Applications are invited only through online mode for direct recruitment to the posts in Combined Technical Services Examination (Non - Interview Posts).

1. Important Instructions:

1.1. Candidates to ensure their eligibility for the examination:

All candidates are requested to carefully read the “Instructions to Applicants” available in the Commission’s website www.tnpsc.gov.in and this Notification. The candidates applying for the examination should ensure that they fulfill all eligibility conditions for admission to the examination. Their admission to all stages of the examination will be purely provisional, subject to their satisfying the eligibility conditions. Mere admission to the written examination / certificate verification / counselling or inclusion of name in the selection list will not confer on the candidates any right to appointment. The Commission reserves the right to reject candidature at any stage, after due process even after selection has been made, if a wrong claim or violation of rules or instructions is confirmed.

1.2. Important Dates and Time:

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<thead>
<tr>
<th>Date of Notification</th>
<th>26.07.2024</th>
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<tbody>
<tr>
<td>Last date and time for submission of online application</td>
<td>24.08.2024 11.59 pm</td>
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<tr>
<td>Application Correction Window period</td>
<td>28.08.2024 12.01 am to 30.08.2024 11.59 pm</td>
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<table>
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**Paper - I**

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<thead>
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<th>Subject</th>
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**Paper - II**

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14.10.2024 to 23.10.2024 (excluding 19.10.2024 and 20.10.2024)

1.2.1. The date and time of examination for the Paper-II-Subject Paper, will be informed only through Commission’s website www.tnpsc.gov.in

1.3. How to Apply:

1.3.1. One Time Registration and Online Application:

Candidates are required to apply online by using the Commission’s website www.tnpscexams.in. The candidate needs to register himself / herself first at the One Time Registration (OTR) platform, available
on the Commission’s website, and then proceed to fill up the online application for the examination. If the candidate is already registered, he / she can proceed straightway to fill up the online application for the examination.

1.3.2. Application Correction Window:

After the last date for submission of online application, the Application Correction Window will open for 3 days from 28.08.2024 to 30.08.2024. During this period, candidates will be able to edit the details in their online application. After the last date of the Application Correction Window period, no modification is allowed in the online application.

1.3.3. Subject Paper Options:

Candidates should choose the subject paper(s) and specify in the online application. The candidates should only choose the subject paper(s) in which they have obtained the educational qualification or equivalent qualification for appearing in the examination.

1.3.4. The detailed instructions regarding how to apply and the examination centers are available in Annexure I of this Notification.

1.4. Banned Items:

1.4.1. Candidates are not allowed to bring mobile phone, pager or any electronic equipment or programmable device or storage media like pen drive, smart watches, watches and rings with in-built memory notes, etc., or camera or Bluetooth devices or communication chips or any other equipment or related accessories either in working or switched off mode capable of being used as a communication device into the examination hall / room. Candidates are not allowed to bring non-electronic devices such as P&G Design Data Book, mathematical and drawing instruments, log tables, stencils of maps, slide rules, books, notes, loose sheets, guides, rough sheets, hand bags into the examination hall / room.

1.4.2. If they are found to have any such things or instruments, they will not be allowed to write the examination, besides invalidation of the answer sheet and / or debarment and / or rejection of candidature. If it is considered necessary, they will be subjected to a thorough physical search including frisking on the spot.

1.4.3. Candidates are advised, in their own interest, not to bring any of the banned items including mobile phones to the venue of the examination, as arrangements for safekeeping of the same cannot be assured.

2. Warning:

2.1. All the recruitments by the Tamil Nadu Public Service Commission are purely merit-based. The Tamil Nadu Public Service Commission hereby cautions the candidates against touts and agents who may cheat, by making false promises of securing jobs through unfair means. The Tamil Nadu Public Service Commission shall not be responsible or liable for any loss that may be caused to any candidate on account of indulging in any sort of dealings with such unscrupulous elements.

2.2. Candidates are solely responsible for their claims in the online application. They cannot blame service providers like internet cafes / browsing centers / common service centers for the mistakes made while applying online for recruitment. Candidates are advised to check the filled–in online application before finally submitting the same.
### 3. Posts and Vacancies:

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Name of the Post</th>
<th>Post Code</th>
<th>Name of the Department / Organization</th>
<th>Distribution of Vacancies</th>
<th>Number of Vacancies</th>
<th>Level of Pay</th>
</tr>
</thead>
</table>
| 1      | Assistant Engineer (Civil)             | 3351      | Tamil Nadu Police Housing Corporation Ltd., | GT (G) 1  
BC (G) (OBCM) (PSTM) 1  
SC (W) 1  
ST (G) (PSTM) 1 |                      | 05         |
|        |                                        |           |                                        | Level 20  
(EPF) |                      |              |
| 2      | Assistant Engineer (Civil)             | 3232      | Chennai Metropolitan Development Authority | GT (G) (HH) 1 |                      | 01 *         |
| 3      | Agricultural Officer (Extension)       | 1678      | Agriculture                             | GT (G) 4  
GT (G) (LD/ CP/ LC/ DF/ AC/ MuD) 1  
GT (G) (PSTM) 2  
GT(W) 2  
GT(W) (PSTM) 1  
BC (OBCM) (G) 4  
BC (OBCM) (G) (PSTM) 2  
BC (OBCM) (W) 2  
BC (OBCM) (W) (PSTM) 1  
MBC/DC (G) 3  
MBC/DC (G) (PSTM) 1  
MBC/DC (W) 1  
MBC/DC (W) (PSTM) 1  
BC(M) (G) 1  
SC (G) 3  
SC (G) (PSTM) 1  
SC (W) 1  
SC(A) (G) 1 |                      | 32         |
| 4      | Architectural Assistant/ Planning Assistant | 2108      | Town and Country Planning                | SC (G) 1  
GT (W) 1  
BC (OBCM) (W) 1 |                      | 03 *        |
| 5      | Assistant Director                     | 1664      | Industrial Safety and Health             | GT (W) 1  
BC (OBCM) (W) 1  
MBC/DC (G) 1  
SC (G) 1 |                      | 04         |
| 6      | Assistant Engineer (Civil)             | 1656      | Water Resources                          | GT (G) 19  
GT (G) (LD(OA, OL) DF/ AC) 1  
GT (G) (PSTM) 5  
GT (W) 7  
GT (W) (HH) 1  
GT (W) (PSTM) 2  
BC (OBCM) (G) 16  
BC (OBCM) (G) (HH) 1  
BC (OBCM) (G) (LD(OA,OL) DF/ AC) 1  
BC (OBCM) (G) (PSTM) 4 |                      | 115        |
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Total 654

* Including backlog vacancies
** Including shortfall vacancies
@ Vacancies for reservation for meritorious sports persons are deducted.

<table>
<thead>
<tr>
<th>Abbreviations:</th>
</tr>
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<tr>
<td>CPS – Contributory Pension Scheme</td>
</tr>
<tr>
<td>EPF – Employees Provident Fund</td>
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3.1. The number of vacancies notified is tentative and is liable for modification, before the publication of the results of the examination. Whenever the vacancies are revised, the number of candidates selected for the successive stages will also be revised commensurately.

3.2. The Commission reserves the right to include additional posts with different nomenclature and having similar eligibility conditions, as announced in this notification.
4. Eligibility Conditions:

4.1. Age Limit: (as on 01.07.2024)

The candidates should have completed the age of 21 years for all the posts, except for the post of Foreman Marine (Post Code: 1762). For the post of Foreman Marine the candidates should have completed 18 years. The category wise maximum age limit and age concession details are given below:

4.1.1. Others (Candidates not belonging to SCs, SC(A)s, STs, MBCs/DCs, BC(OBCM)s and BCMs):

<table>
<thead>
<tr>
<th>S.No.</th>
<th>Name of the Post</th>
<th>Post Code</th>
<th>Maximum Age (Should not have completed)</th>
<th>Age Concession</th>
<th>Destitute Widow</th>
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<tr>
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<td>2127</td>
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</table>
4.1.3. No maximum age limit shall mean that the candidates should not have completed 60 years of age as on 1.7.2024 or at the time of selection / appointment to the post.

4.1.4. Candidates claiming age concession should upload the supporting documents for such a claim. Failure to upload such a document shall result in the rejection of candidature after due process.

4.2. Supporting Documents:

4.2.1. The date of birth will be verified against the tenth standard (SSLC) or twelfth standard (HSC) mark sheet, issued by the Tamil Nadu Board of Secondary Education and Tamil Nadu Board of Higher Secondary Education respectively.

4.2.2. Those candidates whose date of birth is not mentioned in their tenth standard / twelfth standard mark sheet must upload / produce their Birth Certificate / Transfer Certificate/ Degree Mark Sheets, instead of the tenth standard or twelfth standard mark sheet. Any other form of evidence will not be accepted.

4.2.3. Failure to upload / produce such a document shall result in the rejection of candidacy after due process.

4.3. Educational Qualification, Technical Qualification and Experience:

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Name of the Post</th>
<th>Post Code</th>
<th>Qualification and Experience</th>
</tr>
</thead>
<tbody>
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<td>1678</td>
<td>i) A Bachelor degree in Agriculture and, ii) Must possess adequate knowledge of Tamil</td>
</tr>
<tr>
<td>2</td>
<td>Architectural Assistant/ Planning Assistant</td>
<td>2108</td>
<td>Must possess a Degree of Master of Town Planning or its equivalent; or Associate Membership of the Institute of Town Planners of India or Institute of Architects of India; or A Degree in Civil Engineering; or A Degree in Architecture; or An A.M.I.E (Civil) (i.e.,) Associate Member of the Institute of Engineers (India)</td>
</tr>
<tr>
<td>3</td>
<td>Assistant Curator (Archaeology)</td>
<td>1848</td>
<td>(i) Must possess a degree in Sanskrit with a knowledge of Dravidian languages and Ancient Indian History; or A degree in Archaeology (working knowledge in Sanskrit with high qualification in Sanskrit) and knowledge of Dravidian languages and scripts and Ancient Indian History (ii) If no candidate with the above qualification is available, candidates who possess a degree in</td>
</tr>
<tr>
<td>No.</td>
<td>Position</td>
<td>Code</td>
<td>Qualification</td>
</tr>
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</tr>
<tr>
<td>4</td>
<td>Assistant Curator (Anthropology)</td>
<td>2130</td>
<td>(i) B.Sc., in Zoology or a degree in Anthropology.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(ii) Preference shall be given to the candidates possessing Diploma in Anthropology in the case of degree holders in Zoology</td>
</tr>
<tr>
<td>5</td>
<td>Assistant Curator (Zoology)</td>
<td>2131</td>
<td>A Degree B.Sc., in Zoology, with Botany or Chemistry or Geology as subsidiary subject</td>
</tr>
<tr>
<td>6</td>
<td>Assistant Curator (Botany)</td>
<td>2132</td>
<td>A Degree in B.Sc., Botany, with Zoology or Chemistry or Geology as subsidiary subject or A B.Sc., degree in Geology, with Botany or Zoology or Chemistry as subsidiary subject</td>
</tr>
<tr>
<td>7</td>
<td>Assistant Curator (National Art Gallery)</td>
<td>2133</td>
<td>(i) Must possess a degree of B.A in History</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(ii) Other things being equal, preference shall be given to candidates who possess, in addition, a Diploma in Fine Arts and knowledge of Art History</td>
</tr>
<tr>
<td>8</td>
<td>Assistant Curator (Pudukottai Government Museum)</td>
<td>3369</td>
<td>A degree in any of the following subjects:</td>
</tr>
<tr>
<td></td>
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<td></td>
<td>Sanskrit with knowledge of Dravidian languages, Ancient History, Archaeology, Zoology, Botany, Geology, History (with working knowledge of Sanskrit)</td>
</tr>
<tr>
<td>9</td>
<td>Assistant Director</td>
<td>1664</td>
<td>A Degree in Mechanical or Electrical or Chemical Engineering or Textile Technology or Industrial Engineering or Production Engineering</td>
</tr>
<tr>
<td>10</td>
<td>Assistant Engineer (Civil)</td>
<td>1656</td>
<td>(i) Must possess the B.E degree in Civil Engineering or Civil and Structural Engineering; or Must have passed in Sections A and B of the Institution Examinations under Civil Engineering Branch</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(ii) Other things being equal, preference shall be given to those who have undergone one year of apprenticeship training under the Government of India scheme or the State Government Apprenticeship scheme</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(iii) Other things being equal, preference shall be given to released Emergency commissioned officers, released short service commissioned officers or other Ex-servicemen released from the Armed Forces</td>
</tr>
<tr>
<td>11</td>
<td>Assistant Engineer (Civil)</td>
<td>3656</td>
<td>(i) Must possess the B.E degree in Civil Engineering or Civil and Structural Engineering; or Must have passed in Sections A and B of the Institution Examinations under Civil Engineering Branch</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(ii) Other things being equal, preference shall be given to those who have undergone one year of apprenticeship training under the Government of India scheme or the State Government Apprenticeship scheme</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(iii) Other things being equal, preference shall be given to released Emergency commissioned officers, released short service commissioned officers or other Ex-servicemen released from the Armed Forces</td>
</tr>
<tr>
<td>No.</td>
<td>Position</td>
<td>Code</td>
<td>Requirements</td>
</tr>
<tr>
<td>-----</td>
<td>-----------------------------------------------</td>
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<td>------------------------------------------------------------------------------</td>
</tr>
</tbody>
</table>
| 12  | Assistant Engineer                            | 1661 | (i) Must possess a degree in Civil Engineering or A pass in Sections A and B of the A.M.I.E (India) Examinations (re-named as Institution Examinations)  
(ii) Other things being equal, preference shall be given to a person who has undergone one year of Apprenticeship training under the Government of India Scheme or one year of training under the State Government Apprenticeship Scheme |
| 13  | Assistant Engineer (Civil)                    | 3351 | Must possess a Bachelor Degree in Civil Engineering recognised by Tamil Nadu Government or equivalent |
| 14  | Assistant Engineer (Civil)                    | 3350 | Must be a Graduate in Civil Engineering |
| 15  | Assistant Engineer (Civil)                    | 3232 | Must possess the Bachelor Degree in Civil Engineering |
| 16  | Assistant Engineer (Civil)                    | 3368 | Must possess B.E./B.Tech Degree in Civil Engineering from a recognized University / Institution |
| 17  | Assistant Engineer                            | 1660 | (i) Must possess a B.E degree in Civil Engineering or Must have passed Sections A and B of the Institution of Engineers (India) in Civil Engineering Branch, and he/she should furnish evidence of having undergone practical training in surveying for a period of not less than one year.  
(ii) Other things being equal preference shall be given for appointment to a person who has undergone one year of apprenticeship under the Government of India Scheme or the State Government Apprenticeship Scheme |
| 18  | Assistant Engineer (Electrical)               | 1657 | (i) Must possess a degree in Electrical Engineering or Electronics and Communication Engineering; or A pass in Sections A and B of the Institution Examinations with Electrical Engineering as a subject  
(ii) Other things being equal, preference shall be given to those who have undergone one year Apprenticeship training under the Government of India scheme or one year training under the Government of Tamil Nadu Special Apprenticeship Training Scheme |
<p>| 19  | Assistant Engineer (Electrical)               | 3487 | Must possess Bachelor of Engineering degree in Electrical Engineering or Electronics and Communication Engineering or Electrical and Electronics Engineering or Bachelor of Technology degree in Electrical Engineering or Electrical and Communication Engineering or Electrical and Electronics Engineering or its equivalent awarded by an institute recognized by the All India Council for Technical Education |
| 20  | Assistant Engineer (Industries)               | 1900 | Must possess a Bachelor of Engineering or Bachelor of Technology degree of any discipline except Civil Engineering and Architectural Engineering of any University recognized by the University Grants Commission or Institution recognized by the All India Council for Technical Education |
| 21  | Assistant Geologist                           | 1677 | A degree in M.Sc., (Geology) |</p>
<table>
<thead>
<tr>
<th>No.</th>
<th>Position</th>
<th>Grade</th>
<th>Requirements</th>
</tr>
</thead>
</table>
| 22  | Assistant Geologist                           | 1863  | (i) Must possess M.Sc., Degree in Geology of any University  
(ii) Other things being equal, preference shall be given to those who possess practical experience in field work |
| 23  | Assistant Geologist                           | 1750  | Master of Science degree in Geology or Master of Science degree in Applied Geology or Master of Science (Technology) in Hydrogeology of any University recognized by the University Grants Commission |
| 24  | Assistant Tourist Officer (Grade-II)          | 3111  | (i) A degree in Travel and Tourism or any degree with Diploma in Tourism;  
(ii) Certificate Course in Computer on Office Automation awarded by the Directorate of Technical Education, Government of Tamil Nadu or its equivalent; and  
(iii) Proficiency in English and Tamil Languages i.e. must have studied both Tamil and English as one of the subjects at SSLC or HSC level |
| 25  | Chemist                                       | 1913  | (i) First or Second Class Degree in M.Sc., in Chemistry or Chemical Technology or Industrial Chemistry or Associateship Diploma of the Institution of Chemists (India) obtained by Examination and  
(ii) Experience in research in Pure or Applied Chemistry or Analytical Chemistry for a period of not less than 2 years |
| 26  | Chemist                                       | 3370  | A first class Bachelor's degree with Chemistry as main subject |
| 27  | Junior Chemist                                | 1914  | (i) Must possess a First or Second Class Post Graduate Degree in any Branch of Chemistry; or Associateship Diploma of the Institution of Chemists (India) obtained by Examination  
(ii) Other things being equal, preference shall be given to a candidate who possesses a Post Graduate Degree in Analytical Chemistry or to a candidate who possesses practical experience for a period of not less than one year in any recognized research or Analytical or Metallurgical Laboratory  
Explanation:  
a) “Recognized Research Laboratory” means a laboratory recognized by the Ministry of Science and Technology of the Government of India.  
b) “Recognized Analytical or Metallurgical Laboratory” means a Laboratory, which is engaged in Testing and Analytical and issues Test Certificate |
| 28  | Curator (Chemical Conservation)               | 2127  | (i) Must possess the M.Sc degree with Chemistry (Main) and Electro Chemistry as special subject or M.Sc. (Technical) in Chemical Engineering or M.E. (Chemical) degree; and  
(ii) Must possess research experience with scientific publications  
(iii) Preference shall be given to candidates who possess, in addition, knowledge of French and German |
<table>
<thead>
<tr>
<th>Number</th>
<th>Position</th>
<th>Code</th>
<th>Qualification</th>
</tr>
</thead>
<tbody>
<tr>
<td>29</td>
<td>Curator</td>
<td>2129</td>
<td>A Master’s or Honours degree in any one of the following subjects: Zoology, Botany, Geology, Anthropology, Indian Archaeology, Sanskrit, History, Chemistry</td>
</tr>
<tr>
<td>30</td>
<td>Deputy Manager (System)</td>
<td>3278</td>
<td>Must possess Bachelor Degree in Engineering (Information Technology/ Computer Science) / Bachelor Degree in Technology (Information Technology / Computer Science) / Master of Computer Applications / M.Sc., (Computer Science) from a recognized University</td>
</tr>
<tr>
<td>31</td>
<td>Deputy Manager (Dairying)</td>
<td>3279</td>
<td>Must possess Degree with IDD / NDD or Post Graduate Degree in Dairy Science or B.Tech in Food Technology/ Dairy Technology/ Food Processing from any approved institutions</td>
</tr>
<tr>
<td>32</td>
<td>Deputy Manager (Quality Assurance)</td>
<td>3348</td>
<td>Must possess Post Graduate Degree in Dairy Science/ Dairy Chemistry/ Chemistry/ Bio-Chemistry/ Bio-Tech./ Microbiology</td>
</tr>
<tr>
<td>33</td>
<td>Drugs Inspector</td>
<td>1972</td>
<td>Must possess a degree in Pharmacy or Pharmaceutical Sciences or Medicine with specialization in Clinical Pharmacology or Microbiology from a University or Institution recognized by the University Grants Commission for the purpose of its grant</td>
</tr>
</tbody>
</table>
| 34     | Foreman (Marine)                             | 1762 | (i) Must possess a degree in Mechanical Engineering or Must possess a Post Diploma in Diesel Traction issued by the Tamil Nadu State Board of Technical Education and Training or Must possess a Diploma in Mechanical Engineering awarded by the Tamil Nadu State Board of Technical Education and Training with experience for a period of not less than two years in any workshop or in handling diesel engines  
(ii) Preference shall be given to those who possess the qualifications in the order referred to above  
(iii) Preference shall be given to those who possess experience in Marine Diesel Engine for a period of not less than two years or have successfully undergone the Boat Building Foreman Course of training in the Central Institute of Fisheries Operatives |
| 35     | Junior Analyst                               | 2006 | (i) Must be a graduate in Pharmacy or Chemistry or Pharmaceutical Chemistry and  
(ii) Should possess not less than two years experience in the analysis of drugs  
(iii) Provided that the requirement of experience may be reduced to one year in the case of Pharmacy graduates and Post Graduates in Chemistry with Analytical Chemistry as a specified subject |
| 36     | Junior Architect                             | 1860 | Must possess a degree in Architecture of any University or Institution recognized by the University Grants Commission and should be a registered member of the Council of Architecture |
| 37     | Librarian Grade I                            | 3347 | (i) A degree of any University or Institution recognized by the University Grants Commission or Higher Education Commission of India for the purpose of its grant, and  
(ii) A degree in Library Science from any University recognized by the University Grants Commission or Higher Education Commission of India for the purpose of its grant |
<table>
<thead>
<tr>
<th>No.</th>
<th>Position</th>
<th>Year</th>
<th>Qualification</th>
</tr>
</thead>
</table>
| 38  | Assistant Librarian                          | 1856 | (i) Must be a graduate  
(ii) Must have obtained a degree in Library Science                                                                                                                                                |
| 39  | Library Assistant Grade I                    | 1857 | (i) Must be a graduate  
(ii) Must have obtained a degree in Library Science                                                                                                                                                |
| 40  | Research Assistant                           | 1861 | Must possess a first class post-graduate degree in Economics or Econometrics or Statistics or Business Administration or Mathematics or Social work or Sociology or Anthropology or Agricultural Economics or Public Administration |
| 41  | Statistical Inspector                        | 1697 | Must possess a Degree of any University or Institution recognised by the University Grants Commission for the purpose of its grant, with Statistics or Mathematics as the main subjects |
| 42  | Block Health Statisticist                    | 2010 | A degree in Statistics or Mathematics or Economics from any University or Institution, recognized by the University Grants Commission                                                                       |
| 43  | Store Keeper                                 | 1768 | (i) A Degree in Physics or Chemistry and  
(ii) Experience for a period of not less than three years as Store Keeper in a reputed firm or a Government Institution                                                                 |
| 44  | Translator                                   | 3106 | Must possess a degree in Law awarded by any University or Institution recognized by the University Grants Commission and recognized by the Bar Council of India for the purpose of enrolment as an Advocate |
| 45  | Secretarial Officer (Legal)                  | 3372 | (i) Bachelor of Law (B.L)  
(ii) Preference shall be given to those who possess ACS (Inter)                                                                                                                                 |
| 46  | Junior Manager (Finance and Accounts)        | 3352 | (i) A Degree of any University or Institution recognized by the University Grants Commission for the purpose of its grant; and  
(ii) Must have passed an Intermediate Examination conducted by the Institute of Chartered Accountants of India / Institute of Cost Accountants of India |
| 47  | Assistant Manager                            | 3349 | (i) MBA Finance or Marketing of a Recognized University and PGDCA Qualification  
(ii) The candidates who have acquired Degree in Computer Science/Information Technology / Computer Application is exempted from PGDCA Qualification |
| 48  | Technical Executive (Mechanical)             | 3383 | B.E., / B.Tech., in Mechanical Engineering from a recognized University / Institute                                                                                                                                 |
| 49  | Executive Surveyor                           | 3384 | B.E., / B.Tech., in Civil Engineering from a recognized University / Institute                                                                                                                                 |
| 50  | Executive Geologist                          | 3385 | Degree in Geology from a recognized University / Institute                                                                                                                                                  |
| 51  | X-Ray Analyst                                | 3386 | B.Sc., Chemistry from a recognized University / Institute                                                                                                                                                   |
| 52  | CCR Operator                                 | 3387 | B.E., / B.Tech., in Chemical Engineering from a recognized University / Institute                                                                                                                                 |
| 53  | Assistant Warehouse Manager / Junior Assistant| 3388 | A degree in Agriculture or in Science of any recognized University with Chemistry, Botany or Zoology as a major or Ancillary subject                                                                           |

4.3.1. The candidates should possess the educational qualification, technical qualification and experience prescribed for the post, on the date of notification.
4.3.2. Supporting Documents:

4.3.2.1. SSLC / HSC / Diploma / Degree / PG Degree / Integrated PG Degree / Provisional Degree or Provisional Diploma Certificate / Consolidated Mark Sheet along with Degree or Provisional Degree Certificate shall be accepted as proof of educational qualification.

4.3.2.2. In cases where the Diploma / Degree / PG Degree certificates had been issued after the date of notification, candidates must upload / produce proof (in the form of Provisional Diploma / Degree Certificate / Consolidated Mark Sheet, etc.) of the publication of results of the respective qualification(s) on or before the date of notification.

4.3.2.3. The Under Graduate / Post Graduate degree qualification prescribed for the above posts should have been obtained by passing the required qualification in the following order of studies viz., SSLC + HSC/Diploma or its equivalent + Under Graduate Degree + Post Graduate Degree.

4.3.2.4. Candidates claiming possession of qualification higher than that prescribed for a post, must upload / produce certificates, issued on / before the date of notification, in support of such claim.

4.3.2.5. Candidates claiming experience, should upload the experience certificate in the format available in Annexure-V of this notification.

4.3.2.6. In cases where the duration of the prescribed educational / technical course / experience has been specified in the notification, any discrepancy between the claim in the application and the documents uploaded / produced, shall result in the rejection of candidature after due process.

4.3.2.7. In case the Degree Certificate is lost or is not immediately available for reasons to be specified, an extract from the Convocation Register will be accepted as evidence of qualification.

4.3.3. Equivalence of Qualification: The Government orders relating to equivalence of qualification are available on the Tamil Nadu Public Service Commission’s website. However, if the candidate possesses an equivalence of qualification other than one mentioned in the Commission’s website and if Government Orders to this effect have been issued on or before the date of this notification, candidates should furnish the details of the same while applying and should upload a copy of the Government Order at the time of uploading of documents, failing which his / her candidature will be rejected after due process. The Government orders regarding equivalence of qualification issued after the date of this notification will not be considered for this recruitment.

4.4. Medical and Physical Standards:

4.4.1. Candidates selected for appointment to the posts will be required to submit a certificate of physical fitness to the Appointing Authority at the time of joining the post.

4.4.2. The prescribed standards of visual acuity of the candidates selected for the following posts are mentioned below:

<table>
<thead>
<tr>
<th>S.No.</th>
<th>Name of the Post</th>
<th>Post Code</th>
<th>Standard of Vision</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Architectural Assistant/ Planning Assistant</td>
<td>2108</td>
<td>Standard-II or better</td>
</tr>
<tr>
<td>2</td>
<td>Assistant Director</td>
<td>1664</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Assistant Engineer (Civil)</td>
<td>3350</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Assistant Engineer (Civil)</td>
<td>3232</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Assistant Manager</td>
<td>3349</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Assistant Engineer</td>
<td>1661</td>
<td>Standard-II or better Colour Blindness will be a disqualification</td>
</tr>
<tr>
<td>No.</td>
<td>Position</td>
<td>Grade</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>7</td>
<td>Agricultural Officer (Extension)</td>
<td>1678</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Assistant Geologist</td>
<td>1750</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Curator (Chemical Conservation)</td>
<td>2127</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Curator</td>
<td>2129</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>Drugs Inspector</td>
<td>1972</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>Research Assistant</td>
<td>1861</td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>Junior Architect</td>
<td>1860</td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>Assistant Tourist Officer (Grade-II)</td>
<td>3111</td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>Statistical Inspector</td>
<td>1697</td>
<td></td>
</tr>
<tr>
<td>16</td>
<td>Assistant Curator (Zoology)</td>
<td>2131</td>
<td></td>
</tr>
<tr>
<td>17</td>
<td>Assistant Curator (National Art Gallery)</td>
<td>2133</td>
<td></td>
</tr>
<tr>
<td>18</td>
<td>Assistant Curator (Archaeology)</td>
<td>1848</td>
<td></td>
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<tr>
<td>19</td>
<td>Assistant Curator (Botany)</td>
<td>2132</td>
<td></td>
</tr>
<tr>
<td>20</td>
<td>Assistant Curator (Anthropology)</td>
<td>2130</td>
<td></td>
</tr>
<tr>
<td>21</td>
<td>Assistant Curator (Pudukottai Government Museum)</td>
<td>3369</td>
<td></td>
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<tr>
<td>22</td>
<td>Assistant Engineer (Civil)</td>
<td>1656</td>
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<tr>
<td>23</td>
<td>Assistant Engineer (Civil)</td>
<td>3656</td>
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<tr>
<td>24</td>
<td>Assistant Engineer (Civil)</td>
<td>3351</td>
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<tr>
<td>25</td>
<td>Assistant Engineer (Civil)</td>
<td>3368</td>
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<tr>
<td>26</td>
<td>Assistant Engineer (Electrical)</td>
<td>1657</td>
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<tr>
<td>27</td>
<td>Assistant Engineer (Electrical)</td>
<td>3487</td>
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</tr>
<tr>
<td>28</td>
<td>Assistant Engineer (Industries)</td>
<td>1900</td>
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</tr>
<tr>
<td>29</td>
<td>Assistant Geologist</td>
<td>1677</td>
<td></td>
</tr>
<tr>
<td>30</td>
<td>Assistant Geologist</td>
<td>1863</td>
<td></td>
</tr>
<tr>
<td>31</td>
<td>Assistant Librarian</td>
<td>1856</td>
<td></td>
</tr>
<tr>
<td>32</td>
<td>Block Health Statistician</td>
<td>2010</td>
<td></td>
</tr>
<tr>
<td>33</td>
<td>Chemist</td>
<td>1913</td>
<td></td>
</tr>
<tr>
<td>34</td>
<td>Chemist</td>
<td>3370</td>
<td></td>
</tr>
<tr>
<td>35</td>
<td>Deputy Manager (System)</td>
<td>3278</td>
<td></td>
</tr>
<tr>
<td>36</td>
<td>Deputy Manager (Dairying)</td>
<td>3279</td>
<td></td>
</tr>
<tr>
<td>37</td>
<td>Deputy Manager (Quality Assurance)</td>
<td>3348</td>
<td></td>
</tr>
<tr>
<td>38</td>
<td>Foreman (Marine)</td>
<td>1762</td>
<td></td>
</tr>
<tr>
<td>39</td>
<td>Junior Analyst</td>
<td>2006</td>
<td></td>
</tr>
<tr>
<td>40</td>
<td>Junior Chemist</td>
<td>1914</td>
<td></td>
</tr>
<tr>
<td>41</td>
<td>Librarian Grade I</td>
<td>3347</td>
<td></td>
</tr>
<tr>
<td>42</td>
<td>Library Assistant Grade I</td>
<td>1857</td>
<td></td>
</tr>
<tr>
<td>43</td>
<td>Translator</td>
<td>3106</td>
<td></td>
</tr>
<tr>
<td>44</td>
<td>Junior Manager (Finance and Accounts)</td>
<td>3352</td>
<td></td>
</tr>
<tr>
<td>45</td>
<td>Assistant Engineer</td>
<td>1660</td>
<td></td>
</tr>
<tr>
<td>46</td>
<td>Secretarial Officer (Legal)</td>
<td>3372</td>
<td></td>
</tr>
<tr>
<td>47</td>
<td>Technical Executive (Mechanical)</td>
<td>3383</td>
<td></td>
</tr>
<tr>
<td>48</td>
<td>Executive Surveyor</td>
<td>3384</td>
<td></td>
</tr>
<tr>
<td>49</td>
<td>Executive Geologist</td>
<td>3385</td>
<td></td>
</tr>
<tr>
<td>50</td>
<td>X-Ray Analyst</td>
<td>3386</td>
<td></td>
</tr>
<tr>
<td>51</td>
<td>CCR Operator</td>
<td>3387</td>
<td></td>
</tr>
<tr>
<td>52</td>
<td>Assistant Warehouse Manager / Junior Assistant</td>
<td>3388</td>
<td></td>
</tr>
<tr>
<td>53</td>
<td>Store Keeper</td>
<td>1768</td>
<td></td>
</tr>
</tbody>
</table>

Standard – III or better
Colour Blindness will be a disqualification

4.4.3. Candidates with defective vision should produce an Eye Fitness certificate from a qualified Eye Specialist working in a Government Hospital, to the Appointing Authority.
4.5. Knowledge in Tamil:

4.5.1. Candidates should possess adequate knowledge in Tamil on the date of this Notification. The candidate shall be deemed to possess an adequate knowledge of Tamil if, he/she has passed the SSLC examination or its equivalent examination / HSC / Degree, etc., with Tamil as one of the languages or studied the High School Course in Tamil medium; or passed the SSLC examination or its equivalent examination in Tamil medium; or passed the Second Class Language Test (Full Test) in Tamil conducted by the Tamil Nadu Public Service Commission.

4.5.2. Candidates must upload/ produce either SSLC / HSC / Degree / PG Degree mark sheets or proof of having passed the Second Class Language Test (Full Test) in Tamil conducted by the Tamil Nadu Public Service Commission, at the time of submission of online application.

4.5.3. Failure to produce documents in support of the possession of adequate knowledge of Tamil, shall result in the candidate being required to pass the Second Class Language Test (Full Test) in Tamil conducted by the Commission, within a period of two years from the date of his / her appointment, failing which he / she shall be discharged from service. This instruction is not applicable to the post of Agricultural Officer (Extension) Post Code-1678

4.6. Posts identified suitable for Persons with Benchmark Disability:

4.6.1. The following posts are identified as suitable for reservation to persons with benchmark disabilities as detailed below:

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Name of the Post</th>
<th>Post Code</th>
<th>Suitable Category of Benchmark Disabilities</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Agricultural Officer (Extension)</td>
<td>1678</td>
<td>LV, HH, LD, CP, LC, DF, AC, MuD</td>
</tr>
<tr>
<td>2.</td>
<td>Architectural Assistant / Planning Assistant</td>
<td>2108</td>
<td>LV, HH, LD (OA, OL), AC, LC, DF</td>
</tr>
<tr>
<td>3.</td>
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<td>1657</td>
<td>LD (OA, OL), HH, DF, AC</td>
</tr>
<tr>
<td>4.</td>
<td>Assistant Engineer (Civil)</td>
<td>1656</td>
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</tr>
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<td>5.</td>
<td>Assistant Engineer (Civil)</td>
<td>3656</td>
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</tr>
<tr>
<td>6.</td>
<td>Assistant Engineer (Civil)</td>
<td>3232</td>
<td>LD (OA, OL), HH, LC, DF, AC</td>
</tr>
<tr>
<td>7.</td>
<td>Assistant Engineer</td>
<td>1661</td>
<td>HH</td>
</tr>
<tr>
<td>8.</td>
<td>Assistant Geologist</td>
<td>1677</td>
<td>LV, HI, HH, LD, LC, DF, AC</td>
</tr>
<tr>
<td>9.</td>
<td>Assistant Geologist</td>
<td>1863</td>
<td>LV, HI, HH, LD (with mobility), LC, DF, AC</td>
</tr>
<tr>
<td>10.</td>
<td>Junior Manager (Finance and Accounts)</td>
<td>3352</td>
<td>HH, LD (OA, OL, BA, OAOL), AC, DF, LC</td>
</tr>
<tr>
<td>11.</td>
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<td>1660</td>
<td>HH, LD (OA,OL), LC,AC,DF</td>
</tr>
<tr>
<td>12.</td>
<td>Deputy Manager (System)</td>
<td>3278</td>
<td>VI, LV, HI, HH, LD (OA, OL, BL, OAOL) LC, DF, AC</td>
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<tr>
<td>13.</td>
<td>Deputy Manager (Dairying)</td>
<td>3279</td>
<td>HH, LD (OA, OL), DF, AC</td>
</tr>
<tr>
<td>14.</td>
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<td>3351</td>
<td>LD (OA,OL), HH,DF,AC</td>
</tr>
<tr>
<td>15.</td>
<td>Drugs Inspector</td>
<td>1972</td>
<td>LD (Lower Limbs 40 to 70%)</td>
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<td>16.</td>
<td>Foreman (Marine)</td>
<td>1762</td>
<td>LC, DF, LV</td>
</tr>
<tr>
<td>17.</td>
<td>Junior Analyst</td>
<td>2006</td>
<td>LV, HH, LD, LC, DF, AC, AC, ASD, SLD</td>
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<td>18.</td>
<td>Junior Architect</td>
<td>1860</td>
<td>HI, LD (OL,BL), AC</td>
</tr>
<tr>
<td>19.</td>
<td>Research Assistant</td>
<td>1861</td>
<td>LV, HH, LD, CP, LC, DF, AC, AC, ASD</td>
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<td>20.</td>
<td>Technical Executive (Mechanical)</td>
<td>3383</td>
<td>HH, LD (OA, OL)</td>
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<tr>
<td>Number</td>
<td>Position</td>
<td>Code</td>
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<tr>
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<td>21.</td>
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</tr>
<tr>
<td>22.</td>
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<td>3370</td>
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<tr>
<td>23.</td>
<td>Librarian Grade I</td>
<td>3347</td>
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</tr>
<tr>
<td>24.</td>
<td>Store Keeper</td>
<td>1768</td>
<td></td>
</tr>
<tr>
<td>25.</td>
<td>Assistant Curator (Zoology)</td>
<td>2131</td>
<td></td>
</tr>
<tr>
<td>26.</td>
<td>Assistant Curator (National Art Gallery)</td>
<td>2133</td>
<td></td>
</tr>
<tr>
<td>27.</td>
<td>Assistant Curator (Archaeology)</td>
<td>1848</td>
<td></td>
</tr>
<tr>
<td>28.</td>
<td>Assistant Curator (Botany)</td>
<td>2132</td>
<td></td>
</tr>
<tr>
<td>29.</td>
<td>Assistant Curator (Anthropology)</td>
<td>2130</td>
<td></td>
</tr>
<tr>
<td>30.</td>
<td>Assistant Curator (Pudukottai Government Museum)</td>
<td>3369</td>
<td></td>
</tr>
<tr>
<td>31.</td>
<td>Deputy Manager (Quality Assurance)</td>
<td>3348</td>
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</tr>
<tr>
<td>32.</td>
<td>Block Health Statisticist</td>
<td>2010</td>
<td></td>
</tr>
<tr>
<td>33.</td>
<td>Secretarial Officer (Legal)</td>
<td>3372</td>
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<tr>
<td>34.</td>
<td>X-Ray Analyst</td>
<td>3386</td>
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</tr>
<tr>
<td>35.</td>
<td>CCR Operator</td>
<td>3387</td>
<td></td>
</tr>
<tr>
<td>36.</td>
<td>Assistant Warehouse Manager / Junior Assistant</td>
<td>3388</td>
<td></td>
</tr>
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</table>

**Abbreviations:**

- LV – Low Vision
- VI – Visually Impaired
- HH – Hard of Hearing (with assistive device)
- HI – Hearing Impaired
- LD – Locomotor Disability
- BLOA – Both Leg One Arm
- OA – One Arm
- OL – One Leg
- OAOL – One Arm One Leg
- BL – Both Leg
- BABL – Both Arm Both Leg
- CP – Cerebral Palsy
- LC – Leprosy Cured
- AC – Acid Attack Victims
- DF – Dwarfism
- MuD – Muscular Dystrophy
- ASD – Autism Spectrum Disorder
- SLD – Specific Learning Disability
- MI – Mentally ill
- MD – Multiple Disabilities

4.6.2. Persons with Benchmark Disability with only those category (ies) of disability (ies) mentioned above shall be eligible to apply for this Examination under Persons with Benchmark Disability category. Therefore candidates concerned are advised to read it carefully before applying appropriately for admission to the Examination.

4.7. Restrictions on applying for the Examination:

4.7.1. The candidates not belonging to SCs, SC(A)s, STs, MBCs/DCs, BC(OBCM)s, and BCMs, who have put in 5 years or more of service, since his/ her first appointment to a service of Government of India or Government of a State / Union Territory, are not eligible to apply even if they are within the age limit.

4.7.2. Persons professing Hindu religion alone are eligible for the posts of Assistant Engineer (Electrical) in the Tamil Nadu Hindu Religious and Charitable Endowments Department. Candidates applying for the post should produce / upload a Community Certificate / Certificate from the Revenue Authorities concerned, in support of the religion claimed in the online application, when called for by the Commission. Failure to upload / produce such a certificate, shall result in the rejection of candidature after due process.
4.7.3. The persons with benchmark disabilities are not eligible for the following posts:

<table>
<thead>
<tr>
<th>S.No.</th>
<th>Name of the Post</th>
<th>Post Code</th>
<th>Department / Organization</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Assistant Director</td>
<td>1664</td>
<td>Industrial Safety and Health</td>
</tr>
<tr>
<td>2.</td>
<td>Assistant Engineer (Industries)</td>
<td>1900</td>
<td>Industries and Commerce</td>
</tr>
<tr>
<td>3.</td>
<td>Chemist</td>
<td>1913</td>
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</tr>
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<td>4.</td>
<td>Junior Chemist</td>
<td>1914</td>
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<td>5.</td>
<td>Assistant Geologist</td>
<td>1750</td>
<td>Water Resources</td>
</tr>
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<td>6.</td>
<td>Assistant Tourist Officer (Grade-II)</td>
<td>3111</td>
<td>Tourism</td>
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<td>7.</td>
<td>Statistical Inspector</td>
<td>1697</td>
<td>Animal Husbandry</td>
</tr>
<tr>
<td>8.</td>
<td>Assistant Engineer (Civil)</td>
<td>3350</td>
<td>Tamil Nadu Small Industries Development Corp.</td>
</tr>
<tr>
<td>9.</td>
<td>Assistant Manager</td>
<td>3349</td>
<td></td>
</tr>
<tr>
<td>10.</td>
<td>Assistant Engineer (Civil)</td>
<td>3368</td>
<td>State Industries Promotion Corporation of Tamil Nadu Ltd.,</td>
</tr>
<tr>
<td>11.</td>
<td>Assistant Engineer (Electrical)</td>
<td>3487</td>
<td>Hindu Religious and Charitable Endowments</td>
</tr>
<tr>
<td>12.</td>
<td>Curator (Chemical Conservation)</td>
<td>2127</td>
<td>Museum</td>
</tr>
<tr>
<td>13.</td>
<td>Curator</td>
<td>2129</td>
<td></td>
</tr>
<tr>
<td>14.</td>
<td>Translator</td>
<td>3106</td>
<td>Law</td>
</tr>
<tr>
<td>15.</td>
<td>Library Assistant Grade I</td>
<td>1857</td>
<td>Archives and Historical Research</td>
</tr>
<tr>
<td>16.</td>
<td>Executive Surveyor</td>
<td>3384</td>
<td>Tamil Nadu Cement Corporation Ltd.</td>
</tr>
<tr>
<td>17.</td>
<td>Executive Geologist</td>
<td>3385</td>
<td></td>
</tr>
</tbody>
</table>

5. Plan of Examination:

5.1. The Combined Technical Services Examination (Non-Interview Posts) will be conducted as single stage Written Examination. The candidates will be admitted to the examination, based on the claims made in the online application.

5.2. On screen certificate verification will be conducted before admission to the physical certificate verification and counselling. The Commission will draw a list of candidates to be qualified for the onscreen certificate verification based on the criterion of minimum qualifying marks as mentioned in para 6 of the notification and rule of reservation of appointments. For the posts not requiring experience the candidates will be admitted to onscreen certificate verification in the ratio of 1:3 / 1:2 for General category and all Reserved categories respectively. For the posts requiring experience the candidates will be admitted to onscreen certificate verification in the ratio of 1:5 for all categories. The experience certificate uploaded by the candidates will be verified by the Head of the Department / Organization concerned, during onscreen certificate verification.

5.3. After onscreen certificate verification, based on the marks obtained in the written examination and subject to the rule of reservation of appointments, candidates will be admitted to physical certificate verification and counselling (wherever applicable). For the posts requiring counselling, the candidates will be admitted to physical certificate verification and counselling in the ratio of 1:3 and 1:1.5 for General category and all Reserved categories respectively. For the posts not requiring counselling, candidates will be admitted to physical certificate verification in the ratio of 1:1.2 for all categories.

5.4. In respect of posts whose total cadre strength is one only and for which the rule of reservation of appointments does not apply, the number of candidates to be admitted to the physical certificate verification and counselling (wherever applicable) on the basis of the marks obtained in the written examination will be three.

5.5. Marks obtained by the candidates in the Examination (Part B of Paper I and Paper II) would determine final ranking. The final selection will be made based on the total marks obtained by the candidate in the Examination (Part B of Paper I and Paper II) subject to rule of reservation of appointments. Candidates will be allowed to participate in counselling (wherever applicable) based on his/her rank.

5.6. Appearance in Paper I and Paper II is compulsory. Candidates who have not appeared either for Paper I or Paper II will not be considered for selection, even if they secure the minimum qualifying marks.
6. Scheme of Examination:

6.1. Posts other than Translator:

<table>
<thead>
<tr>
<th>Subject</th>
<th>Standard</th>
<th>No. of Questions</th>
<th>Duration</th>
<th>Maximum Marks</th>
<th>Minimum Qualifying Marks</th>
<th>Type of Examination</th>
<th>Mode of Examination</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Paper I</strong></td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td><strong>Part A</strong></td>
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<tr>
<td>Tamil Eligibility Test</td>
<td>SSLC</td>
<td>100</td>
<td>3 hours</td>
<td>150</td>
<td>60</td>
<td>60</td>
<td>Objective</td>
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<tr>
<td><strong>Part B</strong></td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(i) General Studies</td>
<td>Degree</td>
<td>75</td>
<td></td>
<td>150</td>
<td>135</td>
<td>180</td>
<td>OMR</td>
</tr>
<tr>
<td>(ii) Aptitude and Mental Ability Test</td>
<td>SSLC</td>
<td>25</td>
<td></td>
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<tr>
<td><strong>Paper II</strong></td>
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<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Subject Paper</td>
<td>Degree / PG Degree</td>
<td>200</td>
<td>3 hours</td>
<td>300</td>
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<td>CBT</td>
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</tr>
<tr>
<td><strong>Total (Part B of Paper-I and Paper-II)</strong></td>
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<td>450</td>
</tr>
</tbody>
</table>

*Others - Candidates not belonging to SCs, SC(A)s, STs, MBCs/DCs, BC(OBCM)s and BCMs

OMR - Optical Mark Recognition; CBT - Computer Based Test

6.1.1 Paper II – Subject Paper

<table>
<thead>
<tr>
<th>Name of the Post</th>
<th>Post Code</th>
<th>Subject Paper</th>
<th>Subject Code</th>
<th>Standard</th>
<th>Language of Question Paper</th>
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<tbody>
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<td>1678</td>
<td>Agriculture</td>
<td>284</td>
<td>Degree</td>
<td>English</td>
</tr>
<tr>
<td>Architectural Assistant/Planning Assistant</td>
<td>2108</td>
<td>Town and Country Planning*</td>
<td>382</td>
<td>Post Graduate Degree / Degree</td>
<td>English</td>
</tr>
<tr>
<td>Assistant Curator (Archaeology)</td>
<td>1848</td>
<td>Archaeology</td>
<td>313</td>
<td>Degree</td>
<td>English</td>
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<td></td>
<td></td>
<td>Sanskrit</td>
<td>318</td>
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<td>Sanskrit</td>
</tr>
<tr>
<td>Assistant Curator (Anthropology)</td>
<td>2130</td>
<td>Anthropology</td>
<td>417</td>
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<td>English</td>
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<td></td>
<td>Zoology</td>
<td>270</td>
<td></td>
<td>Tamil and English</td>
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<tr>
<td>Assistant Curator (Botany)</td>
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<td>Geology</td>
<td>394</td>
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<td>Tamil and English</td>
</tr>
<tr>
<td>Assistant Curator (National Art Gallery)</td>
<td>2133</td>
<td>History</td>
<td>315</td>
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<td>Tamil and English</td>
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<td>Position</td>
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<td>Degree</td>
<td>Major Subjects</td>
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<td>---------------------------------------</td>
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<td>Assistant Curator (Pudukottai Government Museum)</td>
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<td>Degree</td>
<td>Sanskrit, Archaeology, Geology, Zoology, Botany, History</td>
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<td>Chemical Engineering, Electrical and Electronics Engineering, Textile Technology</td>
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<td>Electrical and Electronics Engineering, Electronics and Communication Engineering</td>
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<td>Basics of Engineering</td>
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<td>1677</td>
<td>English</td>
<td>Geology</td>
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<tr>
<td>Assistant Geologist</td>
<td>1863</td>
<td>English</td>
<td>Geology</td>
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<td>Assistant Geologist</td>
<td>1750</td>
<td>English</td>
<td>Geology</td>
<td></td>
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</tr>
<tr>
<td>Assistant Tourist Officer, Grade II</td>
<td>3111</td>
<td>English</td>
<td>Travel and Tourism</td>
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</tr>
<tr>
<td>Block Health Statisticist</td>
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<td>Tamil and English</td>
<td>Economics, Mathematics, Statistics</td>
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<tr>
<td>Position</td>
<td>Code</td>
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<tr>
<td>Deputy Manager (System)</td>
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<td>Computer Science and Engineering</td>
<td>407</td>
<td>English</td>
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<td>Information Technology</td>
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<td>PG Degree</td>
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<td>Computer Science</td>
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<tr>
<td>Deputy Manager (Dairying)</td>
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<td>Dairy Science</td>
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<td>English</td>
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<td>Food Technology / Food Processing</td>
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<td>Degree</td>
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<td>Dairy Technology</td>
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<td>Deputy Manager (Quality Assurance)</td>
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<td>Dairy Science</td>
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<th>Duration</th>
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<th>Minimum Qualifying Marks</th>
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<td>(ii) Aptitude and Mental Ability Test</td>
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<td>Paper II</td>
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</table>

*Others - Candidates not belonging to SCs, SC(A)s, STs, MBCs/DCs, BC(OBCM)s and BCMs

OMR - Optical Mark Recognition

6.3. The Paper II and Part B of Paper-I will be evaluated only if the candidate secures minimum qualifying marks of 40% (i.e., 60 Marks) in Part A of Paper I.

6.4. The questions in Part B of Paper I will be set both in English and Tamil.

6.5. The differently abled candidates can avail exemption from writing Part A in Paper I (Tamil Eligibility Test). Such candidates have to furnish the required details in the online application without fail. Subsequent claim will receive no attention. The candidates need to upload the Certificate in the format prescribed in the para 6 of Annexure IV of this notification.

6.6. The syllabus for the written examination is available in Annexure III of this Notification.

6.7. The instructions to be followed while appearing for the examination, are available in Annexure IV of this Notification.

6.8. The Notification is published in English and Tamil versions. In case of doubt, English version is final.

### 7. Reservation of Appointments:

The rule of reservation of appointments applies to this recruitment. The details of the reservation to candidates belonging to various categories are given in Annexure II of this Notification. In respect of posts whose total cadre strength is one only, the rule of reservation of appointment does not apply.
8. Communication to Candidates:

8.1. The memorandum of admission (Hall Ticket) for eligible candidates will be made available on the Commission’s website www.tnpscexams.in / www.tnpsc.gov.in for downloading by candidates. The memorandum of admission will not be sent by post. The candidates must comply with every instruction given in the memorandum of admission.

8.2. The Commission will publish the written examination results, date and time of physical certificate verification, and counselling on the Commission’s website. No individual communication will be sent to the candidates by post. Candidates will be informed of the above fact only through SMS and email, through the registered Mobile Number and email ID. Candidates are directed to watch the Commission’s website in this regard. The Commission shall not be responsible if the communication does not reach the candidate due to an incorrect / invalid e-mail ID /mobile number and failure / delay in delivery of SMS / email to the candidates due to any reason including technical issues. Any representation from the candidates for non-receipt of SMS or e-mail will not be responded.

9. Communication with the Commission:

9.1. Candidates requiring clarification, can contact the office of the Tamil Nadu Public Service Commission in person or over the Toll-Free No.18004190958 on all working days between 10.00 a.m. and 5.45 p.m.

9.2. Queries relating to One Time Registration / online application may be sent to helpdesk@tnpscexams.in. Any other communication with the Commission must be made through email to grievance.tnpsc@tn.gov.in. Communications sent by post must be addressed only to the Secretary, Tamil Nadu Public Service Commission, TNPSC Road, V.O.C. Nagar, Park Town, Chennai -600003.

9.3. All communications to the Commission should invariably contain the following particulars. Communications not containing the following particulars will not be attended to

a. Name and Year of the examination
b. Registration No.
c. Name of the Candidate (in full and in block letters)
d. Complete postal address as given in the application
e. Valid and Active E-mail ID

9.4. Request for exemption from age limit or other qualifications will receive no attention. Requests for furnishing causes of failure in the written examination or for non-selection based on the results of the written examination or for revaluation of answer sheets will not be entertained.

9.5. Requests from candidates for furnishing of their marks or answer paper copy before the completion of the entire selection process, will not be entertained by the Commission.

10. Litigations:

The selection for appointment to the posts included in this recruitment is purely provisional subject to the final orders in the court cases, if any, pending before the Hon’ble High Court of Madras and Madurai Bench of Madras High Court, relating to this recruitment.

Secretary
Annexure I

How to Apply Online

1. Website: Candidates should apply only through online mode in the Commission's website viz., www.tnpscexams.in.

2. One Time Registration:

2.1. It is essential for the candidate to register himself / herself first at the One Time Registration (OTR) platform, available on the Commission’s website, and then proceed to fill up the online application for the examination. Candidates should register only once in the One Time Registration by paying Rs.150/- as registration fee. Successfully registered One Time Registration is valid for five years from the date of registration.

2.2. During One Time Registration, the candidates should keep ready the scanned image of their photograph, taken within the last 3 months of size 20 KB – 50 KB and saved as “Photograph.jpg” and signature of size 10 KB – 20 KB and saved as ‘Signature.jpg’. Both photograph and signature, of 200 DPI resolution, should be saved in a CD / DVD / Pen drive, to upload the same.

2.3. One Time Registration is not an application for any post. It is just a collection of information from the candidates and provides a separate dashboard to each candidate to facilitate the maintenance of their own profile. A candidate should make an online application separately for every examination for which he / she intends to appear.

2.4. A valid e-mail ID and mobile number are mandatory for One Time Registration. E-mail ID and mobile number are to be kept in ’ACTIVE’ mode. Every candidate should have his / her email ID and password. No candidate should share his/her e-mail ID, password, mobile number with any other person. In case a candidate does not have a valid personal email ID, he / she should create a new email ID before applying online and must maintain that email account live. Inquiries relating to One Time Registration / online applications will be answered only if the inquiries are received through a registered e-mail ID.

2.5. Linking the Aadhaar number with One Time Registration (OTR) is mandatory for candidates. The information associated with the Aadhaar number including biometrics will be used only for identification purposes and will not be stored or shared. Candidates are requested to give their consent in their respective OTR. The Aadhaar details will be submitted to the Central Identities Data Repository (CIDR) only for authentication. Linking of the Aadhaar number is mandatory for all prospective candidates to create new OTR, renew / access the existing OTR and apply for any recruitment to be notified henceforth.

2.6. Details to be furnished during One Time Registration:

2.6.1. Candidates shall furnish their correct SSLC Register Number and Certificate Number, Month and Year of Passing, Medium of Instruction, and Name of the Board that issued the certificate while registering online. If any detail furnished is found to be wrong, the online application will be rejected at any stage after due process.

2.6.2. Candidates who have more than one SSLC mark sheet, should enter the details available in the mark sheet issued on the final attempt in which he / she had passed the SSLC examination.

2.6.3. Besides details related to SSLC, all other details required in the One Time Registration, shall be furnished without any mistake, as these details shall form the basis of all other details given subsequently by the candidate while filling the online application for each recruitment.

2.7. One-Time Registration (OTR) Edit:

2.7.1. The candidates shall be permitted to edit the details in the OTR whenever required by uploading the supporting documents.
2.7.2. Any changes in the One Time Registration must be made before the submission of the online application since the details furnished in the One Time Registration will be filled in automatically in the online application. Hence, incorrect particulars furnished in the One Time Registration may result in the rejection of online application after due process. Candidates are therefore advised to fill in the One Time Registration particulars carefully and correctly.

2.7.3. The Commission will not be responsible for any consequences arising out of failure on the part of the candidates to adhere to the instructions issued regarding One Time Registration or filling up of online application.

2.7.4. The instructions and illustration regarding One Time Registration are available on the website viz., www.tnpscexams.in.

3. Online Application:

3.1. A candidate who wishes to apply for any post shall click “APPLY” against the post notified on the Commission’s website and use the same User ID and Password given for One Time Registration. User ID and Password are to be created by the candidates themselves. In case the candidate forgets the User ID and Password, he/she can retrieve or reset them using the “FORGOT PASSWORD and FORGOT USER ID” options. The Commission will not furnish User ID and Password details to the candidates.

3.2. A candidate already having user ID and password, has to login. The available One Time Registration particulars will be displayed on the screen, including the photograph furnished at the time of One Time Registration, as well as the photographs uploaded with previous online applications. Candidates shall check and confirm the One Time Registration details before proceeding further. Thereafter, the candidates shall fill up additional details required in the specific recruitment application. If any of the One Time Registration details are found to be incorrect, the same should be corrected by clicking on OTR Edit. Changes made in the One Time Registration will be reflected only in online applications to be submitted subsequently.

3.3. Candidates shall upload their photograph taken on or after the date of notification at the time of submission of each and every online application. The photograph should be in colour, of passport size, against a white background and taken in a photo studio. The candidate should be photographed in frontal view showing both ears and part of the neck. The candidate should ensure that the name of the candidate and the date of photography (i.e., on or after the date of notification) are printed at the bottom of the photograph. The face of the candidate as well as his / her name and date of photography should be clearly visible in the photograph of height 4.5 cm (170 pixels) and width 3.5 cm (130 pixels). Of the total height of the photograph, the image of the candidate shall be 3.0 cm (115 pixels) and the candidate’s name and date of photography shall be 1.5 cm (55 pixels), as illustrated above. The photograph should be saved in a digital format (in CD / DVD / pen drive / hard drive), ready for uploading.

3.4. If the photograph is not available in a digital format, a passport-size photograph showing the image of the candidate along with the name of the candidate and the date of photography printed at the bottom, in the same dimensions as specified above, may be pasted on a plain white paper and scanned to obtain a
resolution of 200 DPI. The image should then be cropped to show only the photograph of size 20 KB–50KB saved as “Photograph.jpg” and uploaded. The entire sheet of white paper on which the photograph is pasted should not be scanned / uploaded. Photographs taken using cellular phones, selfies, photocopies (Xerox) of photographs, photographs taken during family functions, at tourist places, or against a backdrop of plants or buildings should not be uploaded. Photographs of nature, wildlife, buildings, etc. shall not be uploaded. In case of uploading an inappropriate photograph, in violation of the aforementioned instruction, the application is liable to be rejected after due process.

3.5. Before uploading of signature, the candidate shall draw a box of dimension 6.0 x 2.0 cm (230 pixels x 75 pixels) on white paper and sign within the box, using a blue or black ink pen. The paper should then be scanned to obtain a resolution of 200 DPI. The image should then be cropped to show only the box with the signature, of size 10 KB –20KB, and saved as “Signature.jpg” and uploaded.

3.6. Clear images of the photograph and the signature should be uploaded in the correct dimensions, size, and format. Failure to upload/upload clear images of the photograph and signature will result in the rejection of the online application after due process.

3.7. Examination Centres:

3.7.1. While applying online, candidates shall be permitted to choose two district centres as their preference for the Written Examination. Candidates shall be allotted a venue in one of these two district centres. However, candidates with benchmark disability, shall be permitted to choose only one district centre and shall be allotted a venue in that district centre.

3.7.2. Candidates must appear for the examination at the venue they have been allotted, as mentioned in the memorandum of admission (hall ticket). Request for change of examination centre will not be permitted.

3.7.3. The Commission reserves the right to increase or decrease the number of examination centres and to re-allot the candidates accordingly. The Commission also reserves the right to allot a candidate to the nearby centre, if he / she could not be accommodated in the centres opted by the candidate.

3.7.4. The written examination will be held at the centres given below:

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<th>Code</th>
<th>S.No.</th>
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3.8. Application Preview:

3.8.1. Candidates should carefully fill in the details in the online application at the appropriate places and click on the ‘SAVE AND PROCEED’ button at the end of each page of the application. Before pressing the ‘SAVE AND PROCEED’ button, candidates are advised to verify each particular field in the application.

3.8.2. Candidates can edit / add / delete any information while filling the online application. Before finally submitting the application, candidates will be given the option of seeing a preview of their application. As soon as a candidate clicks the button meant for preview, an SMS will be sent to the registered mobile number, informing the availability of such a preview in the registered email ID provided by the candidate.

3.8.3. Once the candidate desires to make modifications based on the preview arrangement as indicated in the paragraph above, he/she may re-open the application and make necessary modifications using the Edit option and make the final submission of the corrected application, before the last date prescribed for submission of the online application. It is the responsibility of the candidate to carefully check the details available in the preview and make suitable corrections, if any, in the application / OTR before final submission. The candidate will be solely responsible for any non-rectification or non-submission of the application.

3.8.4. An individual is considered to have applied for a recruitment, if and only if, he / she finally submits the application, by clicking the ‘SUBMIT’ button. The mere availability of a preview shall not be tantamount to “having applied” for a particular recruitment.

3.9. Examination Fee:

3.9.1. The examination fee of Rs.100 (Rupees One hundred only) should be paid at the time of submitting the online application for this recruitment, unless exemption of fee is claimed.

3.9.2. Candidates belonging to special categories can avail of exemption from paying examination fees as per eligibility criteria. For further details refer to Annexure II of this Notification.

3.9.3. The total number of free chances availed, will be calculated based on claims made in previous applications. The number of free chances availed by the candidate may be verified by the Commission at any stage of the selection process. In case a candidate makes a false claim for exemption from payment of the application fee by suppressing information regarding his/her previous application(s), his / her candidature shall be rejected after due process and he / she shall be debarred for a period of one year, from appearing for examinations conducted by the Commission.

3.9.4. Candidates are directed to carefully choose the option “Yes” or “No” regarding availing of the fee concession. The choice made, cannot be modified or edited after successful submission of the online application. Candidates are advised in their own interest, to keep an account of the number of times fee concession has been availed, irrespective of the information displayed in the <Application History> of the candidate dashboard.

3.9.5. An application (irrespective of the post applied for) claiming fee concession will operate to exclude one chance from the number of free chances allowed. Candidates who have availed the maximum number of free chances permitted / candidates who do not wish to avail of the fee concession / candidates who are not eligible for fee concession shall choose the option “No” against the query regarding fee concession. Such candidates shall thereafter pay the requisite fee through the prescribed mode of payment.

3.9.6. Failure to pay the prescribed fee in time, along with the online application, will result in the rejection of the application after due process.
3.10. Examination Fee Payment:

3.10.1. After submitting the details in the online application, the candidates can pay the examination fee by online mode through Net Banking / Credit card / Debit card on or before the last date of submission of the online application by choosing the option in the online application. Candidates have to pay the service charges also as applicable.

3.10.2. Offline mode of payment if any received in the form of Demand Draft / Postal Order etc. will not be accepted and the applications forwarded with such modes of payment will be summarily rejected and the same will not be returned or refunded.

3.10.3. To facilitate payment of fees through the online mode, an additional page of the application format will be displayed wherein candidates may follow the instructions and fill in the requisite details to make payment. There is a possibility of online payment failure. Hence, if the online payment fails, candidates can check the status of the earlier transaction. If the earlier transactions have failed, the candidate shall retry paying the fee again by online mode. In case of online payment failure, the amount debited from the candidate’s account will be reverted to his/her account. The candidates have been given a provision to check the status of the transaction made. If all the attempts / transactions have failed, candidates have to make the payment again. The Commission is not responsible for online payment failure. It is the responsibility of the candidates to ensure that the transaction made by them is successful.

3.10.4. After submitting the payment information in the online application format, wait for the intimation from the server. Meanwhile, DO NOT press ‘Back’ or ‘Refresh’ button to avoid payment failure or double payment.

3.10.5. If the online transaction has been successfully completed, an Application Number / Applicant ID will be generated. Candidates should note the Application Number / ID for future reference in respect of the recruitment applied for.

3.10.6. Tamil Nadu Public Service Commission reserves the right to change the mode of payment at any time.

3.11. Online Application Edit:

3.11.1. The candidates shall be permitted to edit all the details in the online application till the last date stipulated for submission of the online application.

3.11.2. If the candidate desires to change his / her photograph and/or signature in his / her online application, the candidate shall select the edit option in the online application to re-upload them which must be saved finally before submitting the online application.

3.11.3. Some of the information contained in the online application has been brought forward from the candidate’s one-time registration. If such information has to be edited in the online application, the candidate shall select the edit profile option in One Time Registration (OTR) and shall make and save necessary corrections. After doing so, the candidate shall select the edit option in the online application and edit the details as desired. The candidate shall save the changes and submit it finally. The candidate shall take a printout of the same if required.

3.11.4. After editing the online application, if the edited details are not finally saved and submitted by the candidate, the details provided by the candidate in the application submitted before editing shall only be considered. If the candidate has to pay a fee based on the edited details, the candidate shall pay the prescribed examination fee in online. Candidates who have already paid the examination fee are not required to pay.
3.12. Application Correction Window:

3.12.1. After the last date for submission of the online application, the Online Application Correction Window shall open for 3 days as mentioned in Para 1 ‘Important Instructions’ of this Notification. During this period, candidates will be able to edit the details in their online application. After the last date of the Correction Window period, no modification is allowed in the online application.

3.12.2. The applications shall be processed as per the details finally furnished by the candidates. It is the responsibility of the candidates and the Commission has no liability for subsequent rejection of the application consequent to the editing details already submitted in the online application. Request / representation received for modification of claims in the online application, in any mode shall not be entertained.

3.13. Candidates are advised in their own interest to apply online much before the closing date and not to wait till the last date to avoid the possibility of disconnection / inability / failure to log on to the Commission's website on account of heavy load on internet / website.

3.14. The Commission does not assume any responsibility for the candidates not being able to submit their online applications within the last date on account of the aforesaid reasons or for any other reason beyond the control of the Commission.

3.15. Candidates need not send the printout of the online application or any other supporting documents to the Commission by post unless asked for specifically.

3.16. The name of the candidate or the name of his / her father or mother, should be spelt correctly in the application as it appears in the certificates / mark sheets.

3.17. Any discrepancy between the details as given in the online application and the documents submitted shall result in the summary rejection of candidature after due process.

3.18. The Commission will not be responsible for any consequences arising out of furnishing of incorrect and / or incomplete details in the application or omission to provide the required details in the application.

3.19. Upload of Documents:

3.19.1. Candidates should upload the required documents of proof in respect of all the claims made in the application with reference to this notification while applying for this post / these posts. If the required certificates are not uploaded by the candidate, within the stipulated time, his/her candidature will be rejected after due process.

3.19.2. The candidates shall have the option of verifying the uploaded certificates / documents through their OTR. If any of the certificates / documents have wrongly been uploaded or not uploaded or if any modifications are to be done in the uploading of documents, the candidates shall be permitted to upload / re-upload the documents till two days prior to the date of hosting of hall tickets for that particular examination. (i.e., twelve days prior to the date of examination).

3.19.3. The uploaded credentials shall be mapped with the One Time Registration of the respective candidate along with the Application number and Notification Number (i.e., with reference to the notification for each post), so that they can be used during future submission of application by the same candidates.

3.19.4. The online application of the candidates who have not uploaded the required supporting documents (correctly / clearly / legibly) on or before the stipulated period shall be rejected after due process.

3.19.5. The documents uploaded by the candidates shall be linked with OTR and retained in the server for a maximum period of two years. If the candidate applies subsequently for other posts within two years, the documents that were already uploaded shall be displayed to the candidate during the online application
process for confirmation and the same need not once again be uploaded by the candidates. If the candidate applies to other posts after the period of retention i.e. two years, the candidate shall be instructed to upload all the documents afresh.

4. Information regarding criminal cases / disciplinary cases:

4.1. Candidates who have declared pending criminal or disciplinary cases in their online application, must upload / produce a copy of the First Information Report (FIR) or memorandum of charges / show cause notice, as the case may be. Failure to upload / produce such papers at the time of submission of online application, shall result in rejection of candidature after due process.

4.2. Candidates who have declared conviction in criminal cases or punishment in disciplinary cases, in their online application, must upload / produce the relevant court orders and / or release orders or memorandum of proceedings, as the case may be, at the time of submission of online application. Failure to upload / produce such papers shall result in the rejection of candidature after due process.

4.3. In case any criminal case is filed / disciplinary action is taken against or conviction / punishment is imposed on a candidate after submission of the online application, at any stage of the recruitment process before the completion of the entire selection process, such candidates should report this fact to the Commission in the next immediate stage when Commission calls for uploading / producing documents. Failure to comply with these instructions shall result in the rejection of candidature after due process and debarment for a period of one year.

4.4. The pendency of disciplinary cases / criminal cases shall in no way affect the selection prospects of candidates. However, failure to inform such pendency, shall result in the rejection of candidature after due process.

5. Employment Details:

5.1. Candidates who are in the service of the Indian Union or a State in India or in the employment of Local Bodies or Universities or Quasi Government Organizations or Public Sector Units constituted under the authority of the Government of India or of a State in India, in regular service, must inform the Commission of such fact, at the time of applying. Suppression of the fact of employment by candidates shall result in rejection of candidature after due process.

5.2. Candidates need not send their applications through their Head of Department or employer. Instead, they may directly apply to the Commission after duly informing their employer in writing that they are applying for the particular recruitment, subject to the condition that they should produce ‘No Objection Certificate’ in the format prescribed as shown below.

**No Objection Certificate**

This is to certify that Thiru/Tmt./Selvi. ………………………………… (Name) employed as …………………… (designation) in this office from ……………………………(specify the date from which appointed), who is regularly / temporarily appointed and who is as probationer / approved probationer / full member, had applied for the post of ………………………………in ……………………………service called for by the Tamil Nadu Public Service Commission through online application form to the Tamil Nadu Public Service Commission and informed the fact to this department / organisation. This department / organisation has ‘no objection’ for processing the said application of the individual by the Tamil Nadu Public Service Commission subject to the condition that the particulars furnished by the individual are found to be correct.

Appointing Authority
(Signature with Seal)
* In the case of a Government servant against whom departmental or criminal proceedings are contemplated or pending, the appointing authority shall inform the said fact to the Tamil Nadu Public Service Commission along with the "No Objection Certificate" and shall also inform the Tamil Nadu Public Service Commission about the initiation of departmental or criminal proceedings, if any, subsequently, till the date of his / her actual relief from the office to take up appointment in the post for which he / she has been selected.

5.3 Candidates who secure employment after submission of online application, must upload / produce a ‘No Objection Certificate’ or at least an undertaking regarding the fact of employment and that ‘No Objection Certificate’ has been applied for. Failure to upload / produce the 'No Objection Certificate' / an undertaking shall result in the rejection of candidature after due process.

5.4. Candidates who have been removed / dismissed / resigned from a post, shall intimate such fact to the Commission, through the One Time Registration Dashboard. Any failure in this regard shall result in the rejection of the candidature after due process.

5.5. Any change in the employment status of the candidate, whether appointment to or resignation / removal / dismissal, from a post, at any stage of the recruitment process, until completion of the entire selection process, must be informed to the Commission. Any failure in this regard shall result in the rejection of the candidature after due process.

5.6. Failure on the part of employed candidates to upload / produce the ‘No Objection Certificate’ shall result in the rejection of candidature after due process.
Annexure II

1. Ex-Servicemen:

1.1. ‘Ex-serviceman’ means,

1.1.1. any person who had served in any rank (whether as combatant or not) in the Armed Forces of the Union for a continuous period of not less than six months after attestation, if released between 1st July 1979 and 30th June 1987 (both days inclusive):
   a. for reasons other than at his own request or by way of dismissal or discharge on account of misconduct or inefficiency; or
   b. at his own request after serving for a period of not less than five years; or

1.1.2. Any person who had served in any rank (whether as combatant or not) in the Armed Forces of the Union, and had retired or had been released on or after 1st July 1987 from such service:
   a. at his own request after earning his pension; or
   b. on medical grounds attributable to military service or circumstances beyond his control and awarded medical or other disability pension; or
   c. otherwise than at his own request after earning his pension, as a result of reduction in establishment; or
   d. after completing specific period of engagement, otherwise than at his own request or by way of dismissal or discharge on account of misconduct or inefficiency and has been given a gratuity.

1.1.3. any person of the Territorial Army of the following categories, namely, pension holder for continuous embodied service, person with disability attributable to military service and gallantry award winner retired on or after 15th November 1986; or

1.1.4. any person of the Army Postal Service, who retired on or after 19th July 1989 directly from the said service without reversion to Postal and Telegraph Department with pension or who has been released on or after 19th July 1989 from such service on medical grounds attributable to military service or circumstances beyond his control and awarded medical or other disability pension; or

1.1.5. Any person who was on deputation in the Army Postal Service for more than 6 months prior to the 14th day of April 1987; or

1.1.6. Any person who was boarded out or released on medical grounds and granted medical or disability pension; or

1.1.7. any person discharged on or after July 1987 under Army Rule 13(3) III (V) for the reason that his service is no longer required and in receipt of pension; or

1.1.8. Such other person as may be notified by the Government from time to time.

1.2. Ex-servicemen does not mean the wards / dependants of those mentioned above.

1.3. A person discharged before July 1987 under Army Rule 13(3) III (V) for the reason that his service is no longer required is not an ex-serviceman.

1.4. In all cases, an ex-serviceman once recruited to a post in any class or service or category, cannot claim the concession of being called an ex-serviceman for his further recruitment.
1.5. Persons serving in the Armed Forces shall be eligible to apply for posts under the Government, if they are due to complete the specified term of their engagement in the Armed Forces, within one year from the last date prescribed by the Commission, for receipt of the online application in respect of a particular recruitment.

1.6. The above mentioned age concession will not apply to the Ex-Servicemen candidates who have already been recruited to any class or service or category.

1.7. **Fee Concession**: Two free chances.

1.8. **Reservation of Appointments**: The rule of reservation of appointment to Ex-Servicemen is applicable only for the posts in Level- 9 to 12 in the Pay Matrix in the notification. If no qualified and suitable Ex-Servicemen belonging to a particular category is available for selection for appointment against reserved turn, such turn shall be filled up by a candidate other than Ex-Servicemen belonging to the particulars communal category.

1.9. **Supporting Documents**:

1.9.1. A candidate who claims to have been demobilised from the Army or Navy or Air Force needs to upload/produce either a properly authenticated extract from his Discharge Certificate (viz., a Bonafide Certificate) issued by the Ex-Servicemen’s Welfare Board in the format as depicted below or the Pension Pay Order at the time of submission of online application.

**Form of Bonafide Certificate to be produced by Ex-Servicemen**

1. Name of the applicant
2. Rank held, Name of the Service (Army / Navy / Air force)
3. Date of enrolment
4. Date of discharge
5. Reasons for discharge
6. Whether an 'Ex-Serviceman' should be specifically stated
7. Whether in receipt of pension
8. P.P.O No.
9. Conduct and character while serving in the defence forces
10. Name of the post applying for
11. Unique Service No.
12. Whether the individual is employed in any post under the Government of Tamil Nadu? If so, Name of the post and date of appointment

1.9.2. Persons serving in the Armed Forces who are due to complete the specified term of their engagement in the Armed Forces, within one year from the last date prescribed by the Commission, for receipt of the online application in respect of this recruitment, shall upload / produce at the time of certificate verification, an undertaking and a certificate from their Commanding Officer in the format as depicted below.
Form of Undertaking to be given by the Serving Personnel

I hereby accept that if selected on the basis of the recruitment / examination to which this application relates, I will produce documentary evidence to the satisfaction of the appointing authority that I have been duly released / retired / discharged from the Armed Forces and I am entitled to the benefits admissible to Ex-Servicemen given under Section 63 of the Tamil Nadu Government Servants (Conditions of Service) Act, 2016.

Place:                                                                                                         Signature of the Applicant

Form of Certificate for Serving Personnel

I hereby certify that according to the information available with me (Number) ..........(Rank) ....................
(Name) is due to complete the specified term of his engagement with the Armed Forces on the (date) ...........

Place:                                                                                       Signature of the Commanding Officer

Date:

1.9.3. Failure to upload/produce the supporting documents at the time of applying shall result in the rejection of candidature after due process.

2. Persons with Benchmark Disability:

2.1. “Person with Benchmark Disability” means a person with not less than forty percent of a specified disability where specified disability has not been defined in measurable terms and includes a person with disability where specified disability has been defined in measurable terms, as certified by the certifying authority designated by the Government under sub-section (1) of section 57 of the Rights of Persons with Disabilities Act, 2016.

2.2 Fee Concession: Full exemption.

2.3. Reservation of Appointments: (For posts identified suitable for persons with benchmark disabilities)
Out of the total number of appointments to be made in the communal reservation categories, viz., Scheduled Castes / Scheduled Caste - Arunthathiyars (on preferential basis) / Scheduled Tribes / Most Backward Classes / Denotified Communities / Backward Classes (other than Muslim) / Backward Classes (Muslim) and General Turn, in the case of appointment made by direct recruitment, 1% each shall be reserved for persons with benchmark disabilities under categories (a), (b) and (c) and 1% for persons with benchmark disabilities under categories (d) and (e) both taken together, namely:

a. blindness and low vision;
b. deaf and hard of hearing;
c. locomotor disability including cerebral palsy, leprosy cured, dwarfism, acid attack victims and muscular dystrophy;
d. autism, intellectual disability, specific learning disability and mental illness;
e. Multiple disabilities from amongst persons under categories (a) to (d) including deaf-blindness in the posts identified for each disability.
2.4. Supporting Documents:

2.4.1. The Persons with Benchmark Disability should produce Disability Certificate at the time of online application in the format shown below, prescribed in the Rights of Persons with Disabilities Rules, 2017 and issued by the competent authority as mentioned below:

**Form V**

**Certificate of Disability**

*(In cases of amputation or complete permanent paralysis of limbs or dwarfism and in case of blindness)*

*(Name and Address of the Medical Authority issuing the Certificate)*

<table>
<thead>
<tr>
<th>Certificate No.</th>
<th>Date:</th>
</tr>
</thead>
</table>

This is to certify that I have carefully examined Shri./ Smt./ Kum.________________________ Son / wife / daughter of Shri.________________________ Date of Birth (DD/ MM/YY)________________________ Age _____ years, male / female _____ Registration No. __________ permanent resident of House No. __________ Ward / Village / Street __________ Post Office __________ District __ State __, whose photograph is affixed above, and am satisfied that:

(A) he / she is a case of:
   * locomotor disability
   * dwarfism
   * blindness

(Please tick as applicable)

(B) the diagnosis in his / her case is______________

(C) he / she has_____ % (in figure)____________ percent (in words) permanent locomotor disability/ dwarfism/ blindness in relation to his / her __________ (part of body) as per guidelines

(____________ number and date of issue of the guidelines to be specified).

2. The applicant has submitted the following document as proof of residence:-

<table>
<thead>
<tr>
<th>Nature of Document</th>
<th>Date of Issue</th>
<th>Details of authority issuing certificate</th>
</tr>
</thead>
</table>

Signature/ thumb impression of the person in whose favour certificate of disability is issued.

(Signature and Seal of Authorized Signature of notified Medical Authority)
Form VI
Certificate of Disability
(In cases of multiple disabilities)
(Name and Address of the Medical Authority issuing the Certificate)

Recent passport size attested photograph (Showing face only) of the person with disability.

Certificate No.__________________________ Date:________
This is to certify that we have carefully examined Shri./ Smt./ Kum.________________ son/ wife/ daughter of Shri_________________ Date of Birth (DD/ MM/ YY) ____________ Age _____ years, male/ female ___. Registration No. ________________ permanent resident of House No. ____________ Ward/
Village/ Street ___________ Post Office ___________ District ____________ State ____________, whose
photograph is affixed above, and am satisfied that:

(A) he/ she is a case of Multiple Disability. His/ her extent of permanent physical impairment/ disability has been evaluated as per guidelines (........................ number and date of issue of the guidelines to be specified) for the disabilities ticked below, and is shown against the relevant disability in the table below:

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Disability</th>
<th>Affected part of body</th>
<th>Diagnosis</th>
<th>Permanent physical impairment/ mental disability (in%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Locomotor disability</td>
<td>@</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td>Muscular Dystrophy</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td>Leprosy cured</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td>Dwarfism</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5.</td>
<td>Cerebral Palsy</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6.</td>
<td>Acid attack Victim</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7.</td>
<td>Low vision</td>
<td>#</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8.</td>
<td>Blindness</td>
<td>#</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9.</td>
<td>Deaf</td>
<td>£</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10.</td>
<td>Hard of Hearing</td>
<td>£</td>
<td></td>
<td></td>
</tr>
<tr>
<td>11.</td>
<td>Speech and Language disability</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12.</td>
<td>Intellectual Disability</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>13.</td>
<td>Specific Learning Disability</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>15.</td>
<td>Mental illness</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>16.</td>
<td>Chronic Neurological Conditions</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>17.</td>
<td>Multiple sclerosis</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>18.</td>
<td>Parkinson's disease</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>19.</td>
<td>Haemophilia</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>20.</td>
<td>Thalassemia</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>21.</td>
<td>Sickle Cell disease</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

(B) In the light of the above, his/ her over all permanent physical impairment as per guidelines (........................ number and date of issue of the guidelines to be specified), is as follows :-
In figures : ------------ percent
In words : ------------------------------------------------ percent

2. This condition is progressive/ non-progressive/ likely to improve/ not likely to improve.

3. Reassessment of disability is:
   (i) not necessary, or
   (ii) is recommended/ after ...... years ...... months, and therefore this certificate shall be valid till --- --- --- (DD) (MM) (YY)

@ e.g. Left/ right/ both arms / legs
# e.g. Single eye
£ e.g. Left/ Right/ both ears

4. The applicant has submitted the following document as proof of residence:-

<table>
<thead>
<tr>
<th>Nature of document</th>
<th>Date of issue</th>
<th>Details of authority issuing certificate</th>
</tr>
</thead>
</table>

5. Signature and seal of the Medical Authority.

<table>
<thead>
<tr>
<th>Name and Seal of Member</th>
<th>Name and Seal of Member</th>
<th>Name and Seal of the Chairperson</th>
</tr>
</thead>
</table>

Signature/ thumb impression of the person in whose favour certificate of disability is issued.
Certificate No._____________ Date:________

This is to certify that I have carefully examined Shri./ Smt./ Kum. __________________ son / wife / daughter of Shri _______________ Date of Birth (DD/ MM/ YY)______ Age _______ years, male/ female permanent resident of House No. ___________ Ward/ State ____________________, whose photograph is affixed above, and am satisfied that he/ she is a case of ________________ disability. His/ her extent of percentage physical impairment/ disability has been evaluated as per guidelines (................. number and date of issue of the guidelines to be specified) and is shown against the relevant disability in the table below:-

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Disability</th>
<th>Affected part of body</th>
<th>Diagnosis</th>
<th>Permanent physical impairment/mental disability (in %)</th>
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<td></td>
<td></td>
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<td>Muscular Dystrophy</td>
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<td>3.</td>
<td>Leprosy cured</td>
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<td>Cerebral Palsy</td>
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<td>Low vision</td>
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<td>7.</td>
<td>Deaf</td>
<td>€</td>
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<td>8.</td>
<td>Hard of Hearing</td>
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<td>Intellectual Disability</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11.</td>
<td>Specific Learning Disability</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12.</td>
<td>Autism Spectrum Disorder</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>13.</td>
<td>Mental illness</td>
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<td>19.</td>
<td>Sickle Cell disease</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

(Please strike out the disabilities which are not applicable)

2. The above condition is progressive / non-progressive / likely to improve / not likely to improve.
3. Reassessment of disability is:
   (i) not necessary, or
   (ii) is recommended/ after __ years __ months, and therefore this certificate shall be valid till
4. The applicant has submitted the following document as proof of residence:

<table>
<thead>
<tr>
<th>Nature of Document</th>
<th>Date of Issue</th>
<th>Details of authority issuing certificate</th>
</tr>
</thead>
</table>

(Authorized Signatory of notified Medical Authority)
(Name and Seal)

Countersigned

{Counter signature and seal of the
Chief Medical Officer/ Medical Superintendent/
Head of Government Hospital, in case the
Certificate is issued by a medical authority who is
not a Government servant (with seal)}

Signature/ thumb impression of the person in whose favour certificate of disability is issued.
List of Certifying Authority for the issue of disability certificate

### TABLE – I

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Specified disability</th>
<th>Medical Authority for the purpose of the issue of disability certificate</th>
<th>Certifying authority to issue certificate of disability</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>In case of amputation or complete permanent paralysis of limbs or dwarfism</td>
<td>Hospitals/ Institutions/ Primary Health Centres run by Central and State Government/ Statutory Local bodies</td>
<td>Any doctor/ medical practitioner working in the Hospitals/ Institutions/ Primary Health Centres run by Government/ Statutory Local bodies.</td>
</tr>
<tr>
<td>2</td>
<td>Multiple Disability</td>
<td>District Hospital/ Other hospitals/ Institutions run by Central and State Government /Statutory Local Bodies having relevant medical specialist and testing/assessment facilities</td>
<td>Medical Board consisting of three members of whom two will be specialist dealing with relevant disabilities</td>
</tr>
<tr>
<td>3</td>
<td>Specified Disabilities not mentioned in Serial numbers 1 &amp; 2 above</td>
<td>Hospitals / Primary Health Centers / Institutions run by Central and State Government/ Statutory Local bodies having relevant medical specialist and testing / assessment facilities</td>
<td>A specialist dealing with the relevant disability as specified in the Table - II given below</td>
</tr>
</tbody>
</table>

### TABLE – II

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Category</th>
<th>Specialist</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Locomotor disability other than amputation or complete permanent paralysis of limbs and dwarfism</td>
<td>Specialist in Physical Medicine and Rehabilitation or Orthopaedician.</td>
</tr>
<tr>
<td>2</td>
<td>Muscular Dystrophy</td>
<td>Specialist in Physical Medicine and Rehabilitation or Orthopaedician.</td>
</tr>
<tr>
<td>3</td>
<td>Leprosy cured person</td>
<td>Specialist in Physical Medicine and Rehabilitation or Orthopaedician.</td>
</tr>
<tr>
<td>4</td>
<td>Cerebral Palsy</td>
<td>Specialist in Physical Medicine and Rehabilitation or Orthopaedician.</td>
</tr>
<tr>
<td>5</td>
<td>Acid Attack Victim</td>
<td>Specialist in Physical Medicine and Rehabilitation or Orthopaedician.</td>
</tr>
<tr>
<td>6</td>
<td>Blindness</td>
<td>Specialist in the field of Ophthalmology.</td>
</tr>
<tr>
<td>7</td>
<td>Low Vision</td>
<td>Specialist in the field of Ophthalmology.</td>
</tr>
<tr>
<td>8</td>
<td>Deaf</td>
<td>Specialist in the field of Ear, Nose, Throat (E.N.T).</td>
</tr>
<tr>
<td>9</td>
<td>Hard of Hearing</td>
<td>Specialist in the field of Ear, Nose, Throat (E.N.T).</td>
</tr>
<tr>
<td>---</td>
<td>-----------------</td>
<td>-------------------------------------------------</td>
</tr>
<tr>
<td>10</td>
<td>Speech and Language Disabilities</td>
<td>Specialist in the field of Ear, Nose, Throat (E.N.T) and Neurologist.</td>
</tr>
<tr>
<td>11</td>
<td>Intellectual Disability</td>
<td>Psychiatrist.</td>
</tr>
<tr>
<td>12</td>
<td>Specific Learning Disabilities</td>
<td>Medical board consisting of a) Paediatrician; and b) Psychiatrist and Trained Psychologist.</td>
</tr>
<tr>
<td>13</td>
<td>Autism spectrum disorder</td>
<td>Medical Board consisting of a) Psychiatrist and Trained psychologist; and b) Paediatrician or General Physician.</td>
</tr>
<tr>
<td>14</td>
<td>Mental Illness</td>
<td>Psychiatrist.</td>
</tr>
<tr>
<td>15</td>
<td>Chronic Neurological Conditions such as Multiple Sclerosis and Parkinson’s Disease</td>
<td>Medical Board consisting of a) Psychiatrist and Trained Psychologist; and b) Neurologist; and c) Orthopaedician or Specialist in Physical Medicine and Rehabilitation.</td>
</tr>
</tbody>
</table>

2.4.2. In case the certificate is issued by a medical authority who is not a Government servant, it shall be valid only if countersigned by the Joint Director, Medical Services.

2.4.3. The disability claimed in the online application, shall be exactly the same as stated in the Disability Certificate. Any discrepancy in this regard shall result in rejection of candidature after due process.

2.4.4. Claim as person with benchmark disability, unsupported by the prescribed documents shall result in rejection of candidature after due process.

3. Destitute Widow:

3.1. “Destitute Widow” means a widow whose total monthly income from all sources shall not be more than Rs.4,000/- (Rupees Four Thousand only), including any family pension or other receipts including income from private practice in the case of professionals. Destitute Widow shall not include a divorcee or a woman deserted by her husband. The status of an individual as Destitute Widow is with reference to the date of notification.

3.2. Fee Concession: Full exemption.

3.3. Reservation of Appointments: The rule of reservation of appointment to Destitute Widow candidates will apply for this recruitment. 10% of vacancies out of 30% of vacancies set apart for Women candidates in direct recruitment are reserved for Destitute Widows. The reservation of appointment to Destitute Widow is applicable only for the post which does not exceed Level-10 in the pay matrix in this notification. If no qualified and suitable destitute widow is available, then, the turn so set apart for destitute widow shall go to the women / Transgender (Women) (other than destitute widow) belonging to the respective category.
3.4. Supporting Documents:

3.4.1. The Destitute Widows should produce a certificate from the Revenue Divisional Officer or the Assistant Collector or the Sub-Collector concerned, in the format prescribed below. Failure to upload / produce such certificate or uploading / production of a widow or divorcee certificate at the time of online application shall result in rejection of candidature after due process.

**Form of Destitute Widow Certificate**

1. Name of the individual
2. Full Postal Address
3. Details of job held, if any:
4. Particulars of her children, if any
5. Name and last occupation of her late husband
6. Date of demise of her husband
7. Monetary benefits received after her husband’s death by way of family pension, insurance, etc., if any
8. Details of Properties if any immovable and movable left behind by him
9. Present monthly income—
   a. From salaries/wages
   b. From family pension
   c. From private properties
   d. Rents received
   e. From private practice
   f. Other sources, if any
   g. Total
10. Whether living alone or living with her husband’s parents / in-laws / parents / brother(s)
11. Whether she satisfies the definition of the term “Destitute Widow” as defined in section 20(8) and 26 of Tamil Nadu Government Servants (Conditions of Service) Act, 2016.

Certified that I have verified the particulars furnished by the individual and satisfied myself as to the correctness of her claim with reference to the definition of the term – “Destitute Widow” in section 20(8) and 26 of Tamil Nadu Government Servants (Conditions of Service) Act, 2016.

Certificate Reference No.: Signature:
Place: Name:
Date: Designation:

Revenue Divisional Officer / Assistant Collector / Sub-Collector

Explanation - The above certificate should be issued only by the Revenue Divisional Officer or the Assistant Collector or the Sub-Collector concerned.

3.4.2. A ‘Widow Certificate’ is different from a ‘Destitute Widow Certificate’. Candidates who have uploaded / produced Widow Certificates will not be considered as Destitute Widow.

3.4.3. Claim as Destitute Widow shall be admitted only if the date of demise of husband is on or before the date of notification.
3.4.4. Any correction in the Destitute Widow certificate must be attested by the issuing authority or a fresh certificate in lieu thereof must be uploaded / produced.

4. Person Studied in Tamil Medium (PSTM):

4.1. “Person Studied in Tamil medium” means a person who has studied through Tamil medium of instruction up to the educational qualification prescribed for direct recruitment in the rules or regulations or orders applicable to any appointment in the services under the State.

4.1.1. In cases where a Degree is prescribed as the educational qualification, one shall have studied from first standard to Degree through Tamil medium of instruction.

4.1.2. In cases where a Post Graduate Degree is prescribed as the educational qualification, one shall have studied from first standard to Post Graduate Degree through Tamil medium of instruction.

4.2. Supporting Documents:

4.2.1. Candidates claiming to be Persons Studied in Tamil Medium (PSTM) must upload/produce evidence for the same, in the form of SSLC, HSC, Transfer Certificate, Provisional Certificate, Convocation Certificate, Degree Certificate, PG Degree Certificate, Mark Sheets, Certificate from the Board or University or from the Institution, as the case may be, with a recording that he had studied the entire duration of the respective course(s) through Tamil medium of instruction.

4.2.2. Candidates must upload/produce documents as evidence of having studied in the Tamil medium, all educational qualifications from 1st standard up to the educational qualification prescribed.

4.2.3. If no such document as evidence for ‘Person Studied in Tamil Medium’ is available, a certificate from the Principal / Head Master / District Educational Officer / Chief Educational Officer / District Adi Dravidar Welfare Officer / Registrar / Controller of Examinations / Head / Director of the Educational Institution / Director / Joint Director of Technical Education / Registrar of Universities as the case may be, in the format as shown below, must be uploaded / produced, for each and every educational qualification, from 1st standard upto the educational qualification prescribed.

4.2.4. Failure to upload/produce such documents as evidence for ‘Persons Studied in Tamil Medium’ for all educational qualification up to the educational qualification prescribed, at the submission of online application shall result in the rejection of candidature after due process.

4.2.5. Documents uploaded / produced as proof of having studied in Tamil medium, for the partial duration of any course / private appearance at any examination, shall not be accepted and shall result in the rejection of candidature after due process.
Certificate for having studied in Tamil Medium

This is to certify that Thiru./Tmt./Selvi. …………………………………(Name) had studied Classes ………. to ………… with Tamil as the medium of instruction, during the year …………. to ………….. and had satisfactorily completed the course of studies prescribed for Classes ……….. to ……….

Thiru./Tmt./Selvi. …………………………………(Name) was / was not awarded scholarship meant for students studying in the Tamil medium.

This certificate is issued with reference to Section 2(d) of the PSTM (Amendment) Act, 2020, based on verifiable documentary evidence. The undersigned assumes full responsibility for the veracity of the contents herein.

Signature of Principal / Head Master / District Educational Officer / 
Chief Educational Officer / 
District Adi Dravidar Welfare Officer

Place: 
Date: Seal of the Institution Mobile No. __________________________

# - If the candidate has studied in different schools from 1st std. up to 10th std./ 12th std., then the above certificate shall be obtained from each of the schools the candidate has studied in.

Certificate for having studied in Tamil Medium

This is to certify that Thiru./Tmt./Selvi. …………………………………(Name) had studied………………… (Diploma/Degree/PG Degree, etc.) during the year …………. to ………….. with Tamil as the medium of instruction and had satisfactorily completed the course of studies prescribed for ………….. (Diploma / Degree/PG Degree, etc.).

Thiru./Tmt./Selvi. …………………………………(Name) was / was not awarded scholarship meant for students studying in the Tamil medium.

This certificate is issued with reference to Section 2(d) of the PSTM (Amendment) Act, 2020, based on verifiable documentary evidence. The undersigned assumes full responsibility for the veracity of the contents herein.

Signature of Registrar / Principal / Controller of Examinations / 
Head / Director of Educational Institution / Director/Joint Director of Technical Education/ Registrar of Universities

Place: 
Date: Seal of the Institution Mobile No. __________________________

@If the candidate has completed different courses in different Institutions, such a certificate shall be obtained from each of these Institutions for the courses completed therein.
5. Scheduled Castes, Scheduled Caste (Arunthathiyars) and Scheduled Tribes:

5.1. “Scheduled Castes” means the communities given in the Annexure to the “Instructions to Applicants” [extracted from Part-A of Schedule-II of the Tamil Nadu Government Servants (Conditions of Service) Act, 2016].

5.2. ‘Arunthathiyar’ means the castes: Arunthathiyar, Chakkiliyan, Madari, Madiga, Pagadai, Thoti and Adi Andhra.

5.3. “Scheduled Tribes” means the communities given in the Annexure to the “Instructions to Applicants” [extracted from Part-B of Schedule-II of Tamil Nadu Government Servants (Conditions of Service) Act, 2016.

Note: Persons belonging to Tamil Nadu and to any one of the communities mentioned in the lists shown in the Annexure to the “Instructions to Applicants” alone shall be treated as Scheduled Castes or Scheduled Tribes as the case may be. Persons belonging to other States shall not be treated as belonging to the Scheduled Castes or Scheduled Tribes even though they may belong to any one of the communities specified in the list.

5.4. Fee Concession: Full exemption

5.5. Reservation of Appointments: The selection will be made following the rule of reservation of appointments for Scheduled Castes / Scheduled Caste (Arunthathiyars) / Scheduled Tribes.

<table>
<thead>
<tr>
<th>Community</th>
<th>Reservation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scheduled Caste (SC)</td>
<td>15%</td>
</tr>
<tr>
<td>Scheduled Caste (Arunthathiyar) (SCA)</td>
<td>3%</td>
</tr>
<tr>
<td>Scheduled Tribe (ST)</td>
<td>1%</td>
</tr>
</tbody>
</table>

5.6. Supporting Documents:

5.6.1. The Scheduled Caste (Arunthathiyars) and Scheduled Castes candidates should produce the Community certificate, citing either father’s / mother’s name, issued by Taluk Tahsildar, in whose jurisdiction the candidate claims to have permanent residence.

5.6.2. The Scheduled Tribe candidates should produce the Community certificate, citing either father’s / mother’s name, issued by the Revenue Divisional Officer / Assistant Collector / Sub-Collector / Personal Assistant (General) to the Collector of Chennai / District Adi-Dravidar Welfare Officer, in whose jurisdiction the candidate claims to have permanent residence.

5.6.3. Candidates belonging to Scheduled Tribe communities must upload/produce the report of the State Level Scrutiny Committee (SLSC), if available. Failure to do so would render their claim liable to verification by the State Level Scrutiny Committee.

5.6.4. Uploading / production of a community certificate citing name of the spouse, shall result in rejection of candidature after due process.

5.6.5. The certificate obtained by the candidates in the form other than the one referred to in G.O. Ms. No.781, Revenue Department, dated 2nd May 1988 and solely based on the entries in SSLC or Transfer Certificate or other school / college records will not be accepted.
5.6.6. Candidates are warned that if the community recorded in the certificate produced by them from the competent authority is not included in the list of Scheduled Castes, Scheduled Caste (Arunthathiyyars), Scheduled Tribes, given in the Annexure to the “Instructions to Applicants” [extracted from the Tamil Nadu Government Servants (Conditions of Service) Act, 2016], they will not be permitted to claim to belong to Scheduled Castes, Scheduled Caste (Arunthathiyars), Scheduled Tribes, as the case may be. They will, in that case, be permitted to claim to belong to ‘Others’ category only.

5.6.7. Candidates belonging to Scheduled Castes, on conversion to religions other than Christianity / Islam, shall be treated as ‘Others’. However, Scheduled Caste converts to Sikhism and Buddhism shall be treated as Scheduled Castes.

5.6.8. Failure to upload / produce the supporting documents at the time of online application shall result in the rejection of candidature after due process.

6. Backward Classes:

6.1. “Backward Classes” means the communities specified as Backward Classes, Backward Class Muslims, Most Backward Classes / Denotified Communities given in the Annexure to the “Instructions to Applicants” [extracted from Parts A, B, C and D respectively, of Schedule-I of the Tamil Nadu Government Servants (Conditions of Service) Act, 2016].

6.2. Explanation - Persons who belong to the State of Tamil Nadu alone, who belong to one of the communities specified in Schedule-I, of the Tamil Nadu Government Servants (Conditions of Service) Act, 2016 shall be treated as persons who belong to one of such communities.

6.3. Fee Concession: Three Free Chances

6.4. Reservation of Appointments: The selection will be made following the rule of reservation of appointments for Backward Classes (Muslim), Backward Classes, Most Backward Classes and Denotified Communities.

<table>
<thead>
<tr>
<th>Backward Class (BC)</th>
<th>26.5%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Backward Class (Muslim) [BC (M)]</td>
<td>3.5%</td>
</tr>
<tr>
<td>Most Backward Class / Denotified Communities (MBC / DC)</td>
<td>20.0%</td>
</tr>
</tbody>
</table>

6.5. Supporting Documents:

6.5.1. The candidates belonging to Backward Classes (Muslim), Backward Classes, Most Backward Classes and Denotified Communities should produce the Community certificate, citing either father’s / mother’s name, issued by Revenue Officer not lower in rank than a Tahsildar or Head Quarters Deputy Tahsildar or Special Deputy Tahsildar appointed to issue Community Certificate or Deputy Tahsildar (School Certificates) or Executive Deputy Tahsildar (in respect of Chennai district) or Additional Head Quarters Deputy Tahsildar or Zonal Deputy Tahsildar, in whose jurisdiction the candidate claims to have permanent residence.

6.5.2. The candidates belonging to Thottia Naicker (including Rajakambalam, Gollavar, Sillavar, Thockalavar, Thozhava Naicker, and Erragollar) included in the list of MBC / DC should produce the Community certificate, citing either father’s / mother’s name, issued by Head Quarters Deputy Tahsildar/ Zonal Deputy Tahsildar, in whose jurisdiction the candidate claims to have permanent residence.

6.5.3. Uploading / production of a community certificate citing name of the spouse, shall result in rejection of candidature after due process.
6.5.4. The certificate obtained by the candidates in the form other than the one referred to in G.O. Ms. No.781, Revenue Department, dated 2nd May 1988 and solely based on the entries in SSLC or Transfer Certificate or other school / college records will not be accepted.

6.5.5. Candidates are warned that if the community recorded in the certificate produced by them from the competent authority is not included in the list of Backward Classes (Muslim), Backward Classes, Most Backward Classes / Denotified Communities, given in the Annexure to “Instructions to Applicants” [extracted from the Tamil Nadu Government Servants (Conditions of Service) Act, 2016], they will not be permitted to claim to belong to Most Backward Classes / Denotified Communities, Backward Classes (other than Muslim) or Backward Classes (Muslim), as the case may be. They will, in that case, be permitted to claim to belong to ‘Others’ category only.

6.5.6. Candidates belonging to Backward Classes, Most Backward Classes / Denotified Communities on conversion to religions other than Christianity / Islam, shall be treated as ‘Others’.

6.5.7. Failure to upload / produce the supporting documents at the time of online application shall result in the rejection of candidature after due process.

7. Women:

7.1. Reservation of Appointments: A minimum of 30% of all vacancies shall be set apart for women candidates, irrespective of the fact of whether the rule of reservation of appointments applies to the posts or not. In respect of the posts to which the rule of reservation of appointments applies, 30% of vacancies shall be set apart for women candidates, following the reservation for each communal category as well as open category. Women / Transgender (women) candidates shall be entitled to compete for the said 30% of vacancies. They shall also be entitled to compete for the remaining 70% of vacancies along with male / Transgender / Transgender (men) candidates.

7.2. Supporting Documents: Gender claimed shall be verified against the Transfer Certificate / Community Certificate. Failure to upload/produce the supporting documents at the time of submission of online application shall result in the rejection of candidature after due process.

8. Transgender:

8.1. Supporting Documents:

8.1.1. Transgender / Transgender (Male) / Transgender (Female) candidates should produce the Transgender ID card issued only by the Tamil Nadu Transgender Welfare Board.

8.1.2. Uploading / production of Transgender ID card, issued by any authority other than the Tamil Nadu Transgender Welfare Board shall result in rejection of candidature after due process.

8.1.3. Transgender or Transgender (Male) or Transgender (Female) claim made in the online application must correspond to what is stated in the Transgender ID card. Any discrepancy in this regard shall result in rejection of candidature after due process.

8.1.4. Gender claim unsupported by the requisite documents shall result in rejection of candidature after due process.
8.2. Community:

8.2.1. Transgender candidates, who do not possess any community certificate may choose to be considered under ‘Others’ or under Most Backward Classes.

8.2.2. Transgender candidates who belong to Scheduled Caste / Scheduled Caste (Arunthathiya) / Scheduled Tribe communities and possess community certificate as such, shall be considered as per their respective community.

8.2.3. Transgender candidates who belong to communities other than Scheduled Caste / Scheduled Caste (Arunthathiya) / Scheduled Tribe and possess community certificate as such, are permitted to choose to be considered as belonging to their own community or as Most Backward Class, whichever is advantageous to them, at the time of One Time Registration itself. Once the individual opts to be considered as a particular community, it shall be crystallized and this option shall not be changed in the future.

8.2.4. Transgender candidates who do not possess a community certificate and have chosen to be considered under ‘Most Backward Classes’ or ‘Others’ and those in possession of a community certificate as Backward Classes / Backward Classes (Muslim) / Denotified Communities but have chosen to be considered under ‘Most Backward Classes’, need not upload / produce a community certificate in support of their claim.

8.2.5. Transgender candidates, in possession of a community certificate and who have chosen to be considered under the communal reservation category as stated in the community certificate, must upload / produce the same. Failure to upload / produce such a certificate shall result in rejection of candidature after due process.

8.2.6. All concessions permitted to Transgender candidates in the matter of choice of communal reservation category, shall be wholly dependent on the uploading / production of a Transgender ID card issued by the Tamil Nadu Transgender Welfare Board. Failure to upload / produce the same or uploading / production of a Transgender ID card issued by other authorities, shall result in rejection of candidature after due process.
1. பிரித்துதல் / தேர்த்துதல்.
2. தழுதல் நிறுவலாம்.
3. நடைவுச் செயலாட்டு தவறு.
4. விளையாடும் புள்ளியுதவி / (ii) முயற்சி முயற்சி நிறுவலாம் / முயற்சி நிறுவலாம்.
5. உள்கட்டமைப்பு வேலாச் செயலாட்டு பதிவு/தவறு.
6. வேலாசு வேலாசு வேலாசு வேலாசு வேலாசு வேலாசு வேலாசு வேலாசு வேலாசு.
7. முயற்சியான் காலம் பதி நிறுவலாம்.
8. வேலாசு வேலாசு வேலாசு வேலாசு வேலாசு.
9. வேலாசு வேலாசு வேலாசு / வேலாசு வேலாசு. வேலாசு வேலாசு. வேலாசு வேலாசு. வேலாசு வேலாசு / வேலாசு வேலாசு.
10. அலை வேலாசு வேலாசு வேலாசு வேலாசு.
11. வேலாசு வேலாசு வேலாசு வேலாசு வேலாசு வேலாசு.
12. வேலாசு வேலாசு வேலாசு வேலாசு வேலாசு வேலாசு.
13. வேலாசு வேலாசு வேலாசு வேலாசு வேலாசு.
14. வேலாசு வேலாசு வேலாசு வேலாசு வேலாசு வேலாசு. வேலாசு வேலாசு. வேலாசு வேலாசு. வேலாசு வேலாசு. வேலாசு வேலாசு.
15. வேலாசு வேலாசு வேலாசு வேலாசு வேலாசு வேலாசு வேலாசு.
16. அலை வேலாசு வேலாசு வேலாசு (கொண்டு வேலாசு)
17. வேலாசு வேலாசு.
18. வேலாசு வேலாசு வேலாசு வேலாசு வேலாசு வேலாசு வேலாசு (கொண்டு வேலாசு) வேலாசு.
19. வேலாசு வேலாசு வேலாசு வேலாசு வேலாசு வேலாசு வேலாசு (கொண்டு வேலாசு) வேலாசு.
20. வேலாசு வேலாசு வேலாசு வேலாசு வேலாசு வேலாசு வேலாசு.
21. வேலாசு வேலாசு வேலாசு வேலாசு வேலாசு (கொண்டு வேலாசு).
22. வேலாசு வேலாசு வேலாசு வேலாசு வேலாசு வேலாசு.
23. வேலாசு வேலாசு வேலாசு வேலாசு (கொண்டு வேலாசு)
24. வேலாசு வேலாசு வேலாசு வேலாசு வேலாசு வேலாசு.
25. வேலாசு வேலாசு வேலாசு வேலாசு (கொண்டு வேலாசு)
26. அலை வேலாசு வேலாசு வேலாசு வேலாசு வேலாசு வேலாசு.
27. வேலாசு வேலாசு வேலாசு.
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.
(iii) Elements and Compounds, Acids, Bases, Salts, Petroleum Products, Fertilisers, Pesticides.
(iv) Main concepts of Life Science, Classification of Living Organisms, Evolution, Genetics, Physiology, Nutrition, Health and Hygiene, Human Diseases.
(v) Environment and Ecology.

Unit II: Current Events
(i) History - Latest diary of events - National symbols - Profile of States - Eminent personalities and places in news – Sports - Books and authors.
(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 Vijayanagara 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.
(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.

Unit VI: Indian Economy
(i) Nature of Indian Economy – Five year plan models - an assessment – Planning Commission and Niti Ayog.

Unit VII: Indian National Movement
(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, Dravida Movement and Principles underlying both these Movements, Contributions of Thanthai Periyar and Perarignar Anna.
Unit IX: Development Administration in Tamil Nadu
(i) Human Development Indicators in Tamil Nadu and a comparative assessment across the Country – Impact of Social Reform Movements in the Socio - Economic Development of Tamil Nadu.
(ii) Political parties and Welfare schemes for various sections of people – Rationale behind Reservation Policy and access to Social Resources - Economic trends in Tamil Nadu – Role and impact of social welfare schemes in the Socio - Economic Development of Tamil Nadu.
(iii) Social Justice and Social Harmony as the Cornerstones of Socio- Economic Development.
(iv) Education and Health Systems in Tamil Nadu.
(v) Geography of Tamil Nadu and its impact on Economic growth.
(vi) Achievements of Tamil Nadu in various fields.
(vii) e-Governance in Tamil Nadu.

Unit X: Aptitude and Mental Ability
(i) Simplification – Percentage - Highest Common Factor (HCF) - Lowest Common Multiple (LCM).
(ii) Ratio and Proportion.
(iii) Simple interest - Compound interest - Area - Volume - Time and Work.
(iv) Logical Reasoning - Puzzles-Dice - Visual Reasoning - Alpha numeric Reasoning – Number Series.
Syllabus
Paper II – Subject Paper
1. AGRICULTURE
(Degree Standard)

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 - AgroClimatic 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

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, silk work 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

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

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

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.

2. ARCHITECTURE
(Degree Standard)

UNIT I: INTRODUCTION TO ARCHITECTURE

UNIT II: HISTORY OF ARCHITECTURE & CULTURE
Historical development of Egyptian, West Asian, Greek & Roman Architecture with examples. Historical development of Buddhist Architecture with examples. Evolution of Hindu Temple Architecture – Dravidian

UNIT III: MATERIALS AND CONSTRUCTION TECHNIQUES

UNIT IV: BUILDING SYSTEMS AND SERVICES – CURRENT DEVELOPMENT & NEW TRENDS

UNIT V: HUMAN SETTLEMENTS PLANNING

UNIT VI: URBAN STUDIES
environment, streetscapes. Housing in the Indian Context, Socio-Economic aspects, Housing standards, Site Planning & Housing Design. Vernacular architecture of India and Heritage tourism; Smart city and Sustainable urban development. Conservation in India – Understanding the need & purpose, definition, Adaptive re-use, International agencies & their role – Policies & legislations, case studies – Conservation practice and Planning; National and state level government organizations – Initiatives, schemes and projects; Relevant National and state level legislations and guidelines

UNIT VII: ENVIRONMENTAL STUDIES, SITE PLANNING & LANDSCAPE ECOLOGY

UNIT VIII: CLIMATIC DESIGN & ENERGY EFFICIENT ARCHITECTURE

UNIT IX: PROJECT MANAGEMENT AND CURRENT TRENDS

UNIT X: PROFESSIONAL PRACTICE AND ETHICS
Understanding the basic concepts and terminology in architectural practice -Architectural profession – Code of conduct & ethics and profession.Role of Architects in conceptualizing, design proposal until the execution procedure.Role of COA & IIA – Architect’s Services, Scale of fees, Architectural Competitions - Tender & Contracts – Legal aspects – Important Legislations & current trends. Note: Medium of Instruction is English only.

3. CIVIL ENGINEERING
(Degree Standard)

UNIT I: BUILDING MATERIALS AND CONSTRUCTION PRACTICES
UNIT II: ENGINEERING SURVEY

UNIT III: ENGINEERING MECHANICS AND STRENGTH OF MATERIALS

UNIT IV: STRUCTURAL ANALYSIS

UNIT V: GEOTECHNICAL ENGINEERING

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

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

UNIT VIII: HYDRAULICS AND WATER RESOURCES ENGINEERING

UNIT IX: URBAN AND TRANSPORTATION ENGINEERING
Urbanization trend and impact - Slum clearance and slum improvement programmes - Different modes of transport and their characteristics. Geometric design of highways – Pavement materials and testing –

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

4. ARCHAEOLOGY
(Degree Standard)

CODE: 313

UNIT I: HISTORY OF TAMIL NADU

UNIT II: HISTORY OF ARCHAEOLOGY

UNIT III: FIELD ARCHAEOLOGY

UNIT IV: PRE AND PROTO HISTORY OF INDIA

UNIT V: EPIGRAPHY AND PALAEOGRAPHY

UNIT VI: NUMISMATICS

UNIT VII: ART AND ARCHITECTURE

UNIT VIII: ICONOGRAPHY AND PAINTING
UNIT IX: MUSEOLOGY

UNIT X: EARLY HISTORICAL ARCHAEOLOGY

5. BOTANY
(Degree Standard)
CODE: 268

UNIT I: PHYCOLOGY, MYCOLOGY & LICHENOLOGY

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

UNIT V: ANATOMY AND EMBRYOLOGY

UNIT VI: GENERAL MICROBIOLOGY AND PLANT PATHOLOGY
UNIT VII: PHYSIOLOGY, BIOCHEMISTRY AND BIOPHYSICS

UNIT VIII: CYTOLOGY, GENETICS AND EVOLUTION

UNIT IX: ECOLOGY, ENVIRONMENT AND CONSERVATION BIOLOGY

UNIT X: HORTICULTURE AND PLANT BREEDING

6. ZOOLOGY
(Degree Standard)

UNIT I: Non-Chordata

UNIT II: Prochordata
Amphioxus, Balanoglossus - Ascidian retrogressive Metamorphosis, neoteny and affinities. Chordata: General Organisation - Characters, Outline, classification upto class level. Pisces: Locomotion, migration,

UNIT III: Cell and Molecular Biology

UNIT IV: Genetics

UNIT V: Bio Chemistry

UNIT VI: Development Biology

UNIT VII: Environmental Biology
UNIT VIII: Evolution

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.

7. ANTHROPOLOGY
(Degree Standard)

UNIT I: INTRODUCTION
Anthropology - Origin and History; Meaning and Definitions; Uniqueness and approaches - Holistic, Comparative, Integrative, Cross-Cultural, Human Friendly and Relativistic, etc; Scope and Utility; Subfields / Branches – Physical / Biological Anthropology, Archaeological / Prehistoric Anthropology, Social – Cultural Anthropology and Linguistics Anthropology; Relationship of Anthropology with Sociology, Psychology, Archaeology, History, Economics, Geography and Politics. Indian Anthropology.

UNIT II: HUMAN BIOLOGY AND VARIATION
Emergence and dispersal of Homo sapiens-Characteristic and geographical distribution of early humans; Theories of human origin and Evolution; Position of Human in the Animal kingdom; Stages of Human Evolution; Adaptation and change; Race and Ethnicity; Peopling and People of India.

UNIT III: FOUNDATIONS OF SOCIETY AND CULTURE
Society - Characteristics and Types; Individual and Society; Status and Role; Groups, Association, Community, Institution, Social Structure, Socialization, Social Organization, Social System and Social stratification; Society in India. Culture - Elements, Culture and Civilization; Material and Non-material Culture; Cultural trait, Culture complex, Culture area, Cultural diversity and Multiculturalism; Ethnocentrism, Egalitarianism, Enculturation, Acculturation, Cultural Lag and Culture Shock; Culture of India. Social and Cultural Change-Diffusion, Assimilation, Integration, Innovation, Syncretism, Dominance, and Subjugation. Institution and Organization - Meaning and Definition.

UNIT IV: MARRIAGE, FAMILY AND KINSHIP
Marriage - Definition, Universal Definition of Marriage; Nature, Functions, and Forms of Marriage; Rules of Marriage, Incest Taboo; Ways of acquiring mates. Marriage Payments: Bride Price, Bride Wealth, and Dowry; Divorce; widowhood and remarriage; Marriage systems in India. Family-Definition, Functions, and Universality of Family; Types and classification of Family; Nature of Family in India; Household vs Family;
Lineage, Clan, Phratry, Moiety; Right – de-passage; Ritual, Myth, Folklore. Kinship-Definition, Terminology, and Types of Kinship; Kinship Behaviour - Avoidance, Joking Relationship Teknonymy, Avunculate, Animate and Couvade; Descent and Descent groups; Importance of Kinship; Kinship system in India. Social and Cultural Change-Global and Indian context.

UNIT V: RELIGION, MAGIC AND SCIENCE

UNIT VI: ECONOMIC ORGANISATION
Economic Organisation-Meaning and definition; Key Concepts-Production, Distribution, Re-distribution and Consumption; Concept of Property and Wealth; Division of labour; Types of Traditional Economic Organizations – Hunting and Gathering, Fishing, Shifting Cultivation, Pastoralism, Agriculture; Forms of Exchanges – Ceremonial, Ritual etc.

UNIT VII: POLITICAL ORGANIZATION
Political Organisation - Meaning and Definitions; Concept of Power, Leadership and Authority; Law, Conflicts and Social Control; Concept of Crime and Punishment; Typology of Political Systems – Band, Chiefdom, Big-man, Tribe, State.

UNIT VIII: TRIBE, RURAL AND URBAN SOCIETIES
Tribe - Meaning and Definition; Characteristics, Classification and Distribution in India; Tribal Administration and Constitutional safeguards; Tribal Development, Problems and Tribal movements in India; Tribal Communities of Tamil Nadu. Rural or Village Society-Community, Peasant and their Significance; Structure and Function of Indian Village; Significance of Caste & Class System in India; Agrarian and Peasant movements in India. Panchayat Raj, Social Change and Impact of Market/Industrial Economy on Indian Villages. Urban and Complex Society - Meaning and characteristics; Urbanism and Urbanisation; Folk – Urban – Continuum; Urban problems-Migration, Poverty, Culture of Poverty, Study on Slum, Study on Beggars, Drug, Alcoholism, Environmental degradation, Pollution and Health issues; Development and Globalisation in Indian Context.

UNIT IX: APPLIED ANTHROPOLOGY
Applied Anthropology - Definition and Scope; Application-Teaching, Research, Administration, Governance, Planning and Development; Social Engineering and Social Doctor; Action, Advocacy and Public Anthropology; Utility in various other fields-Global, National, Local, and Domestic.

UNIT X: RESEARCH AND PRACTICING ANTHROPOLOGY
Research - Meaning, Definition, Objectives and Characteristics; Significance of research; Scientific Research; Qualitative and Quantitative Research; Research Methodology-Methods, Techniques, Tools, and Instruments; Fieldwork and Ethnography; Types of Research; Pilot study and Research Design; Steps involved in Research process. Practicing Anthropology-Applied, Advocacy, Action and Public Anthropology.

8. HISTORY
(Degree Standard)

UNIT I: INDIA – PRE-HISTORIC AND EARLY HISTORIC INDIA
Physical features - Cultural pluralism - Unity in Diversity - Indus Valley Civilization – Vedic Age - Jainism – Buddhism.
UNIT II: ANCIENT POLITY

UNIT III: ANCIENT AND MEDIEVAL TAMIL CULTURE
Sangam Age - Social, economic, religious and cultural conditions – The Kalabharas - Identity and services to Tamil culture -The Pallavas - Their contribution to Art and Architecture – The First dynasty of the Pandyas of Madurai - The Imperial Cholas - Their administration - Growth of religion and culture - Second Pandyan Kingdom - Religion and culture - Spread of Tamil culture abroad.

UNIT IV: EMERGING MIGHT OF ISLAM

UNIT V: MEDIEVAL DECCAN
Bahmini Kindgom - Vijayanagar Kingdom - Krishna Devaraya - Their contributions to Art and Architecture, religion and literature - Bakthi cult.

UNIT VI: THE GREATER MUGHALS
Babur - Humayun - Shershah - Akbar to Aurangzeb - Mughal Administration - Art and Architecture under the Mughals. Shivaji - His administration - The Sikhs.

UNIT VII: LAYING THE FOUNDATION OF THE BRITISH RULE IN INDIA

UNIT VIII: INDIA’S STRUGGLE FOR FREEDOM

UNIT IX: CONSTITUTIONAL DEVELOPMENT

UNIT X: IMPACT OF THE BRITISH RULE ON INDIA
Integration of Indian States - State reorganization, Planning Commission - India's Foreign policy - Education in India since Independence - Human Rights in India - Tamil Nadu since 1947 - Congress governments and development - Dravidian Party Governments and Social welfare since 1968.
9. SANSKRIT
(Degree Standard)
CODE: 318

UNIT I: POETRY (MAHAKAVYA) Raghuvamsam Canto I, R.S. Vadhyars Sons Palaghat II

UNIT II: PROSE (GADYAKAVYAM) Sukanase, Upadesa of Kadambari, Sangraha by R.V. Krishnamacharia, Chennai.

UNIT III: DRAMA (NATAKAM) Pancharathra of Bhasa R.S.V. & Sons, Palaghat


UNIT V: DEVOTIONAL LYRIC Krishna Karnamrutam by Leela suka, Lifco, Chennai-17

UNIT VI: ETHICAL AND GNOMIC Neeti Satakam of Bharatruhari: Motilal Banarasidoss, Chennai-4

UNIT VII: ALANKARAS Chandraloka, Vth Mayukha, Ghowkhambe, Sanskrit services, Varanasi.

UNIT VIII: GRAMMAR (SANDHI, SAMASA VIBHAKTI (AJANTHA PULLINGA TO HALANTA PULLINGA) AND KARAKA) LaghuSiddhanta Kaumudi Ghowkhambha Sanskrit Series.

UNIT IX: TRANSLATION Sanskrit to English and English to Sanskrit (simple sentences).


10. GEOLOGY
(Degree Standard)
CODE: 394

UNIT I: GENERAL GEOLOGY

UNIT II: STRATIGRAPHY

UNIT III: STRUCTURAL GEOLOGY
UNIT IV: PALEONTOLOGY

UNIT V: CRYSTALLOGRAPHY
Definition of Crystals – Classification - Inter facial angles – Goniometer - Symmetry - Symmetry Elements - Study of Symmetry Elements, forms and representative minerals of Normal Classes of Isometric, Tetragonal, Hexagonal, Orthorhombic, Monoclinic and Triclinic systems - Twin crystals – Definition – Classification Types – Schemes.

UNIT VI: MINERALOGY

UNIT VII: IGNEOUS PETROLOGY AND METAMORPHIC PETROLOGY

UNIT VIII: SEDIMENTARY PETROLOGY

UNIT IX: ECONOMIC GEOLOGY

UNIT X: APPLIED GEOLOGY

11. CHEMISTRY
(Degree Standard)

UNIT I: Physical Chemistry

UNIT II: Chemical Kinetics
Electrochemistry Conductance in electrolytic solution, specific and molar conductance - Ostwald's dilution law - Kohlraush's law - Debye Huckel theory- 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 (ΔG, ΔH, ΔS and K) Determination of pH and pKa of acids by potentiometric methods.

UNIT III: Analytical chemistry and Instrumental methods
Principle, instrumentation and applications of UV- Visible, IR, Raman, NMR, Mass, GCMS and Atomic Absorption spectroscopy.

UNIT IV: Inorganic Chemistry
Periodic classification Classification based on electronic configuration – periodic properties - atomic and ionic radii, ionisation potential, electron affinity and electronegativity - various scales - Trends along periods and groups.
Chemical bond Lattice energy - VSEPR Theory and its applications - partial ionic character from electronegativity - Fajan's Rule.
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 V: Lanthanides and Actinides
Position in the periodic table, occurrence, electronic configuration, oxidation state - lanthanide contraction - magnetic properties and complexation behaviour - comparison of lanthanides and actinides.
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 radioactive isotopes in industries, medicine and agriculture.

UNIT VI: Co-ordination Chemistry
Nomenclature – theories of co-ordination compounds - Werner, valence bond, crystal field theories - Effective atomic number – isomerism.
Analytical Chemistry Principles of volumetric analysis - different types of titrations- Gravimetric analysis – Basic principles - Separation and purification techniques

UNIT VII: Organic Chemistry
Nature of Bonding Hybridisation (sp, sp 2 and sp3) and Geometry of molecules - cleavage of bonds - homolytic and heterolytic fission of carbon – carbon bonds - Reaction intermediates - free radicals, carbocations and carbanions - their stability.
Types of reactions Nucleophilic, electrophilic, free radicals, addition, elimination, substitution, oxidation and reduction reactions.

UNIT VIII: Electron displacement effects Inductive, inductometric, electromeric, mesomeric, resonance, hyperconjugation and steric effects.
Stereochemistry 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 fumaric acids-R-S-Notations - conformational analysis of cyclohexane

UNIT IX: Carbohydrates
Classification, sources, preparation and reactions - Glucose, Fructose, Sucrose and lactose- structure of glucose and fructose.
Amino acids: Classification - Zwitter ion - peptide linkage - structure of proteins - structure and functions of DNA and RNA
Hormones and vitamins: Classifications, sources and functions

UNIT X: Pharmaceutical Chemistry
Terminology-pharmacology, pharmacotherapies, 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, anaesthetics, antacids, antimalarial antidepressants, antipsychotic and sedatives.
Nano Chemistry Definition – types of nano materials – Nano drugs and their delivery- Applications of nano materials in medicine

12. CHEMICAL ENGINEERING
(Degree Standard)
CODE: 405

UNIT I: CHEMICAL PROCESS CALCULATIONS AND CHEMICAL ENGINEERING THERMODYNAMICS

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

UNIT III: CHEMICAL TECHNOLOGY AND RENEWABLE ENERGY SOURCES

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

UNIT V: MASS TRANSFER AND SEPARATION OPERATIONS
Fick’s Laws, Diffusion, Mass Transfer Coefficient and theories of Mass Transfer, Momentum, heat and mass transfer analogies, Inter phase Mass transfer operations, HTU, NTU and HETP concepts, Design of equipment - Distillation column, Extraction, Adsorption, Absorption, Drying, humidification and dehumidification. 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 VI: CHEMICAL REACTION ENGINEERING

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

UNIT VIII: NUMERICAL AND COMPUTATIONAL METHODS
finite difference method - Matrix, determinants and properties – Elementary Row transformations algebraic equations; ordinary differential equations and non homogeneous first order ordinary differential equations, rank of Matrix, Eigen value problems, Orthogonal and ortho normal vectors; Gram-Schmidt orthogonalization; Theorem for Eigen values and Eigen functions.

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

UNIT X: PROFESSIONAL ETHICS, LAWS & LEGISLATIONS:

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

CODE: 400

UNIT I: ELECTRICAL CIRCUITS

UNIT II: ELECTRIC AND MAGNETIC FIELDS

UNIT III: MEASUREMENTS AND INSTRUMENTATION
UNIT IV: CONTROL SYSTEMS

UNIT V: ELECTRICAL MACHINES

UNIT VI: POWER SYSTEMS

UNIT VII: ANALOG AND DIGITAL ELECTRONICS

UNIT VIII: POWER ELECTRONICS AND DRIVES
Principle of Operation and Static and dynamic behaviour of Power Semiconductor devices - Power Diode, DIAC, SCR, TRIAC, GTO, MOSFET and IGBT - Single and Three Phase AC to DC Converters –

UNIT IX: DIGITAL PROCESSORS AND COMMUNICATION

UNIT X: RENEWABLE ENERGY SOURCES AND STORAGE DEVICES

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

CODE: 399

UNIT I: MECHANICS, KINETICS AND DYNAMICS

UNIT II: STRENGTH OF MATERIALS AND DESIGN

UNIT II: FLUID MECHANICS AND TURBO MACHINERY
Fluid properties, fluid statics, manometry, buoyancy, control volume analysis of mass, momentum and energy, fluid acceleration, differential equations of continuity and momentum, Bernoulli’s equation, Dimensional Analysis, viscous flow of incompressible fluids, boundary layer, elementary turbulent flow,

UNIT IV: THERMAL ENGINEERING AND THERMODYNAMICS

UNIT V: HEAT AND MASS TRANSFER

UNIT VI: MATERIALS SCIENCE AND METALLURGY
Constitution of alloys and phase diagrams, Iron – Iron Carbide Phase Diagram - steels, cast iron, phase transformations- diffusion-TTT diagram, ferrous and nonferrous alloys, heat treatment of ferrous and non-ferrous metal, surface modification techniques, powder metallurgy, non-metallic materials, mechanical properties and testing, crystal defects and strengthening mechanisms, conducting and semi conducting materials, magnetic and dielectric materials, Engineering ceramics, Engineering and commodity polymers, composites, nano-materi...
UNIT IX: CAD / CAM / CIM / FEA

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

15. TEXTILE TECHNOLOGY
(Degree Standard)

UNIT I: FIBRE PROPERTIES AND MANUFACTURE
(i) Classification of fibres, production of natural fibres - cotton, jute, silk, wool; Identification of natural and synthetic fibres
(ii) Fine, gross structure and properties of fibres
(iii) Microscopic, physical and chemical test methods for fibre identification; blend analysis
(iv) Morphology characterization – Density, XRD, Electron microscopy
(v) Thermal characterization methods - DSC, TGA, DMA / TMA, FTIR spectroscopy
(vi) Mechanical – Tensile, Elastic recovery, Time Effect, Bending, Twisting and Compression
(vii) Optical - Absorption and dichroism, Reflection and lustre.
(viii) Electrical and Thermal Properties - Dielectric property, Static Electricity, Structural changes in fibres on thermal treatment.
(ix) Moisture Property – Absorption, Desorption, Swelling, Theories of moisture sorption
(x) Requirements of fibre forming polymers
(xi) Spinning of Polymers - Melt Spinning, Wet spinning, Dry spinning, Dry-jet-wet Spinning and Gel spinning

UNIT II: YARN MANUFACTURE, YARN STRUCTURE AND PROPERTIES
(i) Principle of ginning
(ii) Blow room machines; principles of opening, cleaning and mixing / blending of fibrous materials; cleaning efficiency; calculations
(iii) Carding machine; Fundamentals of carding, settings, card clothing, autoleveller; calculations
(iv) Comber; Lap preparation, combing cycle, mechanisms; combing efficiency; calculations
(v) Draw frame; doubling and drafting, settings, autoleveller; calculations
(vi) Roving frame; drafting, twisting, bobbin building; calculations
(vii) Ring frame; drafting, twisting, cop formation, forces acting on yarn and traveller; limitations, compact yarn spinning; calculations
(viii) Ring doubler and TFO - principle; single and folded yarn twist
(ix) Alternate Spinning systems - rotor, two nozzle air-jet, air vortex, friction, core, wrap, twist-less spinning process
Helical geometry, packing density, yarn diameter, yarn contraction, yarn twist and relation to yarn strength - staple fibre yarn and filament; mass irregularity of yarn; structure - property relations of ring, rotor, air-jet and friction spun yarns

UNIT III: WEAVING PREPARATORY AND WEAVING, FABRIC STRUCTURE AND PROPERTIES
(i) Cheese, Cone winding - random and precision winding, winding parameters
(ii) Yarn clearers and Tensioners; yarn splicing
(iii) Types of warping - beam and sectional warping, pirn winding process;
(iv) Sizing techniques, sizing of spun and filament yarns; Beam Gaiting
(v) Principles of fabric formation in shuttle looms – primary, secondary and auxiliary motions
(vi) Shedding – Types and Principles, Reversing Motions
(vii) Beat up - types, kinematics of sley
(viii) Principles of weft insertion in shuttleless looms - Rapier, air-jet, projectile, water-jet, circular and multiphase
(ix) Basic woven fabric constructions and its derivatives - plain, twill, satin; honeycomb, warp and weft figuring, warp and weft pile, backed fabrics, double cloth Pierce’s geometry of plain woven fabrics; structure - property relationship

UNIT IV: KNITTING and NONWOVEN MANUFACTURE
(i) Knitting - yarn quality requirements, principles of weft and warp knitting
(ii) Basic weft and warp knitted structures and its properties; calculations
(iii) Circular, Flat and Warp knitting machines
(iv) Geometry of plain knitted fabrics
(v) Nonwovens – Needle punch, spun lace, spun bond, melt blown, thermal bond
(vi) Finishing of nonwovens - mechanical, chemical

UNIT V: PREPARATORY AND COLOURATION
(i) Preparatory processes for natural fibres, synthetics and common blends
(ii) Classification of dyes, auxiliaries and their properties
(iii) Dyeing of fabrics using various dye classes.
(iv) Batch-wise and continuous dyeing techniques
(v) Dyeing machines for fibre, yarn, woven and knitted fabrics
(vi) Styles and methods of printing; print paste preparation
(vii) Pigment printing
(viii) Digital Printing and Transfer Printing
(ix) Fixation and after treatment process
(x) Washing and drying of fabrics
(xi) Colour measurement and colour difference calculation of dyed fabrics
(xii) Fastness to wash, perspiration, light and rub

UNIT VI: FINISHING AND SUSTAINABLE PROCESSING
(i) Mechanical finishing of Textiles - shrink proof, raising and calendaring
(ii) Heat setting of synthetic fabrics
(iii) Chemical finishes - crease resistant, water proof, water repellant, flame retardant, soil release, UV resistant, anti microbial, anti-static, softening, stiffening, elastomeric, self cleaning
(iv) Bio-polishing of cotton fabrics
(v) Washing and fading of denim fabrics
(vi) Eco-friendly processing; Eco standards and Eco labels
(vii) Minimum application technique, waterless dyeing
(viii) Characteristics of Effluent and Effluent treatment
UNIT VII: QUALITY EVALUATION OF TEXTILES
(i) Sampling techniques
(ii) Measurement of fibre properties - length, strength, fineness, maturity and trash
(iii) HVI and AFIS techniques
(iv) Determination of yarn properties - count, twist, strength and elongation, unevenness and hairiness
(v) Determination of fabric properties - construction parameters, tear, tensile strength and elongation; air permeability, drape, bending, crease and wrinkle recovery, thickness, pilling, abrasion, shrinkage
(vi) Low stress mechanical properties of fabrics - FAST and KESF
(vii) Yarn defects and analysis; diagram, spectrogram, VL curve

UNIT VIII: GARMENT MANUFACTURE AND SPECIAL FINISHES
(i) Fabric defects and analysis
(ii) Garment manufacture - Pattern making, Marker planning, Spreading and Cutting,
(iii) Stitches and Seams, Sewing defects
(iv) Types of spreading, cutting and sewing machines; mechanisms and accessories
(v) Sewing threads
(vi) Components and trims
(vii) Pressing, packing, care labels
(viii) Garment Inspection and Merchandising

UNIT IX: TECHNICAL TEXTILES
Fibre, yarn and fabric requirement for
(i) Industrial Textiles - Belts, Ropes, Tyre-cords, Coated abrasives
(ii) Automotive Textiles - Filter fabrics, Airbags, Seatbelts
(iii) Geotextiles – Applications in civil engineering
(iv) Agriculture Textiles – Crop covers, bird nets, soil mats and sacks
(v) Medical Textiles – Non-implantable, Implantable, hygiene products
(vi) Protective Textiles - Ballistic textiles, cold protective clothing, UV Protection, Clean room garments
(vii) Sports Textiles

UNIT X: MANAGEMENT OF TEXTILE INDUSTRY
(i) Industrial Engineering – Work study, method study, motion study, work measurement
(ii) Costing of yarn, fabric and garment; costing - elements, cost sheet, Balance sheet, P & L Account, ratio analysis
(iii) Depreciation, investment appraisal techniques
(iv) Management Tools – Lean, TQM, TPM, 5S, Kaizen, MIS, Supply chain management, six sigma, FMEA
(v) Industrial safety and industrial hygiene
(vi) Industrial relations and Labour laws
(vii) Energy conservation in textile industry

16. ELECTRONICS / ELECTRONICS AND COMMUNICATION ENGINEERING
(Degree Standard)
CODE: 403

UNIT I: SEMICONDUCTOR THEORY AND ELECTRONIC DEVICES
Intrinsic and Extrinsic semiconductors, Energy Bands, Diffusion ad Drift current densities. PN junction diode, current equation, Transition and Diffusion capacitances, Zener diode, Tunnel diode, Varactor diode, Photo diode, Schottky diode, LED, BJT, FET, JFET, MOSFET, UJT, SCR, DIAC, TRIAC.
UNIT II: CIRCUIT THEORY, SIGNALS AND SYSTEMS

UNIT III: ANALOG CIRCUITS
BJT, JFET, MOSFET amplifiers – Biasing analysis, Small signal analysis and frequency response, BJT and MOSFET multistage amplifiers: Differential, Darlington, Cascade and Cascode, Feedback amplifiers, Tuned amplifiers, RC and LC oscillators, Power amplifiers. Rectifiers and wave-shaping circuits, Operational amplifier characteristics and applications, CMRR, slew rate, waveform generators, active filters, timers, PLL, VCO, ADC, DAC, Regulators and Converters.

UNIT IV: CONTROL SYSTEMS
Control system components, Feedback, Transfer function, Transient and Steady state analysis of LTI systems, Frequency response, Bode, Polar and Nyquist plots, Routh-Hurwitz and Nyquist stabilities, Lag, Lead, Lag-lead compensation, State variable model.

UNIT V: COMMUNICATION SYSTEMS

UNIT VI: ELECTROMAGNETIC THEORY

UNIT VII: WIRELESS COMMUNICATION TECHNIQUES
Wireless channel characteristics, Frequency reuse, Channel assignment and handoff, Multipath effect, Spread spectrum, OFDM, Adaptive equalization, Rake receiver, Diversity techniques, MIMO systems.

UNIT VIII: DIGITAL SIGNAL AND IMAGE PROCESSING
UNIT IX: DIGITAL CIRCUITS

UNIT X: DATA NETWORKS
OSI model, TCP/IP reference model, Data link layer: Framing, error and flow control, HDLC, P to P – Medium Access Control: Random and controlled access, Channelization. Network layer: IPV4 and IPV6, ARP and RARP, Network routing algorithms – Distance Vector routing, OSPF, Dijkstra’s and Bellman Ford, Congestion control, Transport layer: TCP and UDP, Application layer: WWW, HTTP, FTP and TELNET.

17. GEOLOGY
(PG Degree Standard)
CODE: 395

UNIT I: GENERAL GEOLOGY AND GEOMORPHOLOGY

UNIT II: STRATIGRAPHY

UNIT III: PALEONTOLOGY
Fossil record and geological time scale - modes of preservation of fossils and concept of taphonomy – Body and ichno-fossils, species concept, organic evolution, Ediacara Fauna - morphology and time range of Graptolites, Trilobites, Brachiopods, Lamellibranchs, Gastropods, Cephalopods, Echinoids and Corals - Evolutionary trends in Trilobites, Gastropods, Cephalopods; and Graptolites - Micropaleontology – methods of preparation of microfossils, morphology of microfossil groups (Foraminifera, Ostracoda), Fossil spores and pollen - Application of micropaleontology in oil exploration - Gondwana plant fossils and their
age and climate significance - Vertebrate life through ages, evolution in Proboscidea, Equidae and Hominidae - Dinosaurs – their classification and extinction - Applications of paleontological data in stratigraphy, paleoecology, and paleoclimatology - Mass Extinctions.

UNIT IV: STRUCTURAL GEOLOGY
Mechanical principles of rocks – Strain markers in deformed rocks - Mohr’s circle – V rules and outcrop patterns – Stereographic Projections of structural elements - Mechanics and causes of folding and faulting - Classification of folds and faults - Recognition of folds and faults in the field - Joints – Cleavage and Schistosity types and origin – Secondary lineation - Types of unconformity and their recognition in the field – Introduction to Petrofabric analysis – Tectonites, their classification and geological significance.

UNIT V: MINERALOGY AND CRYSTALLOGRAPHY

UNIT VI: IGNEOUS AND METAMORPHIC PETROLOGY

UNIT VII: SEDIMENTOLOGY

UNIT VIII: ECONOMIC GEOLOGY

UNIT IX: HYDROGEOLOGY

UNIT X: APPLIED GEOLOGY

18. LIBRARY AND INFORMATION SCIENCE
(Degree Standard)

UNIT I: LIBRARY AND SOCIETY
(i) Library as a Social Institution; Impact of Libraries on Social, Political, Economical, and Cultural aspects, Laws of Library Science.
(ii) Types of Libraries – Public, Academic and Special Libraries; Library movement in India;
(iii) Library Legislation; Public Library Act; Delivery of Books and Newspapers (Public Library) Act; Intellectual Property Rights – Copyright Act
(iv) Library associations and Professional bodies – UNESCO, IFLA, ALA; CILIP; ILA; IATLIS
(v) Role of government agencies in library development – RRRLF; UGC- INFLIBNET

UNIT II: LIBRARY MANAGEMENT
(i) Management – Concept; Definition; School of Thoughts – Functions of Management; (POSDCORB); Library Authority and Committee.
(iii) Human Resource Management – Job Analysis, Job Description, Recruitment, Selection, Training, performance Appraisal, training, motivation, etc.
(iv) Financial Management– Budget – Types, Sources of income to various types of libraries, Physical facilities – Building and Furniture.
(v) Library Records - Statistics; Reports
UNIT III: INFORMATION PROCESSING (LIBRARY CLASSIFICATION)
(i) Library Classification – Concept; Definition; Need and Purpose
(ii) Library Classification – Types: General and Special; Various Schemes of classification – Colon Classification; Dewey Decimal Classification; Universal Decimal Classification and Library of Congress Classification.
(iii) Structure of knowledge – Modes of Formation of Subject, - Canons and Laws
(iv) Facet and Facet analysis – Fundamental categories (PMEST); Analytico- Synthetic approach and Devices.
(v) Notation – Types; Characteristics

UNIT IV: INFORMATION PROCESSING (LIBRARY CATALOGUING)
(i) Library Cataloguing – Concept; Definition; Need, Purpose and Functions.
(ii) Library Catalogue – Types – Physical forms and Inner forms - Alphabetical, Classified, and Alphabetico-Classified; Trade catalogue;
(iii) Cataloguing Standards – ISBDs; Cataloguing Codes – Classified Catalogue Code of Ranganathan, Anglo-American Cataloguing Rules
(iv) International Standards – MARC – CCF; UNIMARC; MARC21; Metadata
(v) Subject Headings – Sears’ List of Subject Headings, LCSH, Centralised and Co-Operative Cataloguing.

UNIT V: INFORMATION SOURCES
(i) Information Sources – Types – primary, secondary, and tertiary; Print Vs. Electronic resources; Human Vs. Institutional
(ii) Evaluation of Information Sources – Criteria
(iii) Secondary Sources: Dictionaries, Encyclopedias, Indexing and Abstracting Sources, Directories, Biographical Sources; Geographical Sources
(iv) Electronic Information Sources - Databases; Full-text databases
(v) Information Sources – Discipline-oriented sources – Pubmed; INSPEC; etc; UGC- e-Sadhsindhu Open sources

UNIT VI: INFORMATION SERVICES
(i) Information Services - Types: Ready reference and Long range reference services; User education; Information literacy
(ii) Literature search – Bibliography compilation and Bibliographical services
(iii) Current Awareness Service, SDI
(iv) Indexing and Abstracting services; Referral Service.
(v) Reprography, Translation and other specialized services

UNIT VII: COMPUTER AND COMPUTER APPLICATION
(i) Computer – Definition; Characteristics; Classification of Computers Hardware – Generations; Input and Output Devices; Secondary Storage Devices; Telecommunication – Concept and Components.
(ii) Computer Software – Meaning; Types – System Software and Application Software; Operating System – Single user vs. Multi-user; Open Sources vs Proprietary
(iii) Database – Concept; Database Management System (DBMS) – Concepts; Functions;
(iv) Library Automation - Need and Purpose; Areas of library automation; Library automation software packages – Proprietary vs. Open.
(v) Web Technology – Browser, Search Engine, Protocol, ISDN.

UNIT VIII: RESOURCE SHARING AND NETWORKING
(i) Resource sharing – Concept, Definition, Need, Purpose.
(ii) Library Co-operation – Concept, Definition, Need and Purpose.
UNIT IX: INFORMATION SYSTEM
(i) Information System – Concept, Characteristics and Functions.
(iii) Information Systems – International UNESCO, INIS, AGRIS, INSPEC, PUBMED, CAS; National – NISCAIR, DESIDOC.
(v) Open Access movement; Open Access System.

UNIT X: DIGITAL LIBRARY
(i) Digital Library – Concept, Definitions, Characteristics, Theoretical framework, Merits and Demerits.
(iii) Digital Library Initiatives - Initiatives in India; Open Archives Initiatives.
(iv) Metadata – Definition, Standards, Metadata Harvesting.
(v) Digital Library – Building process – Digitization; Software and Hardware; Institutional repositories.

19. TRAVEL AND TOURISM
(Degree Standard)

UNIT I: PRINCIPLES AND PRACTICES OF TOURISM

UNIT II: TOURISM PRODUCTS OF INDIA

UNIT III: TRANSPORT

UNIT IV: ACCOMMODATION OPERATIONS
Origin and growth of hotels – Classification of Hotels on the basis of Size, Location, Facilities, Plan, Service and Ownership – Allied Catering Services – Supplementary Accommodation House Keeping – Front Office Management – Booking Procedures – Types of Food and Beverages.

UNIT V: TOURISM MARKETING

UNIT VI: TOURISM POLICY AND PLANNING

UNIT VII: FUNCTIONS OF TRAVEL AGENCY AND TOUR OPERATION

UNIT VIII: TOURISM GEOGRAPHY
Physical Geography of India – Climate Sub-Continent - River System – Mountains – Plains – Political Geography of India – World Time Zone, GMT – India Time Zone.

UNIT IX: TOURISM ORGANISATIONS
Organisation and Functions of WTO, ICAO, IATA, PATA, TAAI, IH&RA, SIHRA, FHRAI, NTO.

UNIT X: IMPACT OF TOURISM

20. ECONOMICS
(Degree Standard)

CODE: 416

UNIT I: MICRO ECONOMICS

UNIT II: MACRO ECONOMICS

UNIT III: MONETARY ECONOMICS
UNIT IV: PUBLIC FINANCE

UNIT V: INTERNATIONAL ECONOMICS

UNIT VI: INDIAN ECONOMY – I

UNIT VII: INDIAN ECONOMY – II

UNIT VIII: DESCRIPTIVE STATISTICS
Different data types – Nominal, ordinal, binary and categorical data types - Diagrammatic representation of data – Standard charts, curves diagrams and plots including box plots - Statistical measures – Measures of central tendency – Measures of dispersion - Regression and Correlation coefficient.

UNIT IX: SAMPLING METHODS AND STATISTICAL TEST
Official Statistical System in India - Sampling versus Census – preparation of schedules and questionnaires - Probability and non-probability sampling method including simple random sampling, systematic sampling, stratified sampling, cluster sampling. Single proportion, equality of two proportions (large sample) - single mean, equality of two population means (small and large samples) - single variance and equality of two variances - independence of attributes.

UNIT X: ETHICS IN RESEARCH

21. MATHEMATICS
(Degree Standard)

UNIT I: ALGEBRA AND TRIGONOMETRY
and Logarithmic series theorems - Summation of finite series using method of differences – Simple problems. Expansion of \( \sin(x) \), \( \cos(x) \), \( \tan(x) \) in terms of \( x \) – Expansion of \( \sin(nx) \), \( \cos(nx) \), \( \tan(nx) \), \( \sin nx \), \( \cos nx \) - Hyperbolic and Inverse Hyperbolic functions - Simple problems. Matrix Theory: 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 and Eigen Vectors.

UNIT II: CALCULUS

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 \( eax \), \( xm \), \( \cos mx \), \( \sin mx \), \( eax\cos mx \), \( eax\sin mx \). 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 – First order P.D.E - complete integral - Singular integral - general integral - Charpit’s method - standard types \( f(p,q)=0 \), \( f(x,p,q)=0 \), \( f(z,p,q)=0 \) and \( f(x,p)= f(y,q) \) - Clairaut’s form 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) – 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 - Applications of Gauss, Stokes and Green’s Theorems – simple problems. Fourier Series: Expansions of periodic function of period 2\( \pi \) - expansion of even and odd functions - half range series.
Fourier Transform - Fourier integral transform (Complex form, no derivation) - sine and cosine transforms - simple properties of Fourier Transforms - Convolution theorem - Parseval’s identity.

UNIT V: ALGEBRAIC STRUCTURES

UNIT VI: REAL ANALYSIS
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.


UNIT VII: COMPLEX ANALYSIS

UNIT VIII: DYNAMICS

UNIT IX: OPERATIONS RESEARCH

UNIT X: STATISTICS
UNIT I: Descriptive Statistics
Uses, scope and limitations of Statistics - Collection, Classification and Tabulation of data - Diagrammatic and Graphical representations - Measures of location, dispersion, skewness and kurtosis – Correlation and regression – Curve fitting – Linear and quadratic equations by the method of least squares.

UNIT II: Probability Theory

UNIT III: Probability Distributions
Discrete distributions – Binomial, Poisson, Geometric and Hypergeometric Continuous distributions – Uniform, exponential, normal, Gamma and Beta - Sampling distributions and standard error - student’s ‘t’, Chi-square and F statistic – Distributions and their applications.

UNIT IV: Estimation Theory

UNIT V: Tests of Hypotheses
Hypothesis testing – Null and Alternative – Types of errors – Level of Significance - 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: Sampling Theory and Design of Experiments

UNIT VII: Statistical Quality Control and Operations Research

UNIT VIII: Time Series and Index Numbers

UNIT IX: Vital Statistics
UNIT X: Statistical Computing using MS-Excel and SPSS
Introduction to MS-Excel – MS-Excel Options using Excel Shortcuts – Link the Data in Rows, Columns and Sheet - Functions: Logical Functions –Math and Statistical Functions – Charts-Plotting Density Function and Distribution Function. Understanding on the usage of Statistical Package SPSS.

23. ARCHAEOLOGY
(PG Degree Standard)

CODE: 314

UNIT I: CULTURAL HISTORY OF TAMIL NADU UPTO 1565 AD

UNIT II: HISTORY OF ARCHAEOLOGY

UNIT III: FIELD ARCHAEOLOGY

UNIT IV: PRE AND PROTO HISTORY OF INDIA

UNIT V: EPIGRAPHY AND PALAEOGRAPHY

UNIT VI : NUMISMATICS

UNIT VII: ART AND ARCHITECTURE
UNIT VIII: ICONOGRAPHY AND PAINTING

UNIT IX: CONSERVATION AND MUSEOLOGY

UNIT X: EARLY HISTORICAL ARCHAEOLOGY

24. BOTANY
(PG Degree Standard) CODE: 269

UNIT I: PLANT DIVERSITY – I, PLANT DIVERSITY – II AND ECONOMIC BOTANY


Economic Botany- Study of plants as sources of food, (cereals, millets, pulses, oil seeds) fodder, forage, fatty acids, essential oils, wood, timber, fiber, paper, rubber, beverages, spices and condiments, drugs, narcotics, resins, gums, dyes and tannins, insecticides and pesticides, ornamental and medicinal – plants as indigenous medicine system (Siddha, Ayurveda & Unani) Bioactive compounds.

UNIT II: CELL BIOLOGY AND SEED BIOLOGY


Seed Biology - Definition – scope – Importance of seed as source of enriched nutrients – Chemical composition of cereals, millets, Common pulses and common oil – seeds. Seed development, phases of growth. Synthesis and accumulation of food reserves (storage proteins, carbohydrates, lipids, oils) Physiology of seed dormancy and germination. Methods to overcome seed dormancy. Early physiological events of seed germination. Hydrolysis and mobilization of reserve food materials from storage organ tissues to the germinating embryonic axis. Seed certification and quarantine.
Unit III: ANATOMY AND EMBRYOLOGY

Unit IV: GENETICS AND PLANT BREEDING


Unit V: PLANT PHYSIOLOGY AND BIOCHEMISTRY

Unit VI: BIOPHYSICS AND BIOSTATISTICS


Unit VII: MICROBIOLOGY AND PLANT PATHOLOGY

Unit VIII: MORPHOGENESIS, PLANT TISSUE CULTURE, BIOTECHNOLOGY AND APPLICATIONS
Morphogenesis – Polarity, Symmetry and Totipotency, Morphogenetic Centres of origin and organization. Differentiations de- differentiations and re-differentiation of cells and organs. Morphogenetic factors.

Plant Tissue Culture – Methodology and application of cell, tissue, organ and prootoplast culture from vegetative and reproductive parts – Meristem culture and its significance. Somatic hybrid and Cybrids. Synthetic seeds and their application.


Unit IX: ENVIRONMENTAL BOTANY

Unit X: BIORESOURCES, BIODIVERSITY CONSERVATION AND ETHANOBOTANY


25. CHEMISTRY (PG Degree Standard)

UNIT 1
Reaction Kinetics:-

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

UNIT 2
Solid State:-
crystal systems - designation of crystal faces, lattice structure and unit cell - law of rational indices - Bragg's law and x rays diffraction by crystals - schottky and Frenkel defects - Electrical properties - Insulators and semiconductors - band theory of solids –Superconductors – nano materials preparations and properties.

Electrochemistry:-
Types of Reversible electrodes - Nearest equation - calculation of thermo dynamic quantities of cell reactions - overpotential and hydrogen over voltage – Determination of pka of acids by potentiometric methods - Kohlarash's law - ostwald's dilution law - Debye - Huckel onsager equation for Strong electrolytes - (no derivation required) - Primary and Secondary fuelcells - corrosion and prevention – drycells and storage batteries

UNIT 3
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 heter 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 and covalent bonds – covalent character in ionic bond and partial ionic character – lattice energy.

Acids and Bases:-
Bronsted and Lewis acids and bases - pH and pKa acid - base concept in non - aqueous media – HSAB concept - Buffer Solutions. Redox Reactions:- Oxidation numbers, Redox potential, Electro chemical series – application of EMF measurements - Redox indicators.
Chemistry of Non - transition elements:
General characteristics, structure and reaction of simple compounds - boranes - silicates Oxoacids of N,P,S and halagens - xenoncompounds - inter halegens, Pseudehalides and noble gas compounds – metal clusters – S,N ring and chain compounds - inorganic Polymers such as silicones, Borazines and phosphonitrilic compounds. IUPAC Nomenclature of simple organic and Inorganic compounds.

UNIT 4
Organic reaction mechanism:
General methods (Kinetic and non Kinetic) of study of reaction mechanisms Methods of determining reaction mechanism. – isotopic labelling SN1, SN2 mechanisms - addition substitution, elimination and rearrangements -free radical mechanism - aromatic substitution - and stability of reactive intermediate (Carbocations, Carbanion's free radicals, nitrates and benzyenes) - Polar effects - Hammet's equation and it modification.

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

UNIT 5
Quantum Chemistry:
Planck's quantum theory wave - particle duality, uncertainty principle, operators and commutation relations, postulates of quantum mechanics, schrodinger wave equation, particle in one dimensional box and three dimensional box - harmonic oscillator, rigid rotator and hydrogen atom, angular momentum, spin - orbit coupling. Classical thermodynamics and elements of statistical thermodynamics:
First law of thermodynamics: heat capacity - isothermal adiabatic processes - Thermo chemical laws - Kircheff's equation second law of thermodynamics, entropy, in reversible and irreversible processes - Gibe's free energy and Helmoltz free energy - Third law of thermodynamics

UNIT 6
Spectroscopy:
Rotational spectra of diatomic molecules - Isotopic substitution and rotational constants - vibrations spectra of linear symmetric, linear asymmetric and bent triatomic molecules - electronic spectra - selection rules - nuclear magnetic resonance - chemical shifts - spin - spin coupling - election spin resonance and hyperfine splitting theoretical principles of mass spectroscopy. Application's of UV, IR, NMR, ESR and mass spectroscopy for structural elucidation of organic compounds, inorganic complexes and free radicals.

UNIT 7
Chemistry of Co-ordination Compounds:
structural aspects, isomerism - octahedral and tetrahedral, crystal - splitting of orbitals - CFSE - magnetism and colour of transition metal ions - charge transfer spectra - crystal field theory and ligand field theory – MO theory complexes of pi acceptor ligands - stereochmistry of inorganic co-ordination compounds – ORD and CD Techniques.
Chemistry of lathanides and actinides:
Electronic configuration - occurrence and Separation techniques -oxidation states, colour, magnetic and spectroscopic properties – lanthanide contraction, use of lanthanide compounds as shift reagents.
UNIT 8
Organometallic compounds and bio inorganic chemistry:-
Metal carbonyls, Metal nitrosyls, metal alkyl, alkenes and arene compounds – organo metallic compounds in catalysis - Chemistry of porphyrins - chlorophyll hemoglobin, myoglobin, ferrodexin, rubredoxin, and cytochromes, copper proteins, enzymes, zinc enzymes, toxicity of metals and the effect of excess and deficient levels, metal complexes in therapy.

UNIT 9
Stereochemistry:-
Elements of symmetry - optical and goemetric isomerism E. Z and R.S notation's - Conformational analysis of simple cyclic and acyclic systems - Effects of conformation on reactivity in acyclic compounds and cyclohexanes.
Carbohydrates:-
Classification - configuration and general reactions of monosacharides - Chemistry of glucose, fructose, Sucrose and Maltose. Important compounds in chemistry - Dyes - aze, triphenylmethane, and phthalein groups - indige - alizarin vitamins, hormones - antibiotics - proteins. Polymers: Preperation and uses of polyethylene, poly butylene PVC, Nylon - Ziegler - Natta catalysts –

UNIT 10
Instrumental methods of analysis:-
Adsorption, partition chromatography - Gas chromatography - HPLC – Solvent extraction and ion turla exchange methods - atomic absorption spectroscopy - Eletroanalytical techniques voltammetry, cyclic voltammetry, polarography, amperonmetry, Coulometry and conductometry, ion - Selective ectrrodes- TGA, DTA, DSC and ICPU. Analysis of industrial products such as ores and Minerals, Coal, Water, Soaps & Detergents, Metals & Alloys, Manures & fertilizer, cement, Aggregate, Bricks, petroleum products, food & products, plastics.

26. HISTORY
(PG Degree Standard)

CODE: 317

Section – A - India through Ages
UNIT I: INDIAN RACES AND GEOGRAPHY
Influence of geography on Indian History - Pluri-culturalism – Unity in Diversity - Sources of Indian History - Beginning of historic period - Indus Valley Civilization – Area - features - Rig Vedic and - Later Vedic cultures - Challenges to Vedic religion and society – Rise of Jainism and Buddhism – Results.

UNIT II: ANCIENT INDIAN POLITY (UP TO 7TH CENTURY AD)

UNIT III: ANCIENT AND PRE-MEDIEVAL TAMIL CULTURE
Sangam Age - Archaeological sites - Adicha Nallur - Pallavaram - Arikkamedu – Keeladi - Sangam polity - The Kalabhras –The new findings on their importance - The Pallavas - Politics - society and culture - Relations with neighbours - The first Pandyan kingdom - The Greater Cholas and the Second Pandyan Kingdom – Their contribution to religion, art and literature – Spread of Tamil culture abroad.
UNIT IV: MEDIEVAL INDIA - RISE OF THE CRESCENT OVER THE SUB- CONTINENT


(ii) Medieval Deccan-Cultures at conflict -Bhamini Kingdom- Muhammed Gawan- Hindus reaction to the Muslim might in Deccan- Foundation of Vijaya Nagar - Krishna Deva Raya – His achievements - Society and culture under Vijaya Nagar - Fall of Vijaya Nagar - Battle of Talikotta (1665) - Impact of Vijayanagar on Tamil Nadu - The Nayak rulers of Tamil Nadu - their cultural contributions - Bakti Movement- Sankara - Ramanuja - Madhwa – Kabr - Guru Nanak - Chaitanya - Ramananda - Vallabha – others.

UNIT V: THE SECOND PHASE OF ISLAMIC INDIA


(ii) Declining phase of the Moghals- Reasons – Advent of the Europeans – Trade settlements - Laying foundation of the British colonial empire in India – Anglo – French rivalry - Carnatic Wars in the Peninsula – Bengal Affairs - Battle of Plassey (1757) and after.

UNIT VI: BRITISH EMPIRE- EXPANSION AND CONSOLIDATION


UNIT VII: PRE AND POST INDEPENDENT INDIA


Section –B –World through Ages

UNIT VIII: ANCIENT AND MEDIEVAL WORLD


UNIT IX: MODERN GLOBAL TRENDS
(iii) Science and Modernism – Industrial and Agricultural Revolutions – Course –Results.

UNIT X: END OF AFRO-ASIAN COLONIAL EMPERIES AND GLOBAL PEACE
First World War - The League of Nations - Rise and fall of Japan in Asia – World War II - Emergence of People’s Republic of China( 1949)- UNO and its achievements

27. ZOOLOGY
(PG Degree Standard)

UNIT I

UNIT II

UNIT III

UNIT IV
techniques. X-ray - Diffraction, Ultra - Violet and infra red, Spectroscopy and Autoradiography. Instrumentation methods: Centrifugation, Electrophoretic and Chromatographic techniques. PCR, DNA finger printing, RFLP, RAPD, AFLP, FISH and GISH.

UNIT V

UNIT VI

UNIT VII

UNIT VIII

UNIT IX

UNIT X
UNIT I: C PROGRAMMING AND OOP

UNIT II: DATA STRUCTURES AND ALGORITHMS

UNIT III: DIGITAL LOGIC AND COMPUTER ARCHITECTURE

UNIT IV: OPERATING SYSTEMS AND SYSTEM SOFTWARES

UNIT V: DATABASE MANAGEMENT SYSTEMS

UNIT VI: SOFTWARE ENGINEERING
Software life-cycle and process models – Agile Models – Extreme Processing – Adaptive Software Development, Scrum – Dynamic System Development Models - Process Assessment Models; Project management activities. 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 – Documentation Tools – Presentation Tools.

UNIT VII: COMPUTER NETWORKS AND SECURITY

UNIT VIII: EMBEDDED SYSTEMS
UNIT IX: CLOUD COMPUTING AND VIRTUALIZATION

UNIT X: WEB TECHNOLOGY AND MOBILE COMPUTING

29. INFORMATION TECHNOLOGY
(Degree Standard)

UNIT I: PROGRAMMING IN C, PYTHON AND OBJECT ORIENTED PROGRAMMING

UNIT II: DATA STRUCTURES AND ALGORITHMS
Linear Data Structures – Abstract Data Types (ADTs) – List ADT – array based implementation – linked list implementation – singly linked lists – circularly linked lists – doubly-linked lists – applications of lists –

UNIT III: DIGITAL PRINCIPLES, COMPUTER ORGANIZATION AND IoT CONCEPTS

UNIT IV: PROBABILITY AND QUEUEING THEORY

UNIT V: DATABASE MANAGEMENT SYSTEMS
UNIT VI: OPERATING SYSTEMS AND CLOUD TECHNOLOGIES


Distributed Systems: Distributed System Models-Distributed Communications-Global States-Causal Ordering of Events-Distributed Mutual Exclusion Algorithms-Deadlock detection in Distributed Systems-Consensus and Agreement Algorithms


UNIT VII: SOFTWARE ENGINEERING


UNIT VIII: WEB TECHNOLOGY

UNIT IX: COMPUTER NETWORKS

UNIT X: ARTIFICIAL INTELLIGENCE, MACHINE LEARNING AND DATA SCIENCE


30. DAIRY SCIENCE
(PG Degree Standard)

UNIT I: Market Milk

UNIT II: Dairy Technology-I
UNIT III: Dairy Microbiology of milk products
Bacteriological Techniques. Basic principles underlying the routine and research methods for enumeration, isolation, cultivation and study of micro-organism, microscopy (including elementary principles of phase-contrast and electron microscopes) and staining procedures, preparation of nutrient media, methods used for identification of organism and taxonomic studies, methods of detection (estimation wherever necessary) and testing of metabolic products of bacteria; Micro-biological assay Routine bacteriological tests for milk, detection of bovine mastitis, general methods and principles involved for efficiency of cleaning and sterilization, methods of checking the conditions of milk-production for efficiency of processing (different tests). Micro-organism in milk and milk products, micro-organisms in milk:milk as a nutrient medium for bacterial growth, inhibitory substances in milk, sources of contamination during production, handling and distribution of milk, important groups of bacteria occurring in milk, thermoduric and thermophilic bacteria, activities of different species in milk and sequence of fermentation Processing of milk, methods of processing commonly employed, bacteria surviving pasteurization and boiling. Microbiology of milk products. Role of lactic acid bacteria and other micro-organisms in manufacture of butter, cheeses and fermented milks, spoilage of various milk products by micro-organisms. Bacteriology of starter cultures: Preparation and maintenance of starter culture, Types, tests for checking their purity and efficiency, bacteriophage, contamination of starters. Dairy Sanitation, Public Health and Microbiology of sewage and Environment: Clean milk production general principles of sanitary milk production, cleaning and sterilization of dairy utensils. Milk and public health: Transmission of diseases of bovine and human origin through milk products. Safe milk and methods to ensure supply of safe milk.

UNIT IV: Dairy Technology- II

UNIT V: Dairy Chemistry
UNIT VI: Rheology and Packaging of milk products
Rheology of Dairy Foods – Introduction to rheology to foods, physical consideration (Stress –strain relationship) in the study of foods, viscoelasticity - importance and practical application in selected dairy products, type of food rheological determination indifferent food stuffs hydrocolloids and influence of food additives (stabilizer+emulsifier) on rheology of different food products. Critical review of the existing knowledge of identification of gaps and problems in current packaging of products and adhesive, graphics and labeling used in food packaging. Protective packaging (MAP, Vacuum Packaging, Active and intelligent packaging) of food, packaging of food products sensitive to oxygen, light, moisture and insect resistant packaging, retention of volatile flavours in food through packaging and special problems in canned foods, packaging of dairy products, fluid milk, cream, butter, cheese, Indian milk products, dried and frozen dairy products.

UNIT VII: Dairy Plant Management:
Location, design, arrangement of floor space and constructional details. Metal and materials used in dairy utensils and machinery. Selection and purpose of equipment. Inspection of premises and protection from contamination. General cleanliness and sanitation of plant. Washing and sterilization of dairy equipment, bottles and cans. Construction, operation and maintenance and technical control methods of equipment: such as heat exchangers, pasteurizers, homogenizers, bottle filler, bottle washer and can washer. Constructional and technical control methods and equipment used for manufacture of different milk products. Methods of disposal of dairy effluents. Evaluation of Sanitizers and Brine: Controlling the alkalinity and PH of detergent solutions. Preparation and evaluation of chlorine sanitizers. Maintenance and checking the strength of brine solution. Role of hardness of water in the dairy and methods of overcoming the problem.

UNIT VIII: Dairy Quality Control
Legal standard for market milk and milk products. Procedure of sampling. Good laboratory practices, Calibration of glass wares, Regulatory institutions involved in quality assurance of milk and milk products, Examination and testing for chemical and bacteriological qualities. LP System and its use in preservation of milk. Quality control of butter and ghee and its grading under AGMARK. PFA and BIS and legal aspects of various indigenous milk products. Milk preservatives and their detection. Adulterants of milk and milk products and their detection. Rapid platform tests and tests for detection and control of bovine mastitis. Quality systems such as HACCP, ISO.

UNIT IX: Dairy husbandry

UNIT X: Utilization of milk by-products
UNIT I: PRINCIPLES OF FOOD TECHNOLOGY
Introduction to food technology- Causes of food spoilage, sources of microbial contamination of foods, food borne illnesses, water activity and its relation to spoilage of foods - Spoilage of processed products and their detection- Principles and methods of food preservation-Methods of food preservation such as heat processing, pasteurization, canning, dehydration, freezing, freeze drying, fermentation, microwave, irradiation and chemical additives-Aseptic preservation, hurdle technology, hydrostatic pressure technology and microwave processing- Use of non-thermal technologies (microfiltration, bacteriofugation, ultra high voltage electric fields, pulse electric fields, high pressure processing, irradiation, thermonsonication), alternate-thermal technologies (ohmic heating, dielectric heating, infrared and induction heating).

UNIT II: HEAT TRANSFER, REFRIGERATION AND COLD CHAIN

UNIT III: FOOD GRAIN PROCESSING

UNIT IV: FRUITS AND VEGETABLE PROCESSING
UNIT V: TECHNOLOGY OF MILK AND MILK PRODUCTS

UNIT VI: TECHNOLOGY OF MEAT / FISH / POULTRY PRODUCTS

UNIT VII: FOOD PROCESS EQUIPMENT DESIGN
Materials for fabrication, mechanical properties, ductility, hardness, corrosion, protective coatings, corrosion prevention linings equipment, choice of materials, material codes; Design considerations: Stresses created due to static and dynamic loads, combined stresses, design stresses and theories of failure, safety factor, temperature effects, radiation effects, effects of fabrication method, economic considerations.-Storage vessels - Operating conditions, design conditions - Design of shell and its component, stresses from local load and thermal gradient, mountings and accessories - Design of fermenter vessel and design problems - Hazards and safety considerations - Design of agitators and separators. Heat exchangers - Design of shell and tube heat exchanger - plate heat exchanger - scraped surface heat exchanger - tubular heat exchanger - sterilizer and retort - single effect and multiple effect evaporators- rising film and falling film evaporators. Design of crystallizer, centrifugal separator, freezing equipment- Types of freezers – Design of ice-ream freezers and refrigerated display system - Design of tray dryer, tunnel dryer, vacuum dryer, spray dryer and freeze dryer-Design of screw conveyor, bucket elevator and pneumatic conveyor - Design of extruders - Cold and hot extruder design, single and twin screw extruder.

UNIT VIII: FOOD GRAIN STORAGE
Importance of scientific storage systems – production and marketing of grain – storage scenario at warehouses - traditional and modern storages - Grain bulk ecosystem – biotic and abiotic variables and their interaction – major stored product insects – characteristics – chemical, enzymatic, biological and mechanical spoilages – grain deterioration and quality loss - Direct damages, indirect damages, causes of spoilage in storage (moisture, temperature, humidity, respiration loss, heat of respiration, sprouting) - destructive agents (rodents, birds, insects, etc.), sources of infestation and control. Storage of grain - respiration of grain, moisture and temperature changes in stored grain - conditioning of environment inside storage through ventilation - Traditional storage structures, improved storage structures, modern storage structures - Farm silos - Horizontal silos, tower silos, pit silos, trench silos, size and capacity of silos - Design of storage structures - Functional and structural design of grain storage structures, pressure
theories, pressure distribution in the bin, grain storage loads, pressure and capacities, warehouse and silos-Aeration and stored grain management - purposes of aeration, aeration theory, aeration system - design and operation – Fumigation – principles – properties and applications of fumigants.

UNIT IX: FOOD PACKAGING TECHNOLOGY
Factors affecting the choice of packaging materials - Interactions of spoilage agents with environmental factors as water, oxygen, light, pH, etc. - Functions of Packaging - Packaging requirement for raw and processed foods, and their selection of packaging materials - Packaging of foods, requirement, importance and scope, environmental considerations – Disposal and recycle of packaging waste. Plastic packaging, different types of polymers used in food packaging and their barrier properties - Paper and paper board packaging, manufacture process, modification of barrier properties and characteristics of paper/ boards - Corrugated fibreboard boxes, Relative advantages and disadvantages of different packaging materials - Testing methods for flexible materials, Tests for paper, thickness, bursting strength, breaking length, stiffness, tear resistance. Metal cans, manufacture of two piece and three piece cans– Coatings – Glass containers, types of glass used in food packaging, manufacture of glass and glass containers, closures for glass containers - Testing methods for rigid materials and semi rigid materials, Glass containers, visual defects, colour, dimensions, impact strength, etc. Metal containers, pressure test, product compatibility, etc. Machines for filling of liquid and wet products – to predetermined level and predetermined volume-filling of dry solids- by count- volume-weight - methods of wrapping and bagging - Form, fill and seal machines - various forms of packaging - Cartoning systems – Printing and Labelling - Container handling. CAS and MAP, shrink and cling packaging, vacuum and gas packaging - Aseptic packaging, Active packaging, Smart packaging, intelligent packaging - Retort packaging, principles, application.

UNIT X: FOOD QUALITY MANAGEMENT

32. DAIRY TECHNOLOGY
(Degree Standard)

UNIT I: MARKET MILK

Fat Rich Dairy Products: Cream-Butter-Ghee and butter oil Status of fat-rich dairy products in India and abroad. Cream: a) Definition & Legal standards, efficiency of cream separation and factors affecting it; control of fat concentration in cream. b) Neutralization, standardization, pasteurization and cooling of cream. c) Preparation and properties of different types of cream; table cream, sterilized cream, whipped


UNIT II: CONDENSED MILK


Ice-cream & Frozen Desserts Definition, classification, composition and standards of ice cream and other frozen desserts, Stabilizers and emulsifiers—calculation and figuring of ice cream mix and yield- their classification, properties and role in quality of ice cream, Thermodynamics of freezing and calculation of refrigeration loads, Types of freezers, refrigeration control/instrumentation - Hygiene, cleaning and sanitation of ice cream plant - Effect of process treatments on the physico-chemical properties of ice-cream mixes and ice cream - Processing and freezing of ice-cream mix and control of over run - Packaging, hardening, storage and shipping of ice-cream - Defects in ice cream, their causes and prevention.

UNIT III: PACKAGING OF DAIRY PRODUCTS

**Sensory Evaluation of Dairy Products**

**UNIT IV: DAIRY PLANT MANAGEMENT**

**Waste Disposal & Pollution Abatement**

**UNIT V: DAIRY ENGINEERING**

**Boilers and Steam Generation Fuels:** Renewable energy sources:- Operation and maintenance of different types of boilers - Properties of steam - Use of steam tables and Mollier charts, Analysis of energy input in steam generation and heat gain in steam consumption. Steam generators - Introduction to Indian Boiler Regulation Act. Boiler Draught - Air Compressors.
UNIT VI: Dairy Process Engineering


UNIT VII: ENERGY CONSERVATION AND MANAGEMENT


UNIT VIII: CHEMISTRY OF MILK
Definition and structure of milk, factors affecting composition of milk, Casein: -Whey proteins: Hydrolysis and denaturation of milk proteins under different physical and chemical environments, Estimation of milk proteins and lactose -Importance of genetic polymorphism of milk proteins –Milk enzymes -Milk -milk lipids. Milk phospholipids -fat soluble vitamins, Milk Salts: Mineral in milk (a) major mineral (b) Trace elements-Milk Sampling techniques from different sources for chemical analysis -; Determination of titratable acidity, pH, fat percent, Total solids and SNF. Determination of casein, whey proteins and NPN in milk; Determination of lipase and phosphatase activity in milk; Determination of lactose and Ash content - Determination of temporary and permanent hardness of water; Estimation of available chlorine from bleaching powder.

Chemical Quality Assurance Importance of chemical quality control, quality assurance and total quality management in dairy industry. Role of national and international food regulatory systems and standards with respect to quality and safety of milk and milk products: FSSAI, PFA, AGMARK, BIS ISO, IDF, Codex, etc., Application of food safety management system (ISO: 22000). Hazard analysis and critical control points (HACCP) Setting up of testing facilities and analytical laboratories; concept of mobile testing laboratories. Accreditation of analytical laboratories. Preparation and standardization of reagents required in the analysis of milk and milk products. Sampling procedures; labeling of samples for analysis; choice of analytical tests for milk and milk products for chemical analysis and instrumental methods of analysis. Calibration of dairy glassware; including butyrometer, pipettes, burettes, hydrometers, lactometers and thermometer. Testing methods for the detection of adulterants, preservatives and neutralizers in milk and milk products. Environmental contaminants such as pesticides, antibiotics, aflatoxin, heavy metals in milk and milk products and their chemical testing methods. Importance of milk contact surfaces, metallic contamination in dairy industry. Chemical quality of water in dairy industry. Prediction of shelf life behavior of milk and milk products.

UNIT IX: MICROBIOLOGY OF FLUID MILK

Microbiology of Dairy Products Microbiology of Cream and Butter - Microbial Defects in butter - Microbiology of Condensed, Evaporated and Dried products: Microbial defects - Bacterial thickening / Mold button formation in SCM; Gassiness/bloating, Bacterial coagulation (Sour and sweet), Bitterness, Fishy flavor in evaporated milk; pre-heating/DSI temperature and their impact on microflora of dried products; Effect of reconstitution on microbial quality of milk powder including baby foods and survivability of pathogens; Regulatory microbiological standards. Microbiology of Ice Cream and Frozen desserts: Microbiology of Indigenous Milk Products: Predominance of spoilage and pathogenic organisms in khoa and khoa based sweets – burfi, peda, gulabjamun, etc., paneer, Chhanna and Chhanna based sweets – rasogulla; kheer, shrikhand, dahi, kulfi etc; Active packaging concepts and role in bio-preservation.

Starter Cultures and Fermented Milk Products Types, metabolism and propagation of starter cultures- Propagation of starter cultures-concentrates - direct bulk and direct vat starter cultures, - Metabolism of starter cultures (carbohydrate, protein, citrate) and production of metabolites and antibacterial substances; methods of starter distillates their merits/demerits. Activity, Purity, Preservation of Starters and Starter Failure -Defects in starters and their control; Starter failures- effect of antibiotic residues, sanitizers and
bacteriophages. Role of Starters in fermented milks: - Curd, Yoghurt, Shrikhand, Kefir and komiss, Bulgarian milk, cultured buttermilk, Leben, Villi and Yakult; Cheese Starters; Rennet.

UNIT X: FOOD BIOTECHNOLOGY

Chemical nature of the genetic material, properties and functions of the genetic material, organization of the genetic material in bacteria, eukaryotes and viruses; DNA replication: Replication fork, DNA polymerases, other enzymes and proteins required for DNA replication, origin of replication, replication of circular DNA molecule; Transcription and translation: RNA synthesis, types of RNA, genetic code; Mutation and DNA repair, mechanisms of repair of damaged DNA (photo reactivation, excision repair, recombination repair, SOS repair, mismatch repair), transposable elements, plasmids, Expression of foreign genes; Promoter enzymes; Recombinant DNA technology: Restriction enzymes, cloning vectors, cloning procedure, cloning of specific gene and their identification (colony hybridization, C-DNA, southern blotting, polymerase chain reaction); Gene cloning: Biosensors: -Application of biotechnology in food: Immobilization of enzymes: GM foods: Testing for GMOs, current guidelines for production, release and movement of GMOs, labeling and traceability, trade related aspects, bio-safety, risk assessment, risk management, public perception of GM foods, IPR, GMO Act 2004.

Quality and Safety Monitoring in Dairy Industry


33. BIOCHEMISTRY

(PG Degree Standard)

CODE: 460

UNIT I: PROTEINS


UNIT II: LIPIDS

Fatty acids - saturated, unsaturated and hydroxy fatty acids. Phospholipids and glycosphingolipids - structure and biological functions. Steroids - animal sterols. Structure, properties and functions of
cholesterol. Lipoproteins - classification and composition. Amphipathic lipids (membranes, micelles, emulsions and liposomes).


UNIT III: CARBOHYDRATES, MINERALS AND VITAMINS


Minerals: major and minor minerals. Water soluble vitamins: thiamin; riboflavin; niacin; pantothenic acid; pyridoxine; biotin; folacin and cynocobalamin. Fat soluble vitamins - Vitamin A and D.

UNIT IV: ENZYMES


UNIT V: BIOENERGETICS, BIOLOGICAL OXIDATION & APOPTOSIS
UNIT VI: CELLULAR BIOCHEMISTRY


UNIT VII: IMMUNOTECHNOLOGY

UNIT VIII: MOLECULAR BIOLOGY
UNIT IX: BIOCHEMICAL TECHNIQUES

UNIT X: GENOMICS, PROTEOMICS AND BIOINFORMATICS

34. BIOTECHNOLOGY
(PG Degree Standard)
CODE: 461

UNIT I:
CELL AND MOLECULAR BIOLOGY:

GENETIC ENGINEERING:
Genes, control gene expression, restriction enzymes, vectors (prokaryotic and eukaryotic) construction of DNA and genomic library.
FOOD CHEMISTRY & NUTRITION:
Carbohydrates, Protein & Lipids and its functional properties, Pigments, Food flavours, Enzyme activity, enzymatic and non-enzymatic browning. Nutrition: balanced diet, essential amino acids and essential fatty acids, water soluble and fat soluble vitamins, role of minerals in nutrition, co-factors, anti-nutrients, nutraceuticals, food acids, moisture relations in food, Chemical and biochemical changes during processing and storage. Food Additives, Role of JECFA in safety assessment of food additives, definition, chemical structure, role in food processing and product end characteristics, Nutritional disorders, Diet therapy, probiotic and prebiotic foods, Therapeutic, organic foods, nutraceutical and functional foods.

FOOD MICROBIOLOGY, FOOD ANALYSIS, SAFETY & QUALITY MANAGEMENT:

DAIRY MICROBIOLOGY:

UNIT II:
FOOD PRODUCT PROCESSING & PRESERVATION TECHNOLOGY:
High temperature processing, Use of non-thermal technologies for preservation Properties, Processing and Preservation of milk and milk products, fermented foods, Value addition and by products utilizations.

FOOD ENGINEERING, PROCESS CONTROL & FOOD PACKAGING:
Heat transfer, momentum transfer, mass transfer, Unit operations, membrane separation processes, mechanical separation process, thermal operations, thermodynamics, Refrigeration – principles and applications, cold chain logistics, Engineering properties of food, food plant equipment design, Static and dynamic response, advanced control systems, Instrumentation.

PACKAGING SYSTEMS AND METHODS:
Bag – in box; microwave packaging; retort pouch technology, active packaging; intelligent packaging, antimicrobial packaging; bio-degradable packages, non-migratory bioactive polymers (NMBP) in food packaging - types and applications; application of nanotechnology in laminates, edible packages; bacterial production of polymer, packaging-flavour interactions, factors affecting flavour absorption, effect of irradiation of polymeric packaging material on the formation of volatile compounds, protective packaging of foods; packaging of food products sensitive to oxygen, light, moisture. Case studies: packaging and lipid oxidation, modelling lipid oxidation and absorption shelf life evaluation of packaged food, package characterization and testing; time – temperature indicators (TTIs), defining and classifying TTIs, requirements for TTIs.

PACKAGING MATERIAL CHARACTERIZATION AND EQUIPMENT:
Paper and paperboard – raw materials, manufacturing stages, pulping techniques, types of paper, specialty papers; glass – types of glass, properties, glass manufacturing, bottle forming process & designs, usp; cartons – designs, manufacturing, applications, corrugated fibre boards, fibre drums; plastic –
classification, glass transition, melting, degradation temperature, properties of plastic – PE, PP, PS, PVC, EVA, PA, EVOH, PLA and others; metals in packaging and their properties; container cleaning – air blast, ionized air blast, water rinse, wash and rinse, aggressive wash and rinse, sterilization, bottle orienting systems. Filling equipment and method - solid, liquid, semi - solid food - types of fillers - filler for glass bottle, paper bottle, pouches, plastic cup thermoforming equipment; form-fill-seal equipment, sealing equipment, labelling, and capping, canning and cartoning equipment. Industrial packaging: unitizing – shrink and stretch wrapping, palletizing, containerizing, rigid and semi-rigid containers; thermoformed packages – skin packaging and blister packaging; flexible containers; form – fill - seal system.

STRUCTURAL AND GRAPHIC DESIGN IN FOOD PACKAGING:
Information required before designing a package for food product: product, targeted consumers marketing a product, branding requirements, style of packaging, budget – steps in designing of food packaging. Creating information architecture for printing, evaluation of packaging design, reuse of containers; child resistant package - design of security features, barcodes, RFID vision/inspection, metal detectors and x-ray inspectors, smart tracking systems, case study. Graphic design: typography, color, illustration, marketing studies, package aesthetics, decoration aspects. Closure design: function, types, selection considerations, closure dimensioning, metal closures, closure seals, plastic closures, injection moulds and closure design, tamper evident closures, child resistant closures. Special closures and functions.

PACKAGING OF FRESH FOODS:
Food packaging laws and regulation, food labelling, packaging requirements for different foods and processing methods - general classification and packaging types, varieties and trends; packaging of convenience foods; packaging of food products – fresh fruits and vegetables, packaging of fruit juices, packaging of jams and jellies, packaging of pickles and chutneys, packaging of fats and edible oils, packaging of break - fast cereals, packaging of tea, coffee & other beverage products; packaging of soft drinks; packaging of bakery products - bread, biscuits & cakes; packaging of snack foods; packaging of ready – cook products; packaging of spices, condiments, oleoresins.

PACKAGING OF PROCESSED FOODS:
Packaging of meat and poultry products; packaging of fish and other sea - foods; packaging of dairy products; packaging requirements for thermal - processed, dehydrated, frozen, irradiated and other specially processed foods - packaging for defence food, space food, high energy food for high altitude, functional foods, recent trends and advancements in food packaging.

UNIT III:
INSTRUMENTATION AND ANALYTICAL TECHNIQUES HPLC ANALYSIS OF FOOD:

GCMS ANALYSIS OF FOOD:
Gas Chromatography: Gas chromatography Introduction, sample preparation, principle of separations, components gas supply system, injection port, oven, column and stationary phases, types of columns, detectors different types of detectors, recorder, types of carrier gases used. Gas liquid chromatography: principle; different types of detectors and its applications: discharge ionization detector (DID), electron capture detector (ECD), flame photometric detector (FPD), Hall electrolytic conductivity detector (EICD), helium ionization detector (HID), Nitrogen phosphorous detector (NPD), mass selective detector (MSD), photo ionization detector (PID), pulsed discharge ionization detector (PDD), thermal energy analyzer (TEA); various applications of GLC. Gas chromatography-mass spectrometry (GC- MS): principles and applications in foods, flavors and fragrances, residue analysis of veterinary hormonal substances and endocrine disruptors, identification of terpenes.
LCMS ANALYSIS OF FOOD:  

NON DESTRUCTIVE TECHNIQUES IN FOOD ANALYSIS:  
Non Destructive Techniques in Food Analysis: optical methods like visible, NIR, and FTIR spectroscopy; computer vision, delayed light emission and fluorescence; X-ray imaging for classifying food products based on internal defects; nuclear magnetic resonance techniques; ultrasonics; firmness measurement methods; linear visco-elastic methods; biosensors in food quality evaluation, new techniques for food quality data analysis and control. MICROBIAL TECHNIQUES IN FOOD ANALYSIS: Microbial techniques in food analysis: Infectious and toxigenic agents of food borne diseases: detection, identification and control methods. Antibiotic resistant strains; methods of detection, conventional, modern, rapid methods, genetic approaches. Molecular based techniques in food analysis: Gel Electrophoresis of Plasmid DNA, Polymerase Chain Reaction (PCR) & Sequencing; Setting up a Gene-Specific Polymerase Chain Reaction, Gel Electrophoresis of Gene-Specific PCR Products, Determining DNA Concentration Using Fluorometer, Amplification of cDNA Using PCR, Sequencing of Gene-Specific Products. Real-time PCR assay for detection of microbial spoilage of foods.

UNIT IV:  
PROPERTIES OF STEAM:  
Introduction, Formation of Steam, Total Heat (or Enthalpy) of Water, Latent Heat of Steam, Dryness Fraction, Wetness Fraction, Total Heat (or Enthalpy) of Wet Steam, Total Heat of Superheated Steam, Advantages of Superheating Steam Use of Steam Tables, Specific Volume of Steam, Volume of Superheated Steam, External Work Done during Evaporation, Internal Energy of Steam, Entropy of Waters, Entropy of Evaporation's Entropy of Wet Steam sg, Entropy of Superheated Steam, Temperature Entropy Diagram for Water and Steam, Isothermal Lines on Temperature Entropy Diagram, Adiabatic Lines on the Temperature Entropy Diagram, Mollier Diagram or Total Heat Energy Chart for Steam, Methods of Heating and Expanding the Steam, Determination of Dryness Fraction of Steam. Type of Steam.

BOILERS:  

MILK PROCESSING:  

UNIT V:  
QUALITY CONTROL IN DAIRY INDUSTRY:  
Importance of chemical quality control in dairy industry, setting up quality control laboratories and testing facilities, mobile testing laboratories. Sampling procedures; labelling of samples for analysis; choice of

UNIT VI:
FOOD PROCESS AUTOMATION:
Food quality, automated evaluation of food quality, food quality quantization and process control, typical problems in food quality evaluation - beef quality evaluation; food odor measurement, continuous snack food frying quality. Data acquisition: Sampling elaboration with examples, concepts and systems for data acquisition such as: ultrasonic signal acquisition for beef grading, electronic nose data acquisition for food odor measurement, snack food frying data acquisition for quality process control, Image acquisition: elaboration with examples.

DATA ANALYSIS: Data pre-processing, Static data analysis, Dynamic data analysis, Image processing: Image segmentation, Image feature extraction etc. MODELLING: Modelling strategies: Theoretical and empirical modelling, Static and dynamic modelling, Linear statistical modelling, ANN modelling etc

PREDICTION:
Prediction and classification, Sample classification for beef grading, examples such as, based on linear statistical and ANN models, Electronic nose data classification for food odour pattern recognition, Snack food classification for eating quality evaluation based on linear statistical and ANN models, One-step-ahead prediction.

CONTROL:
Process control, internal model control, Predictive control, Neuro-fuzzy PDC for snack food frying process, Systems integration: Food quality quantization systems integration, Food quality process control systems integration, Food quality quantization and process control systems development.

UNIT VII:
DAIRY TECHNOLOGY PROCESSING AND STORAGE OF MILK:


**ENZYME AND MICROBIAL INFLUENCE IN MILK PRODUCTS:** Microbial rennet and recombinant chymosin, characteristics and application in cheese making; exogenous free and microencapsulated enzymes, immobilized enzymes-their application in accelerated ripening of cheese; enzymatically modified cheeses (EMC) their utilization in various food formulations. Technological requirements of modified microorganisms for production of cheese and fermented milk products; technological innovations in the development of functional dairy foods with improved nutritional therapeutic and pro-biotic attributes; physiologically active bio-peptides/ nutraceuticals.

**BY PRODUCTS AND ITS PROPERTIES:** Protein hydrolysates – their physicochemical, therapeutic properties, production and application in food formulations; production of bio-yoghurt, probiotic cheese and fermented Milks; bifidus factors in infant food formulations their physicochemical, therapeutic properties, de-bittering and application in food formulations; Enzymatic hydrolysis of lactose for preparation of whey and UF-permeate beverages. Vegan foods. Microbial polysaccharides their properties and applications in foods, production of alcoholic beverages and industrial products from starch; whey and other by-products; bio-sweeteners types properties and their applications in dairy and food industry.

**SHELF LIFE PARAMETERS AND PRESERVATION:** Bio-preservatives- characteristics and their application in enhancing the shelf life of dairy and food products. Practical Effect of exogenous enzymes on hydrolysis of protein and fat in culture containing milk systems; to study the various factors affecting the coagulation of milk by microbial rennets. Manufacture and evaluation of pro-biotic cheese and fermented milks; determination of glycolysis, proteolysis and lipolysis in cheese and fermented milk; enzymatic process for manufacture of low lactose milk whey products; preparation of casein hydrolysis; visit to a bio-processing unit. Current trends in cleaning and sanitization of dairy equipment: biological; detergents; Automation; Ultrasonic techniques in cleaning; bio- detergents, development of sanitzers-heat; chemical; radiation, mechanism of fouling and soil removal; Bio-films, assessing the effectiveness of cleaning and sanitization of dairy products.

**UNIT VIII:**

**FOOD LEGISLATION AND STANDARDS INDIAN FOOD REGULATIONS:** Need for food regulation, Food Safety and Food Standards Act 2006, Food Safety and Standards Authority of India (FSSAI) structure and functions, scientific committees and panels under FSSAI, Rule and Regulation making process. Food Safety and Standards Act, 2006 and the regulations made thereunder like Licensing and Registration, Packaging and Labelling Regulation, Food Products Standards and Food Additives Regulation, Nutraceutical Regulation, Claim Regulation, Contaminants and Toxins Regulation.

**PRODUCT SPECIFIC INDIAN REGULATIONS:** Indian Food Regulation - Food product categorization, Use of food additives in different products, Processing aid regulation New product /additive approval Food Product Recall, BIS mandatory certified products, Packaged Commodity Rules, AGMARK, etc., including latest amendments.


**FOOD SECURITY AND SAFETY LEGISLATION:** Internalizing Externalities: Techniques to Reduce Ecological Impacts of Food Production, Cooperatives and Producer Organizations Roles in Achieving
Food Security, Governing the Global Food System towards the Sustenance with Artificial Photosynthesis. Food Safety and Policy, Trade, Labelling Law - European Food Law, United States and Canada, Australia and New Zealand, Africa, Asia, Association of Southeast Asian Nations (ASEAN).

UNIT IX:
FOOD PRODUCT DESIGN AND DEVELOPMENT FOOD NEEDS & CONSUMER PREFERENCE: Market survey and its importance in; designing a questionnaire to find consumer needs for a product or a concept; advantages of processed foods in urbanised Modern Society; why people buy processed foods. Developing a Product to Meet the Requirements.

DESIGNING NEW FOOD PRODUCTS: New Food Product Development (NPD) process and activities, NPD success factors, new product design, food innovation case studies, market-oriented NPD methodologies, organization for successful NPD; Recipe Development; use of traditional recipe and modification; recent developments in food ingredients/additives flavourings, colorings, emulsifiers, stabilizer and sweeteners; involvement of consumers, chefs and recipe experts; selection of materials/ingredients for specific purposes; modifications for production on large scale, cost effectiveness, nutritional needs or uniqueness; use of novel food ingredients and novel processing technologies.

STANDARDIZATION & LARGE-SCALE PRODUCTION: Process design, equipment needed and Design; establishing process parameters for optimum quality; Sensory Evaluation; Lab requirements; different techniques and tests; statistical analysis; application in product development and comparison of market samples; stages of the integration of market and sensory analysis.

QUALITY, SAFETY & REGULATORY ASPECTS: Product Stability; evaluation of shelf life; changes in sensory attributes and effects of environmental conditions; accelerated shelf life determination; developing packaging systems for maximum stability and cost effectiveness; interaction of package with food; Regulatory Aspects; whether standard product and conformation to standards; Approval for Proprietary Product.

ADVERTISEMENT, MARKETING & CASE STUDIES: Product performance testing; market positioning, Marketing: developing test market strategies; various tools and methodologies to evaluate consumer attitudes, preferences and market acceptance factors; Case Studies of some successes and failures- Factors that influence NPD success, innovation case studies to highlight best practice in terms of the integration of technological and marketing approaches to NPD; food choice models and new product trends.

UNIT X:
FOOD SUPPLY CHAIN MANAGEMENT SUPPLY CHAIN AND QUALITY MANAGEMENT: Introduction, actors in supply chain management, supply chain vs. value chain, factors affecting quality in supply chain management, challenges in supply chain and quality management, pricing and performance measurement in supply chains.

FOOD SUPPLY CHAIN MANAGEMENT SYSTEMS AND INSTITUTIONS: Introduction to FSMS - ISO, GFSI, BRC, IFS, SQF, FSSC; HACCP, Codex, Bis and Bis standards, QCI, EIC, EPC and export regulation, AEPDA, FSSAI and FSSAI Act.

MARKETING AND QUANTIFYING SUPPLY CHAIN: An overview, product differentiation and quality standards, major players in supply chain, marketing channels and legislations, case studies: national and international supply chain management of horticultural produce.

ERP IN SUPPLY CHAIN: Introduction to Enterprise Resource Planning (ERP), inventory management, manufacturing, sales and purchase module, finance module, supply chain management, customer relationship management, HR management module.

LOGISTICS & DISTRIBUTION MANAGEMENT: Physical distribution, distribution channels, channel conflict management, big data analysis, block technology, internet of things, artificial intelligence and sensor based traceability systems in supply chain.
35. MICROBIOLOGY
(PG Degree Standard)

Unit I:
**Microbial Morphology** Cell ultra-structure - prokaryotes and eukaryotes; Cell wall- structure, chemical composition, synthesis and inhibition; cell membrane, cytoplasmic inclusions, cytoskeleton, cell appendages- capsule, flagella, pili; sporulation - structure of endospore, composition and function of spore constituents, induction and germination; Importance of yeasts and moulds, viruses and phages in dairy foods.

Unit II:
**Microbial Growth and Physiology** Bacterial growth: Growth phases and kinetics; synchronous, continuous, and associative growth; factors affecting bacterial growth - Intrinsic factors and extrinsic factors; Growth measurement; sporulation; Bacterial nutrition; Nutrient media; Nutritional groups of bacteria; Role of growth factors; Transport of nutrients - active and passive transport; Energy metabolism: Electron transport chain, fermentation, respiration and photosynthesis.

Unit III:
**Microbial Genetics** Macromolecules: DNA, RNA and their structure, types, organization, function and properties of macromolecules, DNA replication; Regulation and Gene Expression: Gene Expression and its regulation in Prokaryotes- Transcription, Genetic Code, Translation, Negative and Positive regulation in gene expression, Mutations - Spontaneous and Induced, Type of mutations, Mutagenic agents – physical and chemical; Plasmids and gene transfer systems: Plasmids and their properties, transposable elements, bacterial recombination, transformation, transduction and conjugation.

Unit IV:
**Microbiology of Fluid Milk**: Common microbes in milk and their significance, Microflora of mastitis milk, Sources of microbial contamination of raw milk during collection, transport and storage; Clean milk production, natural antimicrobial systems in raw milk; Microbial changes in raw milk during long storage, Microbiological grading of raw milk; Microbiological aspects of processing techniques - bactofugation, thermization, pasteurization, sterilization, boiling, UHT and non-thermal processes including membrane filtration; Role of psychrotrophic, mesophilic, thermophilic and thermoduric bacteria in spoilage of processed milks, their sources and prevention; Heat induced damage in bacteria and role of resuscitation in recovery of injured microbial cells.

Unit V:
**Microbiology of Dairy Products**: Microbiological quality of dairy products - fat rich, frozen, concentrated, dried milks, fermented, infant and indigenous dairy products; Legal standards; Sources of contamination and factors affecting microbial quality of these products during processing, storage and distribution; Shelf life of Dairy Products; Microbiological defects associated with these products and their control; Food poisoning- Food intoxications, Food infections and toxo-infections, pathogens associated with fluid milks, dairy products and their public health significance; Sources of pathogens and their prevention.

Unit VI:
**Applications of Biotechnology in Dairy Industry** Recombinant DNA technology; Restriction enzymes, plasmid vectors, PCR and real time PCR; Genetic improvement of lactic starters to enhance their technological functions for industrial applications - acid, flavour, EPS, probiotic functions; Metabolic engineering of lactic acid bacteria; Production of recombinant dairy/ food enzymes/ proteins -chymosin, lactoferrin, lysozyme, lipases, proteases, immunoglobulins etc.; GMOs, GM foods and their safety from public health point of view; Probiotics, Prebiotics and synbiotics - concepts; Probiotic based functional dairy foods/ health foods and nutraceuticals; Nutrigenomics.
Unit VII:
Dairy Starter Cultures Classification of starters; propagation and preservation of starter cultures (liquid, freeze drying and other methods); factors affecting propagation of starter cultures. Commercial starter preparations: concentrated and super concentrated starters; Production systems for bulk cultures: Lewis, Jones and Tetra-pack systems; growth media: nutritional requirements of lactic acid bacteria, growth media formulations; PIM/PRM, pH control during culturing; preservation of bulk starter cultures- frozen and freeze dried, spray dried cultures; direct vat starter cultures. Growth inhibition of lactic acid bacteria by antibiotics, bacteriocins, bacteriophages, cleaning and sanitizing agents and naturally occurring antimicrobial systems in raw milk; Examination of purity and activity of starter cultures.

Unit VIII:
Environmental Microbiology Environmentally transmitted microbial pathogens (Salmonella, E. coli, Campylobacter, Yersinia etc.) and viruses (enteric and respiratory); indicator microorganisms - total and faecal coliforms, faecal streptococci, bacteriophage etc; Biofouling and biofilms; microbial toxicants and bio-organic pollutants; Waste water treatment: physical; biological unit operations- aerobic and anaerobic cycles; kinetics of biological growth, application of kinetics to treatment systems, aerobic waste treatment, anaerobic waste treatment; tertiary treatment - waste water utilization and disposal. Solid wastes management; environment laws.

Unit IX:
Microbial Food Safety and Quality Assurance Principles of quality and safety functions in dairy processing unit; FSSAI - regulations and guidelines; ISO standards; principles of QMS and HACCP, SAFE, GMP, SSOP, FSMS, personnel hygiene and food handling in dairy industry; Bio-safety concepts - Sampling plan as per International council for microbiological standards for foods (ICMSF); Guidelines and specifications for different dairy foods as recommended by ICMSF, CODEX.

Unit X:
Analytical Techniques in Microbiology Enumeration of composite microflora in milk and dairy products - aerobic & anaerobic; Conventional detection methods for indicator organisms – Standard plate count (SPC), coliforms, E. coli, yeast and mould (YMC), spore; enterobacteriaceae; Faecal streptococci; Dye reduction tests; Rapid techniques like D-count, Petrifilm, ATP bioluminance including VIDAS, SPR, RT-PCR and commercial kits, for monitoring safety indicators; Bio-sensors and micro- techniques for rapid monitoring of contaminants-antibiotics, pesticides, heavy metal, aflatoxin; Microscopy - Staining: simple, differential and special staining; Spectrophotometry, ELISA, protein and enzyme assays, microbiological assay, and microbial receptor assay; Quality requirements of water for dairy plant operations. Characterization of dairy and food industrial waste waters including BOD, COD; Detection of residual antibiotics/pesticides in waste water samples.

36. DAIRY CHEMISTRY
(PG Degree Standard)

UNIT I: PHYSICO-CHEMICAL ASPECTS OF MILK CONSTITUENTS
UNIT II: CHEMISTRY OF MILK LIPIDS:

UNIT III: CHEMISTRY OF MILK PROTEINS:
Nomenclature of milk proteins; genetic polymorphism and biological significance of the chief milk protein- Casein, its methods of isolation, fractionation and heterogeneity; amino acid composition; Casein micelle models; Primary structure of different caseins; Modification of casein: Physical, chemical (glycosylation, phosphorylation) and enzymatic. Minor milk proteins - Whey proteins - alpha-lactalbumin and beta-lactoglobulin, bovine serum albumin: distribution and methods of isolation and their physico-chemical properties; Other Minor milk proteins - Proteose- peptone, immunoglobulins, lactoferrin, and fat globule membrane proteins; Denaturation of milk proteins, various factors affecting denaturation; Casein-whey protein interactions; Enzymes - Indigenous milk enzymes: Properties and their significance

UNIT IV: CHEMISTRY OF LACTOSE:
Molecular structures and isomers; crystalline habits, hydrates, lactose glass, specific rotation, equilibrium of different isomers in solution, solubility, density, sweetness; hydrolysis; Pyrolysis; Oxidation; Reduction; Degradation with strong bases; Derivatives; Dehydration and Fragmentation; Browning reaction; Oligosaccharides in milk

UNIT V: CHEMISTRY OF MINERALS AND VITAMINS:
Minerals in Milk: major and minor minerals; Factors affecting salt composition of milk; Distribution and importance of trace elements in milk. Physical equilibrium amongst milk salts; partitioning of salts; salt balance, salt balance ratio and its importance; protein-mineral interactions. Molecular structure of vitamins, levels in milk and milk products; factors affecting their levels; Biological significance; Ascorbic acid - structure; Relation with redox potential (Eh) of milk and milk products, carotenoids in milk.

UNIT VI: CHEMISTRY OF PROCESSING OF MILK AND DAIRY PRODUCTS:
Heat induced changes in milk; milk stone; Heat stability of concentrated milk; Age gelation; Physico-chemical changes during manufacturing and storage of concentrated milk; dried milk; Mechanism of action of stabilizers and emulsifiers in ice cream; Changes during manufacturing and ripening of cheese.; Lactic acid fermentation in cheese and other fermented dairy products. Chemical defects in cheese. Factors affecting creaming phenomena; mechanism of churning; grading and standards of butter; Physico chemical constants of ghee; Factors responsible for texture (grains) and flavour of ghee. Storage stability of cream, butter and ghee.

UNIT VII: CHEMISTRY OF FUNCTIONAL DAIRY FOODS AND NUTRACEUTICALS:
Bio-functional milk proteins and their therapeutic potential, recent advances in their bio-separation, Phytochemicals, Generation of bioactive peptides from casein and whey proteins, their isolation and characterization, colostrums as source of nutraceuticals. Technological and nutritional aspects of milk lipids, conjugated linoleic acids (CLA) in milk, their variation, physiological effects and their importance in dairy foods. Omega-3 fatty acid and their health attributes, strategies to reduce the cholesterol in dairy products. Mineral and vitamin fortification in milk and milk products.

UNIT VIII CLEANING AND SANITIZATION IN DAIRY PLANTS:
Current trends in cleaning and sanitization of dairy equipment; Desirable properties of detergents and sanitizers; commonly used detergents and sanitizers; Determination of temporary and permanent hardness of water. Estimation of residual chlorine in water. Strength of common detergents and sanitizers
used in dairy plant. Methods of cleaning and sanitization: (i) Hand washing (ii) Mechanical washing (iii) Cleaning In Place. Automation, Ultrasonic techniques in cleaning; Bio-films; Bio-detergents, innovations in sanitizers - chemical, radiation; Mechanism of fouling and soil removal; Assessing the effectiveness of cleaning and sanitization of dairy equipment.

UNIT IX: CHEMICAL QUALITY ASSURANCE IN DAIRY INDUSTRY:
Chemical composition and legal standards of milk products - Quality assurance and quality control in dairy industry; quality management systems; Hazard Analysis and Critical Control Points (HACCP); Good Manufacturing Practices (GMP); Good Laboratory Practices (GLP); various standards pertaining to the chemical quality of milk and milk products - ISO 9000; Total Quality Management (TQM); role of international organisations such as ISO; IDF; CAC; AOAC; WTO and national organisations like FSSAI, BIS, AGMARK, EIA and APEDA (Agricultural and Processed Foods Export Development Authority) in dairy industry.

UNIT X: ANALYTICAL PROCEDURES AND TECHNIQUES IN DAIRYCHEMISTRY:

37. CLINICAL PHARMACOLOGY
(PG Degree Standard)

UNIT I: GENERAL PHARMACOLOGY
Sources of drugs, Routes of drug administration, Dosage formulations, Pharmacokinetics, Pharmacodynamics - Good Clinical Practice& Good Manufacturing Practice - Patient compliance, and self medication, Placebo medicines and pharmacoconomics. Discovery and development of drugs - Preclinical studies in animals – Clinical trials - Official regulatory guidelines. Orphan drugs and diseases, Spurious drugs, Counterfeit drugs - Pharmacoepidemiology and Pharmacovigilance– Pharmacogenetics.
- Adverse drug reactions and monitoring - Clinical importance of drug interactions (both pharmacokinetic and pharmacodynamic interactions with special reference to antibiotics, anti bacteria, NSAIDS and cardiovascular drugs) - Therapeutic drug monitoring.

UNIT II: DRUG THERAPY IN SPECIAL SITUATIONS
Geriatrics – Pediatrics - Pregnancy and Lactation.

UNIT III: CHEMOTHERAPY
Chemotherapy of bacterial (including Tuberculosis & Leprosy) - viral - fungal - protozoal - helminthic infections - Neoplastic diseases.

UNIT IV: DRUGS ACTING ON NERVOUS SYSTEM - CENTRAL NERVOUS SYSTEM
General anaesthetics – Narcotics – Antiepileptics - Sedatives and Hypnotics - Psychopharmacological drugs - CNS Stimulants - Neurodegenerative disorders – Hallucinogens - Deaddiction for alcohol and other drugs of abuse.

UNIT V: PERIPHERAL NERVOUS SYSTEM & AUTONOMIC NERVOUS SYSTEM

UNIT VI: CARDIOVASCULAR DRUGS
Hypertension - Angina & Myocardial Infarction - Congestive Heart failure - Arrhythmias.

UNIT VII: ENDOCRINOLOGY
Anterior pituitary Hormones - Thyroid Hormones – Corticosteroids-Insulin & Oral Hypoglycemic drugs - Male & Female sex Hormones - Oral contraceptives - Uterine stimulants & relaxants.

UNIT VIII: DRUGS ACTING ON HEMOPOEITIC SYSTEM, RENAL AND GIT
Haematinics- Coagulants & Anticoagulants – Fibrinolytics & Antifibrinolytics - Antiplatelets, Hypolipidemic Drugs – Diuretics - Drugs Acting on GIT.

UNIT IX: IMMUNOPHARMACOLOGY& AUTACOIDS
Cell and biochemical mediators involved in allergy, immuno modulation and inflammation, hypersensitivity reactions - therapeutic agents for allergy, asthma and COPD - NSAIDs & DMARDs & gout – Antihistamines - Serotonin agonists & Antagonists.

UNIT X: MISCELLANEOUS
Vaccines - Dermatological preparations - Chelating Agents – Nutraceuticals - Supplementary & formula feeds – Toxicology.

38. MICROBIOLOGY (MEDICINE)
(PG Degree Standard)

UNIT I: GENERAL MICROBIOLOGY
1. History & Milestone in Microbiology
2. Microscopy
3. Sterilization and disinfection
4. Bio Safety in Microbiology Laboratory
5. Bacterial morphology
6. Staining of Bacteria
7. Nutrition and growth of Bacteria
8. Culture Media & Cultivation of Bacteria
9. Identification of Bacteria & Bacterial Classification
10. Normal Microbial flora
11. Bacterial Genetics

UNIT II: IMMUNOLOGY
1. Immunity
2. Structures and functions of Immune system
3. Cells of Immune System
4. Immune Response/Immunity
5. Antigen
6. Antibody
7. The complement System
8. Antigen – Antibody reactions
9. Hypersensitivity
10. Auto Immunity
11. Histo-Compatibility complex
12. Transplantation Immunity
13. Tumour Immunity
14. Immuno Deficiency diseases
15. Immuno Hematology
16. Immuno Prophylaxis against infectious Diseases

UNIT III: SYSTEMATIC BACTERIOLOGY
1. Staphylococcus
2. Streptococcus
3. Neisseria
5. Bacillus
6. Mycobacteria
7. Actinomycetes & Nocardia
8. Coliform bacteria-Escherichia coli & kelsiella 9 Proteus
9. Salmonella
10. Shigella
11. Yersinia
12. Pasteurella & Francisella
13. Haemophilus
14. Bordetella
15. Brucella
16. V. Cholerae
17. Pseudomonas
18. Spirochetes
19. Rickettsiae
20. Chlamydia
21. Mycoplasma
22. Miscellaneous Bacteria
UNIT IV: PARASITOLOGY
1. Classification
2. General principles of Diagnosing parasites & treatment of parasitic infection.
3. Protozology Pathogenic and Non-pathogenic amoebae and free living amoebae Intestinal, Blood & Tissue flagellates Plasmodium, Toxoplasma, Isospora
4. Balantidium coli
5. Helminthology, Cestodes, Trematodes, Nematodes

UNIT V: GENERAL VIROLOGY
1. Classification of viruses
2. Replication of Viruses
3. Cultivation of Viruses
4. Identification of Viruses & Lab diagnosis
5. Pathogenesis & Host response to Viral infection
6. Bacteriophage
7. Antiviral Agents
8. Viral Vaccines

UNIT VI: VIRUSES
1. Pox
2. Adeno
3. Herpes
4. Papova
5. Parvo
6. Picorna
7. Orthomyxo
8. Paramyxo
9. Rota virus
10. Rhabdovirus
11. Hepatitis
12. Arbo
13. Retro
14. Slow-viruses
15. Oncogenic virus
16. Miscellaneous virus

UNIT VII: Mycology
1. Classification of fungi
2. Fungal Mycotoxins
3. Pathogenesis & Lab diagnosis of Mycotic infections
4. Superficial Mycosis
5. Cutaneous Mycosis
6. Subcutaneous Mycosis
7. Systematic Mycosis
8. Opportunistic Mycosis and common lab contaminants
9. Antifungal Agents

UNIT VIII: Clinical Microbiology
1. C.N.S infection
2. Respiratory Infections
3. Urinary Tract Infection
4. Gastro intestinal Infection
5. Genital Tract Infection
6. Congenital Infection
7. Infections of Eye, Ear & Skin
8. Infections of Cardiovascular System
9. P.U.O
10. Zoonotic Infections

UNIT IX: Applied Microbiology
1. Collection ,Transport and Disposal of Specimens
2. Environmental Microbiology (Food, Water, Milk and Air)
3. Hospital Infections Prevention & Control
4. Microbial Control- anti microbial susceptibility testing
5. Bio medical waste management
6. Basic molecular biology related to infections
7. Emerging and reemerging infections – Bio Terrorism

UNIT X: Recent Advances in Microbiology
1. Advanced Molecular Techniques in Relation to Diagnosis of Infectious diseases
2. Scope of Medical Microbiology
3. Automation in Microbiology
4. Anti microbial resistance and antibiotic policy
5. Newer Vaccines
6. Quality Control, Audit and Accredidation of Standard Microbiology Laboratory

39. EVALUATION AND APPLIED RESEARCH

Unit I:

Unit II:
Executive summary - background and purpose - statement of the problem - objectives and Hypotheses – evaluation methods (Statistical methods used in the study) – result and discussion of the result – conclusion and recommendation - reference or bibliography - appendices.

Unit III:
Econometrics - definition, methodology, Data – meaning and types of data such as cross-section, time-series and panel data, primary & secondary data- advantages & disadvantages, Variables – meaning and types such as quantitative and qualitative variables, measurement scales of variables such as ratio, interval, ordinal and nominal simple examples. Correlation – simple and multiple correlation, properties of correlation coefficients, Karl Pearson’s and Spearman’s rank correlation coefficients, Simple numerical problems - Simple & multiple linear regression model – introduction, assumptions, least squares principle, least squares estimators, properties of regression coefficients(Gauss-Markov theorem), interpretation of regression output - $R^2$ & adjusted $R^2$, regression coefficients with t-values and level of significance, Simple numerical problems - advantages of regression analysis over correlation analysis, Functional forms of regression models – log-linear, log-lin and lin-log models and computation of elasticity, computation of simple and compound growth rates - simple numerical examples.

Unit IV:

Unit V:

Unit VI:
UNIT VII:

UNIT VIII:

Unit IX:

Unit X:

Unit XI:
Unit XII:

Unit XIII:

Unit XIV:

UNIT XV:

UNIT XVI:

Unit XVII:

Unit XVIII:

Unit XIX:
Anthropology, meaning scope and relationship with other disciplines particularly social sciences, humanities etc. Main branches, their scope, The nature of culture, The nature of society: concept of society, society and culture, social institutions, social stratification Marriage: Definition and universality, Family, Kinship, Economic organization: meaning, scope, and relevance of economic anthropology, Religion Research methods in Anthropology - Field work tradition in Anthropology - Distinction between techniques, methods, methodology - Tools of data collection, observation, interview, schedules, case study, genealogy etc.

Unit XX:

40. PHYSICS
(Degree Standard)

CODE:241

UNIT I: MECHANICS AND RELATIVITY

UNIT II: PROPERTIES OF MATTER

UNIT III: HEAT AND THERMODYNAMICS
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

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

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 -

UNIT IX: MODERN PHYSICS

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

41. TRANSLATION
(Descriptive Type)

CODE: 462

Translation of the following from English to Tamil:
(a) State Acts, Bills, Ordinances, Rules and Notifications made thereunder.
(b) Central Acts, Ordinances, Rules and Notifications made thereunder.
(c) Legal Terms / Legal Maxims.

42. BUSINESS ADMINISTRATION
(PG Degree Standard)

CODE: 385

Unit I: Management Concepts

Unit II: Managerial Economics
Unit III: Organisational Behaviour

Unit IV: Human Resource Management

Unit V: Research Methodology and Statistics

Unit VI: Operations Management

Unit VII: Marketing Management

Unit VIII: Management Information System & E-commerce

Unit IX: Accounts and Auditing

Unit X: Financial Management

43. BASICS OF ENGINEERING
(Degree Standard)

Unit I: Mathematics

Unit II: Engineering Physics
moment and polarization vector -polarization mechanisms: electronic, ionic, orientational, interfacial and total polarization- frequency dependence - dielectric strength and break-down in gases, liquids and solids.

Unit III: Engineering Chemistry

Unit IV: Basics of Computer Engineering
Programming Languages - Classification of Programming Language, Algorithm, Flow chart, Pseudo code, High-Level Languages – Fundamental concepts of C Programming.
Applications - Office Tools - Word processor - Spreadsheet - Power point - Introduction to Database concepts - E-mail - Browser.
IT Enabled Services - E-Governance - E-Commerce - Multimedia.

Unit V: Basics of Civil and Mechanical Engineering

Unit VI: Basics of Electrical and Electronics Engineering
Ohm’s law – krchoff’s laws – introduction to DC and AC circuits - single phase and three phase circuits – Power and Power factor, Unbalanced and Balanced loads, Operating principles of moving coil and moving iron instruments (voltmeters and ammeters) – wattmeters, multimeter, energy meters and megger, Construction and principle of operation: DC motors- DC generators-Transformers- Induction motors, Characteristics of PN junction diode - zener diode- half wave and full wave rectifiers - Bipolar junction transistor (CC,CE,CB configurations), SCR, Amplifiers- Operational amplifiers – Inverting and Non-inverting amplifiers,Binary number system- logic gates- Boolean algebra - Half and full adders-Flip-flops -
registers and counters- A/D and D/A conversion, Types of analog and digital signals- Modulation and Demodulation (amplitude and frequency) Communication systems: Radio- TV- Fax- Microwave-Satellite and optical fibre.

**Unit VII: Principles of Management**

**Unit VIII: Total Quality Management**

**Unit IX: Environmental Science and Engineering**

**44. ANTHROPOLOGY**
**(PG Degree Standard)**

**CODE: 312**

**UNIT I: FOUNDATIONS OF ANTHROPOLOGY**
Meaning and scope of Anthropology - Major branches of Anthropology - and Contemporary divisions. The relevance of holistic perspective and its interrelations with other disciplines. Indian Anthropologists and their contribution to the society and cultures of India.
UNIT II: PHYSICAL ANTHROPOLOGY

UNIT III: ARCHEOLOGICAL ANTHROPOLOGY
Broad outlines of pre-historic cultures (India and Europe), Palaeolithic - Mesolithic - Neolithic - Chalcolithic - Iron age - Geological time scale - A brief account of stone tool Typology and Technology and methods of problems of dating, Prehistoric and excavated sites in Tamil Nadu and recent findings: Athrampattinam, Adhichanallur, and Keezhadi.

UNIT IV: BASIC THEORIES OF ANTHROPOLOGY
Evolutionary School of Thought, Diffusion School of Thought, Functionalism, Structure Functionalism, Structuralism, Symbolism, Culture and Personality, Postmodernism.

UNIT V: BASIC CONCEPTS OF ANTHROPOLOGY

UNIT VI: ECONOMIC AND POLITICAL ANTHROPOLOGY
Meaning, scope and Relevance of Economic Anthropology; Principles governing production, distribution and consumption in communities subsisting on Hunting and gathering, Fishing, Pastoralism, Horticulture Agriculture and Industrial society. Modes of exchange, barter, ceremonial exchange, reciprocity, and redistribution, market and trade in tribal communities. Substantivism vs. Formalism. Meaning and scope of Political Anthropology, power, leadership, Legitimacy - differences between State and Stateless societies. Social control system, Law and Justice in simple and contemporary societies, New States, Nation building.

UNIT VII: RESEARCH METHODS AND FIELD WORK TECHNIQUES
Fieldwork tradition in Anthropology, Participant Observation, Case Study, Focus Groups, Key informant interview, questionnaire and schedule, Genealogical method, Ethnographic approach, Visual Ethnography, Life histories and personal documents. Qualitative and Quantitative Research Methods, Basic statistics; graphical representation of data and sampling methods. Qualitative data analysis techniques: Content analysis, Narrative analysis and Discourse analysis. Writing culture and postmodernism.

UNIT VIII: SOCIAL STRATIFICATION AND RELIGION
Principles of social stratification, Caste, Class and Power systems, The basis of Indian social System: varna, purushartha, karma and rebirth.

UNIT IX: TRIBE AND THEIR CONTEMPORARY ISSUES IN INDIA
Definition of Tribe, Education, Health, Poverty, Land alienation, Issues of identity: Different Committees and their recommendations, island communities, PVTGs, Tribe and State conflict and compromise, Non-Scheduled Tribes, TRIs and their role in Tribal Development. Constitutional Safeguards for Scheduled Caste and Scheduled Tribes, Tribal Movements in India.

UNIT X: DEVELOPMENT ANTHROPOLOGY

45. CHEMICAL TECHNOLOGY
(PG Degree Standard)
CODE: 290

UNIT I: PROCESS CALCULATIONS AND THERMODYNAMICS

UNIT II: FLUID MECHANICS AND MECHANICAL OPERATIONS
Newtonian and non-Newtonian fluids, compressible and non - compressible fluids, flow through pipeline systems, flow in closed ducts, packed beds and fluidized bed. Continuity and conservation equations. Macroscopic energy balance, Bernoulli equation and its applications, Dimensional analysis, flow meters, pumps and compressors. Size reduction and size separation; laws of size reduction, Gravity settling, hindered settling sedimentation; centrifuges and cyclones; thickening and classification, filtration; mixing and agitation; thickening, elutriation, conveying of solids.

UNIT III: REACTION ENGINEERING, HEAT AND MASS TRANSFER

UNIT IV: PROCESS CONTROL AND INSTRUMENTAL METHODS OF ANALYSIS
UNIT V: CHEMICAL PROCESSES
Nitration, Sulphonation and Sulfation, Hydrogenation, Halogenation & Oxidation, Kinetics and mechanism, the derivative reactions, Industrial applications, Raw material and manufacture of Soda ash, Sodium bicarbonate, Chlorine and Causticsoda, Bleaching powder, Calcium Hypochlorite; Sodium Hypochlorite; Sodium chloride or common salt, sodium sulfate, sodium bisulfate, or Nitercake, Sodium Bisulfite; Sodium Sulfite, Sodium Hydrosulfite; Sodium sulfide, Sodium Hydrosulfide, Sodium Thiosulfate; Sodium Nitrite; Sodium Silicates; Sodium peroxide, Sodium perborate; Sodium amide; Sodium cyanide and Ferri cyanide. Industrial alcohols, Beer, Wine, Butyl alcohol. Raw Materials, Manufacture of phosphoric acid, nitric acid, Sulfuric acid and HCL & the occurrence, Purification of all acids. Occurrences of oils, fats and waxes, classification, chemical composition, Extraction and refining oils and fats. Manufacture of edible oil. Surfactant : Concept of surface activity, Hydrophilic-lypophilic balance; Mechanism of detergency. Classification of surfactants; Biodegradation of surfactant; application of surfactants. Soap and Detergent: Soap, detergent, Glycerine: spentlye, synthetic glycerine manufacture and their applications Origin, Occurrence, exploration and classification of crude oils, Hydrocarbon, composition of petroleum and petroleum products (liquid and gas); Refining of crude oil, Catalytic cracking, thermal cracking; reforming. Chemical conversions, Extraction of Aromatics.

UNIT VI: PULP AND PAPER, AGROCHEMICALS AND FERTILIZERS

UNIT VII: PHARMACEUTICALS, POLYMERS, PLASTICS AND RUBBERS
Types of polymers, Thermoplastics and thermosetting plastics, Polymerization Types. Degradation of polymers through thermal, mechanical and chemical methods. Raw materials for polymers and resins. Chemistry of Natural resins and polymers such as lace, rosin, cellulose, rubber, proteins, fossil resins, etc. Preparation and applications of phenolics, amino resins, polyesters, polyamides, epoxides, polyurethanes, vinyls. Raw materials, manufacturing processes of plastics.

Composites: Raw materials, Comparison of different materials with composite; advantages and disadvantages of Natural rubber, synthetic rubber, rubber compounding, rubber fabrication; latex compound, rubber derivatives. Alkylations, Carboxylation and Acetylation; Condensation and Cyclization; Dehydration; Halogenation; Oxidation; Sulfonation; Amination; Complex Chemical Conversions. Fermentation and Life processing for antibiotics, Biologicals, Harmones and Vitamins, Biologicals, Steroids Hormones; Isolates from Plants and Animals.

UNIT VIII: COAL CHEMICALS AND INDUSTRIAL CARBON AND EXPLOSIVES
The destructive distillation of coal; Coking of coal; Distillation of coal tar; coal to Chemicals. Methods of manufacture and applications of Lampblack; carbon black; activated carbon; Natural graphite; Manufactured graphite and carbon; Industrial diamonds. Nuclear reactions: uranium and Thorium fission; Uranium as an energy source; nuclear fuels and processing. Types, Characteristics & Uses of explosive, Industrial Explosives.

UNIT IX: CERAMIC, GLASS, CEMENT AND LIME
Basic raw Materials; Chemical conversions, Including Basic Ceramic Chemistry; White wares: Structural Clay products; Refractories; Specialized Ceramic products: Vitreous Enamel; Kiln, Composition, manufacture of specialty glasses. Portland cement: Raw materials & Manufacture of Portland cements; Setting and Hardening of cement; Manufacture and use of Lime and Gypsum.
UNIT X: FOOD AND FOOD BY-PRODUCTS

46. COMPUTER SCIENCE
(PG Degree Standard)

UNIT I: MATHEMATICAL FOUNDATIONS
AUTOMATA, LANGUAGES AND COMPUTATION Basic concepts of strings, alphabets, languages, finite automaton, regular expressions, Moore and Mealy machines, regular sets, minimization of finite automata, Chomsky hierarchy of languages, relation between classes of languages, context free grammar, pushdown automata, Linear bounded automata, Turing machines, halting problem and decidability.

DESIGN AND ANALYSIS OF ALGORITHMS Design Techniques, divide and conquer, greedy method, dynamic programming etc., graph algorithms, Strassen's matric multiplication algorithm, geometric algorithms, NP complete problems, approximation algorithms.

UNIT II: COMPUTER ARCHITECTURE
Review of elements of Computer organisation - Machine instructions, addressing modes, instruction pipeling, memory organization. CPU and system buses, bus standards, Von Neumann Vs Non Von Neumann architectures, language directed architectures, RISC architectures, object oriented architectures, memory and I/O subsystems - Hierachial memory, virtual memory system memory allocation and management, cache memories, I/O subsystems, architectural classification, pipelined processors, vector processing. Array processors, multiprocessor architectures.

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, quicksort, heap sort, complexity of algorithms.

UNIT IV: COMPILERS AND ADVANCED OPERATING SYSTEMS
Assemblers loaders, linkers, macro processor, text editors, programming languages, lexical analysis, parsing techniques, precedence grammars, symbol tables, scope rules and parameter passing mechanisms, syntax directed translation, run time environment, machine code generation, interpreter.

ADVANCED OPERATING SYSTEMS (a) Review of uniprocessor operating system: Batch, multiprogramming and time-sharing systems, operating system concepts, memory, device and file management, process scheduling, interprocess communication, process synchronization and concurrency, deadlocks, protection.
(b) Multiprocessor operating system: Classification of multiprocessor operating systems, software and operating system requirements for multiprocessors, multiprocessor scheduling strategies. (c) Distributed Operating System: Communication in distributed systems, client server model, remote procedure call, group communication, synchronization in distributed systems, mutual exclusion and election algorithms,
deadlocks in distributed systems, processor allocation algorithms, scheduling in distributed system, distributed file systems.

UNIT V: DATABASE MANAGEMENT SYSTEMS
Elements of data base systems, file organization, relational and network data models, normal forms, query languages. Design and implementation of typical database systems, Internal and external consistency, concurrency control techniques, object oriented data bases.

UNIT VI: MOBILE COMMUNICATIONS

UNIT VII: SOFTWARE PROJECT MANAGEMENT

UNIT VIII: MULTIMEDIA AND 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 IX: OBJECT ORIENTED ANALYSIS AND DESIGN

UNIT X: ADVANCED TOPICS: ARTIFICIAL INTELLIGENCE, CLOUD COMPUTING, CYBER SECURITY
Artificial Intelligence: Production systems, different strategies, hill climbing, backtracking, graph search specialised production systems, minimax procedure, alphabeta pruning, resolution and refutation, control strategies, structured representation of knowledge, semantic nets, frames.
UNIT I: MATHEMATICAL FOUNDATIONS
Set Theory, Principles of mathematical Induction, Relations, Functions, Algebraic structure - Semigroup, monoid, group, propositional calculus generating functions and graph theory.

UNIT II: COMPUTER ARCHITECTURE
Review of elements of Computer organisation - Machine instructions, addressing modes, instruction pipeling, memory organization. CPU and system buses, bus standards, Von Neumann Vs Non Von Neumann architectures, language directed architectures, RISC architectures, object oriented architectures, memory and I/O subsystems - Hierachial memory, virtual memory system memory allocation and management, cache memories, I/O subsystems, architectural classification, pipelined processors, vector processing. Array processors, multiprocessor architectures.

UNIT III: PROGRAMMING AND DATA STRUCTURES [C AND C++]
Arrays, Stacks, Strings, Queues, Lists, Graphs, Trees and Sets, Graph and Tree Traversals, Recursion, Tree balancing, Hashing, File structures, Sorting and Searching, Algorithm design and Analysis techniques.

UNIT IV: SYSTEMS ANALYSIS AND DESIGN

UNIT V: COMPILER DESIGN
Assemblers, loaders, linkers, macroprocessor, text editors, programming languages, lexical analysis, parsing techniques, precedence grammars, symbol tables, scope rules and parameter passing mechanisms, syntax directed translation, run time environment, machine code generation, interpreters.

UNIT VI: ADVANCED DATABASES
Elements of database systems, file organization, relational and network data models, normal forms, query languages. Design and implementation of typical database systems, Internal and external consistency, concurrency control techniques, object oriented data bases.

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

UNIT IX: MULTIMEDIA AND 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: MANAGEMENT OF SOFTWARE PROJECTS

48. FINANCIAL AND COST ACCOUNTANCY
(Intermediate Standard)
CODE: 433

UNIT I: ACCOUNTING
a) Accounting Standards (old) 2,10,12 and 16
b) Accounting for Cooperative Societies
c) Branch and Departmental Accounts (including foreign branches)
d) Accounting for non-profit organisations and incomplete records e) Computerised Accounting System

UNIT II: AUDITING
a) Nature and scope and significance of auditing
b) Audit Engagement, Audit Programme, Audit working papers, Audit note book audit evidence and audit report
c) Internal check, internal control and internal audit – industry specific
d) Auditing of difference types of undertaking – education, hospitals, cooperative societies, trusts, municipalities
UNIT III: FINANCIAL MANAGEMENT
a) Meaning – objectives – scope of financial management
b) Tools for Financial Analysis – Ratio, Cash flow analysis
c) Analysis and Interpretation of Financial Statements
d) Investment decisions – ARR, Pay back, NPV, IRR, PI
e) Cost of Capital Structure and Leverages
f) Working Capital Management – Financing – Cash, Inventory, Receivables and Payables

UNIT IV: DIRECT TAXATION
a) Heads of Income and Computation of Total Income under various heads
b) TDS/TCS/Advance Tax
c) Taxation as applicable to Government undertaking and Cooperative Societies.

UNIT V: INDIRECT TAXATION
a) Canons of Taxation
c) Filing of GST periodic returns

UNIT VI: COMMERCIAL LAW, INDUSTRIAL LAW & COMPANY LAW
a) Indian Contract Act
b) Sale of Goods Act
c) Negotiable Instrument Act
d) Factories Act, Payment of Gratuity Act
e) Employees Provident Fund Act 1952
f) Employees State Insurance Act 1948
g) Payment of Bonus Act 1965, Minimum Wages Act 1948
h) Tamil Nadu Tender Transparency Act, 1998

UNIT VII: COST ACCOUNTING: PRIME COST AND OVERHEADS
a) Material Cost a. Purchase procedures, ledgers and forms (MRN, GRN etc.) b. Inventory levels management c. Stores ledger under FIFO, Weighted average, retail price d. Physical stock taking and inventory reconciliation e. Wastage and shortage

UNIT VIII: COST ACCOUNTING: BOOKKEEPING AND METHODS
a) Costing accounting records, Ledgers, Cost statements
b) Items excluded from cost and normal and abnormal, terms /cost
c) Integral accounts d) Reconciliation of cost accounting records with financial accounts e) Process, job, contract, and Batch costing f) Service costing: hospital, transport, hotel etc.

UNIT IX: COST ACCOUNTING: TECHNIQUES
a) Marginal costing a. CVP analysis b. Break even point and Margin of safety c. Break even chart d. Cost indifference point e. Key factor analysis
UNIT X: BUDGET AND BUDGETARY CONTROL
a) Concepts, Types of Budgets
b) Budgetary Control Vs Standard Costing
c) Advantages and Limitations
d) Preparation of Various Budgets
e) Zero Base Budgeting

49. TOWN AND COUNTRY PLANNING

Single Paper Consisting of the subjects Town Planning (PG Degree Standard), Civil Engineering (Degree Standard) & Architecture (Degree Standard)

CODE: 382

UNIT I: INTRODUCTION TO PLANNING – SCOPE AND CONTENT
Planning System in India, Regional Plan, Master Plan, Structure Plan, Detailed Development Plans, City Corporate Plan and Smart City Plan. New Town concepts, case studies in India & U.K. – Concept of Region, Types of Region, Techniques of Regional Analysis, Growth Model, Regional disparities, Resources in Regional development. Multi-level Planning – Regional Planning in India, Regional Plan case Studies, USA, U.K., Japan.

UNIT II: PLANNING THEORY AND TECHNIQUES

UNIT III: URBAN SOCIOLOGY, ECONOMICS, GEOGRAPHY: THEORIES AND APPLICATIONS
Socio-economic groups, structures and Institutions as related to urban and rural communities - Ecological processes and structures in Indian Cities - Social Change & Economic Development - Agglomeration economicsEconomics of scale, Multiplier effect concept, scope, limitation - Basic and non-basic activities of economics base, methods of base identification - Land-use determinants, Locational Dynamics of urban Land-use - Spatial organization of Urban settlements - City-region, Urban Sprawl and Fringe - Urbanization in India and Tamil Nadu with reference to settlements and population distribution.

UNIT IV: ENVIRONMENTAL ISSUES RELATED TO PLANNING

UNIT V: URBAN INFRASTRUCTURE NET WORK PLANNING ISSUES
UNIT VI: PROJECT FORMULATION AND IMPLEMENTATION

UNIT VII: PLANNING LEGISLATION AND LEGAL FRAMEWORK

UNIT VIII: ISSUES IN TRAFFIC AND TRANSPORTATION PLANNING

UNIT IX: REMOTE SENSING AND G.I.S., IN PLANNING
Basics of Remote Sensing and GIS. - Classification of spatial and nonspatial data application of spatial data in urban and regional planning - Identification of required spatial data layers - Coding schemes – digitization of spatial data – editing spatial data usable for the given planning problem – Land use Suitability Analysis, Land use Modeling, Existing Land use Preparation using Mobiles, Satellite Imageries, Aerial Photographs, Drones in Physical Planning.

UNIT X: CURRENT TRENDS AND ISSUES IN PLANNING
UNIT I:
1) Historical background and development of profession of pharmacy: History of profession of Pharmacy in India in relation to pharmacy education, industry and organization, Pharmacy as a career, Pharmacopoeias: Introduction to IP, BP, USP and Extra Pharmacopoeia.


3) Surface & interfacial Phenomenon: Measurement of surface and interfacial tensions, spreading coefficient, surface active agents, HLB Scale, solubilisation and Detergency

4) pH, buffers and isotonic solution: pH determination, applications of buffers, buffer equation, buffer capacity and buffered isotonic solutions.

5) Unit Operations: Size reduction, size separation, mixing, filtration, centrifugation evaporation, drying, distillation, heat transfer, compression and Tablet coating.

6) Coarse Dispersion: Suspension, interfacial properties of suspended particles, settling in suspensions, formulation of flocculated and deflocculated suspension. Emulsions and theories of emulsification, micro emulsion and multiple emulsion, stability of emulsions, preservation of emulsions, rheological properties of emulsions and emulsion formation by HLB method.

7) Micromeritics: Particle size distribution, mean particle size, number and weight distribution, particle number, methods of determining particle size by different methods, specific surface, methods of determining surface area and derived properties of powders.


9) Pharmaceutical Excipients – Used in Liquid, Semisolids and solid dosage forms.


11) Cosmetics: Formulation and preparation of the following cosmetics preparationsLipsticks, Shampoos, Cold Cream, Vanishing Cream, Tooth Paste, Hair Dyes and Sunscreens.

12) Packaging Material Sciences: Materials used for packaging of Pharmaceutical Products, factors influencing choice of containers, legal and official requirement for containers, Quality control tests for containers and rubber closures.

13) Bio availability and Bioequivalence: Definitions and objectives of Bioavailability, absolute and relative bioavailability, measurement of bioavailability in-vitro drug dissolution models, in-vitro-in-vivo correlations, bioequivalence studies, methods to enhance dissolution rates and bioavailability of poorly soluble drugs.

14) Pharmacokinetics: Definition and introduction to Pharmacokinetics, Compartment models, Non-compartment models, Physiological models, One compartment open model a) Intravenous Injection (bolus) b) Intravenous infusion c) Extra vascular administrations. Pharmacokinetic parameters - KE, T½, Vd, AUC, Ka, CLt and CLR – definitions, methods of elimination, understanding of their significance and application.

15) Good manufacturing practices (GMP)

16) Good Laboratory practices (GLP): Organisation and personnel, Facilities, equipment, Testing facilities operation, Test and control articles, Protocol for conduct of a Nonclinical Laboratory Study, Records and reports, Disqualification of Testing facilities.

18) Pilot Plant Scale up Techniques: General considerations – including significance of personnel requirements, space requirements, raw materials, Pilot plant scale up considerations for solids, liquid orals, semi solids and relevant documentation, SUPAC guidelines, Introduction to platform technology.

19) Quality management systems: Quality management and certification: concept of quality, Total quality management, Quality by Design (QbD), six sigma concept, out of specifications (OOS) change control, Introduction to ISO 9000 series of quality system standards, ISO 14000, NABL.

20) Indian Regulatory Requirements: Central Drug Standard Control Organisation (CDSCO) and State Licensing Authority, Organisation, Responsibilities, Certificate of Pharmaceutical products (COPP) Regulatory requirements and approval procedures for New drugs.

21) Over the counter (OTC) Sales: Introduction and sale of over the counter and Rational use of common over the counter medications.


UNIT II:


2) Classification and mode of action of disinfectants, factors influencing disinfection, antiseptics and their evaluation, for bacteriostatic and bactericidal actions. Sterility Testing of Products (solids, liquids, Ophthalmic and other Sterile products) according to IP, BP and USP


4) Types of immunity - humoral immunity, cellular immunity

5) Blood products and Plasma Substitutes: Collection, Processing and Storage of whole human blood, dried human plasma, plasma Substitutes Fermentation methods and general requirements, study of media, equipments, sterilization methods, aeration process, stirring. Large scale production fermenter design and its various controls. Study of the production of - Penicillins, Citric acid, Vitamin B12, Glutamic acid, Griseofulvin.

UNIT III:

1) Atomic structure and valency, Radioactivity, Radio isotopes and Pharmaceutical applications of Radio Pharmaceuticals, hazards and precautions.

2) Sources of impurities in Pharmaceutical substances; Limit test as per I.P; Fundamentals of volumetric Analysis. Errors: Sources, types, methods of minimizing errors, Accuracy, Precision, significant figures.

3) A systematic study of inorganic compounds for their preparation, assay and use which includes Gastrointestinal agents, Topical agents and Dental products.

4) Preparation and use of Chemical reagents and Volumetric Solutions as per Pharmacopeia in Pharmaceutical Analysis.

5) Metal hydride reduction, Wolff kishnar reduction, Clemenson’s reduction, Beckmann and Schmidt rearrangement, Oppenauer Oxidation, Claisen-Schmidt condensation.
UNIT IV:
1) Chemistry, synthesis and Medicinal uses of the following categories of drugs - Local Anaesthetics, Drugs acting on CNS, ANS, CVS, Anti-infective agents like Sulphonamides, Antibiotics, AntiTB, Anti-Viral, Antiprotozoal, Antifungal, Antimalarial, Antineoplastic agents, Antihistaminics, Diuretics.
2) QSAR studies, various approaches in drug design.

UNIT V:
1) Principles and Pharmacopeial Assay Procedures involving Non-aqueous Titration, Redox, Diazotization, complexometric methods, electrometric titration, gravimetric analysis.
2) Chromatography- TLC, Column, Paper, GC, Ion exchange, HPLC, HPTLC, Gel electrophoresis.
4) ICH guidelines- Calibration and validation, calibration of electronic balance, UV spectrophotometer, IR spectrophotometer, Fluorimeter, HPLC, GC, Flame photometer.

UNIT VI:
c. Pharmacology of Drugs acting on Peripheral nervous system: Neurohumoral transmission in Autonomic nervous system, Para Sympathomimetics, Parasympatholytics, Sympathomimetics, Sympatholytics, neuromuscular blocking agents, Skeletal muscle relaxants (peripheral), Local anaesthetic agents, Drug used in Myasthenia gravis and glaucoma.
d. Pharmacology of Drugs acting on cardio vascular system: Drugs used in congestive heart failure, Anti-hypertensive drugs, Anti-Anginal Drugs, Anti-arrhythmic drugs, Anti-hyperlipidemic drugs, Drugs used in the therapy of shock, Hematinics, Coagulants and anti-coagulants, Fibrinolytics and anti-platelet drugs, Plasma Volume expanders.
e. Pharmacology of drugs acting on urinary system: Diuretics and Anti-diuretics.
f. Pharmacology of drug acting on respiratory system: Anti-asthmatic drugs, Drugs used in the management of COPD [Chronic Obstructive Pulmonary disease], Expectorants, anti-tussives, nasal decongestants, Respiratory Stimulants.
g. Immuno Pharmacology: Immuno stimulants, immuno suppressants, bio-similars.
h. Bio-assay: Principles and applications of Bio-assay, types of bio-assay, bio-assay of insulin, oxytocin, Vasopressin, ACTH, d-tubocurarine, digitalis, histamine and 5 HT.
i. Chrono Pharmacology: Definition of rhythm and cycles, Biological clock and it’s significance
UNIT VII:
a) Pharmacology of Drugs acting on the Gastrointestinal tract: Anti-ulcer agents, Drugs for constipation and diarrhea, appetite stimulants and Suppressants, Digestants and carminatives, Emetics and anti-emetics.


c) Autocoids and related drugs: Histamine, 5-HT and their antagonists, Prostaglandins, Thromboxanes and Leukotrienes, Angiotensin, Bradykinin and Substance-P, Non-Steroidal antiinflammatory drugs, Anti-gout drugs, Anti-rheumatic drugs.


e) Principles of toxicology: Acute, Sub-acute, Chronic toxicity, genotoxicity, carcinogenicity, teratogenicity, mutagenicity, General Principles of treatment of poisoning, clinical symptoms and management of barbiturates, morphine, organophosphorus compound, lead, mercury and arsenic poisoning.

UNIT VIII:
a) Alphabetical, Morphological, Taxonomical, Chemical and Pharmacological classification of crude drugs.

b) Adulteration of drugs of natural origin, Evaluation by Organoleptic, Microscopic, Physical, Chemical and Biological methods.

c) Plant hormones and their applications.

d) Types of plant tissue culture, nutritional requirements, growth and their maintenance. Application of plant tissue culture in pharmacognosy.

e) Brief study of basic metabolic pathways and formation of different Secondary metabolites through these pathways - Shikimic acid pathway, Acetate mevalonate pathway.

UNIT IX:
a) General introduction, composition, chemistry and chemical classification, general methods of extraction and analysis, bio-sources, therapeutic uses and commercial application of following Secondary metabolites.

Alkaloids : Vinca, Rauwolfia, Belladonna, Opium Steroids, Cardiac glycosides and Triterpenoids : Liquorice, Dioscorea, Digitalis Volatile oils : Mentha, Clove, Cinnamon, Fennel,
Coriander Tannins : Black & Pale catechu Resins : Benzoin, Ginger, Asafoetida, Colophony Glycosides : Senna, Aloes


c) Modern methods of extraction, application of latest techniques like Spectroscopy, Chromatography and Electrophoresis in isolation, purification and identification of Crude drugs.

d) Basic principles involved in Homeopathy systems of medicine.
UNIT X:

a) The Drugs and Cosmetics Act, 1940 and Drugs Rules 1945 (As Amended from time to time)
b) The Drugs and Magic Remedies (Objectionable Advertisement) Act, 1954 and Rules, 1955 (As Amended from time to time)
c) The Drugs (Price Control) Order 2013 (As Amended from time to time)
d) The Narcotic Drugs and Psychotropic substances Act and Rules, 1985 (As Amended from time to time)
e) The Pharmacy Act, 1948 (As Amended from time to time)

51. SANSKRIT

(PG Degree Standard)

Unit I: Vedas and Vedāngas


Unit II: Epics and Purāṇas

Epics Rāmāyaṇa Features of the epic literature- Authorship of the Rāmāyaṇa date Influence of Ramayana on later Sanskrit Literature; Mahābhārata- Three Stages in the development of the Epic - Date-Critical Estimate as a Dharma śāstra Harivamśa- Upākhyānas Influence of Mahābhārata on later Sanskrit Literature - Rāmāyaṇa and Mahābhārata as the National epics of India.

Purāṇas- Definition Authorship Date Importance - Classification Brief account of the Puranas - Upapurāṇas.

Unit III: Pre Kālidāsa Kāvya Period - Kālidāsa - Post Kālidāsa Kāvya

Definition of Kavya - Characteristic Features of the Mahākāvyā- Vālmiki - Vararuci - Pingala.

Kālidāsa - Date of Kālidāsa - Rāghuvamśa, Kumārasambhava.

Post Kālidāsa Kāvya


Unit IV: Lyric - Gnomic and Didactic Poetry - Didactic fable Anthology - Popular tale- Prose - Campū Literature

Features of the lyrics Erotic Lyrics - Meghaśunte - Amaruśataka Gitagovindaand others -Devotional Lyrics- General Features works of Sankara, Rāmānuja and Vedāntadesika - Nārāyaṇīyam - Karuṇālahari Gnomic and Didactic General Features Origin and development works of Bhatphari and Kṣemendra - Anyāpadāesa,

Anthology: Features-Gātāsaptasati - Sadukti karṇamṛta

Didactic fable-General Features - Pañcatantra and Hitopadeśa

Prose Definition Katha and äkhyāyikā Vāsavadatta, Daśakumārarakita, Kathāsaritsāgara. Origin Kādambari,

Campū- definition Rāmāyanacampū Bharatacampū.

Popular tale - General features - Brhatkatha- language form-contents and date - abridgements-Buddhist tales- stories of Vikramaditya and others.
Unit V: Sanskrit Drama - Origin - Characteristics Types, Bhāsa and Kālidāsa - Post Kālidāsa Dramatists

Traditional view about the origin of Drama early beginning - Greek origin Definition and Characteristic Features Uparūpaka. Types of Rūpaka and

Bhāsa and Kālidāsa Trivandrum plays their authorship Abhijñānaśākuntala.

Post Kālidāsa Dramatists śūdraka Dinnāga
Viśākadatta Harṣavardhana- Bhaṭṭanārāyaṇa Bhavabhūti Murari Rājaśekhara and others - Allegorical lays of krṣṇamiśra and Vedānta Deśika.

History Paucity of works on history discussed -Harṣacarita Rajatharangni-and others.

Unit VI: Theories of Poetry and Drama


Unit VII: Grammar - Texts and Concepts


Unit VIII: Prosody and Lexicography, Astronomy, Dharmaśāstra,

Upaveda- ayurveda- Gandharvaveda Dhanurveda Arthaśāstra and Ancillary Sciences.

Prosody - Vṛtta and jāti. Lexicons on Homonyms and Synonyms.

Astronomy - General Features Early Treatises Five Siddhāntas- Indian Mathematics; Varahamihira aryabhatta Brahmagupta Bhāskarācārya.


Unit IX: Bharatiya Darśanas (Indian Philosophy), Religion General Principles

Explanation and Scope of Philosophy - Nāstika and Astika systems -

Nāstika - Cārvaka, Buddhism, Jainism ; Āstika- Nyaya- Vaiśeṣika, Sāmkhya, Yoga, Mimāṁsā - Pūrva and Uttaramimāṁsā on later Sanskrit Literature a- sūtra texts and Commentaries - Independent treatises of these systems.

Unit X: Epigraphy - Manuscriptology

Inscriptions, Scripts used in Ancient Texts - Grantha, Tamil, Devanagari, Nandināgari, Brāhmi and śāradā Scripts - Editing of Sanskrit Texts from manuscripts - Preservation of manuscripts materials used, Deciphering of scripts Textual Errors: Omissions, Deletions, additions. Use of modern Technology to edit texts
52. LAW  
(Degree Standard)  
CODE: 414

UNIT I: CONSTITUTIONAL LAW AND HUMAN RIGHTS  

UNIT II: JURISPRUDENCE  


UNIT III: LAW RELATING TO INDUSTRIAL RELATIONS  

Misconduct – Domestic Enquiry and Disciplinary Proceedings – Appropriate Relief in case of Termination, Discharge, Dismissal.

UNIT IV: LAW RELATING TO WAGES


UNIT V: LAW RELATING TO SOCIAL SECURITY


UNIT VI: ADMINISTRATIVE LAW


Principles of Natural Justice – Concept - Rule against Bias - Audi Alteram Partem – Exceptions to the Rule of Natural Justice


UNIT VII: LAW OF CONTRACTS AND TRANSFER OF PROPERTY ACT


UNIT VIII: COMPANY LAW & BANKING LAW

National Company Law Tribunal and Appellate Tribunal.

Negotiable Instruments Act, 1881 - Definition and Characteristics – Parties to Negotiable instruments – Discharge and dishonor of instruments – Liability – Cheques – Civil and Criminal Liability for dishonor of cheque under Sec.138 to Sec.142 of the Amended Negotiable Instruments Act.

State Financial Corporation’s Act, 1951 (SFCs Act) - Important Definitions viz., Board, Development Bank, Financial Corporation, Industrial concern - Powers and Duties of the Board – Rights available to Financial corporation to enforce securities in case of default - Power to call for repayment before agreed period - Special provisions for enforcement of claims by Financial Corporation - Procedure of District Judge in respect of applications – Recovery of amounts due to the Financial Corporation as an arrear of land revenue.


UNIT IX: PROCEDURAL LAW

UNIT X: OTHER LAWS


Annexure IV

Instructions to be followed by candidates while appearing for written examinations

1. General Instructions

1.1. Candidates shall present themselves at the examination venue with the memorandum of admission (hall ticket) downloaded from the Commission’s website, failing which, they shall not be allowed to write the examination. Candidates shall also bring with them, a photocopy of their Aadhaar card / Passport / Driving Licence / Permanent Account Number (PAN) card / Voter ID card.

1.2. Candidates must appear for the examination at the venue they have been allotted, as mentioned in the memorandum of admission (hall ticket). Change of venue will not be permitted. No candidate, without prior approval, shall be allowed to appear for the examination at a venue other than the one originally allotted.

1.3. Candidates may be subjected to frisking at the examination venue, if required, with the assistance of male / female police personnel or any authorized persons, as the case may be.

1.4. Candidates are advised, in their own interest, not to bring any of the banned items including mobile phones to the venue of the examination, as arrangements for safekeeping of the same cannot be assured.

1.5. Parents and others who accompany the candidates will not be permitted inside the examination venue.

1.6. If the photograph of the candidate in the memorandum of admission (hall ticket) is not printed or not clear or does not match with candidate’s appearance, he / she should furnish a separate photograph affixed on a plain paper, along with his name, address, register number and signature along with a copy of the memorandum of admission (hall ticket) and a copy of Aadhaar card / Passport / Driving License / Permanent Account Number (PAN) card / Voter ID card, to the Chief Invigilator, who shall countersign it.

1.7. The ID proof in original, should also be shown to the room invigilator for verification. The room invigilator upon verification of the identity of the candidate, shall obtain an undertaking as to the genuineness of the candidate and to the effect that he / she is aware that he / she is liable to any criminal / penal action initiated by the Commission, if the information furnished is found to be incorrect at a later date. The undertaking shall then be handed over to the Chief Invigilator.

1.8. In order to facilitate verification of the identity of the candidates and explanation of the procedures pertaining to the examination, the candidates shall present themselves at the examination venue one hour before the time scheduled for the commencement of the examination.

1.9. All gates serving as entry into the examination venue shall be closed thirty minutes before the commencement of the examination and no one shall be allowed into the venue thereafter. (e.g., in case of forenoon session, for an examination scheduled to commence at 09.30 am, the candidates should present themselves at 09.00 am in the examination venue. In case of afternoon session, for an examination scheduled to commence at 02.00 pm, the candidates should present themselves at 01.30 pm. After that no candidate shall be permitted to enter the premises of the examination venue).

1.10. In case of examinations to be held in both forenoon and afternoon sessions, the reporting time for the afternoon session shall also be thirty minutes before the commencement of the examination and no one shall be allowed into the venue thereafter.
1.11. In case of extraordinary circumstances, like pandemic conditions, etc., the procedures / precautions prescribed (e.g., use of sanitizer and face mask, practicing social distancing) shall be adhered to.

1.12. Candidates must show the memorandum of admission (hall ticket) to the Invigilator / Chief Invigilator / inspection authorities / any authorized persons of the examination hall, on demand, for verification.

1.13. Candidates must ensure that the Room Invigilator signs in the memorandum of admission (hall ticket). The memorandum of admission should be preserved carefully and retained permanently. The memorandum of admission should be produced if shortlisted for the next stage of selection / whenever sought for by the Commission.

1.14 The memorandum of admission may also be photo copied, as a precaution, after the exam is over.

1.15. No duplicate memorandum of admission (hall ticket) will be issued later.

1.16. Candidates should maintain strict discipline not only in the examination room, but also inside the campus of the examination venue. Candidates found smoking / intoxicated, or found to have entered into a quarrel of any kind, or to have misbehaved with the Chief Invigilator or with the inspection authorities or with the invigilator or with any other candidate either in the examination hall or inside the campus of the examination venue, either before, during or after the examination, are liable to invalidation of answer sheet and debarment for any period the Commission may deem fit, as well as appropriate criminal action.

1.17. Water, tea, coffee, snacks, soft drinks, etc., will not be allowed inside the examination venue.

1.18. Candidates suffering from serious health issues, may, with the consent of the Chief Invigilator, deposit medication or other medical requirements on the room invigilator’s table for use if needed.

1.19. An alarm bell shall be sounded in respect of each of the following activities in order to alert the candidates. The room invigilators shall make appropriate announcements as and when required.

<table>
<thead>
<tr>
<th>Event</th>
<th>Timeline</th>
<th>Duration of Bell</th>
</tr>
</thead>
<tbody>
<tr>
<td>Before Commencement of Examination</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Objective type Examination:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Distribution of OMR Answer Sheets</td>
<td>30 minutes before</td>
<td>Short Bell (2 seconds)</td>
</tr>
<tr>
<td>Distribution of Question Booklets</td>
<td>15 minutes before</td>
<td>Short Bell (2 seconds)</td>
</tr>
<tr>
<td><strong>Descriptive type Examination:</strong></td>
<td>Distribution of</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Question-cum- Answer Booklets</td>
<td>15 minutes before</td>
</tr>
<tr>
<td>At the Start and During the Examination</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Commencement of the Examination</td>
<td>At the Designated Time</td>
<td>Long Bell (5 seconds)</td>
</tr>
<tr>
<td>During the Examination</td>
<td>Every One Hour</td>
<td>Short Bell (2 seconds)</td>
</tr>
<tr>
<td>Before Conclusion of the Examination</td>
<td>10 minutes before</td>
<td>Short Bell (2 seconds)</td>
</tr>
<tr>
<td>After Conclusion of the Examination</td>
<td>15 minutes after</td>
<td>Long Bell (5 seconds)</td>
</tr>
</tbody>
</table>

1.20. The candidates shall compulsorily be seated in the examination room thirty minutes before the time scheduled for the commencement of the examination.

1.21. Candidates must sit in the place allotted to them after checking the name, register number and photo as pasted on the table.
1.22. Candidates must follow the instructions from the invigilators regarding filling up of OMR answer sheets

2. Objective Type Examination

2.1. Candidates must carry only black ball point pen, a photocopy of any one proof of ID, as specified and memorandum of admission (hall ticket) inside the examination room. Other materials are not allowed.

2.2. The OMR answer sheet as well as instructions regarding filling up of the same, shall be given thirty minutes before the time scheduled for the commencement of the objective type examination.

2.3. Pre-printed personalized OMR answer sheets containing photograph, name, register number, subject and examination centre and venue, date and session as mentioned in the memorandum of admission (hall ticket) will be supplied in the examination room. Before using the OMR answer sheet, the photograph and the details printed on it shall be verified by the candidates. It shall be ensured that the OMR answer sheet pertains to the candidate only. If any of the details are found to be incorrect or defective in any way, it should be immediately reported to the room invigilator for replacement. No OMR answer sheet will be replaced after use.

2.4. Candidates shall shade all fields of the OMR answer sheet, including the particulars required as well as answers, as per the correct method specified in page 2 of the OMR answer sheet.

2.5. Candidates shall affix their signature at the two designated places in the answer sheet. One signature shall be affixed after having read the instructions therein, before the commencement of the examination and the other signature shall be affixed, after the conclusion of the examination.

2.6. Candidates shall affix his/her left hand thumb impression in the appropriate box provided in the answer paper, after the examination is over.

2.7. Candidates will be supplied with the question booklet fifteen minutes before commencement of the examination.

2.8. Candidates must not tick mark / mark the answers in the question booklet. Failure to comply with this instruction will result in rejection of candidature.

2.9. Before writing and shading the Question Booklet Number in the OMR answer sheet, the candidate shall verify whether all the questions are printed without any omission. In case any defect is found, it shall immediately be reported to the Room Invigilator and a replacement shall be obtained which is complete in all aspects. Correct Question Booklet Number which is used by the candidate shall be written in the OMR answer sheet. If any defect is noticed in the question booklet or OMR answer sheet after the commencement of the examination, it will not be replaced.

2.10. After checking the OMR answer sheet and the question booklet for discrepancies, candidates must sign in the attendance sheet, after verifying his name and register number therein, duly mentioning the question booklet number.

2.11. The candidates must write and shade the Question Booklet Number correctly in the bubbles provided in the OMR answer sheet. The OMR answer sheets will be evaluated based on the Question Booklet Number shaded by the candidates in the bubbles.

2.12. The correct method of shading Question Booklet Number is illustrated below. For example, if the Question Booklet Number is 27430896:

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2.13. If the Question Booklet Number shaded by the candidate is not read by the OMR scanner, which may be due to improper or absence of shading of Question Booklet Number by the candidates, such answer sheets shall not be subjected to evaluation. Therefore, the said answer sheets shall be invalidated.

2.14. Candidates must shade only one of the answer bubbles in the OMR answer sheet, for each question. In case more than one bubble is shaded for a particular question, that answer shall not be evaluated.

2.15. There shall be no question for which none of the answer bubbles remains unshaded. In case none of the answer bubbles is shaded, for any question(s), the answer sheet shall be invalidated. Option [E] should be shaded if the answer is not known to the candidate. The total number of [A]s, [B]s, [C]s, [D]s and [E]s shaded as answers should be written in the boxes and the corresponding bubbles should be shaded by the candidates against Section III of Part II of the OMR answer sheet. The total number of [A]s + [B]s + [C]s + [D]s + [E]s shaded should be equal to the total number of questions printed in the question booklet.

2.16. The correct method of writing & shading in section – III (a) & section III (b) of the Part – II of OMR Answer Sheet is illustrated below:

For eg., 36 [A]s are shaded as answers in Response portion, then 036 shall be written in the boxes provided in Section – III (a) and the corresponding bubbles 0,3 and 6 should be shaded in Section – III (b) as illustrated below:

2.17. The room invigilator shall fill in Section IV of Part II, the number of As, Bs, Cs, Ds and Es, as shaded by the candidate in Section III (b) of the OMR answer sheet. Both the invigilator and the candidate must sign below this entry after the examination is over.
2.18. Fifteen minutes extra time shall be given after the examination exclusively for this activity.

2.19. Only upon completion of these procedures, candidates shall be permitted to leave the examination room.

2.20. The video regarding the instructions to candidates appearing for the objective type examinations is available in https://www.tnpsc.gov.in/English/omr-guidelines.html

3. **Descriptive type examination**

3.1. Candidates must carry only black ink pen (Fountain pen or Ball point pen or Gel pen), a photocopy of any one proof of ID, as specified and memorandum of admission (hall ticket) inside the examination room. Other materials are not allowed.

3.2. In respect of descriptive type examination, the question-cum-answer booklet as well as instructions regarding filling up of the same, shall be given fifteen minutes before the time scheduled for the commencement of the examination.

3.3. Candidates must sign in the attendance sheet, after verifying his name and register number therein, duly mentioning the question-cum-answer booklet number.

3.4. In cases where the question number and the answer written therein or the question and answer written therein do not correspond to each other or the candidate makes any modification in the question number, such an answer shall not be evaluated.

3.5. If an answer booklet of a candidate for one paper is declared deemed not fit for valuation, the answer booklets of the candidate for the remaining papers will also be treated as invalid / not subjected for evaluation.

4. **Computer Based Test (CBT) Examination**

4.1. The Registration for the examination shall start one hour before the time scheduled for the commencement of the examination. Further, the candidates should present themselves at the examination venue 30 minutes before the time scheduled for the commencement of examination and no one shall be allowed into the venue thereafter.

4.2. Each candidate will be assigned a Computer to take up the examination.

4.3. No computer knowledge is required to take up the Computer Based Test. Knowledge in Mouse operation would suffice to take up the Computer Based Test.

4.4. Candidates will be provided with a user name and pass word to login the system.

4.5. Use the key board only to key-in the Register Number, User id (registration id) and password.

4.6. Necessary instructions will be displayed on the screen. Kindly read all the instructions carefully and follow the instructions without fail.

4.7. In case of doubt in the questions and answers, English version is the final.
4.8. In Computer Based Test, questions with five options each will be displayed in the computer screen.

4.9. The Question and optional answers will be shuffled randomly and displayed to the candidate.

4.10. Candidates will be provided with a paper for doing rough work. After closure of the examination, rough sheet will be collected.

4.11. 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.

4.12. Candidate can use only the mouse to select the correct answers and proceed with answering the questions.

4.13. Candidates can recheck his / her answers and if he / she feels to correct the answers, it can be done at any time before the closure of examination. They can skip the questions also, if they desire so.

4.14. Candidate can submit their answers at any time during the examination.

4.15. If he/she wants to close the examination, he/ she shall remain in these at till the completion of the scheduled time of examination.

4.16. Once the entire answers are submitted, the candidates have no option to proceed further.

4.17. If the candidates fail to submit their answers, the system will automatically submit the answers to the server, at the closure of the examination.

4.18. The question and answers can be zoomed to the required level for the candidates with visual impairment.

4.19. Candidates have to sign the attendance sheet and affix thumb impression for verification of his / her identity.

4.20. 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.

4.21. The Examination Hall will be under camera surveillance.

4.22. 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) and they can practice 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. Candidates can practice the mock test as many times as he/ she likes.

4.23. Answer sheet answered other than the subject opted by the candidate in the online application / specified in the Hall Ticket will be invalidated.

4.24. One question will be displayed on the screen at a time

4.25. Time available for the candidate to complete the examination will be displayed through a countdown timer in the top right-hand corner of the screen. It will display the remaining time as Time Left. (For example: if duration of examination is 3 hours, at the beginning of exam, timer will show 180 minutes and for Differently Abled candidates with scribe / without scribe 240 minutes, which will reduce gradually with
When the timer reaches zero, the examination will end by itself and the examination will be submitted by the system automatically.

4.26. Question Number Box: Question Number Box displayed on the right side of the screen will show the status of each question using one of the following symbols:

1. You have not visited the question yet.
2. You have not answered the question.
3. You have answered the question.
4. You have NOT answered the question, but have marked the question for review.
5. You have answered the question and marked for review. This will be considered for evaluation.

The ‘Marked for Review’ status for a question simply indicates that you would like to look at that question again.

You can click on the ”>” arrow which appears to the left of question number box to minimize the question number box. This will enable you to view the question on a bigger area of the screen. To view the question number box again, you can click on ”<” arrow which appears on the right side of the screen.

You can click on to navigate to the bottom and to navigate to the top of the question area, without scrolling.

4.27. The summary of number of questions answered, not answered, not visited, marked for review and answered and marked for review will be displayed above the question number box.

4.28. The questions will appear on the screen in ascending order, which can be answered one by one.

4.29. To select your answer of a question, click on the button of one of the options.

4.30. Click on Save and Next button after answering every question to save your answer. Otherwise your answer will not be saved.

4.31. To deselect your chosen answer, click on the button of the chosen option again or click on the Clear Response button.

4.32. Instruction for enlarging images, to view the image provided in the question in a bigger size, click on the image and rotate the scrolling wheel on the mouse.

4.33. Any attempt of malpractice found, will render you liable to such penal action as the Commission may decide.

5. Other Instructions

5.1. Borrowing of any material, instruments from other candidates is strictly prohibited. Candidates shall use only their own pens and specifically permitted material.
5.2. Candidates shall not be allowed to exceed the time allotted for answering the paper, for any reason.

5.3. In the descriptive type of examination, the candidate is to write answers in question cum answer booklet.

5.4. Tentative answer keys will be hosted in the Commission’s website within twenty six working days from the date of conduct of objective type examination. Candidates can challenge the tentative answer keys of the objective type examination through the ‘Answer Key Challenge’ window available in the Commission’s website [Results → Answer Keys]. Representations, if any, challenging the tentative answer keys shall be submitted only through online mode within seven days from the date of publication of tentative answer keys. Representations received by post or e-mail will receive no attention.

5.5. Detailed instructions, procedures to challenge the tentative answer keys have been made available in the Commission’s website. Representations made online/offline after the closure of the window will also receive no attention.

5.6. The challenges submitted on time, through the online mode, shall be referred to a committee comprising of experts in each subject. The decision on the final answer key shall be made, based on the recommendations of the expert committee and paper evaluation shall commence thereafter.

5.7. The Commission shall not publish the final answer key until the completion of the entire selection process.

5.8. Requests from candidates for furnishing of their marks or answer paper copy before the completion of the entire selection process, will not be entertained by the Commission.

5.9. After conclusion of the entire selection process, copies of descriptive type answer booklet shall be made available to the candidates on the Commission's website. On requisite payment, the candidates can download the answer papers.

5.10. After conclusion of the entire selection process, relevant particulars of all candidates who had applied for recruitment to the post shall be made available on the Commission’s website.

6. Special Instructions for Persons with Benchmark Disabilities, Usage of scribes

6.1. Candidates with benchmark disability, shall be permitted to utilize the services of a scribe upon making such request in the online application subject to the following conditions. Request for scribe made after the submission of application or on the date of examination will receive no attention.

6.1.1. Candidate with benchmark disability in the category of blindness, locomotor disability (both arm affected) and cerebral palsy the facility of scribe shall be given.

6.1.2. In case of other category of disability, the provision of scribe can be allowed on production of a certificate from the Chief Medical Officer / Civil Surgeon / Medical Superintendent of a Government Health care institution if so desired by that candidate. The format of the certificate is given below:
Certificate

This is certify that I have examined Mr/Ms/Mrs.______________________________ (Name of the candidate with disability) a person with _____________________________________________ (Nature and percentage of disability as mentioned in the certificate of disability), S/o/D/o ____________________________ A resident of ____________________________ (Village / District / State) and to state that He/She has physical limitation which hampers his / her writing capabilities owing to his / her disability.

Due to the above mentioned disability following concession may be given:

1. Exemption from Tamil / Second Language.
2. Extra ____ hours for writing theory exam.
3. Allocation of a scribe.
4. Over looking spelling mistakes and grammatical errors.
5. Using calculator/assistive devices
6. ___________ (Any other assistive devices or concessions).

*strike out the non applicable.

Signature
(Name of Government Hospital/ Civil Surgeon/ Medical Superintendent/ Signature of the notified Medical Authority of a Government Health Care Institution)

Name & Designation
Name of Government Hospital/ Health Care Centre/ The notified Medical Authority

Place: ____________________________

Date: ____________________________

Signature / Thumb impression of the Differently Abled Person

Note:
Certificate should be given by a specialist of the relevant stream / disability (e.g. Visual Impairment–Ophthalmologist, Locomotor disability–Orthopedic Specialist / PMR etc.,)

6.1.3. The Commission will arrange for scribes and the fee amount to be paid to the scribes will be met by the Commission. Candidates availing of the services of the scribes need not pay any fee to them.

6.2. All candidates with benchmark disability, availing of the services of the scribes while appearing for the written examination will be seated in a separate room in the ground floor, in close vicinity to the Chief Invigilator’s control room and under the close supervision of the Chief Invigilator.

6.3. Candidates with Benchmark disability must affix their signature and left hand thumb impression in the space provided in the answer sheets, if possible.

6.4. Visually disabled / orthopedically disabled candidates who have been permitted to use scribe facility, who are unable to affix their signature, may affix their left hand thumb impression alone.

6.5. Candidates who are unable to use their left hand, must affix right hand thumb impression.
6.6. Candidates who are unable to use both hands, and who have been permitted to use scribe, may leave the signature and thumb impression columns blank.

6.7. Compensatory time of not less than 20 minutes per hour of examination will be allowed to candidates with benchmark disability, who have physical limitation to write including that of speed and who are utilizing the services of a scribe.

6.8. All candidates with disability who have physical limitation with regard to writing including that of speed and not availing the services of a scribe will be allowed additional time of a minimum of one hour for an examination of three hours duration which could further be increased on a case-to-case basis.

6.9. All persons with benchmark disability, who are unable to climb the staircase, will be allowed to write the examination in a room in the ground floor, in close vicinity to the Chief Invigilators control room.

7. Penalty for Violation of Commission's Instructions

The answer sheets of the candidate will be invalidated / marks deducted / criminal action initiated / and debarment imposed for the following violations:

7.1. Invalidation of Answer Sheet (Objective Type)

7.1.1. Usage of any pen other than black ball point pen.

7.1.2. Usage of pencil.

7.1.3. Answered in a subject other than the one opted for in the online application / specified in the memorandum of admission (hall ticket).

7.1.4. In case of non-personalized OMR answer sheet, if the register number is not written in the space provided for it.

7.1.5. The answers are not shaded as per the correct method illustrated on page 2 of the OMR answer sheet.

7.1.6. If the Barcode / OMR-track printed on page 1 of the OMR answer sheet is tampered with.

7.1.7. OMR answer sheet is not signed by the candidate at all required places.

7.1.8. Required particulars in the OMR answer sheet have not been filled up.

7.1.9. Wrongly seated in the place of other candidates and/or written the examination using the OMR answer sheet of other candidates.

7.1.10. If any irrelevant / impertinent remarks amounting to disclosure of identity is found in the OMR answer sheet upon physical verification.

7.1.11. If the bubbles for Question Booklet Number are not shaded.

7.1.12. Even if one or more bubble / bubbles of Question Booklet Number are left blank (not shaded) in the space provided in Section-II of part-II of OMR answer sheet.

7.1.13. If more than one bubble / bubbles is shaded in space provided for bubbles of Question Booklet Number in each column (Multiple Shading)

7.1.14. Question Booklet Number shaded in bubbles provided for Question Booklet Number by the candidate is out of question booklet number series printed [Not in range of QB series]
7.1.15. If either Part-I or Part-II or both of OMR Answer Sheet is crossed out. For Example: OMR Sheet

![Crossed Out]

7.1.16. In cases, where a candidate attends two or more subject papers and if one of the subject papers is invalidated for having violated the Commission’s instructions to applicants and if the General Studies paper is not invalidated, the remaining subject papers will be evaluated. However, if the General Studies paper is invalidated for having violated the Commission’s instructions to applicants, all the subject papers attended will not be evaluated.

7.1.17. In cases, where a candidate is issued with Memorandum of admission (hall ticket) for attending two or more subject papers and if he/she absents himself/herself for one of the subject papers but attends the remaining subject papers and also General Studies paper, all the papers attended will be evaluated. However, if the candidate absents himself/herself for the General Studies paper, all the papers attended will not be evaluated.

7.2. Invalidation of Answer Sheet (Descriptive Type)

7.2.1. Usage of pens other than black ink pens. The candidate shall use the same black ink pen (Fountain pen or Ball point pen or Gel pen) in the entire answer booklet for all purposes including writing the register number, signing on the first page, answering, drawing, underlining, highlighting, striking off unused space in the answer booklet, striking off answers in excess of the number required, etc. For this purpose, candidates should keep sufficient number of additional black ink pens of same type, with same colour and shade of ink.

7.2.2. Usage of whitener, sketch pens, pencil, colour pencils, multicolour pens, crayons or any other writing materials, for any purpose.

7.2.3. Writing religious symbols, writing their name, signature, phone number, cell phone number, initials, address and writing any other name, initial or address in the answer booklet except in the manner instructed in the question-cum-answer booklet.

7.2.4. Appealing to the examiner in the answer booklet, invoking sympathy of examiners in connection with their results.

7.2.5. Candidates writing anything unconnected to the question, or any impertinent remarks and irrelevant matter revealing his identity.

7.2.6. Writing the answers in more than one language (i.e., partly in Tamil and partly in English) except in cases where specifically permitted. If the candidates answer in Tamil, they should write the entire examination in Tamil only or if the candidates answer in English, they should write the entire examination in English only. However, technical words which cannot be translated, can be written in the respective languages, i.e., only the technical words and not the entire sentence / entire answers. The answer booklet of the candidate who violates this instruction will be invalidated.

7.2.7. Wrongly seated in the place of other candidates and / or written the examination using the answer booklet of other candidates.

7.2.8. Tampering with the Bar code printed on the question-cum-answer booklet.
7.2.9. The Question cum Answer Booklet which has not been signed by the candidates in the designated places.

7.3. Deduction of Marks (Objective Type)

7.3.1. In case of non-personalised OMR answer sheet, two marks will be deducted for writing the register number incorrectly.

7.3.2. In case number of [As], [Bs], [Cs], [Ds] and [Es] count wrongly mentioned / not shaded / incorrectly shaded by the candidate in the Part – II of the OMR Answer Sheet, two marks will be deducted from the total marks obtained by the candidate.

7.3.3. None of the answer bubbles is shaded for even one question by the candidate, two marks will be deducted from the total marks obtained by the candidate.

7.3.4. In case of absence of Candidates left thumb impression in answered portion of the OMR answer sheet, two marks will be deducted from the total marks obtained by the candidate.

7.3.5. If the Question Booklet Number is not written or partially written in the space provided, five marks will be deducted from the total marks obtained by the candidates.

7.4. Criminal Action: Criminal action will be initiated against the candidates for the following reasons

7.4.1. Misbehaviour and indiscipline in the examination hall. Candidates should maintain strict discipline not only in the examination room, but also inside the campus of the examination venue. Candidates found smoking / intoxicated, or found to have entered into a quarrel of any kind, or to have misbehaved with the Chief Invigilator or with the inspection authorities or with the invigilator or with any other candidate either in the examination hall or inside the campus of the examination venue, either before, during or after the examination, are liable to invalidation of Question Cum Answer Booklet and debarment for any period the Commission may deem fit, as well as appropriate criminal action.

7.4.2. Indulging in any type of malpractice, including impersonation and resorting to unfair means within the examination hall or outside will lead to debarment for any period deemed fit by the Commission, besides initiation of criminal action.

7.5. Invalidation of Question Cum Answer booklet as well as debarment for such period as the Commission may deem fit will be imposed on candidates resorting to any kind of irregularity or malpractice within / outside the examination hall including:

a. Consulting with/ copying from another candidate in the examination hall.
b. Permitting others to copy from his/her Question Cum Answer Booklet.
c. Copying from books or notes which are printed/ typewritten/ handwritten.
d. Seeking the help / assistance of any official / hall supervisor in answering questions in examination hall.
e. Approaching or attempting to approach an examiner or getting other people to approach an examiner on his behalf.
f. Possession of electronic devices such as cellular phones, watches and rings with in-built memory notes, Bluetooth devices, communication chip, other electronic devices and non-electronic devices such as P&G design data book, books, notes, handbags, other non- permitted materials, etc.
g. Taking away from the examination hall, the whole or part of any used / unused Question Cum Answer Booklet without handing it over to the room invigilator.
h. Tampering with the Barcode printed on the Question Cum Answer Booklet.

7.6. Violation of any one or more of the instructions contained in the Commission’s Instructions to Applicants / instructions printed on the question-cum-answer booklet / memorandum of admission (hall ticket) shall also make the candidate liable to debarment, either permanently or for such period as the Commission deems fit, and/or rejection of candidature after due process and/or invalidation of answer sheet and/or any other penalty, as decided by the Commission.

7.7. Debarment: The period or which candidates shall be debarred from appearing for the examinations / participating in the recruitment processes conducted by the Commission, for the offences committed by the candidates are given below. Besides debarment, the candidate shall also be liable to rejection of candidature after due process, invalidation of answer papers, as the case may be. Criminal action may also be initiated against such candidates wherever indicated.

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Nature of Offence</th>
<th>Period of Debarment</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Attempts to influence the Chairman, Members of the Commission, Secretary, Controller of Examinations or any officer or staff of the Commission, personally /by letter/ through relatives, friends, patrons, officials or other persons.</td>
<td>Three Years</td>
</tr>
<tr>
<td>2.</td>
<td>Production of bogus community/ destitute widow/ differently abled/ ex-serviceman / transgender /person studied in Tamil medium certificates, etc. Tampering or alteration in the documents or certificates.</td>
<td>Permanent, Initiation of Criminal action</td>
</tr>
<tr>
<td>3.</td>
<td>Suppression of material information, at any stage of the selection process, regarding: (i) Previous appearances or availing free chances. (ii) Regular / temporary employment in Government or Quasi-Government organizations, local bodies, public sector undertakings, statutory bodies, public corporations, Universities, etc. (iii) Criminal cases, arrests, convictions, disciplinary proceedings, etc. Debarment or disqualification by Union Public Service Commission / State Public Service Commission / other agencies</td>
<td>One Year</td>
</tr>
<tr>
<td>4.</td>
<td>Possession of electronic devices such as cellular phones, watches and rings with in-built memory notes, Bluetooth devices, communication chip, any other electronic devices inside the examination room and also seeking the help of/ Assistance of any official/ invigilator/ any outsider in answering question</td>
<td>Permanent</td>
</tr>
<tr>
<td>5.</td>
<td>Possession of non-electronic devices such as P&amp;G Design Data Book, books, notes, guides, hand bags, other non-permitted materials, etc. inside the Examination room.</td>
<td>Three Years</td>
</tr>
<tr>
<td>6.</td>
<td>Consulting with other candidates, copying from other candidates, permitting others to copy from his/her answer paper, copying from books or notes which Are printed/ typewritten/ handwritten, etc.</td>
<td>Three Years</td>
</tr>
<tr>
<td>7.</td>
<td>In addition to the offences listed here in, the involvement of candidates in any In discipline or irregular practices within/ outside the examination room.</td>
<td>Three Years</td>
</tr>
<tr>
<td>8.</td>
<td>Written certain un warranted remarks unconnected with answers to the subject Concerned in the answer books, etc., i.e., vulgar, derogatory and obscene language.</td>
<td>Three Years</td>
</tr>
<tr>
<td>9.</td>
<td>Appeal to the examiners in the answer books, to value liberally or to award More marks or to be sympathetic, etc.</td>
<td>One Year</td>
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<tr>
<td>10.</td>
<td>Approaching or attempting to approach an examiner or getting other people to approach an examiner on his / her behalf</td>
<td>Permanent, Initiation of criminal action</td>
</tr>
<tr>
<td>11.</td>
<td>Taking away from the examination hall, the whole or part of any used / unused question cum answer booklet, without handing it over to the room invigilator. Tampering with the Barcode.</td>
<td>Three Years</td>
</tr>
<tr>
<td>12.</td>
<td>Candidates found smoking / intoxicated, or found to have entered into a quarrel of any kind, or to have misbehaved with the Chief Invigilator or with the inspection authorities or with the invigilator or with any other candidate either in the examination hall or inside the campus of the examination venue, either before, during or after the examination.</td>
<td>Three Years</td>
</tr>
<tr>
<td>13.</td>
<td>Indulging in grave malpractices, including impersonation, amounting to subversion of the conduct of examination.</td>
<td>Permanent, Initiation of Criminal action</td>
</tr>
</tbody>
</table>
1. Experience Certificate for the post of Assistant Geologist in Geology and Mining Department (Post Code: 1863)

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<tbody>
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<td>1.</td>
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<td>2.</td>
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<td>3.</td>
<td>Date of Birth</td>
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<tr>
<td>4.</td>
<td>Qualification possessed by the Employee on the date of joining Service.</td>
</tr>
<tr>
<td>5.</td>
<td>Designation of the Employee</td>
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<tr>
<td>6.</td>
<td>Nature of the Work / Duty performed by the Employee (To be mentioned in brief)</td>
</tr>
<tr>
<td>7.</td>
<td>Period of Practical Experience in Field work From (date) To (date)</td>
</tr>
<tr>
<td>8.</td>
<td>Total Experience (YY/MM/DD) ___years ___months ___days</td>
</tr>
<tr>
<td>9.</td>
<td>Whether Attendance Register / Attendance Rolls / Pay Register and other records available Yes / No</td>
</tr>
<tr>
<td>10.</td>
<td>Name of the Organisation / Institution</td>
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<tr>
<td>11.</td>
<td>Address of the Organisation / Institution</td>
</tr>
<tr>
<td>12.</td>
<td>Phone No. and Email ID of the Organisation / Institution</td>
</tr>
</tbody>
</table>

This is to certify that Thiru/Tmt./Selvi ........................................ possesses the practical experience in field work as stated above, as on the date of notification (i.e.26.07.2024). The above particulars furnished by me are correct.

Affix photograph of the employee with the signature of the Certifying Authority on the Photograph

Seal of Office / Officer:

Signature
Name & Designation of the Head of Organization / Institution / Competent Authority

Place
Date:

Note:
1. A certificate in the format prescribed should be obtained from the Head of the Organization/ Institution wherein the individual had served or the authority competent to issue such certificate.
2. The Competent authority who issues the certificate is cautioned that issuing of certificate which contains false or incorrect details will lead to legal / penal action against them.
2. Experience Certificate for the post of Chemist in Industries and Commerce Department  
(Post Code: 1913)

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<tr>
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<td>Father / Spouse Name</td>
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<tr>
<td>4.</td>
<td>Qualification possessed by the Employee on the date of joining service</td>
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<td>5.</td>
<td>Designation of the Employee</td>
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<tr>
<td>6.</td>
<td>Nature of the Work / Duty performed by the Employee (To be mentioned in brief)</td>
</tr>
<tr>
<td>7.</td>
<td>Period of Research Experience in Pure or Applied Chemistry or Analytical Chemistry  From _____(date) To _____(date)</td>
</tr>
<tr>
<td>8.</td>
<td>Total Experience (YY/MM/DD)  ___years ___months ___days</td>
</tr>
<tr>
<td>9.</td>
<td>Whether Attendance Register / Attendance Rolls / Pay Register and other records available for this Employee  Yes / No</td>
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<td>10.</td>
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<td>Address of the Organisation / Institution</td>
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<td>12.</td>
<td>Phone No. and Email ID of the Organisation / Institution</td>
</tr>
</tbody>
</table>

This is to certify that Thiru/Tmt./Selvi .......................................... possesses the **experience in research in Pure or Applied Chemistry or Analytical Chemistry** as stated above, as on the date of notification (i.e.26.07.2024). The above particulars furnished by me are correct.

Affix photograph of the employee with the signature of the Certifying Authority on the Photograph

Signature
Name & Designation of the Head of Organisation / Institution / Competent Authority

Place:  Seal of Office / Officer
Date:  

Note:
1. A certificate in the format prescribed should be obtained from the Head of the Institution where in the individual had served or the authority competent to issue such certificate.
2. The Competent authority who issues the certificate is cautioned that issuing of certificate which contains false or incorrect details will lead to legal/ penal action against them.
3. Experience Certificate for the post of Junior Analyst in Drugs Testing Laboratory in Drugs Control Administration Department  
(Post Code: 2006)

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<td>6.</td>
<td>Nature of the Work / Duty performed by the Employee (To be mentioned in brief)</td>
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<td>7.</td>
<td>Period of Experience</td>
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<tr>
<td>8.</td>
<td>Total Experience (YY/MM/DD)</td>
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<tr>
<td>9.</td>
<td>Whether Attendance Register / Attendance Rolls / Pay Register and other records available for this Employee</td>
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<td>10.</td>
<td>Name of the Organisation / Institution</td>
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<td>11.</td>
<td>Type of Organisation/ Institution</td>
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<td>12.</td>
<td>Address of the Organisation / Institution</td>
</tr>
<tr>
<td>13.</td>
<td>Phone No. and Email ID of the Organisation / Institution</td>
</tr>
</tbody>
</table>

This is to certify that Thiru/Tmt./Selvi .......................................... possesses the experience in analysis of drugs as stated above, as on the date of notification (i.e.26.07.2024). The above particulars furnished by me are correct.

Affix photograph of the employee with the signature of the Certifying Authority on the Photograph

Signature
Name & Designation of the Head of Organisation / Institution / Competent Authority

Place: Seal of Office / Officer
Date:

Note:
1. A certificate in the format prescribed should be obtained from the Head of the Institution / Organization wherein the individual had served or the authority competent to issue such certificate.
2. The Competent authority who issues the certificate is cautioned that issuing of certificate which contains false or incorrect details will lead to legal/ penal action against them.
### 4. Experience Certificate for the post of Junior Chemist in Industries and Commerce Department (Post Code: 1914)

<table>
<thead>
<tr>
<th>1. Name of the Employee</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>2. Father / Spouse Name</td>
<td></td>
</tr>
<tr>
<td>3. Date of Birth</td>
<td></td>
</tr>
<tr>
<td>4. Qualification possessed by the Employee on the date of joining Service.</td>
<td></td>
</tr>
<tr>
<td>5. Designation of the Employee</td>
<td></td>
</tr>
<tr>
<td>6. Nature of the Work / Duty performed by the Employee (To be mentioned in brief)</td>
<td></td>
</tr>
<tr>
<td>7. Period of Experience</td>
<td>From (date) To (date)</td>
</tr>
<tr>
<td>8. Total Experience (YY/MM/DD)</td>
<td>years months days</td>
</tr>
<tr>
<td>9. Whether Attendance Register / Attendance Rolls / Pay Register and other records available</td>
<td>Yes / No</td>
</tr>
<tr>
<td>10. Name of the Organisation / Institution</td>
<td></td>
</tr>
<tr>
<td>11. Type of Organisation/ Institution (Research Laboratory/ Analytical or Metallurgical Laboratory)</td>
<td></td>
</tr>
<tr>
<td>12. a. Is the Research Laboratory recognised by the Ministry of Science and Technology, Government of India?</td>
<td>Yes/No/NA</td>
</tr>
<tr>
<td>12. b. Is the Analytical/ Metallurgical Laboratory engaged in testing and Analytical and issues Test Certificate?</td>
<td>Yes/No/NA</td>
</tr>
<tr>
<td>13. Address of the Organisation / Institution</td>
<td></td>
</tr>
<tr>
<td>14. Phone No. and Email ID of the Organisation / Institution</td>
<td></td>
</tr>
</tbody>
</table>

This is to certify that Thiru/Tmt./Selvi .......................................... possesses the experience as stated above, as on the date of notification (i.e.26.07.2024). The above particulars furnished by me are correct.

Affix photograph of the employee with the signature of the Certifying Authority on the Photograph

Seal of Office / Officer:

Signature

Name & Designation of the Head of Organization / Institution / Competent Authority

Place

Date:

Note:

1. A certificate in the format prescribed should be obtained from the Head of the Organization/ Institution wherein the individual had served or the authority competent to issue such certificate.

2. The Competent authority who issues the certificate is cautioned that issuing of certificate which contains false or incorrect details will lead to legal / penal action against them.
5. Experience Certificate for the post of Curator in Department of Museums  
(Post Code: 2127)

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<table>
<thead>
<tr>
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<tbody>
<tr>
<td>1.</td>
<td>Name of the candidate</td>
</tr>
<tr>
<td>2.</td>
<td>Father / Spouse Name</td>
</tr>
<tr>
<td>3.</td>
<td>Date of Birth</td>
</tr>
<tr>
<td>4.</td>
<td>Qualification possessed by the candidate on the date of joining the Organisation</td>
</tr>
<tr>
<td>5.</td>
<td>Designation of the Employee</td>
</tr>
<tr>
<td>6.</td>
<td>Details of Scientific publications done by the candidate</td>
</tr>
</tbody>
</table>
| 7. | Nature of the Work / Duty performed by the Candidate  
(To be mentioned in brief) |
| 8. | Period of Research Experience  
From _____(date)     To _____(date) |
| 9. | Total Experience (YY/MM/DD)  
__years __months __days |
| 10. | Whether Attendance Register / Attendance Rolls and other records available  
Yes / No |
| 11. | Name of the Organisation / Institution |
| 12. | Type of Organisation/ Institution |
| 13. | Address of the Organisation / Institution |
| 14. | Phone No. and Email ID of the Organisation / Institution |

This is to certify that Thiru/Tmt./Selvi ................................. possesses the research experience with scientific publication as stated above, as on the date of notification (i.e.26.07.2024). The above particulars furnished by me are correct.

Affix photograph of the employee with the signature of the Certifying Authority on the Photograph  
Seal of Office / Officer:  
Signature  
Name & Designation of the  
Head of Organization / Institution /  
Competent Authority  
Place  
Date:

Note:
1. A certificate in the format prescribed should be obtained from the Head of the Organization/ Institution wherein the individual had served or the authority competent to issue such certificate.
2. The Competent authority who issues the certificate is cautioned that issuing of certificate which contains false or incorrect details will lead to legal / penal action against them.
### 6. Experience Certificate for the post of Foreman (Marine) in Fisheries and Fishermen Welfare Department (Post Code: 1762)

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<tr>
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<tr>
<td>5.</td>
<td>Designation of the Employee</td>
</tr>
<tr>
<td>6.</td>
<td>Nature of the Work / Duty performed by the Candidate (To be mentioned in brief)</td>
</tr>
<tr>
<td>7.</td>
<td>Give details of experience possessed by the Candidate</td>
</tr>
<tr>
<td></td>
<td>Workshop/Handling diesel engine/Handling marine diesel engine</td>
</tr>
<tr>
<td>8.</td>
<td>Period of Experience</td>
</tr>
<tr>
<td></td>
<td>From ______(date) To ______(date)</td>
</tr>
<tr>
<td>9.</td>
<td>Total Experience (YY/MM/DD)</td>
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<td></td>
<td>___years ___months ___days</td>
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<td>10.</td>
<td>Whether Attendance Register / Attendance Rolls / Pay Register and other records available for this Employee</td>
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<td>Yes / No</td>
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<td>11.</td>
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<tr>
<td>14.</td>
<td>Phone No. and Email ID of the Organisation / Institution</td>
</tr>
</tbody>
</table>

This is to certify that Thiru/Tmt./Selvi .......................................... possesses the **experience in workshop / handling diesel engine / handling marine diesel engine*** as stated above, as on the date of notification (i.e.26.07.2024). The above particulars furnished by me are correct.

* Strike out whichever is not applicable

Affix photograph of the employee with the signature of the Certifying Authority on the Photograph

Seal of Office / Officer:

Place: __________________________

Date: ________________

Signature

Name & Designation of the Head of Organization / Institution / Competent Authority

---

**Note:**

1. A certificate in the format prescribed should be obtained from the Head of the Organization/ Institution wherein the individual had served or the authority competent to issue such certificate.

2. The Competent authority who issues the certificate is cautioned that issuing of certificate which contains false or incorrect details will lead to legal / penal action against them.
7. Experience Certificate for the post of Store Keeper in Forensic Sciences Department
(Post Code: 1768)

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<td>6.</td>
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<tr>
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<td>Period of Experience</td>
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<td>8.</td>
<td>Total Experience (YY/MM/DD)</td>
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<tr>
<td>13.</td>
<td>Phone No. and Email ID of the Organisation / Institution</td>
</tr>
</tbody>
</table>

This is to certify that Thiru/Tmt./Selvi .......................................... possesses the **experience as Store Keeper** as stated above, as on the date of notification (i.e.26.07.2024). The above particulars furnished by me are correct.

Affix photograph of the employee with the signature of the Certifying Authority on the Photograph

Signature
Name & Designation of the Head of Organisation / Institution / Competent Authority

Place: Seal of Office / Officer
Date:

**Note:**

1. A certificate in the format prescribed should be obtained from the Head of the Organization/ Institution wherein the individual had served or the authority competent to issue such certificate.

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