்ளிட்ட படைப்பாளர்கள் வரை.

நாடக இலக்கியம் - சங்கரதாஸ் சுவாமிகள், பம்மல் சம்பந்த முதலியார், இந்திரா பார்த்தசாரதி முதலியோர்

உரையாசிரியர்களும் உரைநடை வளர்ச்சியும் - உரையாசிரியர்கள் உரைநடை - ஆறுமுக நாவலர் - உ.வே. சாமிநாத ஐயர் - வ.வே.சு. ஐயர் - மறைமலை அடிகள் - திருவிக - ரா.பி. சேதுபிள்ளை - எஸ்.வையாபுரிப் பிள்ளை, பண்டிதமணி மு.கதிரேசனார் - தெ.பொ.மீ, மு.வ, வ.சுப, மாணிக்கம், பெருஞ்சித்திரனார், பாவாணர், சாமி சிதம்பரனார், நா.வானமாமலை, தொ.மு.சி. இரகுநாதன், க.நா.சு.

மொழிபெயர்ப்பு இலக்கியம் - மொழிபெயர்ப்புச் சிக்கல்கள் - மலையாள தமிழ் மொழிபெயர்ப்பு இலக்கியங்கள் ஆங்கில தமிழ் மொழிபெயர்ப்பு இலக்கியங்கள்

நாட்டுப்புற இலக்கியம் - நாட்டுப்புறக் கதைகள், பாடல்கள், நம்பிக்கைகள்

ஊடகவியல் - இதழியல் தமிழ் மொழி வளர்ச்சியில் இதழ்களின் பங்களிப்பு - மணிக்கொடி - எழுத்து - முதலிய இலக்கிய இதழ்கள், சிற்றிதழ்கள்.