



GOVERNMENT OF TAMIL NADU

2010

[Regd. No. TN/CCN/467/2009-11.

[R. Dis. No. 197/2009.

[Price: Rs. 2.40 Paise.



TAMIL NADU GOVERNMENT GAZETTE

EXTRAORDINARY PUBLISHED BY AUTHORITY

No. 196]

CHENNAI, FRIDAY, JULY 2, 2010
Aani 18, Thiruvalluvar Aandu-2041

Part II—Section 2

**Notifications or Orders of interest to a section of the public
issued by Secretariat Departments.**

NOTIFICATIONS BY GOVERNMENT

HIGHER EDUCATION DEPARTMENT

Secretariat, 2nd July 2010.

APPROVED SYLLABUS FOR TWO SUBJECTS FOR DIRECT RECRUITMENT OF LECTURERS
IN GOVERNMENT POLYTECHNIC COLLEGES.

No. II(2)/HE/398(c)/2010.

[Technical Education—Tamil Nadu Educational Service—Direct Recruitment of Lecturers in Government Polytechnic Colleges—
Syllabi for two Subjects—Approved.]

The following Government Order is published:—

[G.O. Ms. No. 174, Higher Education (I-2), 30th June 2010, Aani 16, Thiruvalluvar Aandu-2041.]

READ:

From the Chairman, Teachers Recruitment Board, Chennai-6, Letter No. 2011/A6/2009, dated 11th June 2010.

ORDER : No. 174, Higher Education (I-2), 30th June 2010.

The Government approve the Syllabi for two subjects appended to this order for Direct Recruitment of Lecturers in Government
Polytechnic Colleges by Teacher's Recruitment Board, Chennai.

(By Order of the Governor)

K. GANESAN,
Principal Secretary to Government.

CHEMICAL TECHNOLOGY

Syllabus**Organic Chemistry:**

Carbohydrates - oil, fats and waxes - heterocyclic compounds - proteins - dyes and dyeing - pharmaceutical chemistry

Material Technology:

Ferrous and non-ferrous metals - Polymers, composites, ceramics and inorganic materials-Single crystals-memory metals-Intelligent materials.

Thermodynamics:

The first law and internal energy, statements of first law for the non flow and flow systems, enthalpy and heat capacity limitations of the first law.

The PVT behavior of fluids, laws of corresponding states and equation of states approaches to the PVT relationships of non ideal gas,

Statements of the second law of thermodynamics, available and unavailable energies

Measurable quantities, basic energy relations, Maxwell relations the work expression for different situations - Partial molar properties, ideal and non-ideal solutions, standard states definition and choice, Gibbs-Duhem equation, excess properties of mixtures-standard free energy change and reaction equilibrium constant, evaluation of reaction equilibrium constant, prediction of free energy data, equilibria in chemical reactors, calculation of equilibrium compositions for homogeneous chemical reactors.

Physical Chemistry:

Phase rule- Azeotropic distillation-Fractional distillation-partially miscible liquid-CST-Immiscible liquid-Steam distillation-photochemistry- Quantum efficiency- Hydrogen-chlorine reaction- photosensitization-Chemiluminescence.

Ionic equilibria- Degree of hydrolysis-Determination –acid-base indicators-their applications-solubility product principle-Ionic equilibria involving complex ions - Colloids - properties of colloids – coagulation of solutions –Origin of charge on colloidal particles –Determination of size of colloidal particles- Donnan Membrane equilibrium – Emulsions – Gels – Applications of colloids.-Nuclear chemistry - Applications of Radioactivity-Nuclear forces - Packing fraction-Binding energy-Nuclear fission-Nuclear reactors-Nuclear fusion-Hydrogen bomb-Nuclear reactions-cyclotron-Induced radioactivity.

Chemical Process Calculations

Compositions of mixtures and solutions - gas calculations- material balance- Material balance involving key components, Material balance with chemical reaction - Limiting and excess reactants – Degree of completion- Application of material balance to various types of chemical reactions - recycle and bypassing operations-concept of purge.- humidity and saturation - fuels and combustion-Standard heat of reaction, standard heat of formation and combustion, Hess law, calculation of standard heat of reaction, Heat of reaction at other temperatures - Effect of pressure and temperature on heat of reaction – Heats of solution and mixing.

Instrumental Methods of Analysis:

Spectroscopical methods of analysis-Electromagnetic radiation: Various ranges, Dual properties, Various energy levels, Interaction of photons with matter, absorbance, and transmittance and their relationship, Permitted energy levels for the electrons of an atom and simple molecules, classification of instrumental methods based on physical properties. Quantitative spectroscopy-Nesslerimetry. Estimation of inorganic ions such as Fe, Ni and estimation of Nitrite using Beer-Lambert's Law.

Molecular spectroscopy-Variations in organic and inorganic compounds effected by UV, visible and infra red radiations, various energy level diagrams of saturated, unsaturated and carbonyl compounds, excitation by UV and Visible radiations, Woodward-Fieser rules for the calculation of absorption maxima.

Atomic spectroscopy - Atomic Absorption Spectrophotometry: Principle, Instrumentation and Application, Various interferences observed in AAS (Chemical, Radiation and Excitation). Flame photometry - Polarimetry and Refractometry - Thermogravimetry: Instrumentation, factors affecting the shapes of thermograms, applications, thermograms of some important compounds-Classification of chromatographic methods.

Heat And Mass Transfer:

Molecular diffusion in gases and liquids, steady state diffusion under stagnant and laminar flow conditions Diffusivity measurement and prediction, multi-component diffusion, diffusion in solids and its applications, eddy diffusion, mass transfer coefficients, theories of mass transfer-overall mass transfer coefficient- steady state co current and countercurrent mass transfer processes, stages, cascade and stage efficiencies, stage-wise and differential contactors, NTU and NTP concepts.

Humidification operations- Gas Absorption-theory and mechanism of drying, drying curves, classification of dryers, design of batch and continuous dryers, theory of crystallization, classification of crystallizers- heat transfer from condensing vapours, drop wise and film wise condensation, Nusselt equation for vertical and horizontal tubes, condensation of superheated vapours, effect of non-condensable gasses on rate of condensation.

Heat transfer to boiling liquids - mechanism of boiling, nucleate boiling and film boiling-Parallel and counter flow heat exchangers - Log mean temperature difference - Single pass and multipass heat exchangers; plate heat exchangers; use of correction factor charts; heat exchangers effectiveness; number of transfer unit.

Leaching equipment for batch and continuous operations- calculation of number of stages - Leaching - Leaching by percolation through stationary solid beds, moving bed leaching- Membrane separation process; solid and liquid membranes; concept of osmosis; reverse osmosis; electro dialysis.

Chemical Processing:

The role of a chemical engineers in process industries, - unit operations, unit processes, process utilities and economics, industrial safety and pollution, outline of plant and equipment design, process control and instrumentation.- Chlor-Alkali- Industrial acid - Cement, Glass and Ceramics. Pulp and Paper.- Pharmaceutical, Polymers, Industrial Gases, Paints and Pigments.- Dyes and intermediates, Fertilizers, Food industry.

Chemical Reaction Engineering:

Mass action, rate equation, elementary, non-elementary reactions and their measurements, theories of reaction rate and temperature dependency, analysis of experimental reaction data, evaluation of rate equation, integral and differential analysis for constant variable volume system.- Isothermal and non-isothermal homogeneous reactor systems- design- Criteria for stability of reactors, limit cycles and oscillating reactions, parameter sensitivity- The residence time distribution as a factor of performance; residence time functions and relationship between them in reactor; basic models for non-ideal flow; conversion in non-ideal reactors- Diffusion within catalyst particle, effective thermal conductivity, mass and heat transfer within catalyst pellets, effectiveness factor, Thiele Modulus, fixed bed reactors.

Transport Phenomena:

Viscosity, mechanism of momentum transport, shell balance method, Newton's law, pressure and temperature effect on viscosity of gases and liquids, velocity distributions in falling film, circular tube, annulus, slit.- special forms, use of equations of change, dimensional analysis of equations of change, time-smoothed equations of change.

Petroleum Refining And Petrochemical Technology:

Evaluation of crude oil and testing of petroleum products - Refining of petroleum – Atmospheric and vacuum distillation-Thermal cracking, Vis breaking, coking - Catalytic cracking (FCC), Hydro cracking, Air blowing of bitumen-Treatment techniques for removal of sulphur compounds to improve performance, Storage and stability - Product treatment processes - various solvent treatment processes, dewaxing, Clay treatment and Hydro fining-Cracking of naphtha and gas for the production of ethylene, propylene isobutylene and butadiene. Production of acetylene from methane Catalytic Reforming of petroleum feed stocks. Extraction of Aromatics- Production of petrochemicals like dimethyl terephthalate (DMT), ethylene glycol, Synthetic glycerine, linear alkyl benzene (LAB), acrylonitrile, methyl methacrylate (MMA), vinyl acetate monomer, phthalic anhydride, maleic anhydride, phenol and acetone, Methanol, formaldehyde, acetaldehyde, pentaerythritol. Production of carbon black.

PRINTING TECHNOLOGY

Syllabus**Imaging Technology:**

Printer's measurement system. Type series, Family, Typographic Parameters. Copy mark-up, Casting off, Copy editing, Proof reading marks. House style, Text Composing Techniques

Text and graphics integration, Maths and scientific character composing, Regional language editing systems, Page description languages, Desk top publishing systems.

Types of films, Action of light, Photochemical requirements, Emulsion manufacture, Emulsion structure, Theory of latent image formation, Lith and Rapid access films. Processing of films, Auto processors.

Printing Inks:

Colorants – Pigments Classification, Preparation and properties; Inorganic – White and coloured. Carbon black, Metallic, Ultramarine and Fluorescent; Organic – Diarylide yellow, Hansa yellow, Rhodamine, Lithol, Rubine, Rubine Toner, Phthalocyanine blue & green. Alkali blue, Benzidine orange, Toluidine red and Lake red C; Dyestuffs

Viscosity, Tack, Colour, Gloss, Rub resistance, Length, Drying characteristic, and Fineness of grind gauge, light fastness, standards on environmental concerns, end use applications.

Heat set, quick set, magnetic, water based, fugitive, thermochromic, photochromic, and new technology inks. Radiation curable inks – IR, UV & EB – Raw materials, equipment used for drying. Ink drying mechanisms.

Ink problems related to printing processes – Causes and remedies

Flexographic Printing:

Press types; printing stations – roller & cylinders, fountain rollers, anilox rollers, doctor blades, plate cylinders, impression rollers, roll mechanics, unwind equipment, infeed, corona treatment, web-tension control, rewind equipment, gears, bearings, inking systems, drying systems, cooling rolls, inline laminating, rotary die cutting/sheeting.

Moulded rubber plates – negatives, exposure, etching, finishing, thermosetting mould, printing plate compounds, rubber plate moulding, types; Photopolymer plate – Sheet photopolymer, liquid photopolymer, plate compensation calculations.

Film Assembly And Plate Making:

Direct ruling to plate – Metal keys, Burnout marks, Paper templates; Hand assembly – Negative assembly to Golden rod, Golden rod with plastic interleave, Peelable membrane substrates; Conventional positive assembly, Blue and Red keys on film, Mechanical systems – Pin register, step and repeat machines; Planning softwares – Features.

Waterless plates – configuration, performance characteristic; Electrostatic plates – types, processing and use; Diffusion transfer; Reflex plate making; Computer to Plate – types, chemistry, Processing; Laser plate making .

Paper And Board:

Sources, kinds of cellulose fibres – Pulping – Mechanical, Thermo-mechanical and Chemical processes – Bleaching techniques – Stock preparation – Beating & refining – Sizing, Dyeing – Non-fibrous additives and consistency.

Paper making machines, Head boxes and inlets, Forming section, Press and dryer section, wires, felts, automation-Board manufacturing – cylinder machines. Paper and board coating – Pigments, binders and additives – Techniques.

Print Finishing:

Joggers; pile hoist; cutting – overview, work preparation; cutting machine- parts, types of motion, principles of single knife guillotines, Semi-automatic and automatic programming systems

operation and adjustment of folding machines; additional features – fold glueing, perforators, creasers and slitters; folding boxes.

Principles and operation of perforating, punching, drilling, round cornering, indexing, creasing, embossing and numbering; foil stamping; varnishing, lamination.

Colour Reproduction & Gravure Printing :

Attributes of colour- hue, chroma, lightness. Source, object, standard observer, tristimulus values, chromaticity diagram, CIELAB, colour difference. Spectrophotometer.

Light Source, color filter, photographic emulsion. Optics of the ink film, first surface reflection, multiple internal reflections. Evaluation of ink colour, Additivity and Proportionality rules.

Gravure cylinder – types; doctor blade assembly – conventional, reverse angle, holder, loading, oscillation, positioning; Impression rollers – types, setting, loading, changeover; electrostatic assist impression; inking system, viscosity control, solvent recovery; power transmission.

Sheetfed Offset Technology & Web Offset Technology:

Principles of lithography, three important phenomena, basic configuration of offset machine. Sheet feeding and controls.

Blanket types, requirements, manufacture, performance attributes. Rollers, types- Inking system: requirements, design concepts, fountain types, requirements, metering, roller train design, form rollers, heat generation, ghosting. Roller setting. Dampening system

Development. Classification: blanket-to-blanket, in-line, common impression. Full size and narrow web presses. Job suitability and factors to be considered for selection, presses for producing continuous stationery. Roll stands. Automatic pasters: zero speed and flying paster. Web pre-conditioners, infeed units, dancer types, dancer system design, tension control systems. Automatic webbing updevice, control of fan out using buzzle wheels Web aligner concepts. Web break detectors. Reel handling and storage.

Packaging Technology & Packaging Materials:

Consumer research and sales promotion through package design, factors influencing design, function of package graphics, colour in package design, surface design to suit production- Cutting; creasing; punching - punch selection; die making; cartooning system – lined cartons, form fill seal, selection of cartooning system; CFB – manufacture- aerosol packaging, shrink and stretch wrapping, strip packaging, blister packaging, anti-static packaging, aseptic packaging, oven able package; Cosmetic packaging, confectionery packaging, hardware packaging.

Polymers- Wood- Glass-types of labels – Material properties. Label adhesives – characteristic properties and uses. Collapsible tube – materials and properties. Closures and sealing – materials, method of manufacturing, Cushioning Materials.

Advertising & Visual Communication:

Media concept, structure of media, media characteristics, publication media, TV and Radio, direct mail and POP- Factors involved in advertising planning decision making- Historical development, advertising agencies, special service groups.

Visual persuasion and propaganda, visual image analysis, stereotypes and the media, Ethics of visual story telling.

Visual communication in newspapers, magazines, video, internet, advertising and public relations. Analysis of a visual event.

Screen Printing & Newspaper & Periodical Publishing:

Silk; modern synthetic fabric – multifilament polyester, monofilament polyester, monofilament nylon;

Importance of frames – rigid frame types; Frame size considerations; Stretch and glue frame adhesives. Consequences of improper tension-Squeegee components.

Manuscript from editorial organisation : Layout & design, methods of composition-Basic determinants of News- writer-editor relationships,- defense against libel, mitigation & damages.

Textile Printing & Book Publishing:

Requirements of film elements - Painting grounds and Blotches - Single stage dyeing and polychromatic dyeing.

Pre-production planning, manuscript, layout & design, imposition, composition, Anatomy of a book; Printing techniques; Production Process- Direct promotion techniques, mail order advertising, subscription books, Direct mail promotion, Library purchases, export & import of books.