



## TAMIL NADU PUBLIC SERVICE COMMISSION

NOTIFICATION NO: 02/2015  
ADVERTISEMENT NO.:406

DATED: 06.02.2015

Applications are invited only through online mode upto 04.03.2015 for Direct Recruitment to the vacancies in the following post:-

Name of the Post and Post Code	Name of the Service and Code No.	Number of vacancies	Scale of pay
<b>CHEMIST</b> (2013 - 2014) (Post Code. 1913)	Tamil Nadu Industries Subordinate Service (Code No. 044)	<b>3</b> BC-1 GT(W)-1 SC-1	Rs.9,300-34,800/- (PB2) + 5,100/- Grade Pay

Abbreviation:- BC-Backward Class, GT (W) - General Turn (Woman), SC- Scheduled Caste

### 2. IMPORTANT DATES:-

A	Date of Notification	06.02.2015	
B	Last date for submission of applications	04.03.2015	
C	Last date for payment of Fee through Bank or Post Office	06.03.2015	
<b>Date and Time of Written Examination (Computer Based Test)</b>			
D	Paper - I (Optional Subject)	26.04.2015 FN	10.00 A.M. to 01.00 P.M.
	Paper - II (General Studies)	26.04.2015 AN	02.30 P.M. to 04.30 P.M.

### 3. QUALIFICATIONS:-

#### (A) AGE (as on 01.07.2015)

Sl. No.	Category of Candidates	Minimum Age (Should have completed)	Maximum Age
1	SCs, SC(A)s, STs, MBCs/DCs, BCs, BCMs and DWs of all Castes	18 Years	No Maximum Age Limit
2	"Others" [i.e. Candidates not belonging to SCs, SC(A)s, STs, MBCs/DCs, BCs and BCMs]	18 Years	30 Years (Should not have completed)

#### Note:-

- (i) "Others" [i.e. Candidates not belonging to SCs, SC(A)s, STs, MBCs/DCs, BCs and BCMs] who have put in 5 years and more of service in the State / Central Government are not eligible even if they are within the age limit.

- (ii) The Technical and Non-Technical Staff of TANSI who have faced retrenchment and have not been absorbed in the Government Corporations/ Undertakings may also apply, if they are otherwise qualified except age and the relevant age rule will be relaxed by the Government in their favour if they come up for selection.

**(B) EDUCATIONAL QUALIFICATION: (as on 06.02.2015) :-**

Candidates should possess the following or its equivalent qualification awarded by any University or Institution recognized by the University Grants Commission for the purpose of its grant on the date of this Notification viz. **06.02.2015**

Qualification	Experience
<p><b><u>A First or Second Class Degree in M.Sc., in</u></b>            Chemistry            OR            Chemical Technology              OR            Industrial Chemistry            OR            Associateship Diploma of the Institution of Chemist (India) obtained by Examination</p>	<p>Experience in research in Pure or Applied Chemistry or Analytical Chemistry for a period of not less than 2 years.</p>

**Note:-**

- The Qualification mentioned above should have been obtained in the order of studies viz. SSLC, HSC (or its equivalent), U.G.Degree and P.G. Degree.
- The qualification ordered to be equivalent to the prescribed qualification are indicated in Annexure -I to this Notification (Refer also to the Disclaimer annexed to the Notification)

**4. GENERAL INFORMATION:-**

- The rule of reservation of appointments applies to this post.
- In G.O.Ms.No.145, Personnel and Administrative Reforms (S) Department, dated 30.09.2010, the Government have ordered that "twenty percent of all vacancies in the appointment in the service under, the State which are to be filled by direct recruitment shall be set apart on preferential basis to persons studied in Tamil Medium and the said Tamil Medium reservation applies to this recruitment. In G.O. (Ms.) No.40, Personnel and Administrative Reforms (S) Department, dated 30.04.2014, Government have issued orders substituting the turns already earmarked to PSTM. However, turn earmarked for PSTM does not arise in this recruitment.

- C. The number of vacancies advertised is only approximate and is liable for modification including reduction with reference to the vacancy position at any time before finalisation of selection.
- D. If no qualified and suitable women candidates are available for selection against the vacancies reserved for them, those vacancies will be filled by male candidates belonging to the respective communal categories.

E. **CERTIFICATE OF PHYSICAL FITNESS:-**

Candidates selected for appointment to the post will be required to produce a certificate of physical fitness in the form prescribed below:

Form of Certificate of Physical Fitness	Standard of Vision Prescribed
Form prescribed for Executive Post	Standard-III or Better. Colour Blindness or Night Blindness to be a disqualification

Candidates with defective vision should produce eye fitness certificate from a qualified eye specialist.

- F. In G.O. (Ms.) No.25, Welfare of Differently Abled Persons (DAP 2.1) Department, dated 14.03.2013, executive orders were issued by Government approving a list of 170 posts identified under Group A & B categories as the suitable posts for the persons with disabilities and also directed that 3% of vacancies in direct recruitment for the identified post of A & B groups where the rule of reservation is applicable for the disabled persons. As far as the post of '**Chemist**' in Tamil Nadu Industries Subordinate Service is concerned, it is not been identified as suitable for Differently Abled person in the above said G.O. Hence reservation to differently abled person will not apply for this post. However, they can apply and should send the documents referred to in **para 14 (f)** of the Commission's 'Instructions to the candidates' when called for Reservation to "Destitute Widows" and "Ex-Service Men" will not apply to this post.
- G. Even after filling up of the posts reserved for SC Arunthathiyars on preferential basis, if more number of qualified Arunthathiyars are available, they shall be entitled to compete with the Scheduled Castes other than Arunthathiyars in the inter-se merit among them and if any posts reserved for Arunthathiyars remain unfilled for want of adequate number of qualified candidates, it shall be filled up by Scheduled Castes other than Arunthathiyars. However, no reserved turn to SC(A) candidates arises.

- H. Any claim relating to the selection (not related to candidature or / and claims made in the application) should be received on the date when called for original certificate verification prior to selection. Any claim received thereafter will receive no attention.
- I. Information regarding arrest, convictions/debarment/disqualification by any recruiting agency, criminal or any disciplinary proceedings initiated or finalized, participation in agitation or any Political Organization, candidature in election for Parliament/State Legislature/Local Bodies etc., if any, should also be furnished to the Commission at the time of application i.e. the details thereof, originals of the Judgement of Acquittals, order/or G.O. dropping further action in Departmental proceedings or any document that may prove the suitability of such candidates for a Government appointment must be produced at the stage/time of Certificate Verification.
- J. The selection for appointment to the above said post is purely provisional subject to final Orders on pending Writ Petitions, if any, filed in Madras High Court and Madurai Bench of Madras High Court.
- K. **Applications containing wrong claims relating to other basic qualifications / eligibility criteria / age / communal categories/ educational qualification will be liable for rejection.**

**5. SCHEME OF EXAMINATION (OBJECTIVE TYPE) AND ORAL TEST:-**

Subject	Duration	Maximum Marks	Minimum Qualifying Marks for selection	
			SCs, SC(A)s, STs, MBCs / DCs, BCs and BCMs	Others
<b><u>Computer Based Test</u></b>				
<b>I. Paper-I</b> (200 questions) Any one of the following subjects in <b><u>P.G. Degree Standard</u></b>	3 hours	300	171	228
<b>1. Chemical Technology</b> (Code No.026)				
<b>2. Chemistry</b> (Code No.027)				
<b>3. Industrial Chemistry</b> (Code No.067)	2 hours	200		
<b>II. Paper-II</b> (100 questions) <b>General Studies</b> <b>(Degree Standard)</b>				
<b>Interview and Records</b>		70		
<b>Total</b>		<b>570</b>		

**Note:-**

- (i) The existing syllabus under Paper I and Paper II for the subjects “Chemical Technology”/Chemistry/Industrial Chemistry (P.G. Degree Standard) shall be clubbed together and will constitute a single syllabus for each subject. Candidates should specify the subject in which they wish to be examined in their application. They should choose only the subject in which they have obtained the prescribed qualification.
- (ii) The question papers for the subject Chemistry will be set both **English and in Tamil**. The question papers in the subjects Chemical Technology and Industrial Chemistry will be set in **English only**.
- (iii) The syllabus for the subjects pertaining to Paper I is published in the TNPSC Bulletin No.11, dated 16.05.2001 and Paper II (General Studies) is published in the TNPSC Bulletin No.20, dated 16.09.2014.

Sl. No.	Subject and Code No.	Page No.
1.	Chemical Technology (Code No.026) (P.G. Degree Standard)	774-776
2.	Chemistry (Code No.027) (P.G. Degree Standard)	778
3.	Industrial Chemistry (Code No.067) (P.G. Degree Standard)	867
<b>Paper - II</b>		
4	General Studies (Paper II)	3185-3187

The syllabi for the subjects mentioned in paper I & II are also available in the Commission’s Website ‘[www.tnpsc.gov.in](http://www.tnpsc.gov.in)’ and also furnished at Annexure-II of this Notification.

**Computer Based Test (CBT):**

The candidate has to appear for the examination where he/she has been allotted to the examination. Change of centre or venue is not permitted. He has to carry the Hall Ticket (Admission Card) and same has to be produced at the examination venue. Each Candidate will be assigned a Computer to take up the examination. Candidates will be provided with a user name and password to login the system. Necessary instructions will be displayed on screen. Kindly read all the instructions carefully.

- Candidates are not permitted to carry any electronic and/or communication device into the examination hall. They are advised not to bring the electronic gadgets with them.
- Computer Based Test (CBT) is similar to paper pen shading test.
- In CBT, questions with four options each will be displayed in the computer screen.
- Candidate has to click the best answer to the question.
- Candidates can proceed to the next question by clicking next button. Or previous question by clicking previous button.
- Candidates can review any question and the answers, and the answers can be changed at any time before the closure of examination. They can skip the questions also, if they desire so.
- Candidate can use only the mouse to select the correct answers and proceed with answering the questions.
- The Question and optional answers will be shuffled randomly and displayed to the candidate.
- Candidate can submit their answers at any time during the examination.
- Once the answers are submitted, the candidates have no option to proceed further.
- If the candidate fails to submit their answers, the system will automatically submit the answers to the server, at the closure of the examination.
- No computer knowledge is required to take up the CBT. Knowledge in Mouse operation is sufficed to take up the CBT.
- The question and answers can be zoomed to the required level for the candidates with visual impairment.

Candidates will be admitted to the examination till 30 minutes from the commencement of the examination. Candidates have to sign the attendance sheet and affix thumb impression for verification of his identity. All the activities of the candidates with the mouse will be recorded in the server and a log file will be created for future reference. The Examination Hall will be under camera surveillance.

To acquaint with the operation of Mouse and the CBT, the candidates can take up the mock test available in the Commission's website ([www.tnpsc.gov.in](http://www.tnpsc.gov.in)) and they can practise the usage of mouse in the mock test. Mock test is similar to the CBT to be held on the day of examination. In the Mock test, all the steps are given similar to the CBT. Candidate can practise the mock test as many times as he/she likes.

**6. CENTRE FOR EXAMINATION:-**

Examination will be held at **Chennai Centre** (Code No.001) only.

**Note:-**

1. Candidates should appear for the examination at their own expense.
2. Request for change of venue will not be complied with.
3. The Commission reserves the right to increase or decrease the number of examination venues and to re - allot the candidates.

**7. PROCEDURE OF SELECTION:-**

Selection will be made in two successive stages i.e., (i) Written Examination and (ii) Oral Test. (For further details refer paragraph 21(b) of the 'Instructions to the candidates').

**8. EXAMINATION FEE:-**

- Examination fee Rs.150/- (Examination Fee Rs.100/- + Cost of Application Rs.50/-) (Rupees One Hundred and Fifty only)
- Candidates claiming exemption from examination fee should pay Rs.50/- towards Application Cost. (No exemption for cost of application)
- Candidates have also to pay the service charges applicable to the Bank or Post Office or Fee Processing Agency.
- Candidates can avail the facility of one time Registration on payment of Rs.50/- towards Registration fee. The registration shall be valid for a period of Five Years from the date of one time registration.
- Payment of fee other than online payment / offline payment viz., in the form of DD / Postal Order etc., will not be accepted and the fee will not ordinarily be refunded. The application forwarded with such modes of payment will be summarily rejected.
- Those who have registered in the one time registration system and paid the registration fee of Rs.50/- and received the registration ID need not pay the application fee i.e. Rs.50/- and it is enough to pay the examination fee alone.
- Candidates who have made One - Time Registration must apply for the notified posts. One - Time Registration is only to avail exemption for application fee for a period of 5 years from the date of Registration.

(For further details regarding the Examination fee concessions refer para 12 of the 'Instructions to the candidates').

## **9. NO OBJECTION CERTIFICATE AND INFORMATION TO THE EMPLOYER:-**

For details refer para 15 (g) of the Commission's 'Instructions to the candidates'. Any violation of the instructions will be liable for or end in rejection of his/her candidature.

## **10. CONCESSIONS:-**

Concessions in the matter of age and/or qualification and/or fees allowed to SCs, SC(A)s, STs, MBCs/DCs, BCs, BCMs, Destitute Widows, Ex-Servicemen, Differently Abled persons, other categories of persons etc., are given in para 12 to 14 of the Commission's 'Instructions to the candidates'.

## **11. HOW TO APPLY:-**

- Candidates should apply only through online in the Commission's Website [www.tnpsc.gov.in](http://www.tnpsc.gov.in) or in [www.tnpscexams.net](http://www.tnpscexams.net)
- Before applying, the candidates should have scanned image of their photograph and signature in CD/DVD/Pen drive as per their convenience.
- A valid e-mail ID or Mobile Number is mandatory for registration and e-mail ID should be kept active till the declaration of results. Candidates are cautioned to keep your e-mail ID and password confidentially.
- All the particulars mentioned in the online application including Name of the Candidate, Post Applied, Communal Category, Educational qualification, Date of birth, Address, e-mail ID, Centre of Examination etc. will be considered as final and **no modifications will be allowed after the last date specified for applying online**. Since certain fields are firm and fixed and cannot be edited, candidates are requested to fill in the online application form with the utmost care and caution as no correspondence regarding change of details will be entertained.
- The candidates who wish to receive SMS should register their mobile number in the application.

### **11(A) Applying Online:-**

- 1) Candidates are first required to log on to the TNPSC's website [www.tnpsc.gov.in](http://www.tnpsc.gov.in) or [www.tnpscexams.net](http://www.tnpscexams.net).
- 2) Click "Apply Online" to open up the On-Line Application Form.
- 3) Select the name of the post or service for which you wish to apply.
- 4) If you already have Unique ID, enter the Unique ID and password to view the already available information and update them, if necessary.
- 5) If you do not have valid ID, enter all the required particulars without skipping any field.

- 6) Candidates are required to upload their latest photograph and signature as per the specifications given in the Guidelines for Scanning and Upload of Photograph and Signature. An online application uploaded without the photograph and signature will be rejected.

Note : Candidate who have One Time Registration ID (Unique ID) and password, have to apply separately for all notifications. One Time Registration will not be considered as an application for any post.

**11(B) Mode of Fee Payment:-**

Select the mode of payment (Online Payment/Offline Payment).

**11(C) Online Payment (Net Banking, Credit card/Debit card) :-**

- 1) In case candidates who wish to pay fees through the online payment gateway, i.e. Net Banking, Credit Card and Debit card Payment, **an additional page of the application form will be displayed** wherein candidates may follow the instructions and fill in the requisite details to make payment.
- 2) After submitting your payment information in the online application form, wait for the intimation from the server, **DO NOT press Back or Refresh button in order to avoid double charge.**
- 3) If the online transaction has been successfully completed a Registration Number and Password will be generated. Candidates should note their Application Number and Password for future reference in respect of the post applied for.

**11(D) Offline Payment (Post Office or Indian Bank) :-**

- 1) For offline mode of payment candidates have to select either Post Office or Indian Bank Branch.
- 2) Click "SUBMIT" to submit the Application form.
- 3) Candidates will be provided with Application Number and password. Please note down the Application Number and password.
- 4) On Submission, system will generate the payment challan which the candidate need to take print out and go to the nearest branch of Indian bank or the Designated Post Offices as the case may be, to make the payment.
- 5) Collect the candidate's copy of the fee payment Challan from the Branch. Check that the Challan is properly signed and the details of Transaction Number, Branch Name and DP Code Number, Deposit Date have been noted in the Challan by the Branch authorities.

- 6) Online Application Registration will be taken as successful one, only if the payment is made either in the post office or in the Indian Bank **within two working days from the date of registration/submission of application.**

**11(E) Print Option:-**

- 1) After submitting the application, candidates can print /save their application in PDF format.
- 2) On entering Application Number and password, Candidates can download their application and print, if required.
- 3) Candidates need not send the printout of the online application or any other supporting documents to the Commission. The certificates will be verified only when the candidates come up for next stage of selection.

**Note:**

- i. Candidates are advised in their own interest to apply on-line much before the closing date and not to wait till the last date for depositing the fee/ intimation charges to avoid the possibility of disconnection/inability/failure to log on the TNPSC's website on account of heavy load on internet/website jam.
- ii. TNPSC does not assume any responsibility for the candidates not being able to submit their applications within the last date on account of the aforesaid reasons or for any other reason beyond the control of the TNPSC.
- iii. Under no circumstances, a candidate should share/mention e-mail ID or Mobile Number to any other person. In case a candidate does not have a valid personal e-mail ID, they should create a new e-mail ID before applying on-line and must maintain that email account.
- iv. There is a provision to modify the submitted Online Application. Candidates are requested to make use of this facility to correct their details in the Online Application if any. This modification facility will be available up to the last date for applying online for the particular post. After this date, no modification will be permitted. Candidates should take utmost care and caution while filling in the Online Application. Please note that no modification in fee payment details will be permitted for candidates who pay fees/ intimation charges through the online mode. Since certain fields are firm, fixed and cannot be edited, candidates are requested to fill in the online application form with the utmost care and caution as no correspondence regarding change of details will be entertained.
- v. Candidates should carefully fill in the details in the On-Line Application at the appropriate places and click on the "SUBMIT" button at the end of the On-Line Application format. Before pressing the "SUBMIT" button, candidates are advised to verify each and every

particular column filled in the application. The name of the candidate or his /her father/spouse etc. should be spelt correctly in the application as it appears in the certificates/mark sheets. Any change/alteration found may disqualify the candidature.

- vi. Request for change/correction in any particulars in the Application Form shall not be entertained under any circumstances AFTER THE LAST DATE FOR Editing/ Updating application details specified. TNPSC will not be responsible for any consequences arising out of furnishing of incorrect and incomplete details in the application or omission to provide the required details in the application form.
- vii. Commission is not responsible for the online payment failure.
- viii. Any clarification may be obtained from the Help Desk (No. 1800 425 1002)

## **12. OTHER IMPORTANT INSTRUCTIONS:-**

- a. **Candidates should ensure their eligibility for examination:** The candidates applying for the examination should ensure that they fulfil all eligibility conditions for admission to examination. **Their admission to all stages of the examination will be purely provisional subject to satisfying of the eligibility conditions.** Mere issue of memo of admission for Examination to the candidate will not imply that his/her candidature has been fully cleared by the Commission.
- b. **How to apply:** Candidates are required to apply Online by using the website [www.tnpsc.gov.in](http://www.tnpsc.gov.in) or [www.tnpscexams.net](http://www.tnpscexams.net) Detailed instructions for filling up online application are given in Para 11 of this Notification.
- c. The Hall Tickets for eligible candidates will be made available in the Commission's Website [www.tnpsc.gov.in](http://www.tnpsc.gov.in) or [www.tnpscexams.net](http://www.tnpscexams.net) for downloading by candidates. No Hall Tickets will be sent by post. So, the candidates / applicants should watch TNPSC website since ahead / before the scheduled date of Examinations.
- d. **Grievance Redressal Cell for guidance of candidates:** In case of any guidance/information/clarification of their applications, candidature, etc. candidates can contact Tamil Nadu Public Service Commission's Office in person or over Telephone No. 044 - 25300300 or Toll-Free No. 1800 425 1002 on all working days between 10.00 a.m. and 05.45 p.m.
- e. **Mobile Phones and other Articles Banned:-**
  - (i) Candidates are not allowed to bring Pager, Cellular Phone, Calculator, Memory Notes and books etc. or any other Electronic device or Recording Device either as separate piece or part of something used by the candidate such as Watch or Ring.
  - (ii) If they are found to be in possession of any such thing or instrument they will not be allowed to write the examination further, besides invalidation of answer paper and / or debarment. If it is considered necessary they will be subjected for a physical search including frisking on the spot.
  - (iii) Do not bring into the Examination Hall any article such as books, notes, loose sheets mathematical and drawing instruments, Log Tables, stencils of maps,

slide rules, Text Books, rough sheets etc. except the permitted writing material i.e. pen. No colour pen or pencil must be used.

- (iv) Candidates are advised in their own interest not to bring any of the banned items including Mobile Phones / Pagers to the venue of the examination, as arrangements for safekeeping cannot be assured.
- f. Candidates are not required to submit along with their application any certificates in support of their claims regarding Age, Educational Qualifications, Community Certificates and certificates regarding their Physical Disability, etc. They should be submitted when called for by the Tamil Nadu Public Service Commission. The candidates applying for the examination should ensure that they fulfil all the eligibility conditions for admission to the Examination. Their admission at all the stages of examination for which they are admitted by the Commission viz. Written Examination in Computer Based Test Format and Oral Test will be purely provisional, subject to their satisfying the prescribed eligibility conditions. If on verification at any time before or after the Written Examination in Computer Based Test Format and Oral Test, it is found that they do not fulfil any of the eligibility conditions; their candidature for the examination will be cancelled by the Commission.
- g. If any of their claims is found to be incorrect, they may render themselves liable to disciplinary action by the Commission.
- h. **Unfair means strictly prohibited:** No candidate shall copy from the papers of any other candidate nor permit his papers to be copied nor give nor attempt to give nor obtain nor attempt to obtain irregular assistance of any description.
- i. **Conduct in Examination Hall:** No candidate should misbehave in any manner or create a disorderly scene in the Examination Hall or harass the staff employed by the Commission for the conduct of the examination. Any such misconduct will be severely viewed & penalised.

**The Online Application can be filled upto 04.03.2015 till 11.59 p.m., after which the link will be disabled**

*(For any additional information the candidates may refer Commission's 'Instructions to the candidates' at the Commission's website [www.tnpsc.gov.in](http://www.tnpsc.gov.in) )*

**Secretary**

**ANNEXURE-I****G.Os relating to equivalence of qualification for the post of 'Chemist'  
in Tamil Nadu Industries Subordinate Service**

<b>Sl. No.</b>	<b>Degree</b>	<b>Equivalence Degree</b>	<b>G.O.</b>
1.	M.Sc., (Chemistry)	M.Sc., Applied Chemistry (Anna University) as equivalent to M.Sc., Chemistry	G.O.Ms.No.164, Personnel and Administrative Reforms (R) Department, dated 21.08.2000
		M.Sc., Applied Chemistry (Gandhigram Rural Institute Deemed University) as equivalent to M.Sc., Chemistry	G.O.Ms.No.133, Personnel and Administrative Reforms (R) Department, dated 28.07.1999.
		M.Sc., Organic Chemistry, Analytical Chemistry, Polymer Chemistry, Inorganic Chemistry, Physical Chemistry, Industrial Chemistry and 5 year integrated Chemistry are equivalent to M.Sc., Chemistry	G.O. (Ms.) No.72, Higher Education (K2) Department, dated 30.04.2013

**DISCLAIMER**

“ The Government orders relating to Equivalence of qualification have been hosted in the Tamil Nadu Public Service Commission website. However, the candidates while applying for the examination should upload the equivalence of qualification in the form of Government order, if any, which are not mentioned in the Annexure-I to the Notification and produce the same when called for by Tamil Nadu Public Service Commission”.

Secretary

## ANNEXURE - II

Chemistry

### POST GRADUATE DEGREE STANDARD

#### 1.1 Reaction Kinetics:-

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

#### 1.2 Chemical Equilibrium:-

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

#### 1.3 Solid State:-

Crystal systems - designation of crystal faces, lattice structure and unit cell - law of rational indices - Bragg's law and x rays diffraction by crystals - Schottky and Frenkel defects - Electrical properties - Insulators and semiconductors - band theory of solids.

#### 1.4 Electrochemistry:-

Types of Reversible electrodes - Nernst equation - calculation of thermo dynamic quantities of cell reactions - overpotential and hydrogen over voltage - Determination of pKa of acids by potentiometric methods - Kohlrausch's law - Ostwald's dilution law - Debye - Huckel limiting law equation for strong electrolytes - (no derivation required) - Primary and Secondary fuel cells - corrosion and prevention.

#### 1.5 Structure and Bonding:-

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

#### 1.6 Acids and Bases:-

Bronsted and Lewis acids and bases - pH and pKa acid - base concept in non - aqueous media - HSAB concept - Buffer Solutions.

Redox Reactions:- Oxidation numbers, Redox potential, Electro chemical series - Redox indicators.

#### 1.7 Chemistry of Non - transition elements:-

General characteristics, structure and reaction of simple compounds - boranes - silicates Oxoacids of N,P,S and halogens - xenon compounds - inter halogens, Pseudo halides and noble gas compounds.

#### 1.8 IUPAC Nomenclature of simple organic and Inorganic compounds.

#### 1.9 Organic reaction mechanism:-

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

#### 1.10 Chemistry of important organic reaction:-

Aldol condensation - Claisen condensation - perkin reaction - Cannizzaro reaction - Friedel craft reaction -

Favorski reaction - Stork enamine reaction - Michael addition - Baeyer - Villiger reaction - Chichibabin reaction pericyclic reactions - classification and examples  
Woodward and Hoffmann rules - use of OsO<sub>4</sub>, NBS, diborane, NaBH<sub>4</sub>, LiAlH<sub>4</sub> in organic synthesis.

## PAPER - II

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

2.2 Classical thermodynamics and elements of statistical thermodynamics:- First law of thermodynamics:- heat capacity - isothermal adiabatic processes - Thermochemical laws - Kirchoff's equation second law of thermodynamics, entropy, in reversible and irreversible processes - Gibbs free energy and Helmholtz free energy - Third law of thermodynamics, calculation of entropy, exception to third law - Mathematical and thermodynamic Probability - Thermodynamic variables in terms of partition functions, various types of partition functions, vibrational and electronic partition functions for atomic and molecular gases - Sackur - Tetrode equation - free energy and enthalpy function.

2.3 Spectroscopy:- Rotational spectra of diatomic molecules - Isotopic substitution and rotational constants - vibrational spectra of linear symmetric, linear asymmetric and bent triatomic molecules - electronic spectra - selection rules - nuclear magnetic resonance - chemical shifts - spin - spin coupling - electron spin resonance and hyperfine splitting theoretical principles of mass spectroscopy.

2.4 Applications of UV, IR, NMR, ESR and mass spectroscopy for structural elucidation of organic compounds, inorganic complexes and free radicals.

2.5 Chemistry of Coordination Compounds:- structural aspects, isomerism - octahedral and tetrahedral, crystal - splitting of d orbitals - CFSE - magnetism and colour of transition metal ions - charge transfer spectra - crystal field theory and ligand field theory - complexes of  $\pi$  acceptor ligands - stereochemistry of inorganic coordination compounds.

2.6 Chemistry of lanthanides and actinides:- Electronic configuration - Separation techniques - oxidation states magnetic and spectroscopic properties - use of lanthanide compounds as shift reagents.

2.7 Organometallic compounds and bio inorganic chemistry:- Metal carbonyls, Metal nitrosyls, metal alkyl, alkenes and arene compounds - organometallic compounds in catalysis - Chemistry of porphyrins - chlorophyll hemoglobin, myoglobin, ferredoxin, rubredoxin, and cytochromes.

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

2.9 Carbohydrates:- Classification - configuration and general reactions of monosaccharides - Chemistry of glucose, fructose, sucrose and maltose, important compounds in chemistry - Dyes - azo, triphenylmethane, and phthalic groups - indigo - alizarin vitamins, hormones - antibiotics - proteins.  
Polymers: Preparation and uses of polyethylene, polybutylene PVC, Nylon - Ziegler - Natta catalysts - Inorganic polymers such as silicones, borazines and phosphonitrilic compounds

2.10 Instrumental methods of analysis:- Absorption, partition chromatography - Gas chromatography - HPLC - Solvent extraction and ion exchange methods - atomic absorption spectroscopy - Electroanalytical techniques voltammetry, cyclic voltammetry, polarography, amperometry, coulometry and conductometry, ion - selective electrodes - TGA, DTA and DSC.

## Industrial Chemistry

### POST GRADUATE DEGREE STANDARD

#### UNIT 1.1

Industrial Chemical Process :

Criteria for Process selection - techniques and reagents - consideration of yield, raw materials, processes, by-products - waste disposal and environmental impacts - products competition.

#### UNIT 1.2

Unit Operations:

Equipment and appliances used in major chemical Industries - size reduction ,filtration, centrifugation, membrane separation - settling, flotation, drying and crystallization, distillation, adsorption and extraction.

#### UNIT 1.3

Unit Processes:

Stoichiometric Principles, materials and energy balances, nitration, sulphonation, halogenation, esterification, saponification, animation and hydrogenation

#### UNIT 1.4

Water quality requirements for industries:

Sources, quality parameters - pH, acidity, alkalinity, total dissolved solids, hardness, chloride, sulphate, iron, manganese and silica - permissible limits for various industries, water treatment - lime - soda, zeolite, ion exchange and reverse osmosis methods.

#### UNIT 1.5

Industrial pollution and abatement:

Environmental pollution - causes and types, water pollution - measurement of turbidity, colour, DO,BOD and COD, discharge standards, waste water treatment - primary and secondary treatments, advanced oxidation technologies - ozonation and photodegradation, air pollution - sources and causes, monitoring and control devices, solid waste management, disposal of hazardous wastes.

#### UNIT 1.6

Inorganic heavy chemicals:

Chloralkali industry - membrane cell technology, sulphuric acid - contact process, ammonia - Haber process, sodium carbonate - Solvay process.

#### UNIT 1.7

Silicate Industries:

Refractories - properties and requirements, classification, manufacture of silica, magnestic and carborandum, abrasives - natural and synthetic abrasives - corundum, diamond, boron carbide, Portland cement - raw materials, manufacture, analysis of cement, lime and gypsum, ceramics - raw materials, manufacture by dry and wet processes, cements, manufacture of glass.

#### UNIT 1.8

Fertilizers and agrochemicals:

Manufacture of nitrogenous, phosphorous and potassic fertilizers, mixed fertilizers, insecticides, pesticides and fungicides.

#### UNIT 1.9

Metallurgical Processes:

Methods of ore beneficiation, extraction of titanium, vanadium, thorium, tungsten, powder metallurgy, speciality alloys - tool alloys , fuse alloys and bearing alloys

## UNIT 1.10

### Industrial gases:

Production and uses of hydrogen, oxygen, nitrogen, argon, LPG, acetylene, carbon dioxide, water gas and producer gas.

## PAPER -II

### UNIT 2.1

#### Petrochemicals:

Petroleum refining - process outline, fuels from petroleum - cracking, alkylation, isomerisation, lubricants, petrochemical raw materials.

### UNIT 2.2

#### Coal Chemicals:

Coal varieties, analysis of coal - proximate and ultimate analysis, calorific value, combustion calculations, distillation of coal, coking methods, metallurgical coke, liquid fuels from coal - hydrogenation methods.

### UNIT 2.3

#### Oils, Soaps and detergents:

Fats and Oils - analysis and composition, extraction of oils - pressing, rendering and solvent extraction, bleaching and refining. Soaps - raw materials and manufacture. Detergents - Classification and application, raw materials and manufacture, enzyme and zeolite based detergents, biodegradable detergents.

### UNIT 2.4

#### Paper and pulp industries:

Manufacturing of pulp and paper - raw materials, mechanical and chemical pulping methods, bleaching, fillers and sizing agents, colouring, paper boards and laminates.

### UNIT 2.5

#### Fermentation industries:

Anaerobic fermentations - alcohol fermentation, aerobic fermentation - factors influencing yield, production of penicillin, tetracycline, lysine, glutamic acid, lactic acid, citric acid and enzymes, brewing industry.

### UNIT 2.6

#### Explosive and Propellants:

Chemical explosive - preparation of dynamite, TNB, PETN, Cyclonite, plastic explosives, gelatin, cordite and seismic explosives, propellants - manufacture of liquid and solid propellants - hydrazine, incendiaries and smoke screens.

### UNIT 2.7

#### Plastics:

Classification, Manufacture and application of LDPE, LLDPE, HDPE, PVC, PS, PMMA, ABS, teflon and bakelite, compounding of plastic, moulding techniques - compression, injection, transfer, extrusion and blow moulding, thermoforming.

### UNIT 2.8

#### Fibres and elastomers:

Manufacture of nylons, polyesters and polycarbonates, elastomers - natural rubber - compounding and vulcanisation, synthetic rubber - neoprene, butyl, nitrile, SBR and silicone rubber.

### UNIT 2.9

#### Adhesives, resins and dyes:

Natural and synthetic adhesives - general constituents, types - thermoplastic, thermosetting and protein based adhesives, synthetic resins - epoxy, polyurethane and silicone resins, dyes - colour and constitution, azo dyes and vat dyes.

#### UNIT 2.10

Industrial paints, varnishes and lacquers:

Oil paints - Constituents, emulsions paints acrylic and vinyl paints, speciality paints - heat resistant, fire retardant, temperature indicating and luminous paints, varnishes - types, insulating varnishes, lacquers.

## POST GRADUATE DEGREE STANDARD

### PAPER -I

#### UNIT 1.1

##### PROCESS CALCULATION AND THERMODYNAMICS

Properties of gases, liquid, and gases, Ideal and real gas, Properties and mixture and solutions, Laws of conservation and mass and energy; use of tie components; recycle, bypass and purge calculations; Thermochemistry. First and second law of thermodynamics and their applications; equation of state and thermodynamic properties of real system; phase equilibria; fugacity; excess properties and correlations of activity coefficients; chemical reaction equilibria.

#### UNIT 1.2

##### FLUID MECHANICS AND MECHANICAL OPERATIONS

Fluid statics, Newtonian and non-newtonian fluids, Macroscopic energy balance, Bernouli equation and its applications, Dimensional analysis, continuity equation, flow through pipeline systems, flow meters, pumps and compressors, packed and fluidized beds, elementary boundary layer theory (laminar and turbulent flow) Thickness of boundary layer (definition and formulae). Size reduction and size separation; free and hindered settling; centrifuges and cyclones; thickening and classification, filtration; mixing and agitation; conveying of solids.

#### UNIT 1.3

##### MASS TRANSFER AND HEAT TRANSFER

Fick's law, mass transfer coefficients, film, penetration and surface renewal theories, momentum, heat and mass transfer, stagewise and continuous contacting and stage efficiencies; design and operation of equipment for distillation, absorption, leaching, liquid-liquid extraction, crystallization, drying, humidification, dehumidification and adsorption. Conduction, convection, and radiation, heat transfer coefficients, steady and unsteady hear conduction, boiling, condensation and evaporation; type of heat exchangers and evapators and their design.

#### UNIT 1.4

##### CHEMICAL REACTION ENGINEERING

Theories of reaction rates; kinetics of homogenous reactions, interpretation of kinetic data, single and multiple reaction in ideal reactors, non-ideal reactors; non-isothermal reactors, kinetics of heterogenous catalytic reactions; diffusional effects in catalysis.

#### UNIT 1.5

##### PROCESS CONTROL AND INSTRUMENTAL METHODS OF ANALYSIS

Measurement of process variables; dynamics of simple systems such as CSTR's, heat exchanges etc; transfer functions and response of simple systems, process reaction curve, controller modes (P,PI and PID); control valves; analysis of closed loop systems including stability, frequency response (including Bode Plots) and controller tuning Spectroscopic analysis; Absorption spectroscopy, emission spectroscopy, mass spectroscopy, x-ray diffraction, colour measurement by spectrometers, details of NMR. Gas analysis by thermal conductivity Moisture (humidity analysis) pH measurements, Chromatography - G.L.C; H.P.L.C.

#### UNIT 1.6

##### CHEMICAL PROCESSES

Study of the following processes:-

1 Nitration:- Nitration agents, kinetics and mechanism of aromatic nitration. Thermodynamics of nitration, Equipments for nitration, mixed acids for nitration and typical industrial nitration process e.g. preparation of nitrobenzene, nitronaphthalene, Chloronitronaphthalene and nitro acetanilide.

2 Sulphonation and Sulfation:- Sulphonation and sulfating agents: Kinetics, mechanism and thermodynamics, Industrial equipment and techniques, Technical preparation of sulphonates and sulphate, such as aliphatic sulphonates, sulphonation of laury alcohol, dimethyl ether, etc.

3 Hydrogenation:- Catalytic Hydrogenation, Kinetics and thermodynamics of hydrogenation reaction. Apparatus and material of construction, hydrogenation of fatty oils, synthesis of methanol, Hydroforming of naphtha, Hydrogenation of heavy oils.

4 Halogenation:- Thermodynamics and kinetics of halogenation, Photohalogenation, Equipment and design for halogenation Technical preparation of halogen compounds e.g. allyl chloride, DDT; BHC; Chlorobenzene, dichlorodifluoromethane, vinyl chloride etc.

5 Oxidation: Liquid and vapour phase oxidation, Kinetics and thermodynamics, apparatus for oxidation, Technical oxidation of isoeugenol acetaldehyde, chloroethane, isopropyl benzene, naphthalene, benzene, ethyl benzene and naphthalene sulfonic acid.

#### UNIT 1.7 FERMENTATION

Industrial alcohols, raw materials, making of industrial alcohols, Absolute alcohol. Beer: Raw material; manufacture of beer. Wine, Butyl alcohol.

#### UNIT 1.8 WATER AND WASTE WATER TREATMENT

Source of water, Impurities in water, Requirement of water by different industries, treatment of water for industrial and domestic purpose, boiler feed water treatment, reuse of water, water conservation. Classification of waste waters, Methods of treatment, Sludge treatment and disposal, treatment of effluent water from textiles, rayon, pulp, dairy, distillery. Petroleum refinery, electro-plating tanning, coal mining and radioactive waste.

#### UNIT 1.9 INDUSTRIAL AND FUEL GASES

Manufacture, alternative, method of manufacture and application of Carbon dioxide, Hydrogen, Oxygen and Nitrogen; Rare gases of the atmosphere; Helium; Acetylene; sulfur dioxide; Carbon monoxide; and Nitrous oxides. Occurrences, composition and uses of Natural gas Purification of Natural gas; Coke-oven gas; Producer gas; Water gas; Synthesis gas; Substitute Natural gas; and Liquefied petroleum gases.

#### UNIT 1.10 ACIDS, ALKALIS AND SALTS

A Raw Materials for phosphoric acid and their occurrence; Manufacture of phosphoric acids and their applications.

B Raw material for nitric acids and their occurrence; Manufacture of Nitric acid.

C Mining, manufacture and applications of sulfur; Sulfuric acid. Purification and recovery of used sulfuric acid. Concentration of sulfuric acid.

D Hydrochloric acid. Raw material and manufacture of Soda ash, Sodium bicarbonate, Chlorine and Caustic soda, Bleaching powder, Calcium Hypochlorite; Sodium Hypochlorite; Unit operations and chemical conversions involved therein. Sodium chloride or common salt, sodium sulfate, sodium bisulfate, or Niter cake, Sodium Bisulfite ; Sodium Sulfite, Sodium Hydrosulfite; Sodium sulfide, Sodium Hydro

Sulfide, Sodium Thiosulfate; Sodium Nitrite; Sodium Silicates; Sodium peroxide, Sodium perborate; Sodium amide; Sodium cyanide and Ferricyanide.

## PAPER -II

### UNIT 2.1

#### SURFACE COATINGS

Convertible and non-convertible coatings; Chemical nature of coatings and their properties; Raw materials for surface coatings; Constituents of paints; Varnishes; Lacquers and printing inks. Inorganic and Organic pigments and their specific purposes, Printing Inks.

### UNIT 2.2

#### OILS, FATS, WAXES, SOAPS AND DETERGENTS

Occurrences of oils, fats and waxes. Their classification, chemical composition, Extraction and refining oils and fats. Manufacture of edible oil and fat products like: vanaspati, margarine, shortening etc. Technology of fat splitting.

Surfactant: Concept of surface activity, structure of surfactant molecule; Hydrophilic-lipophilic balance; Mechanism of detergency. Classification of surfactants; Biodegradation of surfactant; application of surfactants.

Soap: Raw material for soap; classification and selection of raw materials; Manufacture of soap.

Detergents: Classification of raw materials, plant and process employed in manufacture of detergents; Applications.

Glycerine: Manufacture of glycerine from natural sources, sweet waters, spent lye, synthetic glycerine; Properties, analysis and utilization of glycerine.

### UNIT 2.3

#### COSMETICS, ESSENTIAL OILS, FRAGRANCES AND FLAVOURS

Cosmetics: Classification and manufacture of cosmetic preparations such as Shampoo, shaving creams, hair conditioners, cold cream, vanishing cream, nail polishes, lipsticks, face powders, and toothpastes.

Essential oils: Classification and chemical constituents of essential oils, methods of extraction of essential oils; Natural and synthetic perfumery materials for industrial uses; Composition of perfumes, Natural fruit concentrates.

Flavor-Essence Formulations.

### UNIT 2.4

#### AGROCHEMICALS AND FERTILIZERS

Classification and manufacture of Insecticides and pesticides, Sulfur and sulfur compounds, Plant derivatives, Pyrethrins, Nicotine, Rotenone, Attractants and repellents, Fumigants, Nematicides, Acaricides, Rodenticides, Fungicides, Industrial Biocides, Plant growth regulators, Herbicides. Raw material for fertilizers; Synthesis of ammonia, Ammonium nitrate, ammonium sulfate, Ammonium Phosphates; Urea, Superphosphates, Mixed fertilizers.

### UNIT 2.5

#### PULP AND PAPER

Raw material for pulp, manufacture of pulp and paper. Hydrolysis of wood, Wood extractives and conversion products. Occurrences, distribution and morphology of Cellulose; Hemicellulose, lignin and associated materials in plant. composition of cell walls. Physical and Chemical properties of cellulose; Chain structure of cellulose; reaction of cellulose with water, aqueous alkali, organic bases, ammonia and salt solutions, etc. Oxidation of cellulose, chemical, thermal and biological cellulose. Derivatives of cellulose; Technology of Cellulose esters and others and their application.

#### UNIT 2.6

##### PHARMACEUTICALS Classification:

Alkylations, Carboxylation and Acetylation; Condensation and Cyclization; Dehydration; Halogenation; Oxidation; Sulfonation; Amination; Complex Chemical Conversions; Radioisotopes in Medicine; Fermentation and Life processing for antibiotics, Biologicals, Hormones and Vitamins, Biologicals, Steroids Hormones; Vitamins; Isolates from Plants and Animals.

#### UNIT 2.7

##### PETROLEUM PROCESSING

Origin, Occurrence, exploration of crude petroleum; Classification of crude oils, Hydrocarbon composition of petroleum and petroleum products (liquid and gas); Refining of crude oil, Products of refining. Catalytic cracking, thermal cracking; reforming/ platforming. Chemical conversions, Manufacture of various organic chemicals.

#### UNIT 2.8

##### POLYMERS, PLASTICS AND RUBBERS:

Types of polymers, Thermoplastics and thermosettings, Linear, branched, cross linked polymers and copolymers. Polymerisation Types and Methods; Distinctive features of addition and condensation polymerisation. Degradation of polymers through thermal, mechanical, chemical and other agencies. Raw materials for polymers and resins. Chemistry of Natural resins and polymers such as lac, rosin, cellulose, rubber, proteins, fossil resins, etc. Preparation and applications of phenolics, amino resins, polyesters, polyamides, epoxides, polyureathanes, vinyls and others. Raw materials, manufacturing processes and applications of plastics. Composites: Raw materials, Comparison of different materials with composite; advantages and disadvantages Natural rubber, synthetic rubber, rubber compounding, rubber fabrication; latex compound, rubber derivatives.

#### UNIT 2.9

##### NUCLEAR INDUSTRIES, EXPLOSIVES, PROPELLENT

Nuclear reactions: uranium and Thorium fission; Uranium as an energy source; Nuclear fuels, Processing of nuclear materials. Types of explosive, Explosive characteristics; Industrial Explosives; Miscellaneous Industrial Explosive; Uses.

#### UNIT 2.10

##### COAL CHEMICALS AND INDUSTRIAL CARBON

The destructive distillation of coal; Coking of coal; Distillation of coal tar; methods of distillation; coal to Chemicals.

Methods of manufacture and applications of : Lampblack; carbon black; activated carbon; Natural graphite; Manufactured graphite and carbon; Industrial diamonds.

#### UNIT 2.11

##### CERAMIC AND GLASS

Basic Raw Materials; Chemical conversions, Including, Including Basic Ceramic Chemistry; Whitewares: Structural Clay products; Refractories; Specialized Ceramic products: Vitreous Enamel; Kiln, Composition of glass, raw materials for glass, method of manufacture and speciality glasses.

#### UNIT 2.12

##### CEMENT AND LIME

Portland Cement: Types of Portland cements; Raw materials for cements; Setting and Hardening of cement; Manufacturing processes of Portland cements; Occurences, Manufacture and use of Lime and Gypsum.

#### UNIT 2.13

##### FOOD AND FOOD BY-PRODUCTS:

Food Chemistry, Nature and origin of life, Basic additives of animals and plants and their relations. Water

and Ice: Importance of water in food, Structure of water and ice, Concept of bound and free water and their implications. Nomenclature, Classification and structure of carbohydrates, Physical and chemical properties of sugars, starch, pectic substances, gum and other polysaccharide, Functional properties of carbohydrates in foods. Definition and classification of lipids, chemistry of fatty acids and glycerides. Functional properties of lipids in foods. Importance of Proteins, Nomenclature, classification, structure and chemistry of amino acids, peptides and proteins, Source and distribution of proteins, Isolation, identification and purity of proteins. Denaturation, functional properties of proteins in foods. Plant cells and tissues, their structure, functions and physiology, chemical composition of edible plant tissues, Texture of fruits and vegetables, Plant pigments, Effects of cooking on texture and composition of fruits and vegetables Animal proteins, Structure and chemical composition of muscles. Composition of milk, Physical and chemical properties of milk proteins and effects of processing on these, chemistry of milk products like cheese, cream, butter, ghee, etc. Sensory perception of tests and flavours. Browning reactions, Nutritive and non-nutritive sweeteners, Food dispersions and their implications of foods.

## ALL TECHNICAL POST MAIN EXAMINATION

### General Studies

### Degree / P.G Degree Standard

### Topics for Objective Type

#### **Unit-I General science :**

**Physics** Universe-General Scientific laws-Scientific instruments-Inventions and discoveries-National scientific laboratories-Science glossary-Mechanics and properties of matter-Physical quantities, standards and units-Force, motion and energy-Electricity and Magnetism, Electronics and Communication -Heat, light and sound-Atomic and nuclear physics-Solid State Physics – Spectroscopy- Geophysics - Astronomy and space science

**Chemistry** Elements and Compounds-Acids, bases and salts-Oxidation and reduction-Chemistry of ores and metals-Carbon, nitrogen and their compounds-Fertilizers, pesticides, insecticides-Biochemistry and biotechnology-Electrochemistry-Polymers and plastics

**Botany**-Main Concepts of life science-The cell-basic unit of life-Classification of living organism-Nutrition and dietetics-Respiration-Excretion of metabolic waste-Bio-communication

**Zoology**-Blood and blood circulation-Endocrine system-Reproductive system-Genetics the science of heredity-Environment, ecology, health and hygiene, Bio- diversity and its conservation-Human diseases-Communicable diseases and non- communicable diseases- prevention and remedies- Alcoholism and drug abuse-Animals, plants and human life

#### **Unit- II. Current Events**

**History**--Latest diary of events – National--National symbols-Profile of States-Defence, national security and terrorism-World organizations-pacts and summits-Eminent persons & places in news-Sports & games-Books & authors -Awards & honours-Cultural panorama-Latest historical events-- India and its neighbours-- Latest terminology-Appointments-who is who?

**Political Science**-1. India's foreign policy-2. Latest court verdicts – public opinion-3. Problems in conduct of public elections-4. Political parties and political system in India-5. Public awareness & General administration-6. Role of Voluntary organizations & Govt.,-7. Welfare oriented govt. schemes, their utility

**Geography** Geographical landmarks-Policy on environment and ecology—

**Economics**--Current socio-economic problems-New economic policy & govt. sector

**Science**-Latest inventions on science & technology-Latest discoveries in Health Science-Mass media & communication

#### **Unit-III. 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-Climate change - impact and consequences - mitigation measures-Pollution Control

#### **Unit-IV. History and culture of India**

Pre-historic events--Indus valley civilization-Vedic, Aryan and Sangam age-Maurya dynasty-Buddhism and Jainism-Guptas, Delhi Sultans, Mughals and Marathas-Age of Vijayanagaram and the bahmanis-South Indian history-Culture and Heritage of Tamil people-Advent of European invasion-Expansion and consolidation of British rule-Effect of British rule on socio-economic factors-Social reforms and religious movements-India since independence-Characteristics of Indian culture-Unity in diversity –race, colour, language, custom-India-as secular state-Organizations for fine arts, dance, drama, music-Growth of rationalist, Dravidian movement in TN-Political parties and populist schemes-Prominent personalities in the various spheres – Arts, Science, literature and Philosophy – Mother Teresa, Swami Vivekananda, Pandit Ravishankar , M.S.Subbulakshmi, Rukmani Arundel and J.Krishnamoorthy etc.

#### **Unit-V INDIAN POLITY**

Constitution of India-. Preamble to the constitution- Salient features of constitution- Union, State and territory- Citizenship-rights amend duties- Fundamental rights-Fundamental duties- Human rights charter- Union legislature – Parliament- State executive- State Legislature – assembly- Status of Jammu & Kashmir- Local government – panchayat raj – Tamil Nadu- Judiciary in India – Rule of law/Due process of law-Indian federalism – center – state relations-. 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-. Administrative reforms & tribunals- Corruption in public life- Anti-corruption measures – Central Vigilance Commission, lok-adalats, Ombudsman, – Comptroller and Auditor General of India- Right to information - Central and State Commission- Empowerment of women- Voluntary organizations and public grievances Redressal- Consumer protection forms

#### **Unit- VI. Indian economy**

Nature of Indian economy-Need for economic planning-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- Banking, money & monetary policy- Role of Foreign Direct Investment (FDI)- WTO-globalization & privatization- Rural welfare oriented programmes- Social sector problems – population, education, health, employment, poverty-HRD – sustainable economic growth- Economic trends in Tamil Nadu -Energy Different sources and development- Finance Commission -Planning Commission-National Development Council

#### **Unit-VI. Indian national movement**

National renaissance-Early uprising against British rule-1857 Revolt- Indian National Congress-Emergence of national leaders-Gandhi, Nehru, Tagore, Nethaji -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 - Rajaji, VOC, Periyar, Bharathiar & Others-Birth of political parties /political system in India since independence-

## Unit-VII. APTITUDE & MENTAL ABILITY TESTS

Conversion of information to data-Collection, compilation and presentation of data - Tables, graphs, diagrams-Parametric representation of data-Analytical interpretation of data -Simplification-Percentage-Highest Common Factor (HCF)-Lowest Common Multiple (LCM)-Ratio and Proportion-Simple interest-Compound interest-Area-Volume-Time and Work-Behavioral ability -Basic terms, Communications in information technology-Application of Information and Communication Technology (ICT)- Decision making and problem solving-Logical Reasoning-Puzzles-Dice-Visual Reasoning-Alpha numeric Reasoning-Number Series-Logical Number/Alphabetical/Diagrammatic Sequences-

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