



# TAMIL NADU PUBLIC SERVICE COMMISSION

NOTIFICATION NO. 26/2017

DATED:17.11.2017

Applications are invited only through online mode upto 16.12.2017 for Direct Recruitment to the following posts included in the Combined Engineering Services Examination.

It is mandatory for the applicants to register their basic particulars through One - Time online Registration system on payment of Rs. 150/- (Rupees One Hundred and Fifty only) towards registration fee and then should apply online for this recruitment. [The One-Time Registration will be valid for 5 years from the date of registration. Thereafter, the registration should be renewed by paying the prescribed fee.]

Sl. No.	Name of the Post	Name of the Service	No. of Vacancies	Scale of Pay
1	Assistant Director of Industrial Safety and Health (Formerly known as Assistant Inspector of Factories) (2012-2013) (Post Code - 1664)	Tamil Nadu Factory Service (Service Code No. 011)	14	<b>(Pre-Revised) Rs. 9300 - 34800 + Grade pay Rs.5100/- p.m.</b>
2	Junior Electrical Inspector (2015-2016) (Post Code No.1666)	Tamil Nadu Electrical Inspectorate Service (Service Code No.011)	3	
3	Assistant Engineer (Agricultural Engineering) (2016-17) (Post Code No. 1667)	Tamil Nadu Agricultural Engineering Service (Service Code No.011)	117	
4	Assistant Engineer (2016-17) (Post Code No. 3017)	Tamil Nadu Fisheries Engineering Service (Service Code.011)	13	

## 2. DISTRIBUTION OF VACANCIES

The rule of reservation appointments is applicable to this recruitment and the distribution of vacancies will be announced later after receipt of orders from the Government regarding identification of suitable categories of Differently Abled Persons towards 4% reservation for these posts.

## 3. IMPORTANT DATES AND TIME

Date of Notification	17.11.2017	
Last date for submission of application	16.12.2017	
Last date for payment of Fee through Bank(State Bank of India or Indian Bank)	19.12.2017	
<b>Date of Written Examination</b>		
Paper – I (Subject Paper)	24.02.2018 FN	10.00 A.M. to 01.00 P.M
Paper – II (General Studies)	24.02.2018 AN	02.30 P.M. to 04.30 P.M

#### 4. FEES

a)	<p><b><u>Registration Fee</u></b> For One Time Registration (Revised with effect from 01.03.2017 vide G.O.(Ms).No.32, Personnel and Administrative Reforms (M) Department, dated 01.03.2017).</p> <p><b><u>Note</u></b> Applicants who have already registered in One Time Registration system within the validity period of 5 years are exempted.</p>	Rs.150/-
b)	<p><b><u>Examination Fee</u></b> For Examination</p> <p><b><u>Note</u></b> The Examination fee <b>should be paid</b> at the time of submitting the online application for this recruitment if they are not eligible for the concession noted below.</p>	Rs.200/-

#### **EXAMINATION FEE CONCESSION**

Category	Concession	Condition
(i) Scheduled Castes/ Scheduled Caste (Arunthathiyars) and Scheduled Tribes	Full Exemption	--
(ii) Differently Abled Persons, Destitute Widow of all communities	Full Exemption	(i) For Differently Abled Persons, the disability should be not less than 40%.  (ii) For DWs, the DW certificate should have been obtained from the RDO / Sub Collector / Assistant Collector.
(iii) Most Backward Class / Denotified Communities, Backward Classes (Other than Muslim), Backward Class (Muslim)	Those who have not availed three free chances so far in the previous recruitments may avail exemption from payment of examination fee.	Should not have availed three free chances in the previous recruitments.
(iv) Ex-Servicemen	Those who have not availed two free chances so far in the previous recruitments may avail exemption from payment of examination fee.	(i) Should not have availed two free chances in the previous recruitments.  (ii) Fee concession will not apply to those who have already been recruited to any class or service or category.

**Note:**

- (i) The three / two free chances referred to above are not for **EACH POST** but for **ANY THREE / TWO APPLICATION ONLY**. The claim for exemption from payment of

examination fee made in any application which is rejected/admitted or withdrawn will be counted as free chance availed.

- (ii) Failure to pay the prescribed fee along with the application in-time will be liable for rejection of application.
- (iii) The number of free chances availed by the applicant means, the total number of free chances hitherto availed by the applicant in his/her earlier application submitted to the Commission for any post/recruitment.
- (iv) If, the Examination fee concession claimed in the application is found to exceed the admissible limits as announced above, the application will be rejected at any stage of selection. The Number of free chances availed by the applicants will be counted from all previous applications submitted through One Time Registration and / or submitted directly without One Time Registration.

(For further details regarding examination fee concession, refer [para 12 of "Instructions to Applicants"](#)).

## 5. MODE OF PAYMENT OF EXAMINATION FEE

- Examination fee Rs.200/- (Rupees Two hundred only) is payable by online through Net Banking/Credit card/Debit card or it can be paid by offline at State Bank of India / Indian Bank within 2 days from the date of submission of online application by choosing the option in the online application.
- Applicants have to register their basic particulars through One -Time Registration which is mandatory on payment of Rs.150/- (Rupees One Hundred and Fifty only) towards registration fee and then should apply online for this recruitment. The One-Time Registration will be valid for 5 years from the date of registration. Thereafter, the registration should be renewed by paying the prescribed fee. Applicants who have already registered in one time Registration system by paying Rs.50/- before 01.03.2017 and having validity and those who have registered for One-Time Registration on or after 01.03.2017 by paying Rs.150/- towards One-Time Registration are exempted from paying the registration fee for this recruitment.
- Applicants have also to pay the service charges applicable to the State Bank of India / Indian Bank.
- Applicants can avail exemption from paying examination fee as per eligibility criteria.
- Offline mode of payment 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.
- Those who have registered in the One-Time Registration system and paid the registration fee Rs.150/- and received the registration ID need not pay the Registration fee i.e., Rs.150/- and it is enough to pay the examination fee alone.
- Applicants who have made One-Time Registration must pay the prescribed examination fee for this recruitment. (One-Time Registration is only to avail exemption for Registration fee for a period of 5 years from the date of registration and it will not be considered as prescribed examination fee for this recruitment).

(For further details regarding the mode of Examination fee concession, refer [para 2\(14\) of "Instructions to Applicants"](#)).

## 6. QUALIFICATIONS

### (A) AGE LIMIT (as on 01.07.2017)

Sl. No.	Category of Applicants	Maximum Age
1.	SCs, SC(A)s, STs, MBCs/DCs, BCs, BCMs and Destitute Widows of all Castes.	No Age limit
2.	'Others' [i.e. applicants not belonging to SCs, SC(A)s, STs, MBCs/DCs, BCs and BCMs].	should not have completed 30 Years

#### **Note**

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

(For further details regarding Age Limit refer [para 5 of "Instructions to Applicants"](#) and Section 3(r) of Tamil Nadu Government Servants (conditions of Service) Act, 2016)

#### **Age Concession**

##### **(i) For Differently Abled Persons**

- No maximum age limit for applicants who belong to SCs, SC(A)s, STs, MBCs/DCs, BC(OBCM)s and BCMs.
- "Others" not belonging to any of the categories mentioned in item "a" above are eligible for age concession upto 10 years over and above the maximum age limit prescribed.

##### **(ii) For Ex-servicemen**

- No maximum age limit for applicants who belong to SCs, SC(A)s, STs, MBCs/DCs, BC(OBCM)s, BCMs.
- The maximum age limit is 48 years for "Others" i.e. applicants not belonging to any of the categories mentioned in item "a" above.
- The above mentioned age concession will not apply to the Ex-servicemen applicants those who have already been recruited to any class or service or category.

### (B) EDUCATIONAL QUALIFICATION (as on 17.11.2017)

Applicants should possess the following or its equivalent qualification awarded by any University or Institution recognized by the University Grants Commission/AITUC as the case may be.

Sl. No.	Name of the post	Qualification
1	Assistant Director of Industrial Safety and Health (Formerly known as Assistant Inspector of Factories)	A Degree in Mechanical or Production or Industrial or Electrical or Chemical Engineering or Textile Technology
2.	Junior Electrical Inspector in Electrical Inspectorate Service	A Degree in Electrical Engineering Provided that other things being equal, preference shall be given to those who have undergone Apprenticeship Training under the Government of India Scheme or the State Government Apprenticeship Scheme for one year.
3.	Assistant Engineer in Agricultural Engineering Service	i) B.E. (Agriculture) or B. Tech (Agricultural Engineering) or B.Sc., (Agricultural Engineering) <b>(or)</b>

		ii) B.E. (Mechanical) (or) B.E. (Civil) (or) B.Tech (Automobile Engineering) or B.E. (Production Engineering) or B.E.(Industrial Engineering)  <b><u>Provided that only if sufficient applicants with qualification on item (i) is not available, the applicants in item (ii) will be considered.</u></b>
4.	Assistant Engineer in Tamil Nadu Fisheries Department	Must Possess a Degree in Civil Engineering, awarded by any University recognized by the University Grants Commission or A pass in section A and B Examination(AMIE) in Civil Engineering Branch conducted by the Institution of Engineers(India) <b>and</b> practical training in surveying for a period of not less than one year.

**Note**

- i) The qualification prescribed for these posts should have been obtained by passing the required qualification in the order of studies, viz., 10<sup>th</sup> + HSC or its equivalent + Bachelor's Degree + PG Degree from the recognised Institutions as required under Section 25 of Tamil Nadu Government Servants (Conditions of Service) Act, 2016.  
(Results of the examination should have been declared and practical Training if any should have been acquired on or before the date of notification).
- ii) The qualifications considered equivalent are indicated in **Annexure-I** to this notification.  
(Refer also to the disclaimer annexed to the notification).
- iii) Applicants claiming equivalence of qualification should upload and submit evidence for equivalence of qualification in the form of G.O. issued prior to the date of this notification when called for, failing which, their application will be summarily rejected. The G.Os issued regarding equivalence of prescribed qualification after the date of this notification will not be accepted.  
(For further details regarding equivalence of qualification refer [para10 of "Instructions to Applicants"](#)).

**(C) CERTIFICATE OF PHYSICAL FITNESS**

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

Sl. No.	Name of the Post	Standard of Vision	Form of Certificate of Physical Fitness
1	Assistant Director of Industrial Safety and Health	Standard-II or better	Form prescribed for Executive post.
2.	Junior Electrical Inspector	Standard-III or better	
3	Assistant Engineer (Agricultural Engineering)	Standard-II	
4	Assistant Engineer in Tamil Nadu Fisheries Department	Standard-III or better	

For appointment to any of the above posts, colour blindness will be a disqualification. Night blindness will also be a disqualification for the post of Assistant Director of Industrial Safety and Health. Candidates with defective vision should produce eye fitness certificate from a qualified eye specialist.

**(D) KNOWLEDGE IN TAMIL**

Applicants should possess adequate knowledge in Tamil.

(For further details refer [para 11 of 'Instructions to Applicants'](#))

**7. CONCESSIONS**

- (i) Concessions in the matter of age and/or fees allowed to SC's, SC(A)'s, ST's, MBC's/DC's, BC's, BCM's, Destitute Widows, Differently Abled Persons, Ex-servicemen, other categories of persons etc., are given in [para 12 to 14 of 'Instructions to Applicants'](#).
- (ii) Persons claiming concessions referred to above and other claims made in the application have to produce evidence for such claim when called for, otherwise his/her application will be liable for rejection.

**Note**

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 (Section 3 ( j ) of Tamil Nadu Government Servants (Conditions of Service) Act, 2016).

**8. SCHEME OF EXAMINATION (OBJECTIVE TYPE) AND ORAL TEST**

Subject	Duration	Maximum Marks	Minimum Qualifying Marks for selection	
			SCs, SC(A)s, STs, MBCs/ DCs, BC(OBCM)s and BCMs	Others
<b>i. Paper-I</b> one of the following <b>subjects in which the candidate has acquired his/her Degree qualification</b> (Degree Standard - 200 questions each) <ol style="list-style-type: none"> <li>(i) Agricultural Engineering (code No. 280)</li> <li>(ii) Automobile Engineering (Code No. 258)</li> <li>(iii) Chemical Engineering (code No. 260)</li> <li>(iv) Civil Engineering(code No.261)</li> <li>(v) Electrical Engineering (code No. 259)</li> <li>(vi) Mechanical / Production / Manufacturing Engineering (Code No.256)</li> <li>(vii) Textile Technology (Code No. 114)</li> </ol>	3 Hours	300	171	228
<b>ii. Paper -II General Studies</b> <b>Subject Code No-003)</b> <b>(Degree Standard-100 questions)</b> General Studies(Degree Standard)-75 Questions and Aptitude and Mental Ability(SSLC Standard)-25 Questions	2 Hours	200		
<b>iii. Interview and Records</b>	--	70		
<b>Total</b>		<b>570</b>		

**Note**

- i. The questions in Paper-I (Subject Paper) will be set in English only and the questions in Paper-II (General Studies) will be set both in Tamil and English.
- ii. The applicants who possess the equivalent educational qualification should choose the subject to which his qualification is declared as equivalent for appearing in Paper-I (Subject Paper). The syllabi for Paper I (Subject Paper) & Paper II (General Studies) are furnished at **Annexure-II** to this Notification.
- iii. Refer para 22 of “Instructions to Applicants” in regard to Instructions to be followed while appearing for competitive Examinations conducted by the Commission.

**9. CENTRE FOR EXAMINATION**

**Examination will be held at the following Centres:**

Name of the Centre	Centre Code	Name of the Centre	Centre Code	Name of the Centre	Centre Code
Chennai	0100	Madurai	1000	Thanjavur	1900
Coimbatore	0200	Nagercoil	0800	Tiruchirappalli	2500
Chidambaram	0302	Pudukkottai	1500	Tirunelveli	2600
Kancheepuram	0700	Ramanathapuram	1600	Udhagamandalam	1300
Karaikudi	1804	Salem	1700	Vellore	2700

**Note**

- (i) Request for change of venue will not be complied with (For further details refer [“Instructions to Applicants”](#)).
- (ii) The Commission reserves the right to increase/ Decrease the number of examination centres and to re-allot the applicants.
- (iii) Applicants should appear for the written examination / Certificate Verification/ Oral Test at their own expenses.

**10. SELECTION PROCEDURE**

**Selection will be made in two successive stages** i.e., (i) Written Examination and (ii) Oral Test in the shape of an interview. Final selection will be made on the basis of the total marks obtained by the Applicants at the Written Examination and Oral Test taken together subject to the rule of reservation of appointments. Applicant’s appearance in the Written Examination and Oral Test is compulsory. An Applicant who has not appeared for the Written Examination or the Oral Test will not be considered for selection, even if he/she secures qualifying marks for selection.

**(For further details regarding procedure of selection refer [paragraph 23 \(b\) of “Instructions to Applicants”](#))**

**11. NO OBJECTION CERTIFICATE / INFORMATION TO THE EMPLOYER**

No Objection Certificate obtained from appropriate authority shall be produced at the time of Certificate Verification. Failure to produce at that time will lead to rejection of application.

For details refer [para 15 \(g\) of ‘Instructions to Applicants’](#). Any violation of this instruction will be liable for / end in rejection of application and forfeit his/her candidature.

**12. GENERAL INFORMATIONS**

- A. The rule of reservation of appointments is applicable to all posts.

- B. In G.O.(Ms.) No.145, Personnel and Administrative Reforms (S) Department, dated 30.09.2010, and G.O.(Ms.)No.40 Personnel and Administrative Reforms(S) Department dated 30.04.2014 the Government have issued orders to fill up 20% of all vacancies in direct recruitment on preferential basis to persons who studied the prescribed qualification in Tamil Medium. The 20% reservation of vacancies on preferential allotment to Persons Studied in Tamil Medium (PSTM) will apply for this recruitment. (Applicants claiming this reservation should have studied the prescribed qualification for the post in Tamil Medium and should have the certificate for the same. Having written the examinations in Tamil language alone will not qualify for claiming this reservation). If the Applicants with PSTM Certificate are not available for selection for appointment against reserved turn, such turn shall be filled up by Non-PSTM Applicants but belonging to the respective communal category. The PSTM certificate shall be produced / uploaded by the applicant in prescribed format / proforma available in the Commission's website at '[www.tnpsc.gov.in](http://www.tnpsc.gov.in)' which shall be obtained from the Head of the Institution when called for by the Commission.  
**(For further details refer para 27 (XIX) of "Instructions to Applicants")**
- C. The number of **vacancies advertised is only approximate** and is liable for modification including reduction with reference to vacancy position at any time before finalisation of selection.
- D. The selection for appointment to the above said posts are purely provisional subject to final orders on pending Writ Petitions, if any, filed at Madras High Court and Madurai Bench of Madras High Court.
- E. As per Section 26 and 27(c) of Tamil Nadu Government Servants (Conditions of Service) Act, 2016, reservation of appointment to "Destitute Widows" and "Ex-servicemen" **will not apply** to this recruitment.
- F. If the post is identified as suitable for Differently Abled Persons for any category the reservation of 4% for Differently Abled Persons as per G.O.Ms. No.21, Welfare of Differently Abled Persons (DAP 3.2) Department dated 30.05.2017 will be made applicable. Hence the Differently Abled Persons may also apply to this recruitment. Their application will be accepted subject to the orders to be issued by the Government.
- G. The Differently Abled persons should submit/upload copy of Differently Abled Certificate obtained from competent authority specifying the nature of physical handicap and the degree of disability when called for by the Tamil Nadu Public Service Commission.
- H. If no qualified and suitable women applicants are available for selection against the vacancies reserved for them, those vacancies will be filled by male applicants belonging to the respective communal categories
- I. Wherever vacancies are reserved for Arunthathiyars on preferential basis, even after filling up of the vacancies reserved for SC (Arunthathiyars) on preferential basis, if more number of qualified Arunthathiyars are available, they shall be entitled to compete with the Scheduled Castes other than Arunthathiyars in the inter-se-merit among them and if any posts reserved for Arunthathiyars remain unfilled for want of adequate number of qualified applicants, it shall be filled up by Scheduled Castes other than Arunthathiyars.
- J. Evidence for claims made in the online application should be uploaded / submitted in time when documents are called for. Any subsequent claim made thereafter on submission of online application will not be entertained. Failure to submit the documents within the stipulated time limit will entail rejection of application.



- K. Correct and True information regarding arrest, convictions / debarment / disqualification by any recruiting agency, criminal or any disciplinary proceedings initiated / pending or finalised, participation in agitation or any Political Organisation, candidature in election for Parliament / State Legislature / Local Bodies etc, if any, should also be furnished to the Commission at the time of application i.e. the details thereof, originals of the judgement, order/ or G.O. dropping further action in Departmental proceedings or any document that may prove the suitability of such applicants for a Government appointment in such cases must be produced at the stage / time of certificate verification without fail.
- L. Incomplete applications and applications containing wrong claims or incorrect particulars relating to category of reservation / other basic qualification / eligibility wise / age / communal categories / educational qualification / PSTM / physical qualification and other basic eligibility criteria will be liable for rejection.
- M. One Time Registration is not an application for any Post / Recruitment. Though the details / particulars were furnished in the one Time Registration by the applicants, the details / particulars furnished in the online application for this recruitment alone will be taken into consideration. Tamil Nadu Public Service Commission will not be responsible for any consequences arising out of furnishing of incorrect and incomplete details in the application or omission to provide the required details in the application for this recruitment.

### 13. OTHER IMPORTANT INSTRUCTIONS

- a) Applicants **should ensure their eligibility for examination.** The Applicants applying for the examination should go through all instructions carefully and ensure that they fulfil all eligibility conditions for admission to examination. Their admission to all stages of the examination will be purely provisional subject to satisfaction of the eligibility conditions. Mere issue of memo of admission to the applicants will not imply that his/her candidature has been fully cleared by the Commission.
- b) The **Hall Tickets** for eligible applicants will be made available in the Commission's Website [www.tnpsc.gov.in](http://www.tnpsc.gov.in) or [www.tnpscexams.net](http://www.tnpscexams.net) or [www.tnpscexams.in](http://www.tnpscexams.in) for downloading by applicants. No Hall Tickets will be sent by post. So the applicants should watch TNPSC website before the scheduled date of examination.
- c) **Grievance Redressal Cell for guidance of applicants:** In case of any guidance /information / clarification regarding applications, candidature, etc., applicants can contact Tamil Nadu Public Service Commission's Office in person or over Telephone No. 044-25332833 / 25332855 or the Commission's Office Toll-Free No. 1800 425 1002 on all working days between 10.00 a.m. and 05.45 p.m.

#### d) **Communication to Applicants**

Individual communication regarding the date and time of certificate verification, oral test and counselling will not be sent to the applicants by post. The details will be made available on the Commission's website. Applicants will be informed of the above fact only through SMS and e-mail and they should watch Tamil Nadu Public Service Commission website in this regard.

#### e) **Mobile Phones and other Articles Banned**

- i. Applicants are not allowed to bring Pager, Cellular Phone, Calculator, Watches and Ring with Inbuilt Memory Notes etc., or any other Electronic device and Non Electronic devices such as P&G Design Data Book, Books, Notes, Hand Bags and Recording Device either as separate piece or part of something used by the applicant such as Watch or Ring etc., to the examination hall / room on the date of examination.

- ii. Do not bring into the Examination Hall any article such as books, notes, loose sheets, electronic or any other type of calculators, mathematical and drawing instruments, Log Tables, stencils of maps, slide rules, Text Books, rough sheets etc., except the permitted writing material (i.e. pen).
  - iii. If they are found to be in possession of any such thing or instrument they will not be allowed to write the examination further, besides invalidation of answer paper and / or debarment. If it is considered necessary they will be subjected to thorough physical search including frisking on the spot ([For further details refer "Instructions to Applicants"](#)).
  - iv. Applicants are advised in their own interest not to bring any of the banned items including Mobile Phones / Pager to the venue of the examination, as arrangements for safekeeping cannot be assured.
- f) Unless specific instruction is given, applicants are not required to submit along with their application any certificates (in support of their claims regarding age, educational qualifications, physical qualification, community certificates and certificates regarding their physical disability etc.) which should be submitted when called for by the Tamil Nadu Public Service Commission. The applicants applying for the examination should ensure that they fulfil all the eligibility conditions for admission to the Examination. Their admission at all the stages of examination for which they are admitted by the Commission viz. Written Examination and Oral Test will be purely provisional, subject to their satisfying the prescribed eligibility conditions. If, on verification at any time before or after Written Examination, Certificate Verification and Oral Test, it is found that they do not fulfil any of the eligibility conditions, their candidature for the examination will be liable for rejection / cancellation by the Commission. ([For further details refer "Instructions to Applicants"](#))
- g) If any of their claims is found to be incorrect, it will lead to rejection of their candidature and suitable penal action including debarment.
- h) **Unfair means strictly prohibited:** No applicant shall copy from the papers of any other applicant or permit his papers to be copied or give or attempt to give or obtain or attempt to obtain irregular assistance of any description. ([For further details refer "Instructions to Applicants"](#))
- i) **Conduct in Examination Hall:** No applicant should misbehave in any manner or create a disorderly scene in the Examination Hall or harass the staff employed by the Commission for the conduct of the examination. Any such misconduct will be severely viewed and penalised. ([For further details refer "Instructions to Applicants"](#))
- j) For violation of "Instructions to Applicants" in any manner, suitable penalty will be imposed as per the "Instructions to Applicants" or as deemed fit by the Commission.

#### 14. HOW TO APPLY

1. Applicants should apply only through online mode in the Commission's Websites [www.tnpsc.gov.in](http://www.tnpsc.gov.in) / [www.tnpscexams.net](http://www.tnpscexams.net) / [www.tnpscexams.in](http://www.tnpscexams.in)
2. One Time Registration (OTR) and applicant Dashboard are mandatory before applying for any post. Applicant should register only once in the One Time Registration by paying Rs.150/- as registration fee. Successfully registered One Time Registration is valid for 5 years from the date of Registration. All the applications should be submitted using the One Time Registration ID and password registered by the applicant.
3. For applying in One Time Registration, the applicants should have scanned image of their photograph, certificate wherever insisted and signature in CD/DVD/Pen Drive to upload the photo, certificate and signature.

4. Applicants who have already registered in One Time Registration on or before 29.09.2015 shall use their existing user ID and Password to create applicants Dashboard in the new One Time Registration system. No applicant is permitted to create more than one registration ID in One Time Registration.
5. Enter the Unique ID and password to view the already available information and update them.
6. One Time Registration is not an application for any post. It is just collection of information from the applicants and giving a separate dashboard to each applicant to facilitate them to maintain their own profile. Applicants who wish to apply for this recruitment shall click "[Apply](#)" against the recruitment Notified in the Commission's Website using the same USER ID and PASSWORD given for ONE TIME REGISTRATION.
7. Select the name of the post or service for which the applicant wishes to apply, if applicable.
8. Applicants are required to upload their photograph and signature as per the specifications given in the Guidelines for Scanning and Upload of Photograph and Signature.
9. An Online application uploaded without the photograph, specified documents and signature will be rejected.
10. All the particulars mentioned in the online application including name of the Applicant, Post applied, Educational Qualifications, Communal Category, Date of Birth, Address, Email ID, Centre of Examination etc. will be considered as final and no modifications will be allowed after the last date specified for applying online. Since certain fields are firm and fixed and cannot be edited, applicants are requested to fill in the online application form with the utmost care and caution as no correspondence regarding change of details will be entertained.
11. Print Option
  - a) After submitting the application, applicants can print / save their application in PDF format.
  - b) On entering User ID and password, applicants can download their application and print, if required.
  - c) **Need not send the printout of the online application or any other supporting documents** to the Commission. The application and certificates will be verified only when the applicants come up for next stage of selection.

12. One Time Registration will not be considered as an application for any post.

## 15. UPLOAD OF DOCUMENTS

The candidates must upload / submit the documents **whenever called for specifically**.

## 16. LAST DATE FOR SUBMITTING APPLICATION

The Online Application can be submitted upto 16.12.2017 till 11.59 p.m., after which the link will be disabled.

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

**Secretary**

**DISCLAIMER**

“The Government orders relating to Equivalence of qualification have been hosted in the Tamil Nadu Public Service Commission website. However the applicants while applying for the examination should furnish the details of equivalence of qualification in the form of Government orders issued prior to the date of this notification, if any, which are not mentioned in **Annexure-I** to the notification and produce the same when called for by Tamil Nadu Public Service Commission, failing which their application will be rejected. The Government Orders regarding equivalence of qualification issued after the date of this notification will not be considered.”

**Secretary**

## ANNEXURE-I

Sl. No.	Degree considered as Equivalent to the Qualification prescribed in the Rule	G.O.
1	B.E. (Production Engineering) and B.E. (Industrial Engineering) awarded by the Universities in Tamil Nadu be treated as an equivalent qualification to the B.E. Degree in Mechanical Engineering.	G.O.No.183, Personnel and Administrative Reforms (R) Department, dated 06.06.1995.
2	B.E. (Civil and Transportation Engineering) awarded by Bharathiyar University is equivalent to B.E. (Civil Engineering).	G.O.(Ms).No.110, Public Works (B2) Department, dated 30.04.2008.
3	B.E. (Civil Engineering with Diversification in Construction Engineering and Management) awarded by Anna University, B.E. (Civil Engineering and Computer based construction) awarded by Anna University and Madurai Kamaraj University and B.E. (Civil Engineering with Diversification in Environmental Engineering) awarded by the Anna University are equivalent to B.E. (Civil Engineering).	G.O.(Ms).No.232, Public Works (B2) Department, dated 23.07.2008.
4	B.Sc., (Civil Engineering) awarded by Kurukshetra University is equivalent to B.E. (Civil Engineering).	G.O.Ms.No.260, Public Works (B2) Department, dated 16.11.09.
5	B.E Manufacturing Engineering (Part-time) awarded by Anna University is equivalent to that of B.E Mechanical Engineering of the Anna University.	G.O.Ms.No.9 Energy (B2) Department, dated 28.01.2010.
6	(i) B.E. (Civil and Structural Engineering) is equivalent to B.E. (Civil Engineering) and (ii) B.E. (Mechanical and Production Engineering) is equivalent to B.E. (Mechanical Engineering).	G.O.(Ms) No.102, Agriculture (AA3) Department, dated 11.05.2010.
7	6 years integrated U.G. Level Engineering <b>B.Tech.</b> Degree programme in Civil Engineering / Mechanical Engineering (for Speech and Hearing Impaired Students) awarded by Kalasalingam University is equivalent to B.Tech. in similar programmes offered by Anna University.	G.O.(Ms) No.41, Higher Education (J2) Department, dated 03.03.2014.

8	(i) B.E. (Environmental Engineering) Degree of Avinashilingam Institute for Home Science and Higher Education for Women Deemed University is equivalent to B.E. (Civil Engineering) (ii) B.E. (Civil Engineering with Diversification in Building Technology) Degree of Anna University is equivalent to B.E. (Civil Engineering).	G.O.(Ms)No.178, Higher Education (J1) Department, dated 17.07.2015.
9	B.Tech (Mechanical) / B.Tech (Civil) (Part-Time) obtained from Vellore Institute of Technology, Vellore is equivalent to B.E. (Mechanical) / B.E. (Civil) (Regular)	G.O.(Ms) No.77, Higher Education (J2) Department, dated 03.03.2016.
10	பி.இ.(மின்னியல் மற்றும் மின்னணுவியல்) பட்டப்படிப்பினை பி.இ.(மின்னியல்) பட்டப்படிப்பிற்கு இணையானதாக கருதப்படுகிறது.	அரசாணை (நிலை) எண்.262, உயர்கல்வித்(ஜே2) துறை, நாள் 28.07.09
11	1. B.Tech, (Chemical and Electro Chemical Engineering) Degree awarded by Anna University is equivalent to Chemical Engineering 2. B.Tech.(Petrochemical Technology) Degree awarded by Bharathidasan University is equivalent to B.E (Chemical Engineering) 3. B.E (Electronics & Instrumentation Engineering) Degree awarded by Anna University is equivalent to B.E Electrical Engineering or Electronics and Communication Engineering	G.O.(Ms).No.178, Higher Education (J1) Department, dated 17-07-2015
12	Government of India has recognized the following courses of Section A & B Examination as revised, conducted by the Institution of Engineers (India), Kolkata as equivalent to Degree in the Appropriate branch of Engineering of the Recognized Universities in India. 1. Agricultural Engineering 2. Chemical Engineering 3. Civil Engineering 4. Electrical Engineering. 5. Mechanical Engineering 6. Production Engineering 7. Textile Engineering	The Gazette of India, February 11, 2006(MAGHA 22, 1927) Part-I-Section 1
13	B.Tech Petrochemical Technology Degree awarded by Anna University (Tiruchirappalli) is equivalent to Degree in B.E. Chemical Engineering	G.O(Ms)No.284 Higher Education(J1) Department dated 03.10.2017

**ANNEXURE-II**  
**PAPER-I (DEGREE STANDARD)**

**(a) AGRICULTURAL ENGINEERING**

**CODE NO: 280**

**UNIT-I: SURVEYING AND HYDROLOGY**

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

**UNIT-II: SOIL EROSION AND CONSERVATION**

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

**UNIT-III: WATERSHED DEVELOPMENT AND MANAGEMENT**

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

**UNIT-IV: IRRIGATION AND DRAINAGE**

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

**UNIT-V: FARM AND IRRIGATION STRUCTURES**

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

**UNIT-VI: FARM POWER**

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



## **UNIT- VII: FARM MACHINERY**

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

## **UNIT-VIII: UNIT OPERATIONS IN FOOD AND AGRICULTURAL PROCESSING**

Heat transfer principles – Conduction, convection and radiation - Types of heat exchangers - Unit operations – Evaporators - Types - Mechanical separation – Filtration – Sedimentation – Settling – Centrifugal separation – Cyclone separation - Size reduction – Mixing – Blending – emulsification - Food processing operations - Pasteurization – Sterilization – Canning - Retort processing - Extrusion processing of foods - Methods of drying of foods – Preservation of food by irradiation - Microwave and dielectric heating - Fats and oil processing – Extraction methods and equipments - Food packaging – Materials and characteristics – Suitability - Processing of milk and milk products, packaging of milk - Principles of refrigeration and applications in food industries – Cold storage of fruits and vegetables - Design aspects.

## **UNIT- IX: PROCESS ENGINEERING OF AGRICULTURAL AND HORTICULTURAL CROPS**

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

**UNIT-X: RENEWABLE AND BIOENERGY**

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

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**(b) AUTOMOBILE ENGINEERING****(Code No: 258)****UNIT - I: ENGINES**

Petrol engine – principle and construction – diesel engine- principle and construction – four stroke and two stroke. Carburetors – types, working principle, different circuits – compensation circuits. Cooling system – air and water cooling system- forced circulation and pressure cooling system. Lubrication system – pressure lubrication – splash lubrication – wet and dry sump lubrication. Properties of lubricants and coolants. Combustion in SI and CI engines – stages of combustion –flame propagation – detonation in SI engine and knocking in CI engines. Combustion chambers – Turbo and superchargers.

**UNIT – II: AUTOMOTIVE CHASSIS**

Types of chassis layout – various types of frames – front axles – types, stub axle, front wheel geometry – Ackermann & Davis steering mechanism – steering gear boxes. Power Assisted steering. Hutch kiss and torque tube drive. Propeller shaft – final drive – types. Differential –principle and construction details- non slip differential – differential lock. Rear axle - types – full floating –  $\frac{3}{4}$  quarter & semi. Wheels and rims – types and construction. Tyres – types and construction details.

**UNIT – III: SUSPENSION AND BRAKING SYSTEM**

Suspension system – requirements – types - construction details of Single leaf and multi leaf coil and torsion bar springs. Rubber, pneumatic and hydroelastic suspension. Independent suspension – shock absorbers. Braking system – need, stopping distance, classification of brakes. Drum brake and disc brake theory. Mechanical, hydraulic, pneumatic, electric and power assisted braking system. Retarders.

**UNIT – IV: AUTOMOTIVE TRANSMISSION**

Clutches – coils spring, diaphragm clutches – centrifugal and semi centrifugal clutches – multiplate clutches. Gear box – sliding mesh, constant mesh and synchromesh – construction and operation. Automatic transmission – fluid coupling, torque converter, epicycle gear box, hydrostatic transmission, electric drive.

**UNIT – V: AUTOMOTIVE ELECTRICAL AND ELECTRONICS**

Battery – types, lead acid battery, battery charging, rating, and testing. Ignition system – coil, magneto and electronic ignition system – principle and operation. Spark plug –

Automobile Air conditioning, power windows and central locking system – starting system – types of drives - bendix drive, solenoid drive system – charging system – generator system – types – alternator, principle and operation of cut-out and regulators. Sensors – electronic suspension – electronic steering systems. Navigation system – ABS – AIRBAG restraint system.

### **UNIT – VI: VEHICLE BODY ENGINEERING**

Classification of cars, buses, HCVs and LCVs – visibility – forward and rearward visibility – safety – design – safety equipments. Aerodynamics of vehicles – different types of drags – optimization techniques - wind tunnel testing for drag force and pressure distribution. Construction of cars – panels . Construction of buses –conventional and integral construction. Driver's seat – compactness of driver's cab – segmental design – modern painting processes for cars. Body trim items. Body mechanism – window winding – door lock.

### **UNIT – VII: VEHICLE DYNAMICS**

Concept of vibration – free, forced, undamped and damped vibration. Response analysis of single DOF, Two DOF and multi DOF. Vibration absorbers. Tyres – tyre forces and moments – longitudinal and lateral force at various slip angles. Tractive and cornering properties of tyres. Human response to vibration. Design and analysis of passive, semi active and active suspension using quarter car, half car and full car models. Steady state handling characteristics – directional control of vehicle. Stability of vehicle.

### **UNIT – VIII : VEHICLE CONTROL SYSTEMS**

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

### **UNIT – IX : AUTOMOTIVE POLLUTION AND CONTROL**

Pollutants – sources, formation and effects on environment and human beings. Emission standards. HC, CO and NO formation in SI engines. Smoke emission and NOx emissions and its types from diesel engine. Particulate emissions. Control techniques – EGR, SCR, Secondary air induction, particulate trap and catalytic converters. Test procedures CVS1,

CVS3 – Test cycles. NDIR analyser – flame ionization detectors – chemiluminescent analyser – dilution tunnels – gas chromatograph – smoke meters.

**UNIT – X : SERVICING&MAINTENANCE, MOTOR VEHICLE ACT**

Automobile law – motor vehicle act – registration, driving licence, insurance, pollution and control, regulation. Trouble shooting and servicing of clutch, gear box, brakes, suspension and steering system. Trouble shooting and servicing of engine, engine cooling system and lubrication system – tools and equipments required for repairs – service station – organization and management of service stations.

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**(c) CHEMICAL ENGINEERING****CODE NO: 260****UNIT I: CHEMICAL PROCESS CALCULATIONS AND CHEMICAL ENGINEERING THERMODYNAMICS**

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

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

**UNIT II: MECHANICAL OPERATIONS AND ENGINEERING MATERIALS**

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

**UNIT III: CHEMICAL TECHNOLOGY AND RENEWABLE ENERGY SOURCES**

Acids, Fertilizers, marine Chemicals, Cement, Glass, Ceramic and Refractories. Petroleum Refining Products, Fermentation Products, Oils, Soaps and Detergents, Pulp and paper, Dyes, sugar, leather and rubber.

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

**UNIT IV: TRANSFER OPERATIONS**

Momentum: Newtonian and Non-Newtonian fluids, Compressible and in-compressible fluids flow through packed bed, Fluidized bed and closed ducts, Fluid Machinery. Heat transfer: conduction, convection and radiation, Heat transfer with phase change, heat exchangers, Evaporation. Mass transfer: Diffusion, Theories of mass transfer, Inter phase mass transfer, Analogy. Distillation, Extraction, Absorption, Adsorption, Drying.

**UNIT V: CHEMICAL REACTION ENGINEERING**

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

**UNIT VI: INSTRUMENTATION AND PROCESS CONTROL**

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

Laplace transformation, application to solve ODEs. Open-loop systems, first order systems, first order systems in series, linearization and its application in process control, second order systems and their dynamics; transportation lag. Closed loop control systems, feed-back control systems, BODE diagram, stability criterion, tuning of controller settings, cascade control, feed forward control, Smith predictor controller, control of distillation towers and heat exchangers.

**UNIT VII: NUMERICAL AND COMPUTATIONAL METHODS**

Curve fitting, Equations with real and rational Coefficients, Imaginary roots and irrational roots, Transformation of equations. Numerical solutions of linear and non linear algebraic equations- solution of initial value and boundary value ordinary and non-linear differential equations, solution of partial differential equations. Partial Differential equation – finite element, finite difference method.

Matrix, determinants and properties – Elementary Row transformations algebraic equations; ordinary differential equations and non homogeneous first order ordinary differential equations rank of Matrix – Eigen value problems, Orthogonal and orthonormal vectors; Gram-Schmidt orthogonalization; Theorem for Eigenvalues and Eigenfunctions.

**UNIT VIII: SEPARATION OPERATIONS**

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

**UNIT IX: ENVIRONMENTAL ENGINEERING AND SAFETY IN CHEMICAL INDUSTRIES**

Air, Water and soil pollution, causes, effects and remedies, Nuclear waste disposal, Noise control, Wastewater treatment by various methods: Chemical, biochemical and advanced oxidation process.

Industrial hygiene, occupational safety. Industrial safety principles, site selection and plant layout, chemical hazards classification, Safety in operations and processes, hazardous identification techniques.

**UNIT X: DESIGN AND OPTIMIZATION**

Problem formulation, degree of freedom analysis, objective functions, Simplex method, Barrier method, sensitivity analysis, Convex and concave functions, unconstrained NLP, Newton's method, Quasi-Newton's method, Direct substitution, Quadratic programming, Cost estimation, Plant utilities, Heat exchanger networks, Pinch technology.



**(d) CIVIL ENGINEERING****CODE NO: 261****UNIT I : BUILDING MATERIALS AND CONSTRUCTION PRACTICES**

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

**UNIT II : ENGINEERING SURVEY**

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

**UNIT III : STRENGTH OF MATERIALS**

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

**UNIT IV : STRUCTURAL ANALYSIS**

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

**UNIT V : GEOTECHNICAL ENGINEERING**

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

**UNIT VI : ENVIRONMENTAL ENGINEERING AND POLLUTION CONTROL**

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

**UNIT VIII : HYDRAULICS AND WATER RESOURCES ENGINEERING**

Hydrostatics-applications of Bernoulli equation – flow measurement in channels, Applications of Momentum equation, Kinematics of flow.

Water resources in Tamil Nadu - Water resource planning - Master plan for water management flood control –Runoff estimation – hydrograph – flood routing - Soil plant water relationship - Water requirement of crops - Irrigation methods –Design of alluvial canal and design of headworks. Waterlogging and land reclamation - Cross drainage works.

**UNIT IX : URBAN AND TRANSPORTATION ENGINEERING**

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

Railways-Components of permanent way - Signalling, Interlocking and train control. Airport planning-Components of Airport - Site selection – Runways – Planning of terminal buildings. Harbours & Ports- Layout of a harbour - Docks - Breakwaters.

**UNIT X : PROJECT MANAGEMENT AND ESTIMATING**

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

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**UNIT – I ELECTRICAL CIRCUITS**

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

**UNIT – II ELECTRIC AND MAGNETIC FIELDS**

Coulomb's Law-Electric Field Intensity-Electric Flux Density-Gauss's Law- Divergence - Electric Field and Potential due to Point, Line, Plane and Spherical Charge Distributions - Effect of Dielectric Medium - Capacitance of Simple Configurations.

Magnetic Circuits- Magnetomotive force - Reluctance-Faraday's laws-Lenz's law-- Biot Savart's law - Ampere's law - Fleming's Left and Right Hand Rule-Lorentz force - Inductance - Self and Mutual Inductance-Dot Convention-Coupled Circuits

**UNIT – III MEASUREMENTS AND INSTRUMENTATION**

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

**UNIT – IV CONTROL SYSTEMS**

Mathematical Modelling of Physical Systems – Transfer Function - Block Diagrams and Signal Flow Graphs and their Reduction using Mason's Rule – Time Domain and Frequency Domain Analysis of Linear Time Invariant (LTI) System – Errors for Different Type of Inputs and Stability Criteria for Feedback Systems – Stability Analysis Using Routh-Hurwitz Array – Nyquist Plot and Bode Plot – Root Locus – Gain and Phase Margin – Basic Concepts of Compensator Design – PI,PD and PID Controllers-State Variable Matrix – System Modeling and Design – Sampled Data System – Stability of Sampled Data System.

**UNIT –V ELECTRICAL MACHINES**

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

Transformers-Types-Construction and Operation- Testing – Equivalent Circuits – Losses and Efficiency-All day efficiency – Regulation – Parallel Operation – Three Phase Transformers – Auto-transformer.

Induction Machines – Construction, Principle of operation – Rotating Magnetic Field – Performance, Torque-Speed Characteristics, No-load and Blocked Rotor tests, Equivalent Circuit, – Starting and Speed Control – Single-Phase Induction Motors – Linear Induction Motors – Hysteresis Motors – Reluctance Motors. Synchronous Machines – Construction – Operating characteristics and Performance analysis – Efficiency and Voltage regulation – Parallel operation – V and inverted V curves of synchronous motors – Power factor improvement-BLDC Motor.

### **UNIT –VI POWER SYSTEMS**

Single Line Diagram of Power System-Per Unit Quantities-Power Generation Types— Hydro, Thermal and Nuclear Stations – Pumped storage plants – Co generation— Economic and operating factors – Modelling and performance characteristics of Power transmission lines and Cables-HVDC transmission—Mechanical Design of Transmission Lines-Sag-Insulators -  $Z_{BUS}$  and  $Y_{BUS}$  formulation - Load flow studies — Shunt and Series Compensation- Symmetrical and Un symmetrical Faults Analysis - Transient and Steady-State Stability of Power Systems – Equal Area Criterion-Voltage and Frequency Control – Power System Transients – Power System Protection – Circuit Breakers – Relays –AC and DC Distribution.

### **UNIT –VII ANALOG AND DIGITAL ELECTRONICS**

Semiconductor Devices – PN junctions – Transistors – FET – Zener, Photo diodes and their applications – Rectifier circuits – Voltage regulators – Multipliers.

Biasing circuits – Small signal amplifiers – Frequency response – Multistage amplifiers – Coupling methods – Large signal amplifiers – Push-pull amplifiers – Feedback amplifiers – Oscillators – Operational amplifiers and its applications – Precision rectifiers – Multivibrators - Voltage Controlled Oscillator-Timer.

Digital logic gate families (DTL,TTL,ECL,MOS,CMOS) – Logic gates - Simplification of Logic Functions- Design of Combination circuits - Sequential logic circuits-latch–Flip-flops– Counters – Registers – Memories(ROM,PLA and FPGA).

### **UNIT - VIII POWER ELECTRONICS AND DRIVES**

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

### **UNIT –IX DIGITAL PROCESSORS AND COMMUNICATION**

Architecture of 8085, 8086 and 8051 – Instruction Sets – Assembly Language Programming – Interfacing for memory and I/O: 8255 Programmable Peripheral Interface – 8253 Programmable Timer Interface – 8279 Programmable Keyboard and Display Interface – 8257 Direct Memory Access Interface - Embedded processors(ARM and PIC basics only).

Classification of Signals – Properties of Discrete Fourier Transforms - FFT Computation – FIR Filters – IIR Filters: Butterworth Filters – Chebyshev Filters.

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

### **UNIT –X RENEWABLE ENERGY SOURCES AND STORAGE DEVICES**

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

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**(f) MECHANICAL/PRODUCTION/MANUFACTURING ENGINEERING CODE NO: 256****UNIT – I : MECHANICS, KINETICS AND DYNAMICS**

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

**UNIT – II : STRENGTH OF MATERIALS AND DESIGN**

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

**UNIT – III : FLUID MECHANICS AND TURBO MACHINERY**

Fluid properties, fluid statics, manometry, buoyancy, control volume analysis of mass, momentum and energy, fluid acceleration, differential equations of continuity and momentum, Bernoulli's equation, viscous flow of incompressible fluids, boundary layer, elementary turbulent flow, flow through pipes, head losses in pipes, bends etc.

Turbomachinery: Pelton wheel, Francis and Kaplan turbines - impulse and reaction principles – velocity diagrams.

**UNIT – IV : THERMODYNAMICS**

Basic concepts, Zeroth, First and Second laws of thermodynamics, thermodynamic system and processes, Carnot cycle. irreversibility and availability, behaviour of ideal and real gases, thermodynamic relations, properties of pure substances, calculation of work and heat in ideal processes, analysis of thermodynamic cycles related to energy conversion, Fuel and combustion.

**UNIT – V : HEAT AND MASS TRANSFER**

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

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

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

**UNIT – VI : MATERIALS SCIENCE AND METALLURGY**

Constitution of alloys and phase diagrams, steels, cast iron, TTT diagram, heat treatment of ferrous and non-ferrous metal, surface modification techniques, non-metallic materials, mechanical properties and testing, crystal defects and strengthening mechanisms, conducting and semi conducting materials, magnetic and dielectric materials, Engineering ceramics, Engineering and commodity polymers, composites.

**UNIT – VII : PRODUCTION TECHNOLOGY**

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

**UNIT – VIII : METROLOGY AND QUALITY CONTROL**

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

**UNIT – IX : CAD / CAM / CIM / FEA**

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

**UNIT – X : INDUSTRIAL ENGINEERING AND MANAGEMENT**

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

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**Unit I: Fibre Identification and Blend analysis**

- i) Textile fibre Classification.
- 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, DMA / TMA, TGA

**Unit II: Physical Properties of Fibres**

- i) Mechanical – Tensile, Elastic recovery, Time Effect, Bending, Twisting & Compression
- ii) Optical - Absorption and dichroism, Reflection and lustre.
- iii) Electrical and Thermal Properties - Dielectric property, Static Electricity, Structural changes in fibres on thermal treatment

**Unit III: Synthetic Fibre Spinning and Post Spinning Operations**

- i) Requirements of fibre forming polymers
- ii) Spinning of Polymers - Melt Spinning, Wet spinning, Dry spinning
- iii) Post Spinning Operations – Drawing, Crimping, Heat setting, Tow-to-top conversion, Texturing methods

**Unit IV: Spinning:**

- i) Principles of opening, cleaning and mixing/blending of fibrous materials
- ii) Draft and Drafting, Irregularity introduced by drafting
- iii) Roller arrangements in drafting systems;
- iv) Combing cycle, combing efficiency, lap preparation;
- v) Mechanism of roving bobbin building, roving twist;
- vi) Ring Cop formation, forces acting on yarn and traveller;
- vii) Single and folded yarn twist, production of core spun / compact spun yarn.
- viii) Alternate Spinning systems - rotor spinning, air jet spinning, friction spinning.
- ix) Principles of long staple spinning – Jute, Wool

**Unit V: Weaving:**

- i) Warp 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
- v) Primary, Secondary and Tertiary motions of loom, Loom timings.
- vi) Tappet, Dobby and Jacquard shedding;
- vii) Principles of Shuttleless Weft insertion systems.
- viii) Principles of Circular and Multiphase weaving
- ix) Basic woven fabric constructions and its derivatives

**Unit VI: Testing & Quality Control:**

- i) Sample selection techniques using statistics.
- ii) Measurement of fibre length, strength, fineness, maturity
- iii) HVI and AFIS techniques

- iv) Determination of yarn count, twist and hairiness
- v) Tensile testing of fibres, yarns and fabrics
- vi) Evenness testing of slivers, rovings and yarns
- vii) fabric properties - air permeability, drape, crease recovery, tear / bursting strength & abrasion.
- viii) Objective Evaluation of fabric hand - FAST and KESF
- ix) Statistical analysis of experimental results – Mean, SD, CV%

Unit VII: Chemical Processing:

- i) Preparatory processes for natural fibres, synthetics and common blends
- ii) Dyeing of fibres using various dye classes.
- iii) Batch-wise and continuous dyeing techniques
- iv) Styles of printing. Printing thickeners and auxiliaries.
- v) Printing of cotton with reactive dyes.
- vi) Printing of polyester with disperse dyes.
- vii) Mechanical and chemical finishing of cotton

Unit VIII: Knitting & Garments:

- i) Knitting - Yarn quality requirements, principles of weft and warp knitting
- ii) Basic weft and warp knitted structures and its properties
- iii) Garments - Pattern making, Spreading, Cutting, Marker efficiency
- iv) Stitches and Seams
- v) Types of Sewing machine
- vi) Sewing thread attributes
- vii) Inspection and Merchandising

Unit IX: Nonwovens & Technical Textiles:

- i) Nonwovens - Web formation
- ii) Bonding methods – mechanical, thermal and chemical.
- iii) Finishing and Application of nonwovens
- iv) Technical Textiles - Property requirements
- v) Industrial Textiles - Belts, Ropes, Tyre-cords, Coated abrasives
- vi) Automotive Textiles - Filter fabrics, Airbags, Carpets
- vii) Geotextiles – Applications in civil engineering
- viii) Agriculture Textiles – Crop covers, bird nets, soil mats and sacks
- ix) Packaging Textiles – Food packing and bags.

Unit X: Textile Management & Environment Conservation:

- i) Industrial Engineering – Work study, method study,
- ii) Costing – Elements, Balance sheet, P & L Account
- iii) Tools – TQM, 5S, Kaizen, MIS.
- iv) Marketing Management
- v) Industrial relations and Labour laws
- vi) Energy conservation in textile production process,
- vii) Characteristics of Effluent
- viii) Effluent treatment.

**PAPER-II****GENERAL STUDIES (DEGREE STANDARD/OBJECTIVE TYPE)****(Code No: 003)****UNIT-I: GENERAL SCIENCE**

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

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

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

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

**UNIT- II: CURRENT EVENTS**

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

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

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

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

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

### **UNIT-III : GEOGRAPHY**

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

### **UNIT-IV: HISTORY AND CULTURE OF INDIA**

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

### **UNIT-V: L INDIAN POLITY**

Constitution of India - Preamble to the constitution- Salient features of constitution- Union, State and territory- Citizenship-rights amend duties- Fundamental rights- Fundamental duties- Human rights charter- Union legislature – Parliament- State executive- State Legislature – assembly- Status of Jammu & Kashmir- Local government – panchayat raj – Tamil Nadu- Judiciary in India – Rule of law/Due process of law- Indian federalism – center – state relations-. Emergency provisions- Civil services in India- Administrative challenges in a welfare state- Complexities of district administration- Elections - Election Commission Union and State. Official language and Schedule-VIII- Amendments to constitution- Schedules to constitution-. Administrative reforms & tribunals- Corruption in public life- Anti-corruption measures – Central Vigilance Commission, lok-adalats, Ombudsman, - Comptroller and Auditor General of India- Right to information - Central

and State Commission- Empowerment of women- Voluntary organizations and public grievances Redressal- Consumer protection forms

### **UNIT- VI: INDIAN ECONOMY**

Nature of Indian economy-Need for economic planning-Five-year plan models-an assessment-Land reforms & agriculture-Application of science in agriculture Industrial growth-Capital formation and investment-Role of public sector & disinvestment-Development of infrastructure- National income- Public finance & fiscal policy- Price policy & public distribution- Banking, money & monetary policy- Role of Foreign Direct Investment (FDI)- WTO-globalization & privatization- Rural welfare oriented programmes- Social sector problems – population, education, health, employment, poverty-HRD – sustainable economic growth- Economic trends in Tamil Nadu -Energy Different sources and development- Finance Commission -Planning Commission- National Development Council

### **UNIT-VII: INDIAN NATIONAL MOVEMENT**

National renaissance-Early uprising against British rule-1857 Revolt- Indian National Congress-Emergence of national leaders-Gandhi, Nehru, Tagore, Nethaji -Growth of militant movements -Different modes of agitations-Era of different Acts & Pacts-World war & final phase struggle-Communalism led to partition-Role of Tamil Nadu in freedom struggle - Rajaji, VOC, Periyar, Bharathiar & Others-Birth of political parties /political system in India since independence.

### **UNIT-VIII: APTITUDE AND MENTAL ABILITY TESTS**

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