Assistant Conservator of Forests
(Group – IA Services)
Syllabus for Preliminary Examination
General Studies (Degree Standard)
Topics for Objective Type

SUBJECT 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, Fertilizers, Pesticides.
(iv) Main concepts of Life Science, Classification of Living Organisms, Evolution, Genetics, Physiology, Nutrition, Health and Hygiene, Human diseases.
(v)   Environment and Ecology.

UNIT-II: CURRENT EVENTS

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

UNIT-VI: INDIAN ECONOMY

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

UNIT-VII: INDIAN NATIONAL MOVEMENT

(i) National Renaissance – Early uprising against British rule - Indian National Congress - Emergence of leaders – B.R.Ambedkar, Bhagat Singh, Bharathiar, V.O.Chidambaranar, Jawaharlal Nehru, Kamarajar, Mahatma Gandhi, Maulana Abul Kalam Azad, Thanthai Periyar, Rajaji, Subash Chandra Bose, 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 (S.S.L.C. STANDARD)

(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.

உதவி வனப் பாதுகாவலர்
தொகுதி – IA பணிகள்
முதல் நிலை தேர்வு
பொது அறிவு (பட்டப்படிப்பு தரம்)
கொள்குறி வகைகளுக்கான தலைப்புகள்

அலகு – I: பொது அறிவியல்

(i) அறிவியல் அறிவு மற்றும் அறிவியல் உணர்வு – பகுத்தறிதல் – பொருள் உணராமல் கற்றலும் கருத்துணர்ந்து கற்றலும் - கடந்தகாலம், நிகழ்காலம், எதிர்காலம் பற்றி புரிந்து கொள்வதற்கான ஒரு கருவி அறிவியல்.

(ii) பேரண்டத்தின் இயல்பு – பொது அறிவியல் விதிகள் – இயக்கவியல் – பருப்பொருள்களின் பண்புகள், விசை, இயக்கம் மற்றும் ஆற்றல் – அன்றாட வாழ்வியல் இயக்கவியல், மின்னியல், காந்தவியல், ஒளி, ஒலி, வெப்பம், அணுக்கரு இயற்பியல், லேசர் (LASER) மின்னணுவியல் மற்றும் தகவல் தொடர்பியல் ஆகியவற்றின் அடிப்படை கோட்பாடுகளின் பயன்பாடுகள்.

(iii) தனிமங்களும் சேர்மங்களும், அமிலங்கள், காரங்கள், உப்புகள், பெட்ரேலிய பொருட்கள், உரங்கள், பூச்சிகொல்லிகள்.

(iv) உயிரியலின் முக்கியகோட்பாடுகள், உயில் உலகின் வகைப்பாடு, பரிணாமம், மரபியல், உடலியங்கியல், உணவியல், உடல் நலம் மற்றும் சுகாதாரம், மனிதநோய்கள்.

(v) சுற்றுப்புறச்சூழல் மற்றும் சூழலியல்.

அலகு – II: நடப்பு நிகழ்வுகள்

(i) வரலாறு – அண்மை நிகழ்வுகளின் தொகுப்பு – தேசியச் சின்னங்கள் – மாநிலங்கள் குறித்த விவரங்கள் – செய்திகளில் இடம்பெற்ற சிறந்த ஆளுமைகளும் இடங்களும் – விளையாட்டு – நூல்களும் ஆசிரியர்களும்.

(ii) ஆட்சியியல் - இந்தியாவில் அரசியல் கட்சிகளும் ஆட்சியியல் முறைமைகளும் – பொது விழிப்புணர்வும் (Public Awareness) பொது நிர்வாகமும் – நலன்சார் அரசுத் திட்டங்களும் அவற்றின் பயன்பாடும், பொது விநியோக அமைப்புகளில் நிலவும் சிக்கல்கள்.

(iii) புவியியல் – புவியியல் அடையாளங்கள்.

(iv) பொருளாதாரம் – தற்போதைய சமூக பொருளாதார பிரச்சனைகள்.

(v) அறிவியல் – அறிவியல் மற்றும் தொழில்நுட்பத்தில் அண்மைக்கால கண்டுப்பிடிப்புகள்.

(vi) கலை, அறிவியல், இலக்கியம் மற்றும் தத்துவம் ஆகிய வெவ்வேறு துறைகளில் தனித்துவம் கொண்ட ஆளுமைகள்.

அலகு – III: இந்தியாவின் புவியியல்

(i) அமைவிடம் – இயற்கை அமைவுகள் - பருவமழை, மழைப்பொழிவு, வானிலை மற்றும் காலநிலை – நீர் வளங்கள் – இந்திய ஆறுகள் – மண், கனிம வளங்கள் மற்றும் இயற்கை வளங்கள் – காடு மற்றும் வன உயிரினங்கள் – வேளாண் முறைகள்.

(ii) போக்குவரத்து - தகவல் தொடர்பு.

(iii) சமூகப் புவியியல் – மக்கள் தொகை அடர்த்தி மற்றும் பரவல் - இனம், மொழிக் குழுக்கள் மற்றும் முக்கிய பழங்குடிகள்.

(iv) இயற்கைப் பேரிடர் – பேரிடர் மேலாண்மை – சுற்றுச்சூழல் மாசுபடுதல்: காரணங்களும் தடுப்பு முறைகளும் – பருவநிலை மாற்றம் - பசுமை ஆற்றல்.

அலகு – IV: இந்தியாவின் வரலாறும் பண்பாடும்

(i) சிந்துவெளி நாகரிகம் – குப்தர்கள், தில்லி சுல்தான்கள், முகலாயர்கள் மற்றும் மராத்தியர்கள் – விஜயநகர மற்றும் பாமினி அரசுகளின் காலம் – தென் இந்திய வரலாறு.

(ii) இந்திய சமூகப் பண்பாட்டு வரலாற்றில் மாற்றங்களும் தொடர்ச்சியும்.

(iii) இந்தியப் பண்பாட்டின் இயல்புகள், வேற்றுமையில் ஒற்றுமை – இனம், மொழி, வழக்காறு.

(iv) இந்தியா ஒரு மதச்சார்பற்ற நாடு, சமூக நல்லிணக்கம்.

அலகு – V: இந்திய ஆட்சியியல்

(i) இந்திய அரசியலமைப்பு – அரசியலமைப்பின் முகவுரை – அரசியலமைப்பின் முக்கிய கூறுகள் – ஒன்றியம், மாநிலம் மற்றும் யூனியன் பிரதேசங்கள்.

(ii) குடியுரிமை, அடிப்படை உரிமைகள், அடிப்படைக் கடமைகள், அரசின் நெறிமுறைக் கோட்பாடுகள்.

(iii) ஒன்றிய நிர்வாகம், ஒன்றிய நாடாளுமன்றம் – மாநில நிர்வாகம், மாநில சட்டமன்றம் – உள்ளாட்சி அமைப்புகள், பஞ்சாயத்து ராஜ்.

(iv) கூட்டாச்சியின் அடிப்படைத் தன்மைகள்: மத்திய – மாநில உறவுகள்.

(v) தேர்தல் – இந்திய நீதி அமைப்புகள் – சட்டத்தின் ஆட்சி.

(vi) பொதுவாழ்வியல் ஊழல் – ஊழல் தடுப்பு நடவடிக்கைகள் – லோக்பால் மற்றும் லோக் ஆயுக்தா – தகவல் உரிமை – பெண்களுக்கு அதிகாரமளித்தல் – நுகர்வோர் பாதுகாப்பு அமைப்புகள் – மனித உரிமைகள் சாசனம்.

அலகு – VI : இந்தியப் பொருளாதாரம்

(i) இந்தியப் பொருளாதாரத்தின் இயல்புகள் – ஐந்தாண்டு திட்ட மாதிரிகள் – ஒரு மதிப்பீடு – திட்டக்குழு மற்றும் நிதி ஆயோக்.

(ii) வருவாய் ஆதாரங்கள் – இந்திய ரிசர்வ் வங்கி – நிதி கொள்கை மற்றும் பணவியல் கொள்கை – நிதி ஆணையம் – மத்திய மாநில அரசுகளுக்கிடையேயான நிதிப் பகிர்வு – சரக்கு மற்றும் சேவை வரி.

(iii) இந்திய பொருளாதார அமைப்பு மற்றும் வேலைவாய்ப்பு உருவாக்கம், நிலச் சீர்திருத்தங்கள் மற்றும் வேளாண்மை – வேளாண்மையில் அறிவியல் தொழில்நுட்பத்தின் பயன்பாடு – தொழில் வளர்ச்சி – ஊரக நலன்சார் திட்டங்கள் - சமூகப் பிரச்சினைகள் – மக்கள் தொகை, கல்வி, நலவாழ்வு, வேலைவாய்ப்பு, வறுமை.

அலகு – VII : இந்திய தேசிய இயக்கம்

(i) தேசிய மறுமலர்ச்சி – ஆங்கிலேயர் ஆட்சிக்கு எதிரான தொடக்க கால எழுச்சிகள் – இந்திய தேசிய காங்கிரஸ் – தலைவர்கள் உருவாதல் – பி.ஆர்.அம்பேத்கார், பகத்சிங், பாரதியார், வ.உ.சிதம்பரனார், ஜவகர்லால் நேரு, காமராசர், மகாத்மா காந்தி, மௌலானா அபுல் கலாம் ஆசாத், தந்தை பெரியார், இராஜாஜி, சுபாஷ் சந்திர போஸ், ரவீந்திரநாத் தாகூர் மற்றும் பலர்.

(ii) விடுதலைப் போராட்டத்தின் பல்வேறு நிலைகள்: அகிம்சை முறையின் வளர்ச்சி மற்றும் புரட்சிகர இயக்கங்கள்.

(iii) வகுப்புவாதம் மற்றும் தேசப்பிரிவினை.

அலகு – VIII: தமிழ்நாட்டின் வரலாறு, மரபு, பண்பாடு மற்றும் சமூக – அரசியல் இயக்கங்கள்

(i) தமிழ் சமுதாய வரலாறு, அது தொடர்பான தொல்லியல் கண்டுபிடிப்புகள், சங்க காலம் முதல் இக்காலம் வரையிலான தமிழ் இலக்கிய வரலாறு.

(ii) திருக்குறள்:
அ) மதச் சார்பற்ற தனித்தன்மையுள்ள இலக்கியம்.
ஆ) அன்றாட வாழ்வியலோடு தொடர்புத் தன்மை
இ) மானுடத்தின் மீதான திருக்குறளின் தாக்கம்
ஈ) திருக்குறளும் மாறாத விழுமியங்களும் – சமத்துவம், மனிதநேம் முதலானவை
உ) சமூக அரசியல் பொருளாதார நிகழ்வுகளில் திருக்குறளின் பொருத்தப்பாடு
ஊ) திருக்குறளில் தத்துவக் கோட்பாடுகள்

(iii) விடுதலைப் போராட்டத்தில் தமிழ்நாட்டின் பங்கு – ஆங்கிலேயருக்கு எதிரான தொடக்க கால கிளர்ச்சிகள் – விடுதலைப் போராட்டத்தில் பெண்களின் பங்கு.

(iv) பத்தொன்பது மற்றும் இருபதாம் நூற்றாண்டுகளில் தமிழ்நாட்டின் சமூக – அரசியல் இயக்கங்களின் பரிணாம வளர்ச்சி – நீதிக்கட்சி, பகுத்தறிவு வாதத்தின் வளர்ச்சி – சுயமரியாதை இயக்கம், திராவிட இயக்கம் மற்றும் இவ்வியக்கங்களுக்கான அடிப்படை கொள்கைகள், தந்தை பெரியார் மற்றும் பேரறிஞர் அண்ணாவின் பங்களிப்புகள்.

அலகு – IX: தமிழகத்தில் வளர்ச்சி நிர்வாகம்

(i) தமிழ்நாட்டின் மனிதவள மேம்பாட்டுக் குறியீடுகளும் அவற்றை தேசிய மற்றும் பிற மாநிலங்களுக்கான குறியீடுகளுடன் ஒப்பாய்வும் – தமிழகத்தின் சமூக பொருளாதார வளர்ச்சிக்கு சமூக மறுமலர்ச்சி இயக்கங்களின் பங்களிப்பு.

(ii) அரசியல் கட்சிகளும் பலதரப்பு மக்களுக்கான நலத்திட்டங்களும் – இடஒதுக்கீட்டுக் கொள்கைக்கான நியாயங்களும் சமூக வளங்களைப் பெறும் வாய்ப்புகளும் – தமிழகத்தின் பொருளாதார போக்குகள் – தமிழகத்தின் சமூக பொருளாதார வளர்ச்சியில் சமூக நலத்திட்டங்களின் தாக்கமும் பங்களிப்பும்.

(iii) சமூக நீதியும் சமூக நல்லிணக்கமும் சமூகப் பொருளாதார மேம்பாட்டின் மூலாதாரங்கள்.

(iv) தமிழகத்தின் கல்வி மற்றும் நலவாழ்வு (Health) முறைமைகள்.

(v) தமிழகப் புவியியல் கூறுகளும் பொருளாதார வளர்ச்சியில் அவற்றின் தாக்கமும்.

(vi) பல்வேறு துறைகளில் தமிழகம் நிகழ்த்தியுள்ள சாதனைகள்.

(vii) தமிழகத்தில் மின்னாளுகை.

அலகு – X: திறனறிவும் மனக்கணக்கு நுண்ணறிவும் (APTITUDE AND MENTAL ABILITY)
(பத்தாம் வகுப்புத் தரம்)

(i) சுருக்குதல் – விழுக்காடு – மீப்பெறு பொதுக் காரணி (HCF) - மீச்சிறு பொது மடங்கு (LCM).

(ii) விகிதம் மற்றும் விகிதாசாரம்.

(iii) தனி வட்டி – கூட்டு வட்டி – பரப்பு – கொள்ளளவு – காலம் மற்றும் வேலை.

(iv) தருக்கக் காரணவியல் – புதிர்கள் – பகடை – காட்சிக் காரணவியல் – எண் எழுத்துக் காரணவியல் – எண் வரிசை.

கட்டாயத் தமிழ் மொழித் தகுதித் தேர்விற்கான பாடத்திட்டம்
(விரிந்துரைக்கும் வகை வினாவிற்கான தலைப்புகள்)
(பத்தாம் வகுப்புத் தரம்)
தேர்வுத் திட்டம்

1. மொழிபெயர்த்தல்

    (i) தமிழிலிருந்து ஆங்கிலத்துக்கு மொழிபெயர்த்தல்

    (ii) ஆங்கிலத்திலிருந்து தமிழுக்கு மொழிபெயர்த்தல்

2. சுருக்கி வரைதல்

3. பொருள் உணர் திறன்

4. சுருக்கக் குறிப்பிலிருந்து விரிவாக்கம் செய்தல்

5. திருக்குறள் தொடர்பான கட்டுரை வரைதல்

    அ) மதச் சார்பற்ற தனித் தன்மையுள்ள இலக்கியம்

    ஆ) அன்றாட வாழ்வியலோடு தொடர்புத் தன்மை

    இ) மானுடத்தின் மீதான திருக்குறளின் தாக்கம்

    ஈ) திருக்குறளும் மாறாத விழுமியங்களும் மனிதநேயம் ,சமத்துவம் – முதலானவை

    உ) சமூக அரசியல் பொருளாதார நிகழ்வுகளில் திருக்குறளின் பொருத்தப்பாடு

    ஊ) திருக்குறளில் தத்துவக் கோட்பாடுகள்

6. கடிதம் வரைதல் (அலுவல் சார்ந்தது)

7. தமிழ் மொழி அறிவு

பாடத்திட்டம்

1. தற்கால நிகழ்வுகள்

2. சமுதாயப் பிரச்சனைகள்

3. சுற்றுச்சூழல் தொடர்பான தலைப்புகள்

4. இந்தியப் பொருளாதரம் தொடர்பான தலைப்புகள்

5. அறிவியலும் தொழில்நுட்பமும்

6. கலையும் பண்பாடும்

7. பகுத்தறிவு இயக்கங்கள் - திராவிட இயக்கம், சுயமரியாதை இயக்கம்.

8. இக்காலத் தமிழ்மொழி - கணினித் தமிழ், வழக்கு மன்றத் தமிழ், அலுவலக மொழியாகத் தமிழ், புதிய வகைமைகள்.

9. தமிழ்நாட்டின் சமூகப் பொருளாதார முன்னேற்றம் மற்றும் தமிழக அரசின் நலத்திட்டங்கள் (பெண்கள் விவசாயிகள்...), சமூக நலத்திட்டங்களை நடைமுறைப்படுத்துதலில் சமூக சீர்திருத்த இயக்கங்களின் பங்கு - இட ஒதுக்கீடும் அதன் பயன்களும் - தமிழ்நாட்டின் சமூகப் பொருளாதார வளர்ச்சியில் சமூக நீதி மற்றும் சமூக ஒற்றுமையின் பங்கு.

10. சொந்த வாக்கியத்தில் அமைத்து எழுதுக, பொருள் வேறுபாடு அறிதல், பிரித்தெழுதுக, எதிர்ச்சொல், எதிர்மறை வாக்கியம் , பிழை நீக்கி எழுதுக.

11. திருக்குறளிலிருந்து கீழ்க்காணும் தலைப்புகள் தொடர்பாக கட்டுரை எழுதுதல்

   அ) மதச் சார்பற்ற தனித் தன்மையுள்ள இலக்கியம்

   ஆ) அன்றாட வாழ்வியலோடு தொடர்புத் தன்மை

   இ) மானுடத்தின் மீதான திருக்குறளின் தாக்கம்

   ஈ) திருக்குறளும் மாறாத விழுமியங்களும் ,சமத்துவம் –மனிதநேயம் முதலானவை

   உ) சமூக அரசியல் பொருளாதார நிகழ்வுகளில் திருக்குறளின் பொருத்தப்பாடு

   ஊ) திருக்குறளில் தத்துவக் கோட்பாடுகள்

UNIT – I: HISTORY: MODERN INDIA

Advent of European invasion- Effect of British rule on socio-economic factors - Social reforms and religious movements - India since independence - Characteristics of Indian culture - India - a secular state - Organizations for fine arts, dance, drama, music - Growth of rationalist, Dravidian movement in Tamil Nadu - Political parties and populist schemes - National renaissance - Early uprising against British rule - 1857 Revolt - Indian National Congress - Emergence of national leaders - Growth of militant movements -Different modes of agitations - Era of different Acts & Pacts - World war & final phase struggle - Communalism led to partition - Role of Tamil Nadu in freedom struggle.

UNIT – II: SCIENCE AND TECHNOLOGY

Basic concepts of Science- Natural disasters and safeguard measures - Chemistry of ores and metals - Fertilizers, pesticides, insecticides   - Biochemistry and biotechnology - Polymers and plastics – Electrochemistry - Main concepts of life science - Nutrition and dietetics - Respiration - Excretion of metabolic waste - Bio – communication - Govt. policy /organizations on   Science and   Technology - Role, achievement   & impact   of Science and Technology - Energy – self-sufficiency - oil exploration   - Defence Research Organization - Ocean research and development - Genetics - the science of heredity - Environment, ecology, health and hygiene, Bio - diversity and its conservation - Human diseases, prevention and remedies - Communicable diseases and non - communicable diseases - Alcoholism and Drug abuse - Computer science and advancement - Genetic Engineering - Remote sensing and benefits

UNIT – III: INDIAN POLITY

Constitution of India -   Preamble to the constitution - Salient features of constitution - Union, state and territory - Citizenship - rights and duties - Fundamental rights - Directive principles of state policy - Fundamental duties - Human rights charter - Union executive - Union legislature – parliament - State executive - State legislature – assembly - Status of Jammu & Kashmir - Local government - panchayat raj - Indian federalism - center state relations - Judiciary in India - Rule of law /Due process of law - Emergency provisions - Civil services in India - Administrative Challenges in a welfare state - Complexities of district administration - Elections - Election Commission Union and State -Official language and Schedule – VIII - Amendments to constitution - Schedules to constitution - Administration of Union and States with special reference to Tamil Nadu.

UNIT – IV: INDIA Vs FOREIGN NATIONS

India's foreign policy - Foreign Affairs with special emphasis on India's relations with neighbouring countries and in the region - Security and defence related matters - Nuclear policy, issues and conflicts -The Indian Diaspora and its contribution to India and the world.

UNIT – V: INDIAN GEOGRAPHY

Earth and universe - Solar system - Atmosphere, hydrosphere, lithosphere - Monsoon, rainfall, weather and climate - Water resources - rivers in India - Soil, minerals & natural resources - Natural vegetation - Forest & wildlife - Agricultural pattern, livestock & fisheries - Transport including Surface Transport & communication - Social geography – population - density and distribution - Natural calamities - disaster management - Bottom topography of Indian ocean, Arabian Sea and   Bay of Bengal - Climate change - impact and consequences - mitigation measures - Pollution Control.

UNIT – VI: CURRENT AFFAIRS

National symbols - Profile of states - Defence, national security system and terrorism - World organizations and Pacts and Summits - Latest inventions on science & technology - Eminent personalities & places in news - Sports & games - Books & authors - Awards & honours   - Cultural panorama - Latest historical events   - Policy on environment and ecology - India and its neighbours - Latest terminology - Appointments - who is who? - Latest court verdicts - public opinion - Problems in conduct of public elections - Political parties and political system in India - Public awareness & general administration - Role of voluntary organizations & govt.   - Welfare oriented govt. schemes, their utility - New economic policy & govt. sector - Mass media & communication.

UNIT VII: INDIAN ECONOMY

Nature of Indian economy - Five - year plan models - an assessment -Land reforms & agriculture - Application of science in agriculture - Industrial growth - Capital formation and investment - Role of public sector & disinvestment - Development of infrastructure - National income - Public finance & fiscal policy - Price policy & public distribution – Consumerism & Consumer protection - Banking, money & monetary policy -   Role of Foreign Direct Investment -WTO – Liberalization, globalization & privatization - Rural welfare oriented programmes - HRD - sustainable economic growth - Economic trend in Tamil Nadu -Energy Different sources and development - Finance Commission - Planning Commission -National Development Council - Poverty Alleviation Programmes - Impact of global economy on India.

UNIT VIII: SOCIO ECONOMIC ISSUES

Population Explosion - Unemployment issues in India & Tamil Nadu - Child Labour - Economic Issues (a) Poverty (b)Sanitation- Rural and Urban (c) Corruption in public life - Anti -Corruption measures -CVC, Lok-adalats, Ombudsman, CAG. – Illiteracy –Women Empowerment- Role of the Government Women Empowerment Social injustice to womenfolk - Domestic violence, dowry menace, sexual assault - Loss of cultural heritage due to economic development -Urbanization and its impact on the society - Impact of violence on the growth of the nation – Religious violence, Terrorism and Communal violence - Regional Disparities -Problems of Minorities - Human Rights issues - Right to information - Central and State Commission - Faith and conflict among legislature, executive, judiciary and media. - Education – Linkage between Education and Economic Growth - Community Development Programme - Employment Guarantee Scheme - Self Employment and Entrepreneurship Development - Role of N.G.O's in Social Welfare – Government Policy on Health

Assistant Conservator of Forests
(Group – IA Services MAIN EXAMINATION)
PAPER – III – General English (SSLC Standard)
Topics For Descriptive Type

CODE NO: 282

UNIT–I: COMPREHENSION
From a given passage (prose or poem) comprehend and identify the central theme and answer questions based thereon. The candidate would not be asked to evaluate or assess the argument, its tone or style.

UNIT –II: USE OF VERBS, ARTICLES AND PREPOSITIONS
Use of verbs, articles and prepositions in different contexts. Construction of sentence. Detecting common mistakes in the usage of verbs, articles and prepositions.

UNIT –III: VOCABULARY
Knowledge of words, phrases and idiomatic expression in common English usage to describe different activities, situations and contexts. Differentiate between the usage and meaning of words having similar vocalization (example: flora/fauna; efficiency/efficacy/ effectiveness; price/prize; affect/effect; etiquette/ attitude etc.) and detect the commonly committed mistakes. Construction of sentence.

UNIT – IV: LETTER WRITING
Writing letters on following themes:
a) Seeking leave of absence from duty to attend to a personal work from the employer / official superior
b) Writing a letter to the editor of the leading newspaper or magazine expressing candidate's views on a topic of general or local importance
c) Writing a letter of condolence to a friend or a colleague on the demise of a close relative or friend.
d) Writing a letter congratulating a friend on his promotion or election to an office of prestige or influence or on his passing a public exam or on a happy event like wedding or birth in the friend's family
e) Writing a letter to a close friend or family member informing him or her about the candidate's travel to an exciting place and witnessing an unusual event.

UNIT – V: PRÉCIS WRITING
Read and understand a given passage, sifting the essential from the non-essential information and prepare a cohesive summary not exceeding 1/3rd the size of the given passage and give a suitable eyecatching title.

UNIT – VI: ESSAY WRITING
Write an essay of 250 to 300 words on a matter of topical interest (Political, economic, religious, cultural, environmental, social, socio-economic etc.)

******

Assistant Conservator of Forests
(Group – IA Services MAIN EXAMINATION)
PAPER – IV AND V OPTIONAL SUBJECTS
(DEGREE STANDARD)TOPICS FOR DESCRIPTIVE TYPE
FORESTRY

Subject Code: 283

UNIT- I: SILVICULTURE

Forests - definition. Extent of forests in India and other countries. Forest types of India and Tamil Nadu - revised classification - pure and mixed stands - even and uneven aged stands. Role of forests. Factors of locality - climatic - edaphic - topographic - biotic - interaction of forest with the environment. Silviculture - objectives - scope - general principles. Regeneration - natural and artificial. Nursery techniques - containerized seedling production - techniques and methods. Vegetative and clonal propagation techniques and methods - macro and micro propagation techniques. Plantation forestry - reforestation and afforestation - maintenance of plantations - enrichment planting. Tending operations - weeding, cleaning, thinning, pruning, after care techniques; cultural operations - soil working. Silvicultural systems - clear felling, shelter wood, selection and coppice systems - improvement felling. Silviculture techniques for some important species - Tropical Species - Acacia spp (indigenous and exotics), Albizia lebbeck, Albizia falcataria, Ailanthus excelsa, Azadirachta indica, Bambusa bambos, B. balcooa, B. vulgaris, Casuarina equisetifolia, C.junghuhniana, Ceiba pentandra, Dalbergia latifolia, D. sissoo, Dendrocalamus strictus, Eucalyptus spp (E. tereticornis, E.camaldulensis, E. grandis, E. globulus), Grevillea robusta, Hardwickia binata, Leucaena leucocephala, Melia dubia, Pongamia pinnata, Populus deltoides, Prosopis juliflora, Pterocarpus santalinus, Santalum
album, Syzygium cuminii, Shorea robusta, Tectona grandis, Terminalia spp.(T.chebula, T.bellerica, T.paniculata, T.tomentosa), Tamarindus indica. Temperate Species - Alnus nepalensis, Cedrus deodara, Pinus roxburghii, P. wallichiana, P. patula.

UNIT - II: FOREST MENSURATION AND MANAGEMENT

Forest Mensuration - Definition and objectives. Measurement of diameter, girth, height, crown and volume of trees - methods and principles - tree stem form - form factor. Volume estimation of stand - age - basal area determinations Stem and Stump Analysis. Forest inventory - sampling techniques and methods - measurement of crops - sample plots. Yield calculation - CAI and MAI - volume, yield and stand tables preparation. Forest management - objectives and principles. Forest organisation. Sustainable Forest Management (SFM) - criteria and indicators of SFM - sustained yield - concept and management - arguments for and against sustained yield - Forest Certification - Standards, Procedures and agencies. Rotation - normal forest - increment - growth stock determination. Yield regulation - principles and concepts - Von Montel's formula and its modifications - yield regulation in regular and irregular forests. Working plan - objectives and scope - constitution of working plan division. Enumeration and sampling. Regeneration survey - Plantation journal - divisional working plans - annual plan of operations. Joint forest management. Aerial photography and remote sensing - methods and techniques - GIS for forest management and modelling.

UNIT- III: FOREST UTILISATION AND WOOD TECHNOLOGY

Logging - extraction of timber - felling rules and methods - conversion methods - conversion season. Implements used - cross cutting system - sawing - different types - extraction methods. Grading of timbers. Transportation of timbers - major and minor transportation methods Storage and sales of logs - sales depot - management of depots. Recent trends in logging - Ergonomics and RIL. Forest products - Timber - timber, fuel, pulp, paper, rayon and match. Wood Composites - plywood, particle board, fiber boards, MDF, hardboard, insulation boards - production technology. Non-timber forest products (NTFP) - collection - processing and storage of NTFP - fibres and flosses - bamboos and canes - katha and bidi leaves - essential oils and oil seeds - gums and resins - tans and dyes - drugs - insecticides - lac and shellac - tassar silk - role of tribal co-operative societies. Wood Science - Macroscopic character of wood - three dimensional structures - structure of heartwood and sapwood - hard wood and soft wood. Composition and structure of wood - chemical components and cell wall structure and formation. Anatomical structures of heartwood and softwood - reaction wood - wood and water relations. Properties of wood - physical properties - specific gravity, density of wood - mechanical properties - gross features of wood. Defects in wood - natural defects. Seasoning of wood - principles and objectives of seasoning - seasoning methods - air and kiln seasoning - seasoning defects. Wood preservation - principles and methods - wood preservatives - definition - kinds of preservatives - method of preservative application - pressure and non- pressure processes - classification of wood based on seasoning behaviour.

UNIT- IV: FOREST SURVEYING AND ENGINEERING

Surveying - principles of surveying - errors in surveying - scope of surveying in forestry. Scales - linear measurement. Different methods of surveying - chain, prismatic, compass, plain table and topographic survey. Area calculation - instruments and principles - maps and map reading. Principles of forest engineering - levelling instruments - building materials and construction. Forest roads - objectives - principles and types of forest roads. Causeways and culverts. Bridges - construction of bridges - construction of timber, RCC, steel and suspension bridges - cable roadways and winches.

UNIT- V: FOREST SOILS AND SOIL CONSERVATION AND WATERSHED MANAGEMENT

Forest soils - Classification - Factors affecting soil formation - podzolisation and laterization. Physical, chemical and biological properties of forest soils. Problem soils - classification of waste lands - extent of waste lands in India - reclamation of alkaline, saline, water logged and other waste lands - sand dune stabilisation - wind breaks and shelter belts. Soil conservation - definition - objectives - problems - programmes and achievements. Erosion - types and causes - wind, water - management of eroded region. Role of microorganisms in soil amelioration - Use of bio-inoculants Azospirillum, Azotobacter, Phosphobacteria, Rhizobium, VAM, Frankia, and Vermicompost. Soil and water conservation measures. Watershed management - concept and methods - forest treatments - stream flow - water harvesting and conservation - ground water recharge - impact on water yield and quality.

UNIT- VI: FOREST ECONOMICS, POLICIES AND LEGISLATIONS

Fundamental principles of forest economics - cost benefit analysis - NPV, IRR analysis - demand and supply estimation. Socio-economic analysis of forest productivity - attitudes and analysis of trends in national and international markets - assessment of market structure. Forest valuation - direct and indirect valuation -stumpage valuing, price size gradients - devastation value - risk management. Project formulation - project monitoring - evaluation - elements of time series analysis and forecasting - role of corporate financing. Forest policies - Necessity - Formulation of National Forest Policy. History of forest development in India - Indian Forest Policy of 1894, 1952 and 1988. NCA report on forestry - role of ICAR and ICFRE in forest research and education. National Mission on Wasteland Development. Forest Organizations and Institutes - National - FRI, IGNFA, FSI, WII, IIFM, IWST, IFGTB, SACON etc. - International - ICRAF, ITTO. Forest laws - necessity - general principles - Indian Forest Act 1927, Forest Conservation Act 1980, Wildlife Protection Act, 1972, Tamil Nadu Forest Act, 1882, Tamil Nadu Timber Transit Rules, 1968, Tamil Nadu Hill Act, 1985 - application of IPC to forests. Recent Policies and Acts - Tribal Bill, 2007, Biodiversity Bill, 2002, National Agroforestry Policy 2014. ITTO, GATT and its relevance to timber export - Rio summit and Kyoto Protocol and its relevance to timber export

UNIT- VII: FOREST BIOLOGY AND BOTANY

Forest ecology - definition - biotic and abiotic components - forest ecosystem - forest community - concepts - succession - primary productivity - nutrient cycling. Composition of forest types in India - classification of India's forests - species composition - association and diversity. Restoration ecology - global warming - green house effects - ozone layer depletion - acid rain - role of trees in environmental conservation. Biodiversity - Definition, origin, types - factors endangering biodiversity - biodiversity hotspots - endemism - Red Data Book. Biodiversity assessments - principles and methods. Forms of trees - structure and function - physiology and reproduction of trees - water relation - physiology in stress environments (drought, water logging, alkalinity and salinity). Seed and its importance. Characters of good quality seeds. Seed dormancy - types and causes - dormancy breaking. Seed collection- physiological maturity - Seed extraction - seed processing. Seed grading and upgrading of seed lots. Seed treatments - principles and methods - seed pelleting. Seed sampling - procedure. Seed testing - purity analysis - moisture estimation - seed germination test - quick viability test. Seed storage - orthodox and recalcitrant seeds - causes of deterioration - seed storage containers. Seed certification procedure - Seed Act and Rules - Quality control and legislation. Forest Botany - Importance of botany - taxonomic classification of plant species - identification of species - composition and association. Dendrology - principles and establishment of herbaria and arboreta. Tree Improvement - Forest Genetics and Tree Breeding - Definition and concepts - Steps in tree improvement - Variation and selection - Progeny Evaluation Test (PET) - Candidate Tree, Plus Tree, Elite trees - use of provenances and seed sources - heritability and genetic gains - hybrids in tree improvement - heterosis exploitation. Seed production Area and seed orchards - types and establishment. *In situ* and *ex situ* gene conservation. Exotics - role of exotic forest trees in India - application of biotechnological methods in forestry.

UNIT -VIII: WILDLIFE BIOLOGY AND MANAGEMENT

Wildlife and wild animals - food chain - prey and predator relationship. Introduction to wildlife management. Ecology and biology of wildlife - principles and techniques of management - Man and Biosphere (MAB) programme - wildlife habitats. Census - methods and application - land tenure system. Major wildlife species in India and their broad study. Wildlife conservation - policies and legal measures - sanctuaries - national parks - biosphere reserves. Ornithology - bird habitats - bird species of India - avian extinction - causes and management. Role of NGOs and others in avian fauna conservation - beneficial and harmful roles of birds. Herpatology - definition and uses. Man and animal interaction - Impact and management. Ecotourism and Recreation Forestry. Management of captive wildlife - captive breeding - diseases of wildlife and their management.

UNIT- IX: FOREST PROTECTION

Role of forest protection in Indian forestry. Injuries caused by various agencies - by human beings, plants, animals, insects, birds, adverse climatic factors. Forest fire - beneficial and adverse causes - fire protection methods and rehabitation. Pests and diseases of economic trees - control measures for pests and diseases for major tree species - biological, chemical and integrated pest and disease management methods. Termites - types and their management. Alien or invasive weeds and their management - forest encroachments and grazing.

UNIT - X: AGROFORESTRY AND SOCIAL FORESTRY

Agroforestry - definition, concept and objectives. Classification of agroforestry systems - primary systems and subsystems - inheritance effects. Tree-crop interactions - above and below ground - competition for space, water, light and nutrients. Microclimatic modifications - nutrient cycling and soil fertility improvement - Allelopathy and allelochemicals. - Ecological aspects of agroforestry - benefits and limitations of agroforestry. Agroforestry practices for different agro-climatic zones of Tamil Nadu. Agroforestry practices for wasteland reclamation. Social forestry - objectives and scope and necessity - its components and implementation in local and national levels - social attitudes and community participation. JFM - principles, objectives and methodology - choice of species for agro forestry and social forestry. Urban Forestry - definition and scope - benefits - choice of tree species - planting techniques and management.

BOTANY
(DEGREE STANDARD)

Subject Code: 268

UNIT – I: PHYCOLOGY, MYCOLOGY & LICHENOLOGY

Phycology - Fritsch's classification of Algae - pigmentation - Thallus organization - Life cycles- patterns of Algae - Evolutionary trends in the Sexulity of Algae - Economic importance - Algae as food, fodder, fertilizer and medicines - phytoplanktons and their role - Mycology - Classification of fungi (Alexopoulos and Mims 1979) - structure, reproduction and economic importance of Phycomycetes, Ascomyates, Basidiomycetes and Deuteromyates - Lichenology - structure, reproduction and economic importance of lichens.

UNIT- II: BRYOLOGY AND PTERIDOLOGY

Byrophytes - General characteristics, structure; reproduction and alternation of generations. **Pteridophytes** - General characteristics - Psilopsida, Lycopsida, Sphenopsida and Pteropsida - Stelar organisation - origin of heterospory and seed habit.

UNIT –III: GYMNOSPERMS AND PALEOBOTANY

A comparative account of vegetative and reproductive structure of Cycadales, Coniferales and Gnetales - Structure of wood in Gymnosperm - Economic importance of Gymnosperms — Paleobotany, Geological Time Scale - Fossilization methods - Fossil types.

UNIT- IV: ANGIOSPERM MORPHOLOGY, TAXONOMY AND ECONOMIC BOTANY

Root and Stem modification in relation to habitat. Infloresence: Raceme, Cyme andSpecial types

Pollination — Types, Agents (Biotic and Abiotic) and contrivances promoting crosspollination.

Taxonomy - Angiosperm Classification - Bentham and Hooker's system - Internationalcode of Botanical Nomenclature (outline).

Characteristics features and Economic importance of the following families:-

1) Magnoliaceae
2) Rutaceae
3) Anacardiaceae
4) Leguminosae
5) Asteraceae
6) Apiaceae
7) Euphorbiaceae
8) Arecaceae
9) Poaceae

Economic Botany of Plants yielding wood timber, fibre, oil and medicines.

UNIT- V: ANATOMY AND EMBRYOLOGY

Anatomy:- Meristems and types. Permanent tissues, Simple and Complex tissues - Normal and Abnormal secondary thickening.

Embryology:- Microsporogenesis, Megasporogenesis - types of embryo sacs (Mono-bi- and tetrasporic). Double fertilization and Triple fusion, Types of Endosperm - Embryo development in Dicots and Monocots. Apomixis and Polyembryony Culture techniques - anther and embryo.

UNIT –VI: GENERAL MICROBIOLOGY AND PLANT PATHOLOGY

Morphology, reproduction and economic importance of Bacteria. Viruses - Bacteriophages, Cyanophages, Mycophages, their general structures and multiplication. Mycoplasma - Structure. Fermentation and Antibiotic production. Plant Pathology:- Name of the causative organism, etiology and control measures of the following plant diseases.

1) Blast of Paddy
2) Wilt of Cotton
3) Citrus Canker
4) Powdery Mildew
5) Red rot of Sugarcane
6) Little leaf of Brinjal
7) Bunch Top of Banana
8) Early and late Blights of Potato
9) Rust and Smut diseases.

UNIT – VII: PHYSIOLOGY, BIOCHEMISTRY AND BIOPHYSICS

Physiology:- Water relations of plants - absorption and translocation of water and minerals - mineral nutrition - Photosynthesis, Photochemical reactions and carbon fixation pathways — Respiratory metabolism: aerobic and anaerobic respiration. Enzymes: Role as biocatalysts - Nitrogen Metabolism: Nitrogen cycle - Nitrogen fixation - Nitrate reduction. Plant growth substances chemical nature and physiological functions of auxins, gibberellins, cytokinins, ethylene, abscissic acid and Brassinosteroids.

Biochemistry and Biophysics

Biopolymers: A brief account of Carbohydrates, Lipids,Proteins and Nucleic acids and theirmonomers. An elementary account of thermodynamics - definition of energy - structure and role of ATP.

UNIT – VIII: CYTOLOGY, GENETICS AND EVOLUTION

Cytology: Organization of Prokaryotic and Eukaryotic cells. Cell organelles - structure andfunction. Chromosomes: morphology structure and their role. Cell division: Mitosis and Meiosis.

Genetics: Medelism - Interaction factors - linkage and crossing over, multiple, alleles, mutation, structure, replication and role of nucleic acids.

Evolution: Origin of life: Theories of evolution Darwin, Lamarck and De Vries.

UNIT –IX: ECOLOGY, ENVIRONMENT AND CONSERVATION BIOLOGY

Ecology: Ecosystem concept - Plant communities: Hydrophytes, Xerophytes, Mangroves.Plant sucession primary and secondary - Climax formation.

Environment: water, air and land, Garbage disposal, Environmental Protection Agencies,Pollution monitoring and control.

Ecosystem: Components and functions – Global warming, Green house effect, OzoneLayer Depletion

Conservation Biology: Conservation and sustainable development/ Productivity of Soil,forests and natural resources.

UNIT-X: HORTICULTURE AND PLANT BREEDING

Horticulture: Importance and scope of Horticulture, Classification of Horticultural Plants - Fruits, Vegetables and Ornamentals.

Garden design and types:- Rockery, Bonsai, Kitchen garden, Lawn making, Floriculture. Cultivation of Commercial Flowers — Jasmine; plant propagation methods - cutting, grafting, layering (Rose) budding, stock - scion relations in Mango,

Plant Breeding: Hybridization techniques Plant breeding methods employed in the following crops:-

1) Cotton
2) Sugarcane
3) Paddy.

ZOOLOGY
(DEGREE STANDARD)

Subject Code: 270

UNIT-I

Non-Chordata: General organisation - Classification with diagnostic features upto classes. Evalutionary relationship among taxa, symmetry.

Protozoa: Structure, reproduction and life history of Amoeba, Paramecium, Trypanosoma, Plasmodium, Monocystis, Leishmania - locomotion, nutrition, economic importance. Porifera: Sponges canal system, skeleton, reproduction and economic importance.

Coelenterata: Diploblastic organization - life history of obelia and Aurelia, Metagenesis - Polymorphism in Hydrozoa. Corals and Coral formation - relationships of Cnidaria and Acnidaria. Helminthes: Structure and life history of Planaria, Fasciola, Teania, Ascaris and Wucheriria - parasitic adaptations - Helminthes in relation to man.

Annelida: Nereis, earthworm and leech - Coelom and metamerism - modes of life in polychactes. Onychophora: Structure, affinities and distribution of Peripatus.

Arthropoda: Prawn, Scorpion and Cockroach - Larval forms and parasitism in Crustacea - Mouth parts, vision, respiration and excretion. Metamorphosis and social life in insects.

Mollusca: Freshwater mussel, pila, sepia. Echinodermata: General organisation - Water vascular system. Larval forms and affinities.

UNIT - II

Prochordata: Amphioxus, Balanoglossus - Ascidian retrogressive Metamorphosis, neoteny and affinities.

Chordata: General Organisation - Characters, Outline, classification upto class level.

Pisces: Locomotion, migration, respiration, Parental care, economic importance; structure and affinities of dipnoi.

Amphibia: Origin of amphibians – Respiration, Parental care - South Indian amphibians. Reptiles: Origin - Conquest of land - adaptations to live on land, adaptive radiation -Temporal Vacuities - identification of poisonous and non-poisonous snakes - poison apparatus – South Indian snakes.

Birds: Origin - flight adaptations - mechanism of flight - double respiration - migration -Flightless birds.

Mammals: Dentition, skin derivatives - distribution - adaptive radiation. Protothria, Metatheria, eutheria and their Phylogenetic relationships.

UNIT- III

Cell and Molecular Biology: Cellular Organelles - Structure and function - Plasma membrane, Mitochondria, Golgi bodies, Endoplasmic reticulum and Ribosomes — Nucleus and Nucleolus. Cell division, cell cycle; Chromosomes - DNA structure and function, replication of DNA, Genetic code - RNA and protein synthesis. Gene expression, regulation of gene expression in prokaryotes and Eukaryotes. Recombinant DNA - Genetic engineering, its uses in agriculture, industries and medicine.

UNIT- IV

Genetics: Mendelian concepts, multiple alleles, blood groups, Rh-factor. Linkage, crossing over - mutation (Natural and induced); Sex chromosomes, Sex determination and Sex Linked inheritance - Chromosome number and form ploidy - cytoplasmic inheritance — Karyo types — chromosome mapping, Normal and abnormal genetic disorders; Bio- chemical genetics – Eugenics. Human genome Project. Bio-statistics: Mean, Median and standard deviation. Bio-informatics: DNA and Protein sequence analysis, Prediction functional structure, protein folding, Phylogenetic tree construction.

UNIT - V

Bio Chemistry: Bio-molecules, Structure and role of carbohydrates, lipids, proteins and amino acids - Glycolysis and kreb's cycle - oxidation, reduction - oxidative phosphorylation - energy conservation and release, cyclic AMP, ATP; enzymes – mechanism; Hormones-classification biosynthesis and function.

Physiology: With reference to mammals, digestion, nutrition, balanced diet - assimilation, intermediary/metabolism. Composition of blood - Coagulation, Transport of oxygen, Carbon dioxide, Blood pigments, Mechanism of respiration. Muscles, mechanism of muscle contraction. Temperature regulation, Acid base balance and homeostasis, Nerve impulses and conduction, neurotransmitters.

Receptors- photo, phono and chemo reception. Nephron and urine formation. Endocrine glands, testis, ovary and pituitary organs and their inter relationship. Physiology of reproduction in humans, Hormonal development in insects, pheromones and their uses. Bioluminescence. Biological clock. Physiology of immune response- Antigens — Immuno globulins - humoral and cell mediated immunity. T and B cells, mechanism of antibody formation - Immunodeficiency diseases; vaccination.

UNIT- VI

Development Biology: Gametogenesis — fertilization, Pathenogenesis, type of eggs — blastulation, cleavage and gastrulation in frog and chick. Morphogenetic movements — organizer, potency, organogenesis with reference to ear, eye, kidney, brain. Formation and fate of extra embryonic membranes in chick.

Plancentation- types, functions. - metamorphosis in Frog — Regeneration. Stem cells- sources, types and their uses in human welfare, IVF, embryo transfer and cloning - Aging and senescence.

UNIT- VII

Environmental Biology: Biotic and abiotic factors, their role, Intra and inter specific association. Biogeochemical cycles. Ecosystem- structure and function of ecosystems, types of ecosystems. Ecological succession, Community structure - Stratification. Population and Population dynamic - Habitat ecology. Wild life, need for conservation management and methods of conservation. Sanctuaries with special reference to Tamil Nadu. Pollution - air, water and land - Perspective policy planning for the environment.

UNIT- VIII

Evolution: Origin of life - Evolutionary theories - Contributions of Lamarck, Darwin and De Vries - present status of Darwinism and Lamarkism - modern synthetic concept - Hardy Weinberg Law - Polymorphism and mimicry in evolution. Speciation: evolutionary species concept — Isolation, mechanisms and their role, role of hybridization in evolution. Fossils and Fossilization, Indian fossils, Geological time scale. Origin and evolution of horse and man - Culture evolution and Biochemical evolution.

Animal distribution: Zoogeographical distribution - Continental and island fauna - Continental drift - Discontinuous distribution, adaptive radiation. Natural resources and their conservation. Alternative sources of energy.

UNIT - IX

Economic Zoology: Parasitism and Commensalism - Protozoan Parasites and diseases, helminthes parasites and diseases of man and domestic animals; Beneficial and harmful insects. Insect pests on crops and stored products - Control methods. IPM. Sericulture, apiculture, lac culture, seaweed culture, vermiculture, - oyster culture and pearl formation, poultry, pisciculture and induced breeding, Shell fisheries, Aquaculture practices in Tamil Nadu and their impact on the environment and on agriculture.

UNIT - X

Instrumentation and Bio-techniques: Microscopy-Phase contrast, fluorescent, TEM, SEM. Colorimetric techniques, Centrifugation techniques. Fixation, staining techniques. Electrophoretic techniques: Principles, AGE and PAGE. DNA finger printing, RFLP, RAPD and AFLP.

PHYSICS
(DEGREE STANDARD)

Subject Code: 241

UNIT –I: MECHANICS AND RELATIVITY

Gravitation- Kepler's law- Gravitational constant and their determination variation of 'g' - Centre of gravity - Centre of gravity of a solid hemisphere - Hollow hemisphere - Tetrahedron and solid cone - Friction — Lubricants - Laws of friction - Cone of friction - angle of friction - Equilibrium of a body in a inclined plane - Impulse — Impact- Laws of Impact - Direct and oblique impact - Impact between two spheres - Loss of Kinetic energy — Moment of Inertia - Angular momentum and Kinetic energy of a revolving body - Moment of inertia of a sphere, shell and cylinder - Compound pendulum - Newton's lawsand their limitations - postulates of special theory of relativity - Lorentz transformation equations and its applications - variation of Mass with Velocity - Mass - energy equivalence — Physical significance.

UNIT-II: PROPERTIES OF MATTER

Elastic moduli - Relations - Couple per unit twist - Torsional oscillations - Bending of beams - Uniform and Non uniform bending - Elastic constants and their determinations - Viscosity of liquids - Highly viscous liquids — Stoke's and Searle's method- Surface Tension - Capillary rise - Method of drops - Surface tension of mercury - Quincke's Method - Laws of osmotic pressure and experimental determination of osmotic pressure- Fick's laws of diffusion - Determination of diffusivity — Applications.

UNIT – III: HEAT AND THERMODYNAMICS

Specific heat capacity — Determination of specific heat capacity by Newton's law of cooling- Debye's theory- Mayer's relation - Vanderwaal's equation - Critical constants and Vanderwaal's constant - J K effect - Theory and experiment — Liquefaction of gasses — Hydrogen - Helium - Thermal conductivity - Forbe's method - Stefan's law - Experimental determination of Stefan's constant- Solar constant - Temperature of the sun.

Zeroth, first law and second laws of thermodynamics - Isothermal and adiabatic change - Reversible and irreversible process - Carnot's theorem- Carnot engine - Carnot cycle - Entropy - Maxwell's thermo dynamical relations and its applications - Third law of thermodynamics.

UNIT- IV: Sound

Simple harmonic motion - Composition of two SHMs along a straight line and at right angles - Lissajou's figures - Laws of transverse vibrations - verification by sonometer and Melde's string - Forced vibrations and resonance - Beats - Doppler effect - Velocity of sound in solids and gases — Theory and experiment - Ultrasonics - production, properties and applications - Acoustics of buildings.

UNIT –V: OPTICS AND SPECTROSCOPY

Spherical aberration - Chromatic aberration and their rectifications — Coma- Eyepiece - Ramsden's and Huygen's eyepieces - Interference - Colours of thin films - Newton's rings- Theory and experiment - diffraction — Fresnel's and Fraunhofer types - Zone -plate - Diffraction grating – Prism- Grating spectra - dispersive and

resolving power of a grating - Double refraction - Huygen's explanation – Nicol's prism - Quarter and half wave plates - Production and detection of plane, circular and elliptically polarized light - optical activity -Determination of specific rotatory power – Polarimeter.

UV and IR Spectroscopy - Principle and application - Raman effect - Explanation of Raman effect on the basis of quantum theory - Applications of Raman effect - Optical fiber - Fiber optic sensors - Fiber optic communication systems and their advantages - Lasers - Population inversion - Ruby and Helium Neon Lasers and applications.

UNIT - VI: WAVE MECHANICS

De Broglie concept of wave theory- Wave velocity and group velocity- De Broglie relations – Heisenberg's uncertainty principle – Basic postulates of wave mechanics - Schrodinger's Wave equation - Eigen function and Eigen values- Particle in a box – Linear harmonic oscillator (one dimension only)

UNIT – VII: ELECTRICITY AND MAGNETISM

Coublom's law - Permitivity of free space - Relative permitivity - Electric field - Intensity of field due to a point charge - Guass theorem and its application - Electric potential - Relation between potential and intensity - Electric dipole moment - potential and intensity due to a dipole - Capacitance - Capacity of a spherical, parallel and cylindrical capacitors - Energy of a charge capacitor - Dielectric constant - Ohm's law - Resistivity and conductivity - Internal resistance of a cell - EMF and Potential difference - Thermo Electricity - Peltier and Thomson Co Efficients - Laws of Electrolysis - Conductivity of an electrolyte Arrheinius theory of electrolytic conduction - Calculation of emf of Daneil cell as reversible cell

Magnetic field around a current carrying conductor - Biot and Savart's law - Ampere's law of magnetic force due to a current - Force between two current carrying parallel conductors- Force on an electron moving in a magnetic field - Faraday's laws of electromagnetic induction - Self and mutual inductance - Induction coils and its uses - Eddy currents - Transformers - Energy losses - Skin effect - Advantages of AC distribution over DC - Dynamos and motors -

Magnetic poles - Magnetic moments - Susceptibility - Relation between susceptibility and permeability - Hysteresis - Dia, para, ferro magnetism - Electromagnetic waves in free space.

UNIT – VIII: ELECTRICAL CIRCUITS AND ELECTRONICS

Kirchoff's laws for a loop and a junction - Measurements of circuit parameters (R,L and C) -AC circuits - Complex impedance and phase diagram — LCR Circuits - Series and parallel resonant circuits - Sharpness of resonance q factor.

Semiconductors - Energy band theory of solid - Insulators - Conductors and Semiconductors - Intrinsic and extrinsic semiconductors - Electrons and holes as charge carriers - P-type and N-type semiconductors - Junction diodes - Characteristics of a diode -Diode applications - Junction transistors - characteristic of transistors - Rectifier, Amplifier and oscillator circuits - AM and FM transmission with block diagrams - Basic principles of super heterodyne receiver with block diagram - Photo conductive cell - Photo diode - Solar cell - LED and LCD - construction and working T.V Camera - Vertical and Horizontal scanning - T.V Transmission and reception with block diagrams - T.V Antenna (Yogi type) -Colour TV - Three colour theory - Radar - Uses of radar.

Logic circuits - AND, OR, NOT NAND, NOR and EX-OR gates - Truth tables - Multivibrators - Astable multivibrators - Flip flop circuits (RS and JK flip flops)

UNIT – IX: MODERN PHYSICS

Canal rays - e/m of positive ions - Thomson's parabola method - Aston's mass spectrograph - Plank's quantum theory of black body radiation - Photoelectric effect - photo electric multipliers - Einstein's equation for photo electric effect - Millikan's experiment - Determination of Plank's constant.

Bohr's theory of hydrogen atom - Spectra of Hydrogen and Hydrogen like atoms - Rydberg's constant - Spatial quantization - Sommerfeld atom model — Vector atom model- Seven quantum numbers - Pauli's exclusion principle - Examples of electronic configuration — Magnetic moment due to orbital motion and electron spin - Bohr magnetron - Experimental verification - Fine structure of sodium D Line - Zeeman effect

- Anomalous Zeeman effect - Theoretical explanation.

UNIT – X: NUCLEAR AND SOLID STATE PHYSICS

Properties of nucleus - size, charge, mass and spin - Nuclear magnetic dipole moment - Binding energy - Packing fractions - Nuclear forces - Nuclear models - Shell model and liquid drop model - Nuclear reactions — Radio activity and induced radio activity-Artificial transmutation Techniques - Application of Radio isotopes - Discovery, Production and detection of neutron - Accelerators - Betatron - Proton Synchrotron - Particle Detectors - Ionization chamber - GM counter - Elementary particle — Baryons and Leptons — Cosmic rays.

Structure of crystals - Periodicity and plane in crystal - Symmetry elements and symmetry groups - Classification of crystals - Unit cell and crystal types Bonding - ionic, covalent, metallic and Vander wall's- X-rays - Bragg's law and absorption of X rays - Mosley's law - Compton effect.

CHEMISTRY
(DEGREE STANDARD)

Subject Code: 243

UNIT – I
PHYSICAL CHEMISTRY:-
a) Gas law and Kinetic Theory:-Ideal gas equation - Deviation from ideal behaviour - vander waals equation for real gases - Molecular velocities - the Maxwell's distribution of molecular velocities –heat capacity and viscosity of gases.

b) Solid State:- Crystal systems - Bravaislattice - Unit Cell - Miller Indices - Symmetry elements in crystals - Bragg's equation - Radius ratio's and packing in crystals — Determination of crystal structures by Braggs method — structure of Nacl, Kcl, Zns and spinals.

c) Thermodynamics:- Intensive and extensive variables - First law of thermodynamics – CP and CV relation - Hess's law of constant heat summation - Kirchoff's equation - Second law of thermodynamics - Carnot theorem - entropy and probability, Joule Thomson effect - Free energy and Chemical equilibrium - Temperature and pressure dependence and - Gibb's and Helmholtz functions – Heterogeneous equilibrium and Le – Chatlier principle.

UNIT- II
d) Chemical Kinetics:- Rate laws - rate constant - order and molecularity of reactions I, II, III, and Zero order reaction Arrhenius theory - collision theory and Transition state theory - catalysis.

e) Electro-Chemistry:- Types of reversible electrodes - Nernst equation - reference electrode and standard hydrogen electrode - computation of cell e.m.f. calculations of thermodynamic quantities of cell reactions (DG, DH, DS and K) - Over potential and hydrogen over voltage - Arrhenius theory - Debye 'Huckel equation - Kohliraush's law - Ostwald's dilution law - Determination of PH and Pka of acids by potentiometric methods.

UNIT- III
f) Chemical spectroscopy: - Elementary ideas of microwave, infrared, Raman, uv, NMR, ESR and Mass spectroscopy.

g) Pharmaceutical chemistry: Terminology pharmacology, pharmacotheraies, toxicology, chemotherapy, classification, and nomenclature of drugs, sources of drugs, assay of drugs by biological, chemical and immunological methods, physiological effects of functional groups of drugs different types of drugs like analgesics, antibiotics, antiseptics, disinfectants, anesthetics, antidepressants, antipsychotic etc.

UNIT - IV
h) Colloids and surface Chemistry: - Classification – preparation, purification - properties -Tyndall effect- Gels - Emulsions Absorption - Langmuir isotherms - Heterogeneous catalysis.

i) Physical properties and Chemical constitution:- Surface tension - parachor and its application to structural problems — Dipole moment - applications of dipolemoment measurements to structural studies of simple inorganic and organic molecules - magnetic properties of matter, diamagnetism, paramagnetism, ferromagnetism and anti- ferromagnetism - Applications to structural problems.

UNIT- V

INORGANIC CHEMISTRY:-

j) Periodic classification:- Classification based on electronic configuration – periodic properties - atomic and ionic radii, ionisation potential, electron affinity and electronegativity-various scales - trend along periods and groups.

k) Chemical bond:- Lattice energy - VSEPR Theory and its applications – partial ionic character from electrone gativity - Fajan's Rules.

l)Compounds of Boron:- Electron deficient nature of boron compounds preparation and properties of halides and nitrates of boron - diborane – Borazine, silicones and structures of silicates.

UNIT - VI

l) LANTHANIDES AND ACTINIDES:-

Ocurrence Electronic configuration oxidation state, magnetic properties and complexation behaviour - comparison of lanthanides and actinides, lanthanide contraction and their position in the periodic table.

m)Fertilisers:- Ammonium nitrate, ammonium phosphate, Superphosphate and Diammonium Phosphate, NPK fertilisers.

n) Nuclear Chemistry:- Radio activity — detection and measurement — half life period - Nuclear stability, - n/p ratio - isotopes, isobars and isotones Nuclear reactions Spallation - Nuclear fission and fusion – stellar energy uses of nuclear energy - nuclear power projects in India - applications of tracers in industry, medicine, agriculture.

UNIT - VII

o) Co-ordination Chemistry:- Redo Nomenclature - theories of co-ordination compounds - Werner, valence bond, crystal field and ligand field theories – Effective atomic number - isomerism - Metal Carbonyls of iron and Nickel.

p) Analytical Chemistry:- i) Principles of volumetric analysis - different types of titrations gravimetric analysis - separation and purification techniques.

UNIT - VIII

ORGANIC CHEMISTRY:-

q) Types of reactions:- Nucleophilic, electrophilic, free radicals, addition and elimination reactions.

r) Electron displacement effects:- Inductive, inductometric, electromeric, mesomeric, resonance, hyperconjugation and steric effects.

UNIT - IX

s) Nature of Bonding:- Hybridisation (Sp, Sp2 & Sp3) and Geometry of molecule - cleavage of bonds - homolytic and heterolytic fission of carbon — carbon bonds – Reaction intermediates - free radicals, carbocations and carbonions – their stability.

t) Stereo Chemistry:- Optical isomerism and Geometrical isomerism – chirality optical isomerism of lactic and tartaric acid - Racemisation - Resolution – Asymmetric synthesis - walden inversion - cis and trans isomerism of maleic and fumeric acids - R-S-Notations - conformational analysis of cyclohexane applications of ORD and CD Techniques.

UNIT- X

u)   Dyes:- Classification and Properties of dyes — methyl orange, cangored, malachitegreen, fluorenscein and indigo.

v)   Carbon hydrates:-   Classification and reactions - Glucose, Fructose, Sucrose and lactose structure of glucose and fructose.

w)   Aromatic Substitution:- Mechanism of nitration, Halogenation, sulphoration and   FriedelCrafts reaction - Orientation effects - nucleophilic substitution – Benzyne mechanism.

MATHEMATICS
(DEGREE STANDARD)

Subject Code:276

UNIT- I: ALGEBRA AND TRIGONOMETRY:

Theory of Equations: Polynomial equations; Imaginary and irrational roots; Symmetric functions of roots in terms of coefficient; Sum of rth powers of roots; Reciprocal equations; Transformations of equations.

Descrates' rule of signs: Approximate solutions of roots of polynomials by Newton - Raphson Method - Horner's method; Cardan's method of solution of a cubic polynomial.

Summation of Series: Binomial, Exponential and Logarithmic series theorems; Summation of finite series using method of differences - simple problems.

Expansions of sin x, cos x, tan x in terms of x; sin nx, cos nx, tan nx, sin nx, cos nx , tan nx, hyperbolic and inverse hyperbolic functions - simple problems.

Symmetric; Skew Symmetric; Hermitian; Skew Hermitian; Orthogonal and Unitary Matrices; Rank of a matrix; Consistency and solutions of Linear Equations; Cayley Hamilton Theorem; Eigen values; Eigen Vectors; Similar matrices; Diagonalization of a matrix.

Equivalence relations; Groups; subgroups — cyclic groups and properties of cyclic groups - simple problems; Lagrange's theorem; Prime number; Composite number; decomposition of a composite number as a product of primes uniquely (without proof); divisors of a positive integer n; congurence modulo n; Euler function; highest power of a prime number p contained in n!; Fermat's and Wilson's theroems - simple problems.

Sums of sines and cosines of n angles which are in A.P.; Summation of trigonometric series using telescopic method, C + i S method.

UNIT-II: CALCULUS, COORDINATE GEOMETRY OF 2 DIMENSIONS AND DIFFERENTIAL GEOMETRY

nth derivative; Leibnitz's theorem and its applications; Partial differentiation. Total differentials; Jacobians; Maxima and Minima of functions of 2 and 3 independent variables - necessary and sufficient conditions; Lagrange's method — simple problems on these concepts.

Methods of integration; Properties of definite integrals; Reduction formulae - Simple problems.

Conics - Parabola, ellipse, hyperbola and rectangular hyperbola - pole, polar, co-normal points, con-cyclic points, conjugate diameters, asymptotes and conjugate hyperbola.

Curvature; radius of curvature in Cartesian coordinates; polar coordinates; equation of a straight line, circle and conic; radius of curvature in polar coordinates; p-r equations; evolutes; envelopes.

Methods of finding asymptotes of rational algebraic curves with special cases. Beta and Gamma functions, properties and simple problems. Double Integrals; change of order of integration; triple integrals; applications to area, surface are volume.

UNIT- III: DIFFERENTIAL EQUATIONS AND LAPLACE TRANSFORMS

First order but of higher degree equations − solvable for p, solvable for x, solvable for y,clairaut's form − simple problems.

Second order differential equations with constant coefficients with particular integrals for e^{ax}, x^m, $e^{ax} \sin mx$, $e^{ax} \cos mx$

Second order differential equations with variable coefficients

$$ax^2 \frac{d^2y}{dx^2} + bx \frac{dy}{dx} + cy = q(x)$$

Method of variation of parameters; Total differential equations, simple problems.

Partial Differential equations : Formation of P.D.E by eliminating arbitrary constants and arbitrary functions; complete integral; Singular integral ; general integral; Charpit's method and standard types $f(p,q)=0$, $f(x,p,q)=0$, $f(y,p,q)=0$, $f(z,p,q)=0$, $f(x,p)= f(y,q)$; Clairaut'sform and Lagrange's equations $Pp+Qq=R$ — simple problems.

Laplace transform; inverse Laplace transform(usual types); applications of Laplace transform to solution of first and second order linear differential equations (constant coefficients) and simultaneous linear differential equations − simple problems.

UNIT- IV: VECTOR CALCULUS, FOURIER SERIES AND FOURIER TRANSFORMS

Vector Differentiation: Gradient, divergence, curl, directional derivative, unit normal to a surface.

Vector integration: line, surface and volume integrals; theorems of Gauss, Stokes and Green — simple problems.

Fourier Series: Expansions of periodic function of period 2π ; expansion of even and odd functions; half range series.

Fourier Transform: Infinite Fourier transform (Complex form, no derivation); sine and cosine transforms; simple properties of Fourier Transforms; Convolution theorem; Parseval's identity.

UNIT- V: ALGEBRAIC STRUCTURES

Groups: Subgroups, cyclic groups and properties of cyclic groups — simple problems; Lagrange's Theorem; Normal subgroups; Homomorphism; Automorphism; Cayley's Theorem, Permutation groups.

Rings: Definition and examples, Integral domain, homomorphism of rings, Ideals and quotient Rings, Prime ideal and maximum ideal; the field and quotients of an integral domain, Euclidean Rings.

Vector Spaces: Definition and examples, linear dependence and independence, dual spaces, inner product spaces.

Linear Transformations: Algebra of linear transformations, characteristic roots, matrices, canonical forms, triangular forms.

UNIT – VI: REAL ANALYSIS

Sets and Functions: Sets and elements; Operations on sets; functions; real valued functions; equivalence; countability; real numbers; least upper bounds.

Sequences of Real Numbers: Definition of a sequence and subsequence; limit of a sequence; convergent sequences; divergent sequences; bounded sequences; monotone sequences; operations on convergent sequences; operations on divergent sequences; limit superior and limit inferior; Cauchy sequences.

Series of Real Numbers: Convergence and divergence; series with non-negative numbers; alternating series; conditional convergence and absolute convergence; tests for absolute convergence; series whose terms form a non-increasing sequence; the class I^2.

Limits and metric spaces: Limit of a function on a real line; metric spaces; limits in metric spaces.

Continuous functions on Metric Spaces: Functions continuous at a point on the real line, reformulation, functions continuous on a metric space, open sets, closed sets, discontinuous functions on the real line.

Connectedness Completeness and compactness: More about open sets, connected sets, bounded sets and totally bounded sets, complete metric spaces, compact metric spaces, continuous functions on a compact metric space, continuity of inverse functions, uniform continuity.

Calculus: Sets of measure zero, definition of the Riemann integral, existence of the Riemann integral properties of Riemann integral, derivatives, Rolle's theorem, Law of mean, Fundamental theorems of calculus, Taylor's theorem.

Sequences and Series of Functions. Pointwise convergence of sequences of functions, uniform convergence of sequences of functions.

UNIT – VII: COMPLEX ANALYSIS

Complex numbers: Point at infinity, Stereographic projection

Analytic functions: Functions of a complex variable, mappings, limits, theorems of limits, continuity, derivatives, differentiation formula, Cauchy-Riemann equations, sufficient conditions Cauchy-Riemann equations in polar form, analytic functions, harmonic functions.

Mappings by elementary functions: linear functions, the function $1/z$, linear fractional transformations, the functions $w=z^n$, $w=e^z$, special linear fractional transformations.

Integrals: definite integrals, contours, line integrals, Cauchy-Goursat theorem, Cauchy integral formula, derivatives of analytic functions, maximum moduli of functions.

Series: convergence of sequences and series,Taylor's series, Laurent's series, zero's of analytic functions.

Residues and poles: residues, the residue theorem, the principal part of functions, poles, evaluation of improper real integrals, improper integrals, integrals involving trigonometric functions, definite integrals of trigonometric functions.

UNIT- VIII: DYNAMICS AND STATICS

DYNAMICS: kinematics of a particle, velocity, acceleration, relative velocity, angular velocity, Newton's laws of motion, equation of motion, rectilinear motion under constant acceleration, simple harmonic motion.

Projectiles: Time of flight, horizontal range, range in an inclined plane. Impulse and impulsive motion, collision of two smooth spheres, direct and oblique impact-simple problems.

Central forces : Central orbit as plane curve, p-r equation of a central orbit, finding law of force and speed for a given central orbit, finding the central orbit for a given law of force.

Moment of inertia : Moment of inertia of simple bodies, theorems of parallel and perpendicular axes, moment of inertia of triangular lamina, circular lamina, circular ring, right circular cone, sphere (hollow and solid).

STATICS: Types of forces, Magnitude and direction of the resultant of the forces acting on a particle, Lami's Theorem, equilibrium of a particle under several coplanar forces, parallel forces, moments, couples-simple problems.

Friction: Laws of friction, angle of friction, equilibrium of a body on a rough inclined plane acted on by several forces, centre of gravity of simple uniform bodies, triangular lamina, rods forming a triangle, trapezium, centre of gravity of a circular arc, elliptic quadrant, solid and hollow hemisphere, solid and hollow cone, catenary-simple problems.

UNIT – IX: OPERATIONS RESEARCH

Linear programming – formulation – graphical solution – simplex method Big-M method – Two-phase method-duality- primal-dual relation – dual simplex method –revised simplex method – Sensitivity analysis.

Transportation problem – assignment problem.

Sequencing problem – n jobs through 2 machines – n jobs through 3 machines – two jobs through m machines – n jobs through m machines

PERT and CPM : project network diagram – Critical path (crashing excluded) – PERT computations.

Queuing theory – Basic concepts – Steady state analysis of M/M/1 and M/M/systems with infinite and finite capacities.

Inventory models : Basic concepts - EOQ models : (a) Uniform demand rate infinite production rate with no shortages (b) Uniform demand rate Finite production rate with no shortages – Classical newspaper boy problem with discrete demand – purchase inventory model with one price break.

Game theory : Two-person Zero-sum game with saddle point – without saddle point – dominance – solving 2 x n or m x 2 game by graphical method.

Integer programming: Branch and bound method.

UNIT X: MATHEMATICAL STATISTICS

Statistics – Definition – functions – applications – complete enumeration – sampling methods – measures of central tendency – measures of dispersion – skewness-kurtosis.

Sample space – Events, Definition of probability (Classical, Statistical & Axiomatic) – Addition and multiplication laws of probability – Independence – Conditional probability –Bayes theorem – simple problems.

Random Variables (Discrete and continuous), Distribution function – Expected values & moments – Moment generating function – probability generating function – Examples. Characteristic function – Uniqueness and inversion theorems – Cumulants, Chebychev's inequality – Simple problems.

Concepts of bivariate distribution – Correlation: Rank correlation coefficient – Concepts of partial and multiple correlation coefficients — Regression : Method of Least squares for fitting Linear, Quadratic and exponential curves - simple problems.

Standard distributions – Binomial, Hyper geometric, Poission, Normal and Uniform distributions – Geometric, Exponential, Gamma and Beta distributions, Inter-relationship among distributions.

Sampling Theory – sampling distributions – concept of standard error-sampling distribution based on Normal distribution: t, chi-square and F distribution.

Point estimation-concepts of unbiasedness, consistency, efficiency and sufficiency-CramerRao inequality-methods of estimation : Maximum likelihood, moments and minimum chi- square and their properties.

Test of Significance-standard error-large sample tests. Exact tests based on Normal, t, chi-square and F distributions with respect to population mean/means, proportion/proportions variances and correlation co-efficient. Theory of attributes — tests of independence of attributes based on contingency tables – goodness of fit tests based on Chi-square.

Analysis of variance: One way, two-way classification – Concepts and problems, interval estimation – confidence intervals for population mean/means, proportion/proportions and variances based on Normal, t, chi-square and F.

Tests of hypothesis: Type I and Type II errors – power of test-Neyman Pearson Lemma – Likelihood ratio tests – concepts of most powerful test –simple problems.

STATISTICS
(DEGREE STANDARD)

Subject Code: 274

UNIT- I

Uses, Scope and limitation of Statistics, Collection, Classification and Tabulation of data, Diagramatic and Graphical representation, Measures of location, dispersion, Skewness and Kurtosis – Correlation and regression – Curve Fitting – Linear and Quadratic equation by the method of least squares.

UNIT- II

Probability - Addition, Multiplication and Baye's Theorems and their application. Tchebychev's inequality. Random variables – Univariate and Bivariate – Probability distributions – Marginal and conditional distributions – Expectations – Moments and cumulants generating functions.

UNIT-III

Probability distributions – Binomial, Poisson, Geometric and Hypergeometric. Continuous distributions – Uniform, exponential and normal. Sampling distributions and standard error, student's 't', Chi-square and F statistic – distributions and their applications.

UNIT -IV

Estimation – Point estimation – properties of estimates Neyman – Fisher Factorization theorem(without proof) Cramer – Rao inequality, Rao – Blackwell theorem – MLE and method of Moments estimation – Interval estimation – for population mean and variance based on small and large samples.

UNIT –V

Tests of Hypothesis – Null and Alternative – Types of errors – Power of test, Neyman –Pearson lemma, UMP and Likelihood ratio tests, Test procedures for large and small samples – Independence of attributes, Chi-square test – Goodness of fit.

UNIT- VI

Simple random sample – stratified, systematic, Cluster (Single stage) Estimation of mean and variance in SKS – Sample Survey – Organisation – CSO and NSSO – Sampling and Non-Sampling errors.

Analysis of Variance — Principles of design CRD, RBD and LSD — Factorial experiments 2^2, 2^3 and 3^2 (Without confounding) Missing plot techniques.

UNIT- VII

Concept of SQC – Control Charts – X, R, p and charts Acceptance sampling plan – single and double – OC curves Attributes and Variables plan.
OR Models – Linear Programming problems – Simplex method Dual – Primal, Assignment problems, Network — CPM and PERT.

UNIT-VIII

Time series – Different components – Trend and Seasonal Variations – Determination and elimination.

UNIT-IX

Index Numbers – Construction and uses – Different kinds of simple and weighted index numbers – Reversal tests – construction and use of cost of living index numbers – Birth and death rates – Crude and standard death rates, Fertility rates – Life table construction and uses.

UNIT-X

Statistical Computing using Excel – Understanding on the usage of Statistical Packages including SPSS, MINITAB and SAS.

GEOLOGY
(DEGREE STANDARD)

Subject Code: 239

UNIT- I: GENERAL GEOLOGY

Origin, Interior and Age of the Earth - Weathering - Types and products - Geological work of Wind, River, Sea and Groundwater - Volcanoes - Earthquakes - causes and effects - Seismic zonation - Richter Scale - Principles of Plate Tectonics — fundamental and geomorphology.

UNIT- II: STRATIGRAPHY

Principles of Stratigraphy - Correlation - Geological Time Scale - General characteristics, descriptive and economic importance of Archean, Cuddapah, Vindhyan and Gondwana systems of Peninsular India -Cretaceous system of Tamil Nadu.

UNIT- III STRUCTURAL GEOLOGY

Folds - Faults - Joints - Unconformities - Recognition of overturned beds – Stress and strain relationship – Attitude of beds – Measurement of dip, apparent dip, strike using Cino and Brunton Compass.

UNIT- IV: PALAEONTOLOGY

Fossils — Definitions, Conditions, mode of preservation, uses of Fossils — General morphology and classification of Graptolites, Mollusca, Coelenterata, Brachiopod, Trilobita,Echinoids and Foraminifera.

UNIT –V: CRYSTALLOGRAPHY

Definition of crystals — Inter facial angles — Goniometer -Symmetry Elements - Study of Normal Classes of Isometric, Tetragonal, Hexagonal, Orthorhombic, Monoclinic and Triclinic systems - Twin crystals.

UNIT- VI: MINERALOGY

Physical properties of minerals - Petrologcal Microscope and its parts, accessory plates and uses — optical properties - Isotropic and Anisotropic Minerals - Descriptive study of quartz and its varieties - Feldspar Group - Pyroxene Group - Amphibole Group - Mica Group - Garnet Group - Descriptive study of Calcite, Dolomite, Tourmaline, Topaz, Staurolite, Chlorite and Zircon.

UNIT –VII: IGNEOUS PETROLOGY

Definition of magma - Composition and constitution of magma - Forms and structures of Igneous Rocks, Textures and Micro structures - classification of Igneous rocks - Bowen's Reaction principle - Descriptive Study of Granite - Syenite - Diorite - Gabbro — Dolerite - Ultramafics (Dunite,Peridotite, Pyroxenite and Anorthosite) - Differentiation - Assimilation.

UNIT –VIII: SEDIMENTARY AND METAMORPHIC PETROLOGY

Classification - Texture and structures of sedimentary rocks - Descriptive study of Residual, Clastic, Chemical and organic deposits - Metamorphism - Agents and kinds of metamorphism - classification of metamorphic rocks - Textures and structure - Different facies - Marble – Schist and Gneiss - Amphibolite - Granulite (Charnockite).

UNIT- IX: ECONOMIC GEOLOGY

Definition of Ore - Tenor - Gangue - Lindgren and Bateman's classification of ore deposits - Ore forming processes - Magmatic concentration – Hydrothermal Process Oxidation and Supergene Enrichment – Evaporation - Sedimentation – Placer deposits. Important ores, their composition, physical properties, mode of occurrence, distribution in India and uses of Gold, Iron, Aluminium, Manganese, Copper, Magnesium and Led and Zinc - Lignite, Coal and Petroleum - their occurrence in India - Building Stones, their characters, distribution and mode of occurrence in India - Mineral Wealth of Tamil Nadu.

UNIT- X: APPLIED GEOLOGY

Principles of Geological mapping - Field Techniques - Drilling methods - Borehole problems from borehole data – Geological investigation and conditions for dams, tunnels and roads - Landslides – Mining methods, role of geology - problems in mines including groundwater – Application of Remote sensing in Geology.

AGRICULTURE

(DEGREE STANDARD)

Subject Code: 284

UNIT- I: IMPORTANCE OF AGRICULTURE

Importance of Agriculture in Indian Economy and its sectoral relationship - Agricultural Development through five year plans in India and Tamil Nadu - Growth pattern of crops in India and Tamil Nadu in terms of area, production and productivity - Government Agricultural Policies – Agricultural development through NITI AYOG – import and export – role of NSC, FCI and PDS.

UNIT - II: FUNDAMENTALS OF CROP PRODUCTION

Factors of Production - Agricultural seasons of India and Tamil Nadu - Cropping patterns in India and Tamil Nadu - package of practices of different crops - Agro-Climatic zones of India and Tamil Nadu and their features - Weather and Climate - Weather forecasting - Climate change and its impact – Minimal tillage practices – Stress mitigating technologies including microorganisms – Nanoparticles and their applications.

UNIT - III: NATURAL RESOURCE MANAGEMENT

Soil - Soil structure - Factors influencing soil structure - Physical and Chemical properties - Effect of nutrient availability and plant growth - Problem soils and their management - Soil survey - its objectives and scope - Soil fertility and productivity - Dry farming - Rainfed agriculture - Conservation of soil and water - Watershed and waste land development. Land use pattern and planning - Size and distribution of holdings - types and systems of farming - Water resources development and management - Command area development - Ground water Development and Conjunctive use - Water use efficiency - Quality of irrigation water - Its effect in soil and crops - Management of poor quality water for crop growth.

UNIT - IV: CROP MANAGEMENT & ALLIED AGRICULTURAL ACTIVITIES

Cropping systems and integrated farming - Recycling of agricultural waste - Organic manures, green manures, bio fertilizers - Balanced usage - integrated nutrient management - Physiological disorders in crop plants and their management- Irrigation management of different crops Mushroom cultivation, bee keeping, silkwork rearing etc., Energy in Agricultural production - Sources - Solar, wind, animal, biomass and biogas - Mechanization in agriculture - Tractors & tillers - Agricultural implements and Machineries and their usage - livestock and poultry rearing.

UNIT -V: CROP IMPROVEMENT

Principles of breeding - Breeding methods in self , cross and vegetatively propogated crops - Modern tools in crop improvement – Heterosis breeding and Hybrid seed production technologies - Latest varieties of major crops in Tamil Nadu - Breeding for Climate resilience varieties – Variety release procedures - Application of bio technology in Agriculture - Tissue culture & its significance - Transgenic Plants. Plant Genetic Resources: Collection conservation and exchange-Crop varietal protection-PPV& FR authority and its role.

UNIT- VI: SEED SCIENCE AND TECHNOLOGY

Seeds - Importance of quality seeds in Agriculture – Nucleus, Breeder, foundation, certified and labelled seeds - Seed certification techniques and processing in Tamil Nadu - Seed testing – Seed testing laboratories-ISTA standards for seed testing - seed village concept Seed Act - Seed coating and priming technologies - Seed enhancement technologies**.**

UNIT – VII: CROP PROTECTION PRINCIPLES AND PRACTICES

Importance of pest, disease, nematodes and weed management in agriculture – categories of pests, diseases, nematodes and weeds - pest and disease surveillance and forecasting weather on pest and disease incidence - Symptoms of damages and control measures of pest, disease and nematodes of major crops in Tamil Nadu - Integrated pest, disease and nematode management in crop production - Pesticides and their use in IPM – mode of action - Pattern - plant protection equipments and their use - Plant quarantine. Storage pests, disease and nematodes and their management. Importance of biological control in pest, disease and nematode management. Weeds - Major weeds and their control.

UNIT – VIII: FARM BUSINESS AND FINANCE MANAGEMENT

Farm business management - Principles of farm business management – Types and systems of farms-Classical Production Functions **-** Cost concepts - Management of resources - Farm Planning and budgeting - Investment analysis – Risk and uncertainties in Agriculture - Agricultural credit system in India - Multi credit delivery system - Role of nationalized banks, NABARD and Regional Rural Banks - Lead Bank Scheme - Service area approach - Scale of finance-Credit Worthiness-3 Rs,5Cs and 7Ps of credit- Crop Insurance - Kisan Credit Cards (KCC) - Agricultural Insurance Company.

UNIT –IX: AGRICULTURAL MARKETING AND MARKET INTELLIGENCE

Marketing - Agricultural marketing - Market structure – Marketing Efficiency - Price Spread- Market Integration-Market Risk-Speculation and hedging - Market Institutions- Warehouses and rural godowns - Agmark-Cooperatives - Commodity Boards – Agri business management – Principles of Management-Entrepreneurship Development - Forms of Business organizations - Agricultural Price Policy - CACP-MSP - FRP- Procurement Price-Policies for agricultural development - Economic liberalization - WTO and its impact on agricultural export - Importance of Agriculture in Indian economy - Land size and distribution of holdings and land use pattern in Tamil Nadu - Agriculture under Five year Plans (FYPs) - Food Security - Public Distribution Systems (PDS) - Buffer Stock.

UNIT - X: AGRICULTURAL EXTENSION: PRINCIPLES AND METHODS

Extension methods for transfer of technology **-** AV aids-Communication models - Use of ICT in transfer of technology-Diffusion and adoption- Pre and post-independence rural development initiatives: key features, strength and weakness of individual programmes - Programme planning and evaluation methods- Rural sociology - key features of Indian rural system-value system-social change- rural migration. Role of women in Agriculture.

HORTICULTURE

(DEGREE STANDARD)

Subject Code: 278

UNIT- I: FUNDAMENTALS OF HORTICULTURE

Scope and importance – State, National and Global scenario of horticultural crops – Area and production – Import and export – Nutritive value of horticultural crops – Horticultural zones of Tamil Nadu and India – National and regional agencies involved in promotion of horticultural Industry in India (NHB, APEDA and Commodity Boards) – Classification of horticultural crops – Factors limiting horticultural crop production – Role of season – Soil and climate requirements - Physical and chemical properties of soil - Climatic factors – Light, temperature, photoperiod, relative humidity, rainfall, altitude, microclimate - Kitchen gardening -Nutrition gardening – Truck gardening – Market gardening - Vegetable forcing - Protected and precision horticulture – Hydroponics, Aeroponics – Nutrient Film Technique - Horticulture therapy.

UNIT - II: GROWTH AND DEVELOPMENT OF HORTICULTURAL CROPS

Important phases of growth and development - Bearing habits – Classification of horticultural crops based on life cycle – Annual, biennial perennial (woody and herbaceous perennials) – Fruitfulness and unfruitfulness - External and internal factors associated with unfruitfulness – Physiology of flowering, fruit set, ripening and senescence – Fruitdrop - Causes and control measures - Plant growth regulators — Functions and role in horticultural crops - Bud dormancy — Dormancy breaking — Parthenocarpy — Parthenogenesis – Polyembryony – Stenospermocarpy – Vivipary - Apomixis.

UNIT - III: PROPAGATION OF HORTICULTURAL CROPS

Propagation — Definition — Establishment of nursery — Site selection - Tools and implements propagation structures - Mist chamber, phytotron - Humidifiers – Greenhouse – Glasshouse – Polyhouse - Shade net, glass house, poly tunnels, cold frames and hotbeds, pit nursery - Media and containers – Soil sterilization - Sexual propagation – Merits and demerits – Crops propagated through seeds - Seed viability, longevity, dormancy, germination – Pre-sowing treatment – stratification, scarification, seed priming, seedling vigour – Raised seed bed and pro-tray nursery – Asexual propagation – Merits and demerits – Methods of vegetative propagation – Identification of plus trees – Mother block, scion bank — Clonal nursery — Cutting — Layering — Grafting, budding types —Anatomical and physiological basis of grafting – Stock scion relationship, graft compatibility -Budwood selection and certification – Propagation through specialized plant parts (bulbs, tubers, offsets, runners, suckers, slip, crown, rhizomes, corms) – Quality management and nursery certification – Micro propagation – Application – infrastructure requirements – Types of media – Stages of micro propagation – Micro grafting – *in vitro* propagation of important horticultural crops.

UNIT - IV: MANAGEMENT TECHNIQUES FOR HORTICULTURAL CROPS

Planning – Layout and management of orchards – Fencing – Wind breaks and shelter beds – Spacing – Planting system – Physical and chemical properties – Soil reaction –acid, saline and alkaline soils – Soil fertility - Essential elements

–Functions - Organic manures and inorganic fertilizers, bio-fertilizers, vermi-composting - Applications and management – Nutrient deficiencies and corrective measures - Physiological disorders and remedies - Irrigation – Critical stages of water requirement – Effect of water stress on crop yield – Anti-transpirants – management of irrigation water quality - Conventional and micro irrigation – Fertigation - Mulching – Sod culture – Weed management – Application growth regulators – Training and pruning principles and methods - Rejuvenation of senile and old orchards – Cropping systems - Cover cropping - Multitier cropping –Intercropping– Special horticultural techniques (pinching, thinning, disbudding, blanching, smudging, notching, ringing) - Principles of organic horticulture – GAP and GMP.

UNIT - V: PRODUCTION TECHNOLOGY OF FRUIT CROPS

Scope and importance of fruit crops - Composition and uses - Origin and distribution — Species – Season - Climate and soil requirement – Varieties and hybrids – Propagation techniques - Planting systems and planting density - Including High density planting (HDP) and ultra-high-density planting (UHDP) – spacing — Water and nutrient management — Fertigation - Weed management - Canopy management - Training and pruning — Intercultural practices - Off season production - Special horticultural techniques – Use of plant growth regulators – Maturity indices - Harvest and yield – Nutrient deficiencies and physiological disorders and its corrective measures and management of important pest and diseases of important fruit crops **:-** Mango, Banana, Acidlime, Sweet orange, Mandarin, Grapes, Papaya, Guava, Sapota, Pineapple, Jackfruit, Pomegranate, Aonla, Annona, Ber, Apple, Pear, Plum, Peach, Strawberry, Litchi, Avocado, Walnut and Almond and minor tropical, arid and temperate fruit crops.

UNIT- VI: PRODUCTION TECHNOLOGY OF VEGETABLE CROPS

Scope and importance of vegetable crops - Composition and uses – Origin and distribution — Area and production - Soil and climatic requirements - Varieties and hybrids — Propagation methods - Seed rate — Sowing and nursery practices — Containerized seedling production - Season — Planting methods — Water, nutrient and weed management — Fertigation — Training for vegetables — Intercultural practices - Maturity indices — Harvest and yield — Nutrient deficiencies and physiological disorder and its corrective measures of important vegetable crops**:** Tomato, Brinjal, Chilli and Capsicum (Sweet Pepper), Bhendi, Leguminous vegetables (Beans, Peas, Cluster beans, Cowpea, Dolichos bean)**;** Bulbous vegetables (Onion, Garlic)**;** Tuber crops - (Potato, Tapioca, Sweet potato, Elephant footyam, Colacassia)**;** Cucurbitaceous vegetables (Cucumber, Bittergourd, Snakegourd, Ridgegourd, Ashgourd, Muskmelon, Watermelon, Pumpkin) - Cruciferous vegetables (Cabbage, Cauliflower and Knolkhol)**;** Root vegetables (Carrot, Radish, Beetroot, Turnip) - Leafy vegetables (Spinach, Lettuce, Palak, Amaranthus) — Perennial vegetables (Drumstick, Coccinea) – Protected cultivation of vegetable crops - Precision farming of important vegetable crops and seed production.

UNIT – VII: FLORICULTURE & LANDSCAPE GARDENING

Scope and importance of flower crops production - Uses - Origin and distribution – Area and production - Climate and soil requirement - Species and varieties - Propagation, season - Spacing and planting methods - Irrigation, nutrient management – Fertigation – Weed management - Training and pruning — Intercultural operations — Special horticultural techniques – Growth regulators – Off season production - Maturity indices – Harvest and yield and management of important pest and diseases for important loose flower crops: Jasmine, Rose, Tuberose, Chrysanthemum, Marigold, Nerium and Crossandra - Cut flowers - Rose, Carnation, Anthurium, Orchid and Gerbera – Cut foliage and fillers. Principles of Landscape designing – Styles of gardening - Types of gardening *viz*., Hindu, English, Mughal, Japanese, Persian, Italian, French gardening – Garden components – Trees foliage flowering and avenue trees – Bur lapping – Shrubs – Flowering annuals creepers and Climbers - Cacti and succulents - Lawn – Astroturf - Types of grasses – Layout, planting and maintenance of lawn – Hedge and edge plants - Indoor plants and interior scaping – Garden adornments - Principles and styles of flower arrangements – Bonsai styles and culture – Industrial, Institutional, Public and Private landscaping - Special types of gardening – Bog garden, dish, terrarium, bottle, roof, vertical gardening and green wall.

UNIT – VIII: PRODUCTION TECHNOLOGY OF SPICES AND PLANTATION CROPS

Scope and Importance of spices and plantation crops - Composition and uses - Origin and distribution – Area and production – Climate and soil requirements - Species and varieties - Season, seed rate / propagation methods – Spacing - Planting system – High density planting – Irrigation and nutrient management – Fertigation and weed management – Training and pruning – Cropping systems – Multitier cropping – Cover cropping – Inter cropping - Growth regulators – Mulching - Shade and canopy regulation – Maturity indices, harvest, yield and management of important pest and diseases and processing m e t h o d s of important plantation and spice crops: Major, seed, tree, herbal spices and minor spices - Black Pepper, Cardamom, Turmeric, Ginger, Curry leaf, Clove, Nutmeg, Cinnamon, Coriander, Fenugreek, Cumin, Tamarind, all spice and vanilla – Plantation crops - Tea, Coffee, Rubber, Cocoa, Coconut, Oilpalm, Cashew, Palmyrah, Arecanut.

UNIT – IX: PRODUCTION TECHNOLOGY OF MEDICINAL AND AROMATIC CROPS

Scope and importance of medicinal and aromatic crops - Composition and uses - Origin and distribution – Area and production - *Ex situ* and *insitu* conservation – Classification of medicinal and aromatic crops — Constraints in medicinal plant cultivation - Climate and soil – Varieties – Propagation - Nursery practices - Planting methods - Cropping systems – Manures & fertilizers – Irrigation – Intercultural operations – Harvest indices – Harvest & yield and management of important pest and diseases - Production systems - Contract farming – GAP – GCP – GMP - Organic production and certification – Classification and distillation methods of essential oils – Secondary metabolite production - Value addition - Organisational support for promotion of medicinal and aromatic crops –

Medicinal crops**:** Senna, Periwinkle, Glory lily, Aswagandha, Medicinal coleus and Solanum, Sweet flag, Aloe, Isabgol, *Phyllanthus*, *Stevia*, Opium poppy.

Aromatic crops**:** Lemon grass, Citronella, Vetiver, Ocimum, Davana, Mint, Geranium, Patchouli and Eucalyptus.

UNIT - X: POST- HARVEST TECHNOLOGY OF HORTICULTURAL CROPS

Importance of post-harvest handling in horticultural crops – Maturity indices – Post- harvest handling methods – Washing – Grading - Waxing – Grades and standards – Methods of packing - Types of containers and their advantages and disadvantages – Storage - Principles and methods of refrigerated and gas storage - Storage methods - Pre-cooling - Controlled atmospheric storage, Modified atmospheric storage – Low pressure storage and cold chain concept - Importance and scope of processing industry in India, general principles of fruit and vegetable preservation like canning, dehydration, freezing, fermentation - Use of chemicals(preservatives) and irradiation – GMP – Food safety and quality control.

AGRICULTURAL ENGINEERING
(Degree standard)

Subject Code: 280

UNIT-I: SURVEYING AND HYDROLOGY

Surveying — Instruments - Methods of surveying — Computation of area — Triangulation,intersection, traversing, cross staff survey – Pane table survey – Earth work computation -Simpson's trapezoidal rule - **Levelling - Definition - Types of benchmarks – Different types of levels** — Reduction of leveling data by rise and fall method and height of collimation method -Contouring – Profile surveying - Cross section survey - **Use of Minorinstruments -** Hydrology — Measurement of rainfall, evaporation and infiltration — Estimation of runoff – Factors affecting runoff – Computation of volume of runoff and peakflow — Unit hydrograph - Occurrence of ground water, hydraulics of wells, types of wellsand their construction - **Well drilling – Techniques for different formations - Well logging - Types of well screen - Design of well screens - Well development – Yield testing.**

UNIT-II: SOIL *EROSION AND* CONSERVATION

Soil erosion — Types — Factors affecting erosion by water and wind - Stages of water erosion -Biological control measures - Biological control measures and their suitability - Contour farming, strip cropping, mixed cropping, intercropping and mulching - Mechanical control measures and their suitability – Design and construction of contour bunds, graded bunds, terraces, contour stone walls, contour trenches, staggered trenches and diversion drain - Gully control structures and check dams - Wind erosion – Types and control - **Dry farming techniques for improving crop production** - Estimation of soil erosion - Universal Soil Loss Equation.

UNIT-III: WATERSHED DEVELOPMENT AND MANAGEMENT

Watershed – Concept, types and delineation - Land capability classification - **Participatory rural appraisal technique** – Watershed development plan – Estimation of cost and benefits -Gully and ravine reclamation – **In-situ & Ex-situ** water harvesting, micro catchments – Ground water recharge - Farm pond and percolation pond – Selection of suitable soil and water conservation practices – Afforestation – Holistic planning - Watershed based rural development – Use of aerial photography and remote sensing in watershed management - Applications of GIS in planning and development of watersheds including forest cover and water resources.

UNIT-IV: IRRIGATION AND DRAINAGE

Irrigation - Sources — Soil- water- Plant relationship - Water requirement of crops — Measurement of irrigation water - Weirs and flumes - Methods of irrigation - Surface, sprinkler and drip irrigation - **Drip irrigation – Components - Wetting pattern - Filters and Fertigation tanks - Design of laterals - Submain - Main lines - Pump capacity - Operation and maintenance - Sprinkler irrigation - Components - Sprinkler performance - Hydraulic design of sprinkler systems - Duty and delta relationship – Irrigation scheduling -** Irrigation efficiencies and their estimation - Pumps - Types, selection and installation - Drainage - Causes of water logging and salt problem - Methods of drainage - Design of surface, sub-surface and vertical drainage systems - Improvement and utilization of poor quality water - Reclamation

of saline and alkali soils.

UNIT-V: FARM AND IRRIGATION STRUCTURES

Design and construction of farm structures – Site selection - Materials of construction – Quality– types of masonry – Foundation, basement and superstructure – Types of roofs – building plan and estimation, requirements of farm house, threshing floor, drying floor, poultry house, dairy farm, rat proof godown and farm roads - Design features earthen dams and gravity dams - Water conveyance structures – Earthen channels and lined channels – Advantages of lining – materials of lining – Design of channel cross section – Crossing control structures – Drop spillway, chute spillway, pipe inlet spill way – Road crossing structures – Culvert, inverted siphon aqueduct – Their uses - Underground pipe line system – Components and their functions – Structures for plant environment – Green houses, polyhouses and shadenets – Construction and utilization - **Soil less culture**.

UNIT-VI: FARM POWER

Agricultural mechanization – Scope and sources of farm power - Animate and electromechanical - Thermodynamics - Construction and working of internal combustion engines - Fuel, ignition, lubrication, cooling, air intake, exhaust, governing and electrical systems of IC engines - Different types of tractors and power tillers - Power transmission, ground drive, power takeoff, steering, brake, implement control and hydraulic systems - Bulldozer – Features, traction, suspension, steering, operations using bulldozer – Weight transfer, theory of traction – Tractive efficiency – Mechanics and stability – Care and maintenance of tractors.

UNIT- VII: FARM MACHINERY

Farm machinery - Primary tillage implements – Mould board plough, disc plough and chisel plough - Secondary tillage implements – Cultivators, harrows and rotary tillers - Land shaping machinery – Leveller, ridger and bund former - Sowing and transplanting – Seed drills, planters and rice transplanters - Interculture implements - Plant protection equipment – Sprayers and dusters - Harvesting, threshing and combining equipment - Machinery for earth moving and land development - Machinery for horticulture, agro-forestry and forages – Haulage of agricultural and forest produces - **Management of farm machinery** – Cost estimation for farm operations.

UNIT-VIII: UNIT OPERATIONS IN FOOD AND AGRICULTURAL PROCESSING

Heat transfer principles — Conduction, convection and radiation - Types of heat exchangers - Unit operations – Evaporators - Types - Mechanical separation

– Filtration – Sedimentation – Settling – Centrifugal separation – **Cyclone separation** - Size reduction – Mixing – Blending – emulsification - Food processing operations - Pasteurization – Sterilization – Canning - R**etort processing - Extrusion processing of foods** - Methods of drying of foods – Preservation of food by irradiation - Microwave and dielectric heating - Fats and oil processing – Extraction methods and equipments - Food packaging – Materials and characteristics – **Suitability -** Processing of milk and milk products, packaging of milk - Principles of refrigeration and applications in food industries – Cold storage of fruits and vegetables - **Design aspects**.

UNIT- IX: PROCESS ENGINEERING OF AGRICULTURAL AND HORTICULTURAL CROPS

Engineering properties of food materials – Moisture content – M**ethods of determination** Psychrometry - Drying – Thin layer and deep bed drying – Types of heat sources and **types of dryers** - Cleaning and grading — Principles — Separators — Efficiency — Performance index - Shelling and decortication – Seed processing and layout of seed processing units - Rice processing – Parboiling and dehusking of paddy – Machines used - Milling of wheat, corn and pulses - Material handling equipments - Conveyors and elevators - Storage – Conditions for safe storage – Bag and bulk storage – **Silo storage - Design aspects** - Modified atmosphere storage – Storage structures - Equipments used for processing of horticultural crops – Preservation of fresh fruits and vegetables – Drying and dehydration – Processing of coffee, tea, rubber, cashew nut, coconut, oil palm, aromatic plants, flowers and spices.

UNIT-X: RENEWABLE AND BIOENERGY

Solar energy – Solar collectors – Air heaters – Water heaters – Solar photovoltaic systems and applications - Wind energy - Suitable sites — Types of wind mills — Wind mill components – Applications – Performance of wind mills - Biomass resources – Agro residues – Characteristics - Conversion technologies – Biochemical conversion – Biogas plant – Types and selection, construction, operation and maintenance - Slurry handling - Thermochemical conversion – Stoves – Types - Improved stoves – Pyrolysis – Charcoal production — Gasification — Briqueitting — Cogeneration - Energy plantation and environmental impact – Global warming – Clean development mechanism (CDM) and role of afforestation - Biofuels – Biodiesel feedstock, production and by-product utilization – Ethanol – Production and utilization – Emission - Standards and control.

CIVIL ENGINEERING
(DEGREE STANDARD)

Subject Code: 261

UNIT I : BUILDING MATERIALS AND CONSTRUCTION PRACTICES

Properties of engineering materials-brick, stones, aggregates, cement (types and grades), concrete (mix design), Concrete admixtures, Self compacting Concrete, steel and new materials. - Construction of stone masonry, brick masonry and R.C.C. and block masonry- construction equipments - Building bye - laws and Development regulations practiced in Tamil Nadu - Provisions for fire safety, lighting and ventilation- Acoustics.

UNIT II : ENGINEERING SURVEY

Survey - computation of areas - Chain Survey - Compass surveying - Plane table survey - levelling - fly levelling - L.S. and C.S. - Contour volumes - Theodolite survey - Traversing - Heights and Distances - Geodetic Observations- Tacheometry and Triangulation - Use of EDM, GPS and Remote sensing techniques.

UNIT III : STRENGTH OF MATERIALS

Stresses and strains -Thermal stresses- elastic constants - Beams and bending - 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.

UNIT V : GEOTECHNICAL ENGINEERING

Formation of soils - types of soils - classification of soils for engineering practice - Field identification of soils - Physical properties of soils - Three phase diagram - permeability characteristics of soils - stress distribution in soils - Theory of consolidation, shear strength parameters of soils - Compaction of soils. Soil exploration - Soil sampling techniques - Borelog profile - shallow foundations - Terzhagi's bearing capacity theory - Pile foundation
- Group action of piles - settlement of foundations.

UNIT VI : ENVIRONMENTAL ENGINEERING AND POLLUTION CONTROL

Sources of water - Ground water Hydraulics - Characteristics of water - Water analysis - water treatment - water borne diseases. Sewerage system - Design of sewerage systems - sewer appurtenances - Pumping of sewage - sewage treatment and disposal - Industrial waste treatment - solid waste management - Air, water and Noise pollution control- ewaste management.

UNIT VII : DESIGN OF REINFORCED CONCRETE, PRESTRESSED CONCRETE ANDSTEEL 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

UNIT VIII : HYDRAULICS AND WATER RESOURCES ENGINEERING

Hydrostatics-applications of Bernoulli equation — flow measurement in channels, 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 of crops - Irrigation methods –Design of alluvial canal and design of headworks. Waterlogging and land reclamation - Cross drainage works.

UNIT IX : URBAN AND TRANSPORTATION ENGINEERING

Urbanisation trend and impact - Slum clearance and slum improvement programmes - Different modes of transport and their characteristics. Geometric design of highways. — Design and Construction of bituminous and concrete roads - Maintenance of roads.

Railways-Components of permanent way - Signalling, Interlocking and train control. 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 ESTIMATING

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 - Building valuation - law relating to contracts and arbitration.

CHEMICAL ENGINEERING

(DEGREE STANDARD)

Subject Code: 260

UNIT-I: CHEMICAL PROCESS CALCULATIONS AND CHEMICAL ENGINEERING THERMODYNAMICS

Properties of gases liquids and solids, Humidity and saturation, Gas laws, Material and Energy balances- involving recycle, by pass and purge systems, Material and Energy balance with reactions.

Thermodynamics functions - Chemical and Phase Equilibrium - Laws of Thermodynamics - Ideal and non-ideal gases and solutions − fugacity, partial molal properties.

UNIT- II: MECHANICAL OPERATIONS AND ENGINEERING MATERIALS

Size Reduction, law, particle size Analysis, Mixing and agitation, Filtration, Sedimentation and Settling, Materials of construction for chemical Industries, Metallic, Non-metallic and Polymeric materials, corrosion. Grinding, Law. Smart materials for Chemical Engineering applications.

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.

Potential for energy resources, energy conversion, solar, thermal, photoelectric, ocean, geothermal, wind energy, bio-energy sources, battery and fuel Cells.

UNIT- IV: TRANSFER OPERATIONS

Momentum: Newtonian and Non-Newtonian fluids, Compressible and in-compressible fluids flow through packed bed, Fluidized bed and closed ducts, Fluid Machinery. Heat transfer: conduction, convection and radiation, Heat transfer with phase change, heat exchangers, Evaporation.

Mass transfer: Diffusion, Theories of mass transfer, Inter phase mass transfer, Analogy. Distillation, Extraction, Absorption, Adsorption, Drying.

UNIT V: CHEMICAL REACTION ENGINEERING

Chemical Kinetics, Rate equations, Interpretation of rate data, Design of reactors, order of reaction, Catalysis, Thermal characteristics of reactors. Isothermal and adiabatic fixed bed reactors, non-isothermal and non-adiabatic fixed bed reactors. Two-phase fluidized bed model, slurry reactors, trickle bed reactor. Experimental determination and evaluation of reaction kinetics for heterogeneous systems.

UNIT VI: INSTRUMENTATION AND PROCESS CONTROL

Principles of measurements and classification of process instruments, measurement of temperature, pressure, fluid flow, liquid weight and weight flow rate, viscosity, pH, concentration, electrical and thermal conductivity, humidity of gases.

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, tuning of controller settings, cascade control, feed forward control, Smith predictor controller, control of distillation towers and heat exchangers.

UNIT VII: 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, 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 orthonormal vectors; Gram-Schmidt orthogonalization; Theorem for Eigenvalues and Eigenfunctions.

UNIT VIII: SEPARATION OPERATIONS

Crystallization, Membrane separation processes. frame, tubular, spiral wound and hollow fibre membrane reactors, dialysis, reverse osmosis, nano/ultra filtration, microfiltration. Ion Exchange chromatography and electrodialysis, Separations involving pervaporation and permeation techniques for solids, liquids and gases, supercritical fluid extraction.

UNIT IX: ENVIRONMENTAL ENGINEERING AND SAFETY 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. Industrial safety principles, site selection and plant layout, chemical hazards classification, Safety in operations and processes, hazardous identification techniques.

UNIT X: DESIGN AND OPTIMIZATION

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.

COMPUTER / COMPUTER SCIENCE ENGINEERING
(DEGREE STANDARD)

Subject Code: 303

UNIT - I: C PROGRAMMING AND OOP

Functions and Pointers in C: Storage classes – Recursion – Preprocessor directives – Arrays – Strings – Arrays, pointers and strings. Pointers to functions – Dynamics Memory Allocation — Structures — Unions — Enumeration Types — Bit fields — Files — Object Oriented Programming: Classes and methods – Constructors and Destructors – Class and Object – Scope – Overloading – Arrays – Type Casting – Pointer. Java API Packages – Inheritance – Sub Classes – Implications of Inheritance – Exception Handling – Assertions – Garbage Collection – String Class – Inheritance – Multiple Inheritance – Polymorphism – Abstract Classes and Methods – Overloading and Overriding – Pure Polymorphism – Operator instance of and Down Casting – Final Methods and Classes – Clone class – Multithreading — Files and Streams — Formatted Output — Object Concurrency — Serialization — Generic Collections — Generic Classes and Methods — Applets — Frameworks.

UNIT – II: DATA STRUCTURES AND DESIGN AND ANALYSIS OF ALGORITHMS

Arrays - Lists — Singly and Doubly linked lists — Stacks — Queues — Insert, Delete and Search operations – Trees – Binary Trees – Binary Search Trees – Representation, Insert, Delete, Traversal – AVL Trees, Heaps – Priority Queues – Graphs – Representation, Traversals – Hashing Algorithms – Growth of Functions – Asymptotic Notation, O, Ω, θ – Solving Recurrence Equations – Algorithms Strategies – Divide and Conquer – Quicksort, Merge Sort, Binary Search – Dynamic Programming – Warshall and Floyd's algorithms – Greedy Strategy – Minimum Spanning Tree – Shortest Path Algorithm – String Matching algorithms — Naïve, Knuth Morris Pratt — NP Problems — NP Complete — NP Hard — Reducibility – Vertex Cover, Hamiltonian Cycle – Travelling Salesperson Problem – Approximation algorithms.

UNIT–III: DIGITAL LOGIC, COMPUTER ORGANIZATION AND COMPUTER ARCHITECTURE

Boolean Algebra and Logic Gates – Combinational Logic – Sequential logic – Functional Units of a Digital Computer – Instruction Set Architecture – RISC and CISC Architectures – Data path and Control – Hazards – Structural, Data and Control Hazards – Dynamic Scheduling – Speculation – ILP and Thread Level Parallelism – Arithmetic – Addition and Subtraction – Binary Multiplication – Binary Division – Floating Point Numbers – Cache Memories – Virtual Memory – Associative memories – Accessing I/O devices – Interrupts - Direct Memory Access – Interface Circuits.

UNIT – IV: OPERATING SYSTEMS AND SYSTEM SOFTWARE INTERNALS

Evolution of OS-Virtual Machines — multiprocessor and multi core. Process states — description, control-execution of OS-Security issues. Threads - Types of threads, multi core and multithreading. Uni and multiprocessor scheduling, real time scheduling. Mutual exclusion, semaphores, monitors, massage passing, reader-writer problem. Deadlock prevention, avoidance, detection, integrated deadlock strategy, dining philosopher's problem. Address binding, logical versus physical address space, dynamic loading and linking, shared libraries, overlays, swapping, contiguous memory allocation, paging, segmentation-Demand paging, process creation, page replacement, frame allocation, thrashing-I/O devices, Organization of I/O function, I/O buffering, disk scheduling. File Management. Access and organization, file directories and sharing, secondary storage management. Linux Systems. One and Two Pass Assemblers — One and Two Pass Loaders, Linkers – One pass Macroprocessors and Emulators – Virtual Machines – Object Oriented VMs — Java VM Architecture — Profiling — Migration — Grids.

UNIT – V: DATABASE MANAGEMENT SYSTEMS

Database Applications — Data Models — Database Architecture — Key issues and Challenges in Database Systems – ER Models – ER to Relational Mapping – Object Relational Mapping – Relational Model - Constraints – Keys – Dependencies – Relational Algebra – Normalization – First, Second, Third & Fourth Normal Forms – BCNF – Join Dependencies – SQL – Embedded & Dynamic SQL – Data Constraints – Database Security — Transaction Systems — ACID Properties — System & Media Recovery — Concurrency – Lacking Protocols – Log Based Recovery – Two Phase Commit Protocol -Recovery – Deadlocks & Managing Deadlocks – Indexing & Hashing Techniques – Query Processing & Optimization – Sorting & Joins – Database Tuning – Data Mining and Warehousing.

UNIT – VI: SOFTWARE ENGINEERING

Software life-cycle and process models; Process assessment models; Project management activates. Requirements elicitation and analysis; Functional and non-functional requirements; User and system requirements, Requirement validation and specification. Design principles; System Models-Context, Behavioural, Data and object models, Architectural design-system structuring, Control models; Structured and object- oriented design; User interface design; Verification and validation planning; Test plan creation and test case generation; Black-box and White-box testing techniques; Unit, integration, validation and system testing; Object-oriented testing; Software inspections. Software maintenance; Reengineering; Legacy systems; Software reuse. Roles and responsibilities in a software team, Project Planning and Scheduling; Software measurement and estimation; Risk analysis and management; Quality management; Configuration management. Quality assurance and Process Improvement; ISO 9000, CMMI, TQM and Six Sigma; programming environments; Project management tools; Requirements analysis and design tools; Testing tools; Configuration management tools; CASE tools.

UNIT - VII: COMPUTER NETWORKS AND SECURITY

ISO/OSI Model – HTTP – FTP – Telnet – Email – DNS – Application Performance. User Datagram Protocol (UDP) – Reliable Data Transfer – Transmission control Protocol (TCP) - Flow Control — Congestion Control. Internet Protocol — IPV4 Packet Format — IP Addressing – Subnetting – Classless Inter Domain Routing (CIDR) – BOOTP/DHCP-ICMP – Routing Principles – Distance Vector Routing (RIP) – Link State Routing (OSPF) – Path Vector Routing (BGP). Framing – Addressing – Error Detection/ Correction – Multiple Access Protocols – Address Resolution Protocol (ARP) – Ethernet Basics – CSMA/CD – Frame Format — Switching — Types (datagram, virtual) — Wireless LAN (802.11). Encryption Techniques – DES – Modes of operation – Triple DES – AES – RSA - Attacks.Diffie – Hellman key exchange – Elliptic curve cryptography key exchange – Message Authentication codes – Hash functions – Digital Signatures. Kerberors – X.509 – PGP, S/MIME-IP Security – Web Security – SSL, TLS, SET – System security.

UNIT – VIII: EMBEDDED SYSTEMS

Embedded System design process, Embedded processors — ARM Processor — Architecture, ARM and Thumb Instruction sets – Embedded C Programming – Looping Structures — Register Allocation — Function calls — Pointer aliasing — Structure arrangement – bit fields – unaligned data and endianness – inline functions and inline assembly – portability issues. Profiling and cycle counting – instruction scheduling – Register allocation – Conditional execution – looping constructs – bit manipulation – optimized primitives. Multiple tasks and processes – Context switching – Scheduling policies – Interprocess communication mechanisms – Exception and interrupt handling –Performance issues. Meeting real time constraints – Multi-state systems and function sequences – Embedded software development tools – Emulators and debuggers – Design methodologies.

UNIT – IX: CLOUD COMPUTING AND VIRTUALIZATION

Cloud Components, Infrastructure, Architecture, Applications, Benefits, Limitations, Cloud Deployment Models, Cloud Technologies. Infrastructure as a Service (IaaS) – Storage asa Service – Compute as a Service – Platform as a Service (PaaS) – Software as a Service (SaaS) : CRM as a Service, Social Computing Services, Document Services. Taxonomy, Server Virtualization, Desktop Virtualization, Network Virtualization, Storage Virtualization, Hypervisor. Hardware and Infrastructure – Server, Clients, Network, Services. Accessing the Cloud-Web Applications, Web API, Web Browsers. Scalable data storage techniques. Map reduce Framework — Hadoop, HDFS. Cloud Security: Requirements, Security Threats, Cloud Security Mechanisms. Scalability, Availability, Migration, Security, NetworkCongestion, Leasing and Billing, on-demand allocation problems.

UNIT – X: WEB TECHNOLOGY AND MOBILE COMPUTING

Internet and WWW Protocols, Client side Programming: HTML, CSS, JavaScript, XML, DTD, Schema, XSLT, server side Programming: Python, PHP, Web Servers: configuration, security, Core Java: I/O, AWT, Network Programming, RMI, JDBC, Applets, Swing, Advanced Java: JSP, Servlets, Beans, MVC. Web Frameworks: sessions, user management, legacy databases and applications, Web Application development. Web Services: SOAP, UDDI, WSDL. Pervasive Computing – Architecture and Applications –Smart devices and operating systems, secure services – Mobile Applications: Mobile Ecosystem – Medium Access and Telecommunications: Frequencies – Signals – Antennas – Signal propagation – Media Access Control – Protocols, Localization and calling, Handove – GPRS. Wireless Networks: Infrastructure and ad hoc networks – WLAN, IEEE 802.11 standards protocols. Piconet – Bluetooth – architecture and services. Mobile IP – DHCP – Routing in Mobile ad hoc networks.

ELECTRICAL ENGINEERING
(DEGREE STANDARD)

Subject Code: 259

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.

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-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.

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 Matrix – System Modeling and Design – Sampled Data System – Stability of Sampled Data System.

UNIT –V: ELECTRICAL MACHINES

D.C. Machines – Construction, Excitation methods – Armature Reaction and Commutation - Characteristics and Performance Analysis – Generators and Motors – Starting and Speed Control — 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 and Speed Control – 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-BLDC 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 - ZBus and YBus 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 –AC and DC Distribution.

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 Combination circuits - Sequential logic circuits-latch–Flip- flops– Counters – Registers – Memories(ROM,PLA and FPGA).

UNIT - VIII POWER ELECTRONICS AND DRIVES

Power Semiconductor devices – Ideal and practical attributes of switch - Power Diode- DIAc - SCRs-TRIAC-GTO - power MOSFET-IGBT- Static Characteristics and Principles of Operation- Single and Three Phase AC to DC Converters – Single and Three Phase AC to AC converters –DC to DC Converters (MOSFET and IGBT based) - Single and Three Phase Inverters (MOSFET and IGBT based) - Pulse Width Modulation – Sinusoidal Modulation with Uniform Sampling – Uninterrupted Power Supplies-Switched Mode Power Supplies – Speed Control of DC and AC Motor Drives– Applications of Variable Speed Drives.

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 – 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.

UNIT –X RENEWABLE ENERGY SOURCES AND STORAGE DEVICES

Renewable Energy — Sources and Features - Solar Radiation Spectrum- Radiation Measurement-Solar Photovoltaic Cell -Operating Principle- Microhydel- Operating principle- Wind Energy Source- Wind Patterns and Wind Data- Site Selection-Types of Wind Generators-Fuel Cells-Batteries-Super Capacitors.

ELECTRONICS / ELECTRONICS AND COMMUNICATION ENGINEERING
(DEGREE STANDARD)

Subject Code: 304

UNIT - I: SEMICONDUCTOR THEORY AND ELECTRONIC DEVICES

Intrinsic and extrinsic semiconductors, Energy Band Diagrams, Diffusion and Drift current densities, Hall effect. PN junction diode, current equation, Transition and Diffusion capacitances, Zener diode, Tunnel diode, Varactor diode, Photo diode, Schottky diode, LED, BJT, FET, JFET, MOSFET, SCR, UJT, TRIAC, IC fabrication.

UNIT - II: CIRCUIT THEORY, SIGNALS AND SYSTEMS

Kirchoff's laws, Nodal and Mesh analysis, Network theorems: Superposition, Thevenin, Norton, Maximum Power Transfer, Miller; Delta-Wye conversion, Transients and resonance in RLC circuits, Magnetically coupled circuits, Mutual inductance.

Continuous and Discrete time signals, Energy and power signals, Fourier series, Fourier transform analysis of continuous time signals and systems, Laplace transform analysis, Convolution integral, DTFT and Z transform analysis of discrete time signals and systems, Convolution sum, Recursive and Non-recursive systems, Sampling Theorem.

UNIT - III: ANALOG ELECTRONIC CIRCUITS

BJT, JFET, MOSFET amplifiers: Biasing analysis, Small signal analysis and frequency response, BJT and MOSFET Multistage amplifiers: Differential, Darlington, cascode and cascade; Feedback amplifiers, Tuned amplifiers, RC and LC oscillators, Power amplifiers. Rectifiers and wave shaping circuits, Operational Amplifier characteristics and applications, CMRR, Slewrate, Waveform generators, Active filters, Timers, PLL, VCO, ADC, DAC, Regulators and Converters.

UNIT - IV: CONTROL SYSTEMS AND INSTRUMENTATION

Control system components, feedback, transfer function, transient and steady analysis of LTI systems, Frequency response, Bode, Polar, Nyquist plots, Routh-Hurwitz and Nyquist stabilities, Lag, Lead, Lag-lead compensation, State variable model.

UNIT – V: ELECTRONIC COMMUNICATION

AM, FM, PM modulation and demodulation, Superheterodyne receiver, AGC, PAM, PWM and PPM, Entropy, Mutual information, Channel capacity, PCM, DPCM, ADPCM, DM, ADM, Source encoding techniques, TDM and FDM, line coding techniques, ASK, FSK, PSK, QPSK, QAM — Bandwidth, SNR, BER, Error Probability, Eye Diagram, Bandpass Sampling, clock and carrier synchronization, Error control coding, Spread spectrum modulation methods.

UNIT – VI: ELECTROMAGNETIC FIELDS AND ANTENNAS

Theorems: Divergence, Stokes, Coulomb; Poisson and Laplace Equation, Ampere's law, Biot-Savort law, Gauss law for magnetic fields, Maxwell's equations, Displacement current, Uniform plane waves, Polarization, reflection and refraction of plane waves at different boundaries, Poynting vector.

Transmission line equation, Characteristic impedance, impedance matching, Smith chart, Attenuators and Equalizers, Lattice diagram, TE, TM and Tem waves, Rectangular guides, Dielectric slab wave guides, TE and TM wave in circular guides, Cavity resonator and Qfor dominant mode.

Antennas: Diploe, Horn, Reflector, Slot, spiral, logperiodic microstrip; Broadside and End fire array, adaptive array, antenna gain, radiation pattern, polarization, VSWR, Radiowave propagation.

UNIT – VII: COMMUNICATION SYSTEMS

Wireless Link budget, Wireless channel characteristics: coherence bandwidth, Doppler spread; Flat, Frequency selective, Fast and slow fading; FDMA, TDMA, CDMA, Capacity calculation, Frequency reuse, Channel assignment, Handoff, trunking and grade of service. Minimum shift keying Gaussian Minimum shift keying, OFDM, cyclic prefix, PAPR, Adaptive equalization, Diversity, Rake receiver, MIMO Systems, Beam forming, Capacity in fading and non-fading channels.

Microwave signal generation: Klysttron, Magnetron, TWT, GUNN Diode, IMPATT, TRAPATT; Devices: Directional Coupler, T Junctions, Isolator, Circulator, Couplers, Irisis, Probes. Microwave transistors — Stability analysis, Microwave measurements — power, VSWR, Frequency, Dielectric constant.

Light Propagation in optical fibres, Ray and mode theory, Fibre structure, Fibre materials, merits of optical fibre communication, Fibre attenuation and dispersion characteristics, Materials for optical sources, LED and LASER Diodes, Optical detection, PIN and Avalanche Photo diodes, WDM Concept, optical networks.

Satellite orbits — Kepler's laws, Geostationary satellite, transponders, GPS receiver DBS/DTH.

OSI/TCP/IP model - functions and protocols of layers, Routing algorithms, Congestion control algorithms, MAC Protocols.

UNIT – VIII: DIGITAL SIGNAL AND IMAGE PROCESSING

DFT, FFT, Overlap and save methods, Butterworth and chebyshev filters, impulse invariant and bilinear transform methods, realization structures, FIR design methods, product quantization, limit cycle oscillations, scaling, Decimation and interpolation, multirate signal processing.

Brightness, Contrast, Hue, Saturation, RGB, HSI Models, Mach band Effect, Image sampling, DCT, Histogram Equilzation, Mean and median filters, Region growing segmentation, JPEG standard.

UNIT – IX: VLSI AND EMBEDDED SYSTEMS

CMOS inverter, Combinational logic circuits, Elmore's Constant, Pass transistor logic, Power dissipation, static and dynamic registers. Clock strategies, synchronous and Asynchronous Circuits, Adders and multipliers, PLA, PAL, FPGA.

Architecture and instruction set of 8085, 8086 and 8051, assembly language programming. Microprocessor based systems. ARM processor family — architecture, Multiple tasks, multiprocesses and multiprocessors. Scheduling, power optimization strategies, I2C, CAN bus.

UNIT – X: COMPUTER ENGINEERING

Number systems, Boolean algebra, Karnaugh map, logic gates, Adders, magnitude comparator, Decoder, Encoder, Mux, Demux, Fliplops, Counters, shift register, Synchronous sequential circuits, Asynchronous sequential circuits, ROM, EPROM, EEPROM.

Fundamentals of Computer architecture, Data path and control unit design, RAM, Optical, Cache and Virtual Memories, Memory allocation, Associative memory, DMA, interrupts, RISC and CISC processors.

MECHANICAL ENGINEERING
(DEGREE STANDARD)

Subject Code: 256

UNIT– I: Mechanics, Kinetics and Dynamics:

Statics of Particles, Equilibrium of Rigid bodies, Properties of Surfaces and Solids, Dynamics of Particles, Friction and Elements of Rigid Body Dynamics, Basics of Mechanisms, Kinematics of mechanisms, gyroscope, Gears and Gear Trains, Friction in Machine Elements, Force Analysis, Balancing, Single Degree Free Vibration, Forced Vibration, mechanisms for Control and Vibration.

UNIT– II: Strength of Materials and Design:

Stress, Strain and Deformation of Solids, Transverse Loading on Beams and 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 of Fasteners and Welded 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.

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, viscous flow of incompressible fluids, boundary layer,elementary turbulent flow, flow through pipes, head losses in pipes, bends etc.
Turbomachinery: Pelton wheel, Francis and Kaplan turbines - impulse and reaction principles — velocity diagrams.

UNIT – IV: Thermodynamics:

Basic concepts, Zeroth, First and Second laws of thermodynamics, thermodynamic systemand 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.

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.

Applications: 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 – VI Materials Science and Metallurgy:

Constitution of alloys and phase diagrams, steels, cast iron, TTT diagram, heat treatment of ferrous and non-ferrous metal, surface modification techniques, 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.

UNIT – VII Production Technology:

Foundry Technology- types of pattern, moulding and casting methods, design of castings, defects, Hot and Cold working, metal forming processes- types and defects, metal joining processes, types and design of weldment, welding metallurgy, welding defects, Metal cutting, machine tools - center lathe, drilling, milling, grinding, gear cutting and broaching, unconventional machining processes, CNC machine tools, Part programming.

UNIT – VIII Metrology and Quality control:

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 and Computerized Process Planning, Cellular Manufacturing, Flexible Manufacturing System and Automated Guided Vehicle System, 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 - objectives - basic procedure, work measurement - objectives - basic procedure, machine loading and scheduling, product sequencing, inventory control - E O Q - quantity discounts, ABC Analysis material handling systems, operations research, simplex method, Transportation model, Assignment model CPM and PERT.
Management theory and practice, planning - nature and purpose of Planning, Decision making, Organising, staffing, Motivation, Leadership, controlling, control techniques .

COMPUTER APPLICATIONS
(DEGREE STANDARD)

UNIT - I: BASIC MATHEMATICS   Subject Code: 288

Prepositional logic sets, relations, functions, partial orders, matrix, algebra, integration, differentiation.

UNIT - II: DIGITAL COMPUTER FUNDAMENTALS

Number systems - Decimal, Binary, Octal, Hexadecimal - Conversion from one to another - Characters and codes - ASCII code, Excess-3 code, gray code - Binary addition, subtraction, multiplication and division - Unsigned binary numbers - Signed magnitude numbers - Complements in number systems - Truth tables, AND, OR, NOT, NOR & NAND gates, EX-OR gates - Parity generators and checkers.

Boolean Algebra and Digital Circuits : Boolean laws and theorems - De Morgan's theorems - Duality theorem - Simplification of sum of 2 product and product of sum expressions - Karnaugh map and simplifications - Simple arithmetic circuits - Half and Full adders - Binary adder/subtracter - BCD adder - Data processing circuits - Multiplexers - Demultiplexers - Encoders and Decoders.

Operating Systems: Types - Scheduling algorithms, Memory Management - Requirements - Partitioning - Paging - Segmentation - Virtual memory

UNIT - III: PROGRAMMING IN C AND C++

Data Types - Variables - Operators - Control structures - Looping structures - Arrays - Strings - Built-in-functions. Function - Scope of Variables - Advanced features of functions. Pointer - Pointers to Array - Pointer Array - Pointer Arithmetic - Pointer of Pointer -Functions and Pointers -Structures and Pointers - Dynamic Allocation - Function pointer.

C++: Objects - Classes - Inheritance-reusability - Creating new data types - Polymorphism and overloading.

UNIT - IV: MANAGEMENT INFORMATION SYSTEMS

Fundamentals of Information System — Overview of Information of System Solving Business Problems with Information Systems : System Approach to Problem Solving —Developing Information System Solution – Information Systems for Strategic Advantages – Fundamentals of Strategic Advantage - Strategic Applications and Issues in It; Managing IT : Enterprise and Global Management.

Business applications of Information Technology: The Internet and Electronic Commerce – Fundamentals of Electronic Commerce – Information System for Business Operations: Business Information System – Transaction – processing Systems. Information systems for Managerial Decision Support : Decision Support Systems – Artificial Intelligence technology in Business – Managing IT – Planning for Business change with IT – Implementing business change with IT – Security & Control Issues in I/S - Ethical and societal challenges of Information Technology.

UNIT - V: COMPUTER NETWORKS

Introduction to Computer Networks and Data Communication: Need for computer networks - evolution - Data Communication - Data Transmission - Transmission media - Classification of Networks - Switching and Routing - Routing - Multiplexing and Concentration Concentrator - Terminal Handling - Components of a Computer Network. Network Standards and OSI - Need for network standard - OSI reference model - Physical layer - Data link layer - Network layer - Transport layer - Session layer - Application layer.

UNIT - VI: FUNDAMENTALS OF DATABASES

Early Information Systems - Problems with Early Information Systems - Organization of Data Base - Components of Data Base Management System-Data Models - Entity -Relationship Model - Network Data Model, Hierarchical Data Model - Semantic Data Modelling. File Organization - Sequential file organization - The indexed sequential file organization -Creation and manipulating of indexed sequential file - Hashing - Key-to- address transformation. Relational Data Model: Introduction - Basic definition and terminology - Relational algebra.

UNIT - VII: OFFICE AUTOMATION

Features of MS – Windows, Control Panel, Taskbar, Desktop, Windows Application, Icons,Windows Accessories, Notepad, Paintbrush.

Editors and Word Processors: Basic Concepts, Examples: MS-Word, Introduction todesktop publishing.

Spreadsheets and Database packages : Purpose, usage, command, MS-Excel, Creationof files in MS-Access, Switching between application, MS-Power Point.

UNIT - VIII: MULTIMEDIA AND APPLICATIONS

Uses of Multimedia – Introduction to making multimedia – Multimedia skills. Multimedia hardware and software – Connections – Memory and storage devices – Input devices – Output devices – Communication devices. Basic software tools – Text editing and word processing tools – Painting and drawing tools – 3-D modelling and animation tools – Image editing tools – Animation, video and digital movie tools. Making instant multimedia – Multimedia authoring tools. Multimedia Building Blocks – Text – Sound – Multimedia System Sounds – MIDI versus Digital Audio – Digital Audio – Making MIDI Audio – Audio File Formats – Production tips - Images – Animation - Video.

UNIT - IX: WEB TECHNOLOGIES

The world wide web: Browsing the Web - Web address - Web browser basics - Strong and managing(book marks) - Surfing the web with web browser - Searching the web directory - Search engines - Navigation tools.

Email: Sending - Reading - Replying - Deleting - Exiting - Sending Mail to more than one person sending folder - Forwarding a mail - Checking   the   spelling   - Attachments. **HTML:** Overview of HTML - Adding structure to a page formatting text and pages - Linking page to the world - Including picture - Clearing lists - Arranging items within tables - Getting feedback from form - Splitting a page into frames.

UNIT - X: ORGANIZATIONAL BEHAVIOR

Organizational Behaviour models, Foundation of individual Behaviour, Concept of Attitude,Concept of value, concept of JOB Satisfaction learning theories, Foundation of GROUP BEHAVIOUR – reasons for GROUP formation by people, Leadership concept.

COMPUTER SCIENCE
(DEGREE STANDARD)

Subject Code: 286

UNIT - I: MATHEMATICAL FOUNDATIONS

Prepositional logic sets, relations, functions, partial orders and lattices, regular and contextfree languages, finite state machines and pushdown automata.

UNIT - II: COMPUTER ORGANIZATION

Function organization, machine instructions, addressing modes, introduction to microprocessors, study of 8085/8086 communication between processor and I/O via DMA and interrupt priority, I/O processors, problems associated with bus scheduling. Micro computer memory, virtual memory, basic concepts, problems of virtual memory, page replacements algorithms, cache memory, associative memory.

Fundamentals of parallel processing and its necessity pipelined processors and multiprocessors.

UNIT - III: DATA STRUCTURES IN C

Data types, control statements, procedures, Scope rules, arrays and records, enumerated data types, sets, pointers, recursion. Sequential, indexed files, sorting and merging report generations. Arrays, queues, linked lists, stacks, tree traversal, evaluation of expressions using postfix notation, sorting algorithms, bubble sort, quick sort, heap sort, complexity of algorithms.

UNIT - IV: SYSTEMS SOFTWARE

Editors, loaders, linkers, assemblers, phases of a compiler and their function, lexical analysers and parsers, parsing techniques, symbol table, code generation.

Batch, Multi-programming and time sharing systems, processor memory, device and file management, virtual memory, process scheduling, inter process communication, I/O redirection, process synchronization and concurrency, deadlocks, prevention, avoidance, detection and recovery, auxiliary storage management, file system functions and its hierarchy.

UNIT - V: DATABASE SYSTEMS

File organisation techniques: indexing, relational and network data models, study of ORACLE as a relational DBMS. Data dictionary, normal forms and query languages.

UNIT - VI: COMPUTER NETWORKS

Data communication concepts, concepts of LAN, evolution of LAN, OSI - 7 layer reference model and design issues. Physical layer-transmission media, packet and circuit switching, topologies, Data link layer, token passing, sliding window protocols, protocols specification and verification, network layer, routing, congestion control, transport layer, session and presentation layers, design issues, application layer, file transfer, electronic mail.

UNIT - VII: SOFTWARE ENGINEERING

Systems analysis, detailed analysis, feasibility study, tools for system designer, input and output design, program definition, module design and design review, structured programming and conversion, testing, training and documentation, systems life cycle, role of System Analyst. Tools for office Automation, word processing Spreadsheets, Financial and Statistical packages, payroll, inventory, picture generation and display in computers, Multimedia systems, Application of computers in Government, Defence, Agriculture, Medicine and Education.

UNIT - VIII: COMPUTER GRAPHICS

Introduction – Point plotting techniques – Line drawing displays – Two dimensional displays – Clipping and Windowing. Graphics package – Segmented display files – Display file compilation – Geometric models – Picture structure. Graphical input units – graphical input techniques – Event handling – Input functions. Raster graphics fundamentals – Solid area scan conversion – Interactive raster graphics – Raster graphics systems – Raster display hardware. Two dimensional and three dimensional transformations.

UNIT- IX: OBJECT ORIENTED PROGRAMMING (C++ & JAVA)

C++ and Java programming, objects and data, derived types, loops and relational expressions, branching statements and logical operators, functions, objects and classes, operator overloading, conversion of functions, dynamic memory and classes, class inheritence, input/ output and files, benefits of OOP, object oriented system development tools.

UNIT- X: WEB TECHNOLOGIES

The world wide web: Browsing the Web - Web address - Web browser basics - Strong and managing(book marks) - Surfing the web with web browser - Searching the web directory - Search engines - Navigation tools.

Email: Sending - Reading - Replying - Deleting - Exiting - Sending Mail to more than one person sending folder - Forwarding a mail - Checking the spelling - Attachments. **HTML:** Overview of HTML - Adding structure to a page formatting text and pages - Linking page to the world - Including picture - Clearing lists - Arranging items within tables - Getting feedback from form - Splitting a page into frames.

ENVIRONMENTAL SCIENCE
(DEGREE STANDARD)

Subject Code: 298

UNIT – I: SCOPE AND IMPORTANCE OF ENVIRONMENTAL SCIENCE

Definition; multidisciplinary nature of environmental science, scope and importance; global environmental problems; components of environment: biotic, abiotic. Atmosphere. Lithosphere: case study on major geological formations in Tamil Nadu; Hydrosphere case study on major river systems in Tamil Nadu.

UNIT- II: ECOLOGICAL CONCEPTS

Ecosystem definition; structure and function; energy flow, food chain and food web; ecological pyramids, biogeochemical cycles (Carbon, Nitrogen and Phosphorus); Hydrological cycle; ecosystem types: ponds, ocean, river, cropland, wetland, desert, forests and grassland; ecological succession; primary, secondary and tertiary producers. Examples of plant and animal adaptations for arid (desert and semi-desert) and humid (rain forest) biomes.

UNIT – III: ENVIRONMENTAL RESOURCES

Non-renewable resources - Mineral use and exploitation; fossil fuels. Renewable resources: water — surface and ground water, supply, demand, dams-benefits and problems; soil and land resources — Structure, formation, erosion, conservation of soil, agricultural practices, land use, land degradation, desertification; Fisheries – inland and marine fisheries, aquaculture, overharvesting. Forest resources — Timber, medicinal plants, fuel-wood, deforestation, forest management. Management of renewable and non- renewable resources; sustainable use.

UNIT- IV: BIODIVERSITY AND CONSERVATION

Biodiversity - Definition; Introduction to genetic, species and ecosystem diversity; biogeographical classification of India: Forest types of Tamil Nadu: tropical dry evergreen, thorny scrub, wet evergreen forests, grasslands, sholas, dry and mixed deciduous forests, mangroves. Coral reefs. Agro-biodiversity, land races and genetic resources. Valuation of biodiversity; Consumptive, productive, cultural value. Threats to biodiversity: habitat loss, poaching, over-utilisation, invasive species. Endemic and threatened species of Tamil Nadu. In situ conservation: Mudumalai, Anamalai and Kalakad-Mundanthurai Tiger Reserves, Gulf of Mannar Marine Reserve, Pulicat and Pt. Calimere Wildlife Sanctuaries; sacred groves. Ex-situ conservation: Vandalur Zoological Park and Madras CrocodileBank. Red data book, National Biodiversity Act, Wildlife Protection Act (1972), Tamil Nadu Forest Conservation Act.

UNIT- V: HUMAN POPULATION AND ENVIRONMENT

Population growth and regulation: Age pyramids, Malthusian theory, global trends of population growth, variation among nations and zero population growth. Environmental health, Nutrition and health. Communicable diseases such as typhoid, cholera, tuberculosis, hepatitis, influenza, HIV- social issues. Non-

communicable diseases such as heart disease, diabetes, asthma. Epidemics. Environmental risk factors. Human displacement and rehabilitation, tribal population and welfare schemes, women and child welfare; Human rights, Intellectual Property Rights.

UNIT- VI: NATURAL CATASTROPHIES AND DISASTER MANAGEMENT

Causes and effects of natural catastrophies — Earthquakes, floods, cyclones, hurricanes, storms, landslides, drought, famine, tsunami; pre-disaster and post - disaster management,risk assessment, early warning systems and forecasting. Role of administrators, scientists, planners, volunteers.

UNIT- VII: ENVIRONMENTAL POLLUTION

Definition of pollution and pollutants; types of pollution - Air, water, soil, noise, thermal, nuclear; causes of pollution, effects of pollution and control measures; liquid and solid waste management, nuclear holocausts. Case studies: leather industry, fly ash, thermal stations, nuclear power plants.

UNIT- VIII: ENVIRONMENTAL MANAGEMENT AND LEGISLATION

Environmental Impact Assessment (EIA) : Objectives, Principles of Process, screening of projects, methodologies, checklist and documentation, prediction methodologies, public participation, limitation of EIA ; Environmental Protection Acts in India : air, water. Lake and River action programmes; coastal zone management; pollution control boards, Management plans using Geographic Information System (GIS) and Remote Sensing (RS)tools.

UNIT - IX: ENVIRONMENTAL ORGANISATIONS AND AGENCIES

International Organisations: United Nations Environment Programme (UNEP), International Union for Conservation of Nature and Natural Resources (IUCN), International Panel on Climate Change (IPCC), International Panel on Oceans (IPO), EarthSummit, Convention on Biological Diversity (CBD), World Wide Fund for Nature (WWF), Man and Biosphere Programme (MAB), India: Ministry of Environment, Forests and Climate Change (MoEFCC), Ministry of Earth Sciences (MoES), NGO's.

UNIT- X: GLOBAL CLIMATE CHANGE

Introduction to climate change, past climatic fluctuations. Current climate and weather — Wind, monsoon, cyclones. Global ocean circulation. Global warming and greenhouses gases – Carbon dioxide, methane, nitrous oxide, ozone. Sources of green house gases – Fossil fuel use, vehicle emissions, industry; agricultural practices, deforestation. Role of UNFCC (United Nation Framework Convention on Climate Change) in monitoring green house gas emissions. International treaties: Kyoto protocol, Paris agreement. Acid rain, source, impacts and management. Ozone layer depletion: causes, impacts and remediation.

VETERINARY SCIENCE
(DEGREE STANDARD)

Subject Code: 296

UNIT – I: GENERAL

Role of livestock and their products in Indian economy and human health, current livestock programmes and policies of State and Nation – Economics of dairy, sheep, goat, poultry, pig and rabbit farming; constraints to the livestock development programs, common offences against animals – SPCA, Animal Welfare Board of India, NGOs.

UNIT – II: LIVESTOCK MANAGEMENT

Common terms used in Animal Husbandry — Identification of age of animals — Livestock and poultry breeds and breed characters; housing systems, and requirements of space, ventilation, water, sanitation and waste disposal.

Management of milk, meat, egg and wool producing livestock, breeding bulls and draft animals and wild animals in captivity, farm records and their maintenance, systems and strategies for livestock improvement for enhancing productivity.

UNIT – III: LIVESTOCK NUTRITION

Nutritional terms and definitions — Role of nutrition in health and production; classification and composition of feed and fodders including forest grasses; anti-nutritional factors and toxins in feeds and fodders; feeding standards and nutrient requirements of different categories of livestock / poultry and computation of rations.

Nutritional deficiency and its influence on livestock performance; feed supplements and additives; conservation and preservation of feed and fodders; economic utilization of agro by-products for feeding livestock – Utilisation of unconventional feeds – Wildlife nutrition.

Quality control of feed, 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.

UNIT – IV: LIVESTOCK BREEDING AND GENETICS

Important breeds of cattle, buffalo, sheep, goat, pig and poultry with special reference to economic characters — Important species of wild animals and their breeding in captivity. Selection of Livestock for production, reproduction and disease resistance traits. Principles of genetics and basis of population genetics, genetic parameters. Nature of DNA and RNA-their models and functions; applications of recombinant DNA technology, cloning and marker Assisted selection and Cytogenetics. Animal breeding policies and programmes in state and Nation.

UNIT – V: VETERINARY ANATOMY, PHYSIOLOGY AND BIOCHEMISTRY

Gross study of bones, joints and muscles of skeleton Gross study of heart and its conduction system. Gross study of organs of digestive, respiratory urinary and reproductive systems. Digestion, metabolism and absorption of carbohydrates, proteins and fats in simple stomach animals and ruminants — 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.

UNIT – VI: VETERINARY MICROBIOLOGY, VETERINARY PREVENTIVE MEDICINE

Bacteriology & Mycology: Classification - isolation, identification and culturing of bacteria and fungi -Methods of transmission of infection - Sterilization and disinfection - Antibiogram. Virology: Classification, - cultivation, replication General characteristics of various families of RNA and DNA viruses. Immune system organs, tissues and cells; infection and immunity; type and grade of immunity, serological reactions and modern diagnostic techniques — vaccine. Epidemiology - Concept, Scope, Objectives and Uses. Monitoring and surveillance-epidemiological disciplines. Pathogenesis, clinical signs, differential diagnosis, preventionand control of common bacterial, viral, fungal, rickettsial and parasitic diseases oflivestock, poultry and pet animals including wild life species- Regional, endemic, emergingand re-emerging important disease. Allergic skin tests and modern diagnostic techniques.

UNIT – VII: PATHOLOGY AND PARASITOLOGY

Concept and causes of diseases in animals; general principles and procedures of necropsy; collection, preservation and dispatch of morbid materials for laboratory diagnosis, disease investigation; common pathological conditions seen in domestic, wild, zoo and laboratory animals and birds. Vetro-legal implications.

Classification of Parasites — Parasite and parasitism in animals; important morphological features, life-cycles, mode of transmission, pathogenesis, diagnosis, chemotherapy and general control measures of parasites associated with disease in animals, birds and zoo animals.

UNIT - VIII: PHARMACOLOGY

Drug action – Pharmacokinetics (absorption, distribution, biotransformation and excretion), Pharmacodynamics – local and general anesthetics. Antibiotics and chemotherapy – Toxicology - Ethnoveterinary practices.

UNIT - IX: VETERINARY CLINICAL MEDICINE, VETERINARY GYNAECOLOGY ANDOBSTETRICS AND VETERINARY SURGERY AND RADIOLOGY

General and special clinical examination, etiology, clinical signs, pathogenesis, diagnosis, prevention and control of metabolic, deficiency diseases. Ethics and jurisprudence in domestic and wild animals.

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.

UNIT- X: LIVESTOCK PRODUCTS TECHNOLOGY

Ante mortem and Post mortem inspection — Objectives of meat inspection — Abattoir practices, methods of slaughtering and dressing; Meat Inspection Laws, utilization of by products; unsound meat and its disposal; quality control of meat and eggs and their products. Milk: Proximate Composition, milk collection, cooling / chilling and transportation; physio-chemical and nutritional characters of milk and milk products; processing of raw milk and production of market milk. Condensed and dried milk, special milk and Indian Dairy Products - Packaging and storage.

Cleaning and sanitization of dairy equipments and plants; role of micro-organisms in milk and milk products; legal standards and quality assessment of milk and milk products-role of milk and milk products, meat and egg in human nutrition — Detection of adulterants in milk. Good Manufacturing Practices (GMP) in dairy and Hazard analysis in critical control point (HACCP) in dairy Processing. FSSAI laws.