The Tripura Power Engineering Services Rules, 1987.

(As Amended upto 7th Amendment dt. 12.12.2017)

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PART-I-----Orders and Notifications by the Government of Tripura, The High Court, Government Treasury etc.

GOVERNMENT OF TRIPURA
DEPARTMENT OF POWER

No.F.6(14)-PWD(E)/83 Dated,Agartala,the 5th March,1987

NOTIFICATION

In exercise of the powers conferred by provision to Article-309 of the Constitution of India, the Governor is pleased to make, in supersession of all previous orders/notification if any on these behalf the following rules, in consultation with the Tripura Public Service Commission for the regulation of recruitments to and conditions of the Engineering Services under the Department of Power, Govt. of Tripura, Namely:-

PART-I : [8][GENERAL]

1.Short title & commencements:-

(a).These rules may be called the **"Tripura Power Engineering Services Rules",1987.**

[9][(b).These Rules shall apply to the members of the Engineering Service of the Department of power, Government of Tripura which presently consists of Electrical Wing and other unit placed or as may be placed under it].

2. Definitions.

In these rules unless the context otherwise requires:-

[10][a). deleted].

[11]["(a)"]."Commission" means Tripura Public Service Commission.

[12]["(b)'Duty Post' means any post specified in the **First Schedule (Annexure-I)** appended to these rules and includes a temporary post carrying the same designation as any of the posts specified in the schedule and the scale of pay of which is identical to that attached to any Grade of the service"].

c)."Government" means the Government of Tripura.

d)."Governor" means the Governor of Tripura.

e).[13]["Member of the Service" means a person appointed in a substantive capacity to any Grade of the service and includes a person appointed on probation."].

[14][(f) "deleted"].

[15][f)]."Schedule" means Schedules[16] [appended] to these rules.

g)."Service" means Tripura Power Engineering Service.

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8. Substituted by the Tripura Power Engineering Service (5th Amendment) Rules,2007 w.e.f.15.10.2007
9. Substituted ibid
10.Deleted ibid
11.Renumbered ibid
12.Inserted ibid
13.Substituted ibid
14.Deleted ibid
15.Renumbered ibid
16.Substituted ibid

PART-II:[17][CONSTITUTION OF THE SERVICE, ITS CLASSIFICATION AND AUTHORIZED STRENGTH]

[18].["3. **Constitution of the Service and its Classification:**

(1). There shall be constituted a State Civil service to be known as the Tripura Power Engineering Service.

(2). The Service shall have the following seven grades,namely-

(i) Grade-I (A)-Group-A,Gazetted
(ii) Grade-I (B)-Group-A,Gazetted
(iii) Grade-II -Group-A,Gazetted
(iv) Grade-III -Group-A,Gazetted
(v) Grade-IV -Group-A,Gazetted
(vi) Grade-V(A)-Group-B,Non-Gazetted; &
(vii) Grade-V(B) –Group-C,Non-Gazetted.

4. Strength of the Service:

(1) The authorized permanent strength of the service and duty posts included therein shall be as specified in the **First Schedule (Annexure-I)** to these rules.

(2) The Government may,by order, create duty posts for such period as may be specified therein.

(3) Distribution of posts of Grade-V between Grade-V (A) and Grade-V (B) shall be 70:30.

(4) Distribution of posts between degree holder and Diploma holder in Grade –V [Grade-V(A) and Grade-V(B) together] shall be 50: 50"].

PART-III.[19]["METHODS OF RECRUITMENT"]

[20]["5. Appointment to the service shall be made by the following methods namely-

(1) Direct Recruitment

(a) 20% of the posts in the authorized permanent strength of Grade-IV of the Service shall be filled by direct recruitment from candidates who have at least a degree in an appropriate branch of engineering from a recognized University or its equivalent academic qualification and at least 2 years' experience of service under the Government or a Government Undertaking or a registered Public Sector Unit in the manner as specified in PART-IV of these rules;

Provided that the the candidates having a Post Graduate Degree in engineering shall be given preference.

17.Substituted by the Tripura power Engineering Service (5th Amendment) Rules,2007 w.e.f.15-10-2007
18.Substituted ibid
19.Substituted ibid
20.Substituted ibid

(b) 71% of the posts in the authorized permanent strength of Grade-V (A) of the service shall be filled by direct recruitment from candidates who have at least a degree in an appropriate branch of engineering from a recognized University or its equivalent academic qualification the manner as specified in PART-IV of the these Rules.

(c) All the posts in the authorized permanent strength of Grade-V(B) of the Service shall be filled by direct recruitment only from candidates who have a Diploma in an appropriate branch of engineering or its equivalent academic qualification from a recognized institution in the manner as specified in PART-IV of these rules.

(2) Recruitment by selection:

The remaining substantive vacancies in the permanent strength of various Grades of the Service shall be filled by selection in the manner as specified in PART-V of these rules;

Provided that-

(a) 70% of the posts in Grade-III of the service shall be filled by Degree holder engineers and the remaining 30% by Diploma holder engineers;

(b) 40% of the posts in Grade-IV of the service shall be filled by Degree holder engineers of grade-V(A) and the remaining 40% of the posts in Grade-IV of the service shall be filled by Diploma holder engineers of Grade –V(A).

(c) 29% of the posts in Grade –V(A) of the service shall be filled by Diploma holder engineers of Grade-V(B)"]

PART-IV [21]["DIRECT RECRUITMENT"]

[22]["6 .Selection to be made by the Commission:

Selection of candidates for direct recruitment to the Service shall be made by the Commission.

7. Competitive Examination:

A competitive examination for direct recruitment to the service shall be held at such intervals in the manner laid down in the **Second schedule (Annexure-II)** to these rules to be conducted by the Commission from time to time.The dates on which and the place at which the examination shall be held shall be fixed by the Commission.

8. Admission to competitive examination:

The qualification for admission to the examination and the conduct thereof shall be in accordanee with such regulations as the Government may, from time to time, issue in this behalf in consultation with the Commission.

21.Substituted by the Tripura Power Engineering (5th Amendment) Rules,2007 w.e.f.15-10-2007

22.Substituted ibid.

9. Decision of the Commission to be final:

The decision of the Commission as to the eligibility or otherwise of a candidate for admission to the examination shall be final and no candidate to whom a certificate of admission has not been issued by the commission shall be admitted to the examination.

10. Commission to forward a list in order of merit:

The Commission shall forward to the Government a list arranged in order of merit of the candidates who have qualified by such standard as the Commission may determine and of the candidates belonging to the Scheduled Castes and the Scheduled Tribes who, though not qualified by that standard, are declared by the Commission to be suitable for appointment to the service with due regard to the maintenance of efficiency in administration.

11. Inclusion in the list not to confer right to appointment:

The inclusion of a candidate's name in the list referred to in rule-10 above confers no right to appointment unless the Government is satisfied, after such inquiry as it may consider necessary, that the candidate is suitable in all respects for appointment to the service and an actual offer of appointment is made.

12. Physical fitness:

No candidate shall be appointed to the service unless he is declared, after such medical examination as the Government may prescribe, to be in good mental and bodily health and free from such mental or physical defect which is likely to interfere with the discharge of the duties of the Service.

13.Appointment of Candidates included in the list:

Subject to the provision of these rules the candidates will be considered for appointment to the available vacancies in the order in which their names appear in the list referred to in rule-10 above,"].

PART-V:[23][RECRUITMENT BY SELECTION]

[24]["14[Constitution of Selection Committees:

(1) Recruitment to Grade-I(A),Grade-I(B),Grade-II,Grade-III and Grade-IV of the service under sub-rule (2) of Rule-5,shall be made on recommendation of a Selection Committee (hereinafter referred to as the Committee) consisting of :-

(i)	Chairman of the Commission	-Chairman
(ii)	One senior Secretary to the Government To be nominated by the Chief Secretary	-Member
(iii)	Secretary,Power Department	-Member
(iv)	Secretary,Tribal Welfare Department	-Member
(v)	Secretary,SC,OBC & Minority Welfare Department	-Member

23.Substituted by the Tripura Power Engineering Service(5th Amendment) Rules,2007 w.e.f.15-10-2007
24.Substituted by ibid.

(2) Recruitment to Grade-V(A) of the service under sub-rule (2) of rule-5 shall be made on recommendation of a Selection Committee consisting of :-

(i) The Secretary,Power Department -Member

(ii) The Secretary,Tribal Welfare department -Member

(iii) The Secretary,SC,OBC & Minority Welfare Department -Member

(3) The Senior-most Secretary shall preside over the meeting of the Selection Committee constituted under sub-rule(2) above.

15. Conditions of eligibility for selection

Other than direct recruitment posts, all substantive posts in various Grades of the service shall be filled by selection from officers as shown below:-

(1) **Grade-I(A)** posts shall be filled:-

(i) By officers who hold Grade-I(B) posts and have rendered not less than one year's regular service in the Grade; and

(ii) Failing that,by officers who hold Grade-I(B) posts and have rendered not less than 5 years'regular service both in Grade-I(B) and grade-II taken together; and

(iii) Failing both,by officers who hold Grade-II hold Grade-II posts and have rendered not less than 5 years' regular service in the Grade.

(2) **Grade-I(B)** posts shall be filled by officers who hold Grade-II posts and have rendered not less than 4 years' regular service in the Grade.

(3) **Grade-II** posts shall be filled by officers who hold Grade-III posts.have rendered not less than 7 years' regular service in the Grade and have at least a degree in an appropriate branch of engineering from a recognized University or its equivalent academic qualification.

(4) **Grade-III** posts shall be filled in the manner as specified in sub-rule (2) of rule-5 by officers who hold Grade-IV posts and have rendered not lelss than 7 years' regular service in the Grade;

(5) **Grade-IV** posts shall be filled in the manner as specified in sub-rule(2) of rule-5 by officers who hold Grade-V(A) posts and have rendered not less than 3 years' regular service in the Grade; and

(6) **Grade-V(A)** posts shall be filled in the manner as specified in sub-rule (2) of rule-5 by officers who are Diploma holder engineers holding Grade-V(B) posts and have rendered not less than 4 years' regular service in the Grade,

16.Procedure for Selection:

(1) The Committee constituted under sub-rule (1) and sub-rule(2),as the case may be,of rule-14 shall consider from time to time, cases of those officers who are eligible **under rule-15** for promotion to a higher Grade and prepare a list of persons recommended taking into account the actual number of vacancies at the time of selection and those likely to occur during a year. The selection for inclusion in the list shall be based on remit and suitability in all respects for appointment to the Service with due regard to seniority.

Provided that where a person is considered for such appointment to a higher Grade from a lower Grade, all persons senior to him in the lower feeder Grade shall also be considered irrespective of whether or not they fulfil the requirement of the minimum period of regular service in the lower grade as provided in rule-15.

(2) The names of persons included in the list shall be arranged in the order of merit and be forwarded to the government.

17. Consultation with the Commission.

(1) The list prepared under sub-rule(2) of rule-16 shall be forwarded by the Government to the Commission along with the relevant reconds,where consultation with the Commission is necessary or where the Chairman of the Commission desires that a reference be made to the Commission.

(2) If the Commission considers it necessary to make any change in the list received from the Government,the Commission shall inform the Government of the changes proposed.

(3) The list shall finally be approved by the Government after taking into account the changes,if any,proposed by the Commission.

(4) The list thus finally approved shall ordinarily be in force until a fresh list is prepared for the purpose in accordance with these rules.

18.Appointment to the service:

Appointment to the service shall be made in the order of merit as shown in the list referred to in sub-rule (3) of rule 17."]

[25][Rule (8) & (9)****Deleted]

PART-VI [26]["ELIGIBILITY FOR DIRECT RECRUITMENT']

[27]"[**19**.Candidates for direct recruitment to the Service must fulfil the following conditions:-

(1).Common eligibility conditions:

For direct recruitment to any Grade of the Service a candidate:-

(i) Must be a citizen of India; and

(ii) Must not be less than 18 and more than 37 years of age.

Provided that the Scheduled Caste, Scheduled Tribe and Physically handicapped category of candidates and the Government servants shall get an upper age relaxation of 5 (five) years.

Provided further that the Government servants of Scheduled Caste, Scheduled Tribe and Physically handicapped category shall not get the upper age relaxation of 5 years over and above the upper age relaxation 5 years admissible to them as Scheduled Castes, Scheduled Tribes and Physically Handicapped.

(2).Educational Qualification:

(a) For direct recruitment to **Grade-IV** and **Grade-V(A)** of the Service a candidate must have at least a degree in an appropriate branch of engineering from a recognized University or its equivalent academic qualification.

(b) For direct recruitment to **Grade-V(B)** of the service a candidate must have a Diploma in an appropriate branch of engineering or its equivalent academic qualification from a recognized Institution."]

PART:VII[28]["APPOINTMENT,PROBATION,TRAINING AND CONFIRMATION"]

[29]["**20Appointment:**

All appointments to the Service shall be made to the grade and not against any specific post included in the service.

25.Deleted by the Tripura Power Engineering Service(5th Amendment) Rules,2007 w.e.f.15-10-2007

26.Substituted ibid.

27. Substituted ibid.

28. Substituted ibid.

29. Substituted ibid.

21.Disqualification:

(a) No person who has more than one spouse living or who,having a spouse living,marries in any case in which such marriage is void by reason of its taking place during the life time of such spouse,shall be eligible for appointment to the service,and;

(b) No woman whose marriage is void by reason of the husband having a wife living at the time of such marriage or who has married a person who has a wife living at the time of such marriage,shall be eligible for appointment to the service.

Provided that the state Government may,if satisfied that there are special grounds for so ordering,exempt any person from the operation of this rule.

(c).No officer who has not passed a Departmental examination prescribed by the Government shall be eligible for selection to a higher Grade of the Service.

22.Special provision for Scheduled Castes and Scheduled Tribes

Appointment to every Grade of the Service made by direct recruitment or by selection or otherwise shall be subject to the laws in force in the State regarding special representation of the Scheduled Castes and Scheduled Tribes in the Services under the State.

23.Period of Probation:-

(1) Every person appointed to grade-IV under rule-5(1)(a),to grade-V(A) under rule-5(1)(b) and to Grade-V(B) of the Service under rule-5(1)(c) shall be on probation for a period of two years.

(2)The State Government may in the case of any person extend the period of probation in consultation with the Commission.

(3)The Government may,in consulation with the Commission,discharge,at any time,a probationer from service without assigning any reason therefore.

(4)A person on probation who holds a lien on any permanent post under the Central or State Government may,if he so desires during the period of probation,has the option to be reverted to his parent Department or Government after giving such notices as may be prescribed by the Government.

24.Training and Departmental Examination:

(1) Every person appointed to the service under Rule-5 shall pass,during the period of probation,such Examination and complete successfully such training as may be prescribed.

(2) Every person appointed to the service under Rule-5 shall pass such Departmental Examination as the Government may,from time to time,prescribe.

25. Confirmation in Service:
A person appointed to the service under Rule-5 may be confirmed in the Service on the basis of general assessment of his performance during the period of probation and his performance in the training and the examinations as provided in Rule-24"]

PART VIII:[30]**["MISCELLANEOUS"]**

[31]**["26.Posting of Members of the Service**

Every member of the service shall, unless he is appointed to an ex-cadre post, or is otherwise not available for holding a duty post owing to the exigencies of service, be posted against a duty post under the Government.

27.Deputation:
A member of the service may, on deputation, be transferred to any post or be allowed deputation to any post outside the service under the Central or State Government, any company or organization.

28.Private Practice:
No member of the service shall undertake private practice of any kind in any form or manner without previous permission of the competent authority.

29.Seniority-
The State Government shall prepare a list of members of the Service arranged in order of seniority as determined in the manner specified below:-

(i) Seniority of officers in each Grade of the service shall be determined separately;

(ii) Seniority of Degree-holder engineers and Diploma-holder engineers shall be determined separately and not clubbed together;

(iii) In the case of persons appointed on the results of a competitive examination, under rule-5(1) or by selection under rule-5(2) seniority in the service shall be determined by the order in which appointments are made to the service.

30.Substituted by the Tripura Power Engineering Service (5th Amendment) Rules,2007 w.e.f.15-10-2007.
31.Substituted ibid.

Provided that-

(a) Persons recruited on the results of a competitive examination in any year shall be ranked inter se in the order of merit in which they are placed at the competitive examination on the result of which they are recruited, those recruited on the basis of an earlier examination being ranked senior to those recruited on the basis of later examination.

(b) The relative seniority inter se of persons recruited by selection shall be determined on the basis of the order in which their names are arranged in the list prepared under rule-16.

(iv) The relative seniority of direct recruits and of promotes shall be determined according to the rotation of vacancies **filled in a recruitment year** between the direct recruits and the promotes which shall be based on the quotas of vacancies reserved for direct recruitment and promotion under rule-5.

30.Pay and Allowances:

(1).The scales of pay attached to various grades of the service shall be as follows:-

(i) Grade-I(A)-	Rs.14,150/--20,000/-
(ii) Grade-I(B)-	Rs.14,150/--20,000/-
(iii)Grade-II-	Rs.12,000/--18,400/-
(iv) Grade-III	Rs.11,000/--18,000/-
(v) Grade-IV-	
(a) For direct recruits at the entry stage-	Rs.10,000-15,100/-
(b) For promotes at the entry stage-	Rs.10,000-15,100/-

(vi)	Grade-V(A)-	
	(a).For Degree-holder direct recruits at The entry stage-	Rs.7,450-13,000/-
	(b).For Diploma holders promotes-	Rs.7,450-13,000/-
	(c).For Degree holders after 8 years Of service(under the Career Advancement Scheme)	Rs.10,000-15,100/-
(vii)	Grade-V(B)-	
	(a).For the direct recruits at the entry stage	Rs.5,000-10,300/-
	(b).After 8 year of service (Under the Career Advancement Scheme)	Rs.7,450-13,000/-

Provided that the Government may from time to time revise the scales of pay.

(2).Dearness and other allowances shall be paid to persons holding duty posts at such rates as may be determined by the Government from time to time.

(3).When a member of the service gets, under the Career advancement Scheme or any other scheme, the benefit of a higher scale of pay which is equal to the pay and allowances of a higher Grade of the Service, the member of the Service shall be entitled to the pay and allowances at the higher rate; but he shall not be entitled to the rank and status of that higher Grade or the duty posts included in that higher Grade.

31. Transitional arrangement;

Transitional arrangement for adjustment of existing members of the service, wherever found in excess, shall be considered in the following manner:-

(1) Degree holders found in excess in Grade-IV,if any, shall immediately be adjusted against both direct recruitment and promotion posts for Degree holders. These shall be adjusted finally as per amended rules hereby on availability of future vacancies.

(2) Diploma holders, found in excess in Grade-IV,if any, shall immediately be adjusted against the vacancies of the direct recruitment posts for Degree holders in Grade-IV,the same shall be adjusted finally as per amended rules hereby on availability of future vacancies.

(vi)	Grade-V(A)-	
	(a).For Degree-holder direct recruits at The entry stage-	Rs.7,450-13,000/-
	(b).For Diploma holders promotes-	Rs.7,450-13,000/-
	(c).For Degree holders after 8 years Of service(under the Career Advancement Scheme)	Rs.10,000-15,100/-
(vii)	Grade-V(B)-	
	(a).For the direct recruits at the entry stage	Rs.5,000-10,300/-
	(b).After 8 year of service (Under the Career Advancement Scheme)	Rs.7,450-13,000/-

Provided that the Government may from time to time revise the scales of pay.

(2).Dearness and other allowances shall be paid to persons holding duty posts at such rates as may be determined by the Government from time to time.

(3).When a member of the service gets, under the Career advancement Scheme or any other scheme, the benefit of a higher scale of pay which is equal to the pay and allowances of a higher Grade of the Service, the member of the Service shall be entitled to the pay and allowances at the higher rate; but he shall not be entitled to the rank and status of that higher Grade or the duty posts included in that higher Grade.

31. Transitional arrangement;

Transitional arrangement for adjustment of existing members of the service, wherever found in excess, shall be considered in the following manner:-

(1) Degree holders found in excess in Grade-IV,if any, shall immediately be adjusted against both direct recruitment and promotion posts for Degree holders. These shall be adjusted finally as per amended rules hereby on availability of future vacancies.

(2) Diploma holders, found in excess in Grade-IV,if any, shall immediately be adjusted against the vacancies of the direct recruitment posts for Degree holders in Grade-IV,the same shall be adjusted finally as per amended rules hereby on availability of future vacancies.

(3) The Degree holders found in excess, in Grade-V(A),if any, shall immediately be adjusted against the vacancies in Grade-V(A) for Diploma holders and shall be adjusted finally as per amended rules hereby on availability for future vacancies.

(4) The Diploma holders found in excess, in Grade-V(A),if any, shall immediately be adjusted against the vacancies in Grade-V(B) for Diploma holders, and the same shall be adjusted finally as per amended rules hereby on availability of future vacancies.

32. Any occupied posts not possible to be adjusted in this service in accordance with the provisions of these rules as per transitional arrangement provided in rules-31 may continue to be held by the officer(s) who are holding such posts before introduction of these amendments as if these amendments had not come into force.

33. Residuary matters:-
In regard to matters not specifically covered by these rules or by regulations or orders issued thereunder or by special orders, the members of the service shall be governed by the rules, regulations and orders applicable to the officers of same status serving in connection with affairs of the State Government.

34. Interpretation:
If any question arises as to the interpretation of these rules, the same shall be decided by the Government."]

PART IX:[32]["RELAXATION"]

[33][35.POWER TO RELAX:
Where the Government is of the opinion that it is necessary or expedient to do so, it may, by order, for reasons to be recorded in writing and, in consultation with Commission, relax any of the provisions of these rules with respect to any class or category of persons or posts."]

[34][**PART ,X,XI,XII,XIV,XV,XVI,XVII,XVIII,XIX,XX,XXI and XXII** along with their heading in the Principal Rules shall be deleted].

[35][**Rule-14,15,16,18,19,20,21,22,23,24,25,26,27,28,29,30 and 31** of the Principal Rules shall be deleted.]

PART-XIII: TRANSITIONAL ARRANGEMENTS:

17. On and after the commencement of these rules and until persons are appointed to the service in accordance with the provisions of these rules, such posts may continue to be held by the officer(s) who are holding such posts at Commencement of these rules as if these rules had not come into force.

32.Substituted by the Tripura Power Engineering Service(5th Amendment) Rules,2007 w.e.f.15-10-2007
33.Substituted ibid
34.deleted ibid
35.deleted ibid

Annexure-I

[37][FIRST SCHEDULE]
(See Rule-4)

Sl.No.	Tripura Power Engineering Services Grade-I(A)	No.of Posts	Total No.of Posts in the Grade
01	Chief Engineer (Power Project)	01	03 (For Degree Holders only)
02	Chief Engineer (Power Project)	01	
03	Deputation/Leave reserve/Training	01	

Sl.No.	Tripura Power Engineering Services Grade-I(B)	No.of Posts	Total No.of Posts in the Grade
01	Additional Chief Engineer(Electrical) & Sole Arbitrator	03	04 (For Degree Holders Only)
02	Deputation/Leave reserve/Training)	01	

Sl.No.	Tripura Power Engineering Services Grade-II	No.of Posts	Total No.of Posts in the Grade
01	Superintending Engineer (Electrical)	08	10 (For Degree Holders Only)
02	Deputation/Leave reserve/Training)	02	

Sl.No.	Tripura Power Engineering Services Grade-III	No.of Posts	Total No.of Posts in the Grade
01	Executive Engineer(Electrical)	32	44 (30 No. Of posts for Degree Holders only and 13 No. Of Posts For Diploma Holders Only)
02	Engineering Officer attached to Chief Engineer (Electrical)	01	
03	Deputation/Leave Reserve/Training	10	
04	Executive Engineer(Civil)	01	(For Degree Holder only)

37.Substituted by the Tripura Power Engineering Service(6th Amendment) Rules,2011,w.e.f.31-05-2011

Sl.No	Tripura Power Engineering Services Grade-IV	No.of Posts	Total No.of Posts in the Grade
01	Assistant Engineer (Electrical	180	237
02	Technical Assistant attached to Superintending Engineer(Electrical)	02	47 No. Of posts for Degree Holders only by way of Direct Recruitment,95 No. Of posts for Degree Holders only by way of Promotion and 95 No. Of post For Diploma Holders only by Way of Promotion
03	Deputation/Leave Reserve/Training	55	
04	Assistant Engineer (Civil)	08	10
05	Deputation/Leave Reserve/Training	02	2 No. Of posts for Degree Holders only by way of direct Recruitment,4 No. Of posts for Degree Holders only by way of Promotion and 4 No. Of posts For Diploma Holders only by way Of Promotion
06	Assistant Engineer(Mechanical)	06	08
07	Deputation/Leave Reserve/Training	02	2 No. Of posts for Degree Holders Only by way of direct recruitment, 3 No. Of posts for Degree Holders Only by way of promotion and 3 No. Of posts for Diploma Holders Only by way of promotion
08	Assistant Engineer(Electronics	03	04
09	Deputation/leave reserve/Training	01	1 No. Of post for Degree Holder Only by way of direct recruitment 1 No.of post for Degree Holder Only by way of Promotion and 2 No. Of posts for Diploma Holders only by way of Promotion.

Sl.No	Tripura Power Engineering Services **Grade-V**	No.of Posts	Total No.of Posts in the Grade
01	Junior Engineer (Electrical)	188	244 **Gr.V(A):171 Posts** 122 No. Of posts for degree Holders only by way of direct Recruitment,and 49 No. Of posts For Diploma Holders only By way of promotion. **Gr.V(B): 73 posts** 73 No. Of posts for Degree Holders only by way of direct Recruitment.
02	Leave Reserve	56	
03	Junior Engineer(Civil)	30	39 **Gr.V.(A): 27 posts** 20 No. Of posts for Degree Holders only by way of direct Recruitment and 07 No. Of posts For Diploma Holders only by Way of promotion. **Gr.V(B): 12 posts** 12 no.of posts for Diploma Holders only by way of direct Recruitment.
04	Leave Reserve	09	
05	Junior Engineer(Mechanical)	17	22 **Gr.V(A): 15 posts** 11 No. Of posts for Degree Holders only by way of direct Recruitment, and 4 No. Of posts For Diploma Holders only by way Of promotion... **Gr.V(B): 7 posts** 7 No. Of posts for Diploma Holders only by way of direct Recruitment.
06	Leave Reserve	05	

07	Junior Engineer(Electronics)	03	04 **Gr.V(A): 3 posts** 2 No. Of posts for Degree Holders only by way of direct Recruitment,and 1 No. Of posts For Diploma Holders only by Way of promotion.. **Gr.V(B): 1 post:** 1 No. Of post for Diploma Holder Only by way of direct recruitment.
08	Leave Reserve	01	

Total No. Of posts in TPES:629

Explanatory Note: 188 No. Of supernumerary posts(UR:98;SC:32;ST:58) for Gr.V(A) & V(B) have been created by the Finance Department vide.,UO.NO.1121/Fin(G)/07,dated 24-09-2007.In Future when post in TPES becomes vacant in case of Gr.V(A) & V(B),those posts will be adjusted against the supernumerary posts created and those supernumerary posts will stand abolished].

Annexure-II

[36][SECOND SCHEDULE]
(Rule-7)
COMPETITIVE EXAMINATION

1. Competitive examination for direct recruitment

(1) As provided in Part-IV of the Rules, selection of candidates for direct recruitment to the service shall be made by the Commission on the basis of a competitive examination to be conducted by it.

(2) Every year, ordinarily by April, the Public Works Department of the Government will send to the Commission a requisition for selection of candidates to fill vacancies against the direct recruitment quota of Grade –IV, Grade-V(A) or Grade-V(B) of the Tripura Engineering service. Having regard to the number of vacancies mentioned in the requisition, the Commission shall conduct a competitive examination for direct recruitment to of the service in the manner as provided in Part-IV of these regulations. The Commission will complete the process of selection of the candidates through the examination ordinarily within a period of 6 (six) months and recommend to the Government a list of selected candidates.

(3)Before holding the examination, the Commission shall issue an advertisement notifying, inter alia,the vacancies with the breakup of the posts earmarked for unreserved and reserved category of candidates and inviting applications from the candidates willing to appear in the examination. The advertisement shall also indicate that the number of vacancies so notified may increase or decrease according to necessity.

(4)In case a communication is received by the Commission from the employer of a candidate withholding permission to appear at the examination, his application shall be rejected/candidature shall be cancelled by the Commission;

Provided that a candidate who gets appointment to any post after submission of his application for admission to the examination must furnish forthwith evidence to show that his employer has no objection to his being selected for a post on the results of the examination.

2.Number of Chances shall allowed to a candidate

1) No candidate who does not belong to Scheduled Castes or Scheduled Tribes shall be permitted to compete more than 3 times in the examination.

2) A candidate shall be deemed to have competed in the examination,if he has actually appeared in any of the subjects/papers.

36.Substituted by the Tripura Power Engineering Service (5th Amendment) Rules,2007 w.e.f.15-10-2007.

3.Admission Certificate

1) A candidate who has paid application fees as prescribed and fulfilled the terms of advertisement will receive an Admit Card and a time table for the examination.The admission will be deemed to be provisional subject to determination of his eligibility in all respects;

2) No candidate shall be admitted to the examination unless he holds an Admit Card.If at any stage after issue of the Admit Card ,a candidate is found to be ineligible for admission in terms of the regulations of the examination; his candidature shall be cancelled without further reference to him.

4.Consequences of violation rule,regulations,instructions etc

A candidate who violates the rules,regulations and instructions issued by the Commission,Supervisor or Invigilator on duty in the Examination Hall,be liable to expulsion from the Examination Hall and/or other penalties as provided in the regulation of the commission.

5.Matters for which no specific provision has been made in the regulations shall be decided by the Commission.

PART-I

Nature and syllabus of the examination

6.The examination shall have the following two parts,namely-

(i) a written part carrying 500 marks; and

(ii) an interview-cum-personality test carrying 50 marks.

7.Written part of the examination

(1) The witten part of the examination shall consist of the following 3 (three) compulsory subjects/papers:-

Subject/paper	Full marks	Duration of the examination
i) General Studies	100	1 hour
ii) two of the following papers a) Civil Engineering Paper-I b) Civil Engineering Paper-II	200 each Paper	2 hours

(The questions will include knowledge of Indian current events and of such matters of every day observation and experience in their scientific aspects as may be expected of an educated person who has not made a special study of any scientific subject)

vi) Mental Ability 20

ENGINEERINGS SUBJECT PAPER-i & ii
(OPTIONAL FOR ALL GRADES /BRANCHES)
TOTAL MARKS-200(each paper)
Duration of examination-2 hours
The break up of marks will be as follows:

Topic		Marks
i)	20 questions of 6 marks each	120
ii)	40 question of 2 marks each	80

SCHEDULE-II
Syllabus for Grade-IV
CIVIL ENGINEERING
PAPER-1
Total Marks-200

Duration of Examination-2 Hours

1.BUILDING MATERIALS

Timber : Different types and species of structural timber, density-moisture relationship, strength in different directions, defects, influence of defects on permissible stress, preservation, dry and wet rots, codal provisions for design, Plywood.

Bricks: Types, Indian Standard classification, absorption, saturation factor, strength in masonry, influence of mortar strength on masonry strength.

Cement: Compounds of, different types, setting times, strength.

Cement Mortar: Ingredients, proportions, water demand, mortars for plastering and masonry.

Concrete: Importance of W/C Ratio, Strength, ingredients including admixtures, workability,testing for strength, elasticity, non-destructive testing, mix design methods.

2.SOLID MECHANICS

Elastic constants, stress, plane stress, Mohr's circle of stress, strains, plane strain, Mohr's circle of strain, combined stress; Elastic theories of failure; Simple bending, shear; Torsion of circular and rectangular sections and simple members.

3.DESIGN OF STEEL STRUCTURES

Principles of working stress method. Design of connections, simple members, Built-up sections and frames, Design of Industrial roofs. Principles of ultimate load design. Design of simple members and frames.

4.DESIGN OF CONCRETE AND MASONRY STRUCTURES

Limit state design for bending, shear, axial compression and combined forces. Codal provisions for slabs, beams, walls and footings. Working stress method of design of R.C. members.

Principles of prestressed concrete design, materials, methods of prestressing, losses.

Design of simple members and determinate structures. Introductions to prestressing of indeterminate structures.

Design of brick masonry as per I.S. Codes.

5.CONSTRUCTION PRACTICES,PLANNING AND MANAGEMENT

Concreting Equipment: Weight Batcher, Mixer, vibrator, batching plant, concrete pump. Cranes, hoists, lifting equipment.

Earthwork Equipment: Power shovel, hoe, dozer, dumper, trailers and tractor, rollers, sheep foot rollers, pumps.

Construction, Planning and Management: Bar chart, linked bar chart, workbreak down structures, Activity-on - arrow diagrams. Critical path, probabilistic activity durations; Event-based networks.

PERT network: Time-cost study, crashing; Resource allocation.

CIVIL ENGINEERING
PAPER-II
Total Marks-200
Duration of Examination-2 Hours.

1.(a) FLUID MECHANICS,OPEN CHANNEL FLOW,PIPE FLOW:

Fluid Properties, Pressure, Thrust, Buoyancy; Flow Kinematics; Integration of flow equations; Flow measurement; Relative motion; Moment of momentum; Viscosity, Boundary layer and Control, Drag, Lift; dimensional Analysis, Modeling; Cavitation; Flow oscillations; Momentum and Energy principles in Open channel flow, Flow controls, Hydraulic jump, Flow sections and properties; Normal flow, Gradually varied flow; Surges; Flow development and losses in pipe flows, Measurements; Siphons; Surges and Water hammer; Delivery of Power Pipe networks.

(a)HYDRAULIC MACHINES AND HYDROPOWER:

Centrifugal pumps, types, performance parameters, scaling, pumps in parallel; Reciprocating pumps, air vessels, performance parameters; Hydraulic ram; Hydraulic turbines, types, performance parameters, controls, choice; Power house, classification and layout, storage, pondage, control of supply.

2.(a) HYDROLOGY:

Hydrological cycle, precipitation and related data analyses, PMP, unit and synthetic hydrographs; Evaporation and transpiration; Floods and their management, PMF; Streams and their gauging; River morphology; Routing of floods; Capacity of Reservoirs.

(b).WATER RESOURCES ENGINEERING :

Multipurpose uses of Water: Soil-Plant-Water relationships, irrigation systems, water demand assessment; Storages and their yields, ground water yield and well hydraulics; Water logging, drainage design; Irrigation revenue; Design of rigid boundary canals, lining of canals; Sediment transport in canals; Non Overflow and overflow sections of gravity dams and their design, Energy dissipaters and tail water rating; Design of head works, distribution works, falls, cross-drainage works, outlets; River training.

3.ENVIRONMENTAL ENGINEERING

(a)WATER SUPPLY ENGINEERING:

Sources of supply, yields, design of intakes and conductors; Estimation of demand; Water quality standards; Control of Water-borne diseases; Primary and secondary treatment, detailing and maintenance of treatment units; Conveyance and distribution systems of treated water, leakages and control; Rural water supply; Institutional and industrial water supply.

(b).WASTE WATER ENGINEERING:

Urban rain water disposal; Systems of sewage collection and disposal; Design of sewers and sewerage systems; pumping; Characteristics of sewage and its treatment, Disposal of products of sewage treatment, stream flow . Plumbing Systems, Rural and semi-urban sanitation.

(c).SOLID WASTE MANAGEMENT:

Sources,classification,collection and disposal;Design and Management of landfills.

4(a)SOIL MECHANICS:

Properties of soils, classification and interrelationship; Compaction behavior, methods of compaction and their choice; Permeability and seepage, flow nets, Inverted filters; Compressibility and consolidation; Shearing resistance, stresses and failure; soil testing in laboratory and in-situ; Stress path and applications; Earth pressure theories, stress distribution in soil; soil exploration, samplers, load tests, penetration tests.

(b).FOUNDATION ENGINEERING:

Types of foundations,Selection criteria, bearing capacity,settlement,laboratory and field tests;Types of piles and their design and layout,Foundations on expansive soils, swelling and its prevention foundation on swelling soils.

5.(a)SURVEYING:

Classification of surveys, scales, accuracy; Measurement of distances - direct and indirect methods; optical and electronic devices; Measurement of directions, prismatic compass, local attraction; Theodolites - types; Measurement of elevations - Spirit and trigonometric leveling; Relief representation; Contours; Digital elevation modeling concept; Establishment of control by triangulations and traversing - measurements and adjustment of observations, computation of coordinates; Field astronomy, Concept of global positioning system; Map preparation by plane tabling and by photogrammetry; Remote sensing concepts, map substitutes.

(b).TRANSPORTATION ENGINEERING:

Planning of highway systems, alignment and geometric design, horizontal and vertical curves, grade separation; Materials and construction methods for different surfaces and maintenance: Principles of pavement design; Drainage.

Traffic surveys, Intersections, signaling: Mass transit systems, accessibility, networking

MECHANICAL ENGINEERING
PAPER-I
Total Marks-200
Duration of Examination-2 Hours

1.STRENGTH OF MATERIALS:

Stress and strain in two dimensions, Principal stresses and strains, Mohr's construction, linear elastic materials, isotropy and anisotropy, stress-strain relations, uniaxial loading, thermal stresses. Beams: Bending moment and shear force diagram, bending stresses and deflection of beams. Shear stress distribution. Torsion of shafts, helical springs. Combined stresses, thick-and thin-walled pressure vessels. Struts and columns. Strain energy concepts and theories of failure.

2.FLUID MECHANICS:

Properties and classification of fluids, Manometer, forces on immersed surfaces, Center of pressure, Buoyancy, Elements of stability of floating bodies. Kinematics and Dynamics. Irrotational and incompressible. Inviscid flow. Velocity potential, Pressure field and Forces on immersed bodies. Bernoulli's equation, fully developed flow through pipes, Pressure drop calculations, Measurement of flow rate and Pressure drop. Integral approach, Laminar and tubulent flows, Separations. Flow over weirs and notches. Open channel flow, Hydraulic jump. Dimensionless numbers, Similitude and modelling. One-dimensional isentropic flow, Normal shock wave, Flow through convergent - divergent ducts, Oblique shock-wave.

3.THEORY OF MACHINES:

Cams.Gears and gear trains.Flywheels.Governors.Balancing of rigid rotors and field balancing.Balancing of single and multicylinder engines.Critical speeds and whirling of shafts Automatic controls.

4. MACHINE DESIGN :

Design of Joints: Cotters, keys, Splines, Welded joints, Threaded fasteners, joints formed by interference fits. Design of friction drives: couplings and clutches, belt and chain drives, power screws.

Design of Power transmission Systems: gears and gear drives shaft and axle, wire ropes.

Design of Bearings: hydrodynamics bearings and rolling element bearings.

5. FLUID MACHINERY AND STEAM GENERATORS:

Performance, Operation and control of hydraulic Pump, impulse and reaction Turbines, Specific speed, Classification. Energy transfer, Coupling, Power transmission, Steam generators, Fire-tube and water-tube boilers. Flow of steam through Nozzles and Diffusers, Wetness and condensation. Various types of steam and gas Turbines. Partial admission. Reciprocating, Centrifugal and axial flow Compressors, Multistage compression, role of Mach Number, Reheat, Regeneration, Efficiency, Governance.

MECHANICAL ENGINEERING
PAPER – II
Total Marks –200
Duration of Examination – 2 Hours

1.THERMO DYNAMICS:

Cycles and IC Engines, Basic concepts, Open and Closed systems. Heat and work. Zeroth, First and Second Law, Application to non-Flow and Flow processes. Entropy, Availability. Properties of ideal gases and vapours. Standard vapour, Gas power and Refrigeration cycles. Two stage compressor. C-I and S.I. Engines. Pre-ignition, Detonation and Diesel-knock, Fuel injection and Carburetion, Supercharging. Turbo-prop and Rocket engines, Engine Cooling, Emission & Control. Measurement of Calorific values. Conventional and Nuclear fuels, Elements of Nuclear power production.

2. HEAT TRANSFER, REFRIGERATION AND AIR-CONDITIONING:

Modes of heat transfer. One dimensional steady and unsteady conduction. Composite slab and Equivalent Resistance. Heat dissipation from extended surfaces, Heat exchangers, Overall heat transfer coefficient, Empirical correlations for heat transfer in laminar and turbulent flows and for free and forced Convection, Thermal boundary layer over a flat plate. Fundamentals of diffusive and connective mass transfer, Black body and basic concepts in Radiation, Enclosure theory, Shape factor.. Heat pump and Refrigeration cycles and systems, Refrigerants. Condensers, Evaporates and Expansion devices, Psychrometry, Charts and application to air conditioning, Sensible heating and cooling, Effective temperature, comfort indices, Load calculations, Solar refrigeration, controls, Duct design.

3. ENGINEERING MATERIALS:

Basic concepts on structure of solids. Crystalline materials. Detects in crystalline materials. Alloys and binary phase diagrams. Structure and properties of common engineering materials. Heat treatment of steels. Plastics, Ceramics and composite materials. Common applications of various materials.

4. INDUSTRIAL ENGINEERING:

Production Planning and Control: Forecasting - Moving average, exponential smoothing, Operations, scheduling; assembly line balancing, Product development, Break-even analysis, Capacity planning, PERT and CPM.

Control Operations: Inventory control ABC analysis, EOQ model, Materials requirement planning. Job design, Job standards, Work measurement, Quality Management - Quality analysis and control.

Operations Research: Linear Programming - Graphical and Simplex methods, Transportation and assignment models.

Value Engineering: Value analysis for cost/value.

ELECTRICAL ENGINEERING
PAPER – I
Total Marks – 200
Duration of Examination – 2 Hours

1.EM THEORY:

Electric and magnetic fields. Gauss's Law and Amperes Law. Fields in dielectrics, conductors and magnetic materials. Time varying fields. Plane-Wave propagating in dielectric and conducting media. Transmission lines.

2. ELECTRICAL MATERIALS:

Conductors, Semi-conductors and Insulators. Super-conductivity. Insulators for electrical and electronic applications. Magnetic materials. Ferro and ferri magnetism. Ceramics, Properties and applications. Hall effect and its applications. Special semi conductors.

3. ELECTRICAL CIRCUITS :

Circuits elements. Kirchoff's Laws. Mesh and nodal analysis. Network Theorems and applications. Natural response and forced response. Transient response and steady state response for arbitrary inputs. Properties of networks in terms of poles and zeros. Transfer function. Resonant circuits. Threephase circuits. Two-port networks. Elements of two-element network synthesis.

4. MEASUREMENTS AND INSTRUMENTATION

Units and Standards. Measurement of current, Voltage, power, Powerfactor and energy. Indicating instruments. Measurement of resistance, inductance, Capacitance and frequency. Bridge measurements. Electronic measuring instruments. Digital Voltmeter and frequency counter. Transducers and their applications to the measurement of non-electrical quantities like temperature, pressure, flow-rate displacement, acceleration, noise level etc. Data acquisition systems. A/D and D/A converters.

5. CONTROL SYSTEMS.

Block diagrams and signal flow graphs and their reduction. 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 and Nicols chart and the estimation of gain and phase margin. Basic concepts of compensator design. State variable matrix and its use in system modelling and design. Sampled data system and performance of such a system with the samples in the error channel. Stability of sampled data system. Elements of non-linear control analysis. Control system components, electromechanical, hydraulic, pneumatic components.

ELECTRICAL ENGINEERING
PAPER – II
Total Marks - 200
Duration of Examination – 2 Hours

1.ELECTRICAL MACHINES AND POWER TRANSFORMERS:

Magnetic Circuits. Construction and testing. Equivalent circuits. Losses and efficiency. Regulation. Auto-transformer, 3-phase transformer. Parallel operation. Basic concepts in rotating machines. EMF, torque, basic machine types. Construction and operation, leakage losses and efficiency. B.C. Machines. Construction, Excitation methods. Circuit models. Armature reaction and commutation. Generators and motors. Starting and speed control.Testing, Losses and efficiency. Synchronous Machines. Construction. Circuit model. Operating characteristics.Synchronous reactance. Efficiency. Voltage regulation. Salient-pole machine, Parallel operation.Hunting. Short circuit transients. Induction Machines. Construction. Principle of operation. Rotating fields. Characteristics and performance analysis. Determination of circuit model. Circle diagram. Starting and speed control. Fractional KW motors. Single-phase synchronous and induction motors.

2. POWER SYSTEMS

Types of Power Stations, Hydro, Thermal and Nuclear Stations. Pumped storage plants. Economics and operating factors. Power transmission lines. Modeling and performance characteristics. Voltage control. Load flow studies. Optimal power system operation. Load frequency control. Symmetrical Components. Per Unit representation. Fault analysis. Transient and steady-state stability of power systems. Equal area criterion. Power system Transients. Power system Protection Circuit breakers. Relays. HVDC transmission.

3. ANALOG AND DIGITAL ELECTRONICS AND CIRCUITS

Semiconductor device physics, PN junctions and transistors, circuit models and parameters, FET, Zener, tunnel, Schottky, photo diodes and their applications, rectifier circuits, voltage regulators and multipliers, switching behavior of diodes and transistors. Small signal amplifiers, biasing circuits, frequency response and improvement, multistage amplifiers and feed-back amplifiers, D.C. amplifiers, Oscillators. Large signal amplifiers, coupling methods, push pull amplifiers, operational amplifiers, wave shaping circuits. Multivibrators and flip-flops and their applications. Digital logic gate families, universal gatescombination circuits for arithmetic and logic operational, sequential logic circuits. Counters, registers, RAM and ROMs.

4. MICROPROCESSORS

Microprocessor architecture-Instruction set and simple assembly language programming. Interfacing for memory and I/O. Applications of Microprocessors in power system.

5. COMMUNICATION SYSTEMS

Types of modulation; AM, FM and PM. Demodulators. Noise and bandwidth considerations. Digital communication systems. Pulse code modulation and demodulation. Elements of sound and vision broadcasting. Carrier communication. Frequency division and time division multiplexing, Telemetry system in power engineering.

6. POWER ELECTRONICS

Power Semiconductor devices. Thyristor. Power transistor, GTOs and MOSFETS. Characteristics and operation. AC to DC Converters; 1-phase and 3-phase DC to DC Converters; AC regulators. Thyristor controlled reactors; switched capacitor networks. Inverters; single-phase and 3-phase. Pulse width modulation. Sinusoidal modulation with uniform sampling. Switched mode power supplies.

ELECTRONICS ENGINEERING
PAPER-I
Total Marks-200
Duration of Examination -2 Hours

1.Electronics devices and circuits:

Semiconductor physics, The P-N junction; The basic transistors, Hybrid model & parameters of Transistors. Transistor biasing techniques, Transistor characteristics, Load line & DC bias circuits, operation of Field effect transistor,MOSFET,Zener diode.

Single stage amplifier-Class-A,Class-B,Class-C,Class-AB configuration, Multistage amplifier, Feedback amplifier, Push-pull amplifier, Sinusoidal oscillators, Differential amplifier, Linear integrated circuit(Such as 555 timer, phase locked loop).

Power Electronics-Thyristor,Triac,Diac,Single Phase AC to DC converter,DC to DC converter, Switching Mode power supply.

2.Measurement & Instrumentation:

Units & standards, Measurement of current, Voltage,Power;Measurement of resistance,Inductance,capacitance;Digital voltmeter, Transducer & their application to the measurement of temperature, reassure & acceleration, Data acquisition system.

3.Digital Electronics & Microprocessors:

Advantages of Digital system, Logic families, Number system & codes, Logic gates,Karnaugh map representation of logical function, Simplification of logical function using Karnaugh map; Multiplexers & Demultiplexers and their usage in combinational logic design,Flip-flops;Counters,shift registers,A/D & D/A converters.

Microprocessor architecture, Instruction set and Simple assembly language programming, Interrups,Stack & subroutines, Application of Microprocessor.

4.EM Theory:

Analysis of Electrostatic & Magneto static fields, Gauss's Law and Amperes Law, Maxwell's equation,Fields in dielectrics, Conductors and magnetic materials, Plane-wave propagation in dielectric and conducting media.

ELECTRONICS ENGINEERING
PAPER-II
Total Marks-200
Duration of Examination-2 Hours

1.Electrical Technology:

Three phases/Single phase supply, Star-Delta connections, Relation between phase & Line voltage, Power factor, All types of motors, Generator AC & DC,Transformer,starters,rectifiers,inverters,battery charger, servo and stepper motors,switchgear,relays,protection devices and schemes,sub-station,circuit breaker, feeder & lightening protections, feeder & bus bar protection, Lightening arrestor,Earthing.

2.Communication:

Modulation & Demodulation technique-Principles & operation of AM,FM & PM;Pulse Modulation-TDM,PAM,PPM,PWM,PCM.

Operation of power line carrier communication & its application, Microwave Communication-Microwave devices,wave-guides,microwave antennas, microwave communication system-block diagram and working principle of microwave communication link.

Elements of television system, composite video signal,AGC & noise cancelling circuit, Sync processing & AFC circuits,"S" correction, Essential of colour television, three colour theory,Hue & saturation, Weighting factor, PAL colour television system.

Importance of satellite communication, satellite frequency band, Satellite Transponder Model, Satellite signal processing,FDMA,TDMA,CDMA technique, propagation of signals at HF,VHF,UHF & Microwave frequency range.

Elements of an optical fibre transmission system, fibre types, web representation,fibre fabrication technique,Signal degradation in Optical fibre(Attenuation, Absorption Losses & Signal distortion in optical Waveguide),Application of optical fibre.

3.Network Theorem,filters and transmission lines:

Two port network, Network theorem-Superposition,Thevenins,Norton & Maximum power transfer;attenuators,Filters,Transmission lines and their application characteristic impedance of line, concept of voltage standing wave ratio on a transmission line, principles of impedance matching, bandwidth consideration of a transmission line.

4.Control System:

Basic elements of control system, Open & closed loop system, Transfer function of simple control components, Time response of system, Stability analysis,Routh Hurwitz criterion,Nyquist criteria, Bode plot, Gain margin & phase margin, Root locus techniques.

5.Computer Engineering:

Computer and its working, Types of computers, Concept of file,Cirectory,Folder,Data representation, Local area network, Communication protocols standard-TCP/IP,X.2.5 Modem,Router,Switches,Programming,Elements of a high level programming language PASCAL/C.

SCHEDULE-III
Syllabus for Grade V (A)
CIVIL ENGINEERING
PAPER – I
Total Marks – 200
Duration of Examination – 2 Hours

1.BUILDING MATERIALS

Timber: Different types and species of structural timber, density-moisture relationship, strength in different directions, defects, influence of defects on permissible stress, preservation, dry and wet rots, codal provisions for design, Plywood.

Bricks: Types, Indian Standard classification, absorption, saturation factor, strength in masonry, influence of mortar strength on masonry strength.

Cement: Compounds of, different types, setting times, strength.

Cement Mortar: Ingredients, proportions, water demand, mortars for plastering and masonry.

Concrete: Importance of W/C Ratio, Strength, ingredients including admixtures, workability, testing for strength, elasticity, non-destructive testing, mix design methods

2. SOLID MECHANICS:

Elastic constants, stress, plane stress, Mohr's circle of stress, strains, plane strain, Mohr's circle of strain, combined stress; Elastic theories of failure; Simple bending, shear; Torsion of circular and rectangular sections and simple members.

3. DESIGN OF STEEL STRUCTURES:

Principles of working stress method. Design of connections, simple members, Built-up sections and frames, Design of Industrial roofs. Principles of ultimate load design.

4. DESIGN OF CONCRETE AND MASONRY STRUCTURES:

Limit state design for bending, shear, axial compression and combined forces. Codal provisions for slabs, beams, walls and footings. Working stress method of design of R.C. members.

Principles of prestressed concrete design, materials, methods of prestressing, losses. Design of simple members and determinate structures.

5. CONSTRUCTION PRACTICES, PLANNING AND MANAGEMENT:

Concreting Equipment: Weight Batcher, Mixer, vibrator, batching plant, concrete pump. Cranes, hoists, lifting equipment.

Earthwork Equipment: Power shovel, hoe, dozer, dumper, trailers and tractor, rollers, sheep foot rollers, pumps.

Construction, Planning and Management: Bar chart, linked bar chart, workbreak down structures, Activity - on - arrow diagrams. Critical path, probabilistic activity durations; Event-based networks.

CIVIL ENGINEERING

PAPER – II

Total Marks – 200

Duration of Examination – 2 Hours

1.(a) FLUID MECHANICS, OPEN CHANNEL FLOW, PIPE FLOW:

Fluid Properties, Pressure, Thrust, Buoyancy; Flow Kinematics; Integration of flow equations; Flow measurement; Relative motion; Moment of momentum; Viscosity, Boundary layer and Control, Drag, Lift; dimensional Analysis, Modeling; Cavitation; Flow oscillations; Momentum and Energy principles in Open channel flow, Flow controls, Hydraulic jump, Flow sections and properties; Normal flow, Gradually varied flow; Surges; Flow development and losses in pipe flows, Measurements; Siphons; Surges and Water hammer.

(b)HYDRAULIC MACHINES AND HYDROPOWER:
Centrifugal pumps, types, performance parameters, scaling, pumps in parallel; Reciprocating pumps, air vessels, performance parameters; Hydraulic ram; Hydraulic turbines, types, performance parameters, controls, choice; Power house, classification and layout, storage, pondage, control of supply.

2. (a) HYDROLOGY :
Hydrological cycle, precipitation and related data analyses, PMP, unit and synthetic hydrographs; Evaporation and transpiration; Floods and their management, PMF; Streams and their gauging.

(b)WATER RESOURCES ENGINEERING :
Multipurpose uses of Water: Soil-Plant-Water relationships, irrigation systems, water demand assessment; Storages and their yields, ground water yield and well hydraulics; Water logging, drainage design; Irrigation revenue.

3. ENVIRONMENTAL ENGINEERING:

(a) WATER SUPPLY ENGINEERING : Sources of supply, yields, design of intakes and conductors; Estimation of demand; Water quality standards; Control of Water-borne diseases; Primary and secondary treatment, detailing and maintenance of treatment units; Conveyance and distribution systems of treated water, leakages and control; Rural water supply; Institutional and industrial water supply.

(b) WASTE WATER ENGINEERING: Urban rain water disposal; Systems of sewage collection and disposal; Design of sewers and sewerage systems; pumping; Characteristics of sewage and its treatment, Disposal of products of sewage treatment, stream flow . Plumbing Systems, Rural and semi-urban sanitation.

(c).SOLID WASTE MANAGEMENT: Sources, classification, collection and disposal; Design and Management of landfills.

4 (a) SOIL MECHANICS:
Properties of soils, classification and interrelationship; Compaction behaviour, methods of compaction and their choice; Permeability and seepage, flow nets, Inverted filters; Compressibility and consolidation; Shearing resistance, stresses and failure; soil testing in laboratory and in-situ; Stress path and applications; Earth pressure theories, stress distribution in soil; soil exploration, samplers, load tests, penetration tests.

(b).FOUNDATION ENGINEERING:

Types of foundations, Selection criteria, bearing capacity, settlement, laboratory and field tests; Types of piles and their design and layout, Foundations on expansive soils, swelling and its prevention, foundation on swelling soils.

5. (a) SURVEYING :

Classification of surveys, scales, accuracy; Measurement of distances - direct and indirect methods; optical and electronic devices; Measurement of directions, prismatic compass, local attraction; Theodolites - types; Measurement of elevations - Spirit and trigonometric leveling; Relief representation; Contours; Digital elevation modelling concept; Establishment of control by triangulations and traversing - measurements and adjustment of observations, computation of coordinates; Field astronomy, Concept of global positioning system.

(b).TRANSPORTATION ENGINEERING:

Planning of highway systems, alignment and geometric design, horizontal and vertical curves, grade separation; Materials and construction methods for different surfaces and maintenance: Principles of pavement design; Drainage.

MECHANICAL ENGINEERING
PAPER – I
Total Marks – 200
Duration of Examination – 2 Hours

1.STRENGTH OF MATERIALS:

Stress and strain in two dimensions, Principal stresses and strains, Mohr's construction, linear elastic materials, isotropy and anisotropy, stress-strain relations, uniaxial loading, thermal stresses. Beams : Bending moment and shear force diagram, bending stresses and deflection of beams. Shear stress distribution. Torsion of shafts, helical springs. Combined stresses, thick-and thin-walled pressure vessels. Struts and columns.

2. Fluid Mechanics:

Properties and classification of fluids, Manometer, forces on immersed surfaces, Center of pressure, Buoyancy, Elements of stability of floating bodies. Kinematics and Dynamics. Irrotational and incompressible. Inviscid flow. Velocity potential, Pressure field and Forces on immersed bodies. Bernoulli's equation, fully developed flow through pipes, Pressure drop calculations, Measurement of flow rate and Pressure drop. Integral approach, Laminar and tubulent flows, Separations. Flow over weirs and notches. Open channel flow, Hydraulic jump. Dimensionless numbers, Similitude and modelling.

3. THEORY OF MACHINES:

Cams. Gears and gear trains. Flywheels. Governors. Balancing of rigid rotors and field balancing. Balancing of single and multicylinder engines. Critical speeds and whirling of shafts Automatic controls.

4. MACHINE DESIGN:

Design of Joints: cotters, keys, splines, welded joints, threaded fasteners, joints formed by interference fits. Design of friction drives: couplings and clutches, belt and chain drives, power screws.

Design of Power transmission systems: gears and gear drives shaft and axle, wire ropes.

Design of bearings: hydrodynamics bearings and rolling element bearings.

5. FLUID MACHINERY AND STEAM GENERATORS:

Performance, Operation and control of hydraulic Pump, impulse and reaction Turbines, Specific speed, Classification. Energy transfer, Coupling, Power transmission, Steam generators, Fire-tube and water-tube boilers. Flow of steam through Nozzles and Diffusers, Wetness and condensation. Various types of steam and gas Turbines. Partial admission. Reciprocating, Centrifugal and axial flow Compressors, Multistage compression, role of Mach Number, Reheat, Regeneration, Efficiency, Governance.

MECHANICAL ENGINEERING

PAPER – II

Total Marks – 200

Duration of Examination – 2 Hours

1.THERMODYNAMICS:

Cycles and IC Engines, Basic concepts, Open and Closed systems.Heat and work. Zeroth, First and Second Law, Application to non-Flow and Flow processes. Entropy, Availability. Properties of ideal gases and vapours. Standard vapour, Gas power and Refrigeration cycles. Two stage compressor. C-I and S.I. Engines. Pre-ignition, Detonation and Diesel-knock, Fuel injection and Carburation, Supercharging. Turbo-prop and Rocket engines, Engine Cooling, Emission & Control. Measurement of Calorific values.

2. HEAT TRANSFER, REFRIGERATION AND AIRCONDITIONING:

Modes of heat transfer. One dimensional steady and unsteady conduction. Composite slab and Equivalent Resistance. Heat dissipation from extended surfaces, Heat exchangers, Overall heat transfer coefficient, Empirical correlations for heat transfer in laminar and turbulent flows and for free and forced Convection, Thermal boundary layer over a flat plate. Fundamentals of diffusive and connective mass transfer, Black body and basic concepts in Radiation, Enclosure theory, Shape factor.. Heat pump and Refrigeration cycles and systems, Refrigerants. Condensers, Evaporates and Expansion devices, Psychrometry, Charts and application to air conditioning, Sensible heating and cooling, Effective temperature, comfort indices, Load calculations, Solar refrigeration, controls, Duct design.

3. ENGINEERING MATERIALS:

Basic concepts on structure of solids. Crystalline materials. Detects in crystalline materials. Alloys and binary phase diagrams. Structure and properties of common engineering materials.

4. INDUSTRIAL ENGINEERING:

Production Planning and Control: Forecasting - Moving average, exponential smoothing, Operations, scheduling; assembly line balancing, Product development, Break-even analysis, Capacity planning, PERT and CPM. Control Operations: Inventory control ABC analysis, EOQ model, Materials requirement planning. Job design, Job standards, Work measurement

ELECTRICAL ENGINEERING

PAPER – I

Total Marks – 200

Duration of Examination – 2 Hours

1.EM THEORY:

Electric and magnetic fields. Gauss's Law and Amperes Law. Fields in dielectrics, conductors and magnetic materials. Time varying fields. Plane-Wave propagating in dielectric and conducting media. Transmission lines.

2. ELECTRICAL MATERIALS:

Conductors, Semi-conductors and Insulators. Super-conductivity. Insulators for electrical and electronic applications. Magnetic materials. Ferro and ferri magnetism. Ceramics, Properties and applications. Hall effect and its applications. Special semi conductors.

3. ELECTRICAL CIRCUITS

Circuits elements. Kirchoff's Laws. Mesh and nodal analysis. Network Theorems and applications. Natural response and forced response. Transient response and steady state response for arbitrary inputs. Properties of networks in terms of poles and zeros. Transfer function. Resonant circuits. Threephase circuits. Two-port networks. Elements of two-element network synthesis.

4. MEASUREMENTS AND INSTRUMENTATION

Units and Standards. Measurement of current, Voltage, power, Powerfactor and energy. Indicating instruments. Measurement of resistance, inductance, Capacitance and frequency. Bridge measurements. Electronic measuring instruments. Digital Voltmeter and frequency counter. Transducers and their applications to the measurement of non-electrical quantities like temperature, pressure, flow-rate displacement, acceleration, noise level etc. Data acquisition systems. A/D and D/A converters.

5. CONTROL SYSTEMS.

Block diagrams and signal flow graphs and their reduction. 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 and Nicols chart and the estimation of gain and phase margin. Basic concepts of compensator design. State variable matrix and its use in system modelling and design. Sampled data system and performance of such a system with the samples in the error channel. Stability of sampled data system. Elements of non-linear control analysis. Control system components, electromechanical, hydraulic, pneumatic components.

ELECTRICAL ENGINEERING
PAPER – II
Total Marks – 200
Duration of Examination – 2 Hours

1.ELECTRICAL MACHINES AND POWER TRANSFORMERS:

Magnetic Circuits . Construction and testing. Equivalent circuits. Losses and efficiency. Regulation. Auto-transformer, 3-phase transformer. Parallel operation.

Basic concepts in rotating machines. EMF, torque, basic machine types. Construction and operation, leakage losses and efficiency.

B.C. Machines. Construction, Excitation methods. Circuit models. Armature reaction and commutation. Generators and motors. Starting and speed control.Testing, Losses and efficiency.

Synchronous Machines. Construction. Circuit model. Operating characteristics.Synchronous reactance. Efficiency. Voltage regulation. Salient-pole machine, Parallel operation.Hunting. Short circuit transients.

Induction Machines. Construction. Principle of operation. Rotating fields. Characteristics and performance analysis. Determination of circuit model. Circle diagram. Starting and speed control. Fractional KW motors. Single-phase synchronous and induction motors.

2. POWER SYSTEMS

Types of Power Stations, Hydro, Thermal and Nuclear Stations. Pumped storage plants. Economics and operating factors. Power transmission lines. Modeling and performance characteristics. Voltage control. Load flow studies. Optimal power system operation. Load frequency control. Symmetrical Components. Per Unit representation. Fault analysis. Transient and steady-state stability of power systems. Equal area criterion. Power system Transients. Power system Protection Circuit breakers. Relays. HVDC transmission.

3. ANALOG AND DIGITAL ELECTRONICS AND CIRCUITS

Semiconductor device physics, PN junctions and transistors, circuit models and parameters, FET, Zener, tunnel, Schottky, photo diodes and their applications, rectifier circuits, voltage regulators and multipliers, switching behavior of diodes and transistors. Small signal amplifiers, biasing circuits, frequency response and improvement, multistage amplifiers and feed-back amplifiers, D.C. amplifiers, Oscillators. Large signal amplifiers, coupling methods, push pull amplifiers, operational amplifiers, wave shaping circuits. Multivibrators and flip-flops and their applications. Digital logic gate families, universal gatescombination circuits for arithmetic and logic operational, sequential logic circuits. Counters, registers, RAM and ROMs.

4. MICROPROCESSORS

Microprocessor architecture-Instruction set and simple assembly language programming. Interfacing for memory and I/O. Applications of Microprocessors in power system.

5. COMMUNICATION SYSTEMS

Types of modulation; AM, FM and PM. Demodulators. Noise and bandwidth considerations. Digital communication systems. Pulse code modulation and demodulation. Elements of sound and vision broadcasting. Carrier communication. Frequency division and time division multiplexing, Telemetry system in power engineering.

6. POWER ELECTRONICS

Power Semiconductor devices. Thyristor. Power transistor, GTOs and MOSFETS. Characteristics and operation. AC to DC Converters; 1- phase and 3-phase DC to DC Converters; AC regulators. Thyristor controlled reactors; switched capacitor networks. Inverters; single-phase and 3-phase. Pulse width modulation. Sinusoidal modulation with uniform sampling. Switched mode power supplies.

ELECTRONICS ENGINEERING
PAPER-I
Total Marks-200
Duration of Examination-2 Hours

1.Basic Electricity:

Electrostatics,Circuit fundamentles,Kirchhoffs Laws,Network theorems-Superpositition,Nortons,Thevenans,Maximum Power transfer theorem; AC fundamentals,Energy sources.

2.Electronics devices and circuits:

Semiconductor physics,The P-N junction,Semiconductor diode;The basic transistors,Transistor biasing techniques,Transistor characteristics,Load line & DC bias circuits,Field effect transistor,MOSFET circuit application,Transistor equivalent circuits & models of CB,CE & CC configuration.

Single stage amplifier-Class A,Class B,Class C,Class AB configuration,Multi stage amplifier,Feedback amplifier,Breakdown devices,Sinusoidal oscillators,Differential amplifier,Linear integrated circuit (Such as 555 timer,Phase locked loop).

Power Electronics-Silicon Control Rectifier,Thyristor,Triac,Diac,Single Phase AC to DC converter,DC to DC converter,Switching Mode Power Supply.

3.Digital Electronics & Microprocessors:

Fundamental concepts of Digital system.Logic families,Number system & codes,Logic gates,Karnaugh map representation of logical function,Simplification of logical function using Karnaugh map;Multiplexers & Demultiplexers and their usage in combinational logic design,Flip-flops;Counters,shift registers,A/D & D/A converters.

Microprocessor architecture and microcomputer systems: Assembly languages,machine language and Mnemonics codes,high-level language,instruction and timings,concept of instruction sets and programming exercises.

ELECTRONICS ENGINEERING
PAPER-II
Total Marks-200
Duration of Examination-2 Hours

1.Electrical Technology:

Three phases/Single phase supply,Star-Delta connections, Relation between phase & Line voltage, Power factor, All types of motors, Generator AC & DC,Transformer,starters,rectifiers,inverters,battery charger, servo and stepper motors,switchgear,relays,protection devices and schemes,sub-station,circuit breaker.

2.Communication:

Modulation & Demodulation technique-Principles & operation of AM,FM & PM;Pulse Modulation-TDM,PAM,PPM,PWM,PCM.

Microwave devices,wave-guides,microwave antennas,microwave communication system-block diagram and working principle of microwave communication link.

Elements of television system,composite video signal,television picture tube,television camera tubes,basic television broadcasting,television receiver,video detector,necessity of colour television,three-colour theory,PAL colour television system.

Importance of satellite communication,satellite frequency bank,satellite transponder,application of satellite communication.

Elements of an optical fibre transmission system,fibre types,web representation fibre fabrication technique,attenuation and absorption,losses in optical fibre communication,application of optical fibre.

3.Network,filters and transmission lines:

Two port network,attenuators,filters,transmission lines and their application,characteristic impedance of line,concept of voltage standing wave ratio on a transmission line,principles of impedance matching,bandwidth consideration of a transmission line.

4.Control System:

Basic elements of control system,open & closed loop system,Transfer function of simple control components,Time response of system,Stability analysis,Routh Hurwitz criterion,Nyquist criteria,Bode plot,Gain margin & phase margin,Root locus techniques.

5.Computer Engineering:

Computer and its working,Types of computers,Concept of file,Directory,Folder,Data representation,Programming,Elements of a high level programming language PASCAL/C.

SCHEDULE-IV
Syllabus for Grade V (B)
CIVIL ENGINEERING
PAPER – I
Total Marks – 200
Duration of Examination – 2 Hours

1.BUILDING MATERIALS & CONSTRUCTION:

BRICKS AND TILE
STONES, SAND
CEMENT
MORTAR
CONCRETE
TIMBER

METALS AND OTHER ENGINEERING MATERIALS
PAINTS AND VARNISHES
BUILDING CONSTRUCTION
CONSTRUCTION PLANNING AND STORAGE OF MATERIAL FOUNDATION

BRICKS AND STONE MASONRY
DAMP PROOFING
LINTEL AND ARCHES
ROOFS AND ROOF COVERINGS
DOORS AND WINDOWS
SCAFFOLDING
STAIR AND STAIRCASES
FLOORING
WALL FINISH

2. STRENGTH OF MATERIALS & THEORY OF STRUCTURE:

STRENGTH OF MATERIALS
BENDING MOMENT & SHARE FORCE IN BEAMS
BENDING STRESS IN BEAMS
SHEARING STRESSES IN BEAMS
COLUMNS & STRUTS
COMBINED BENDING & DIRECT STRESS
COMPOUND & COMPLEX STRESS
STRAIN ENERGY & IMPACT LOADING

THEORY OF STRUCTURES
DEFINITIONS & GENERAL PRINCIPLES
PRIMARY STRESS ANALYSIS FOR STATICALLY DETERMINATE PIN JOINTED STRUCTURES
FIXED & CONTINUOUS BEAMS, PROPPED CANTILEVER
MOMENT DISTRIBUTION METHOD
RETAINING WALLS (EARTH RETAINING STRUCTURES)

3. FOUNDATION ENGINEERING:

GENERAL CONSIDERATIONS FOR DESIGN OF FOUNDATIONS
TYPES OF FOUNDATION
BEARING CAPACITY OF SOILS SETTLEMENT OF FOUNDATION
PILE FOUNDATION
SOIL STABILISATION
SOIL EXPLORATION
STRESS DISTRIBUTION IN SOILS
EARTH PRESSURE

4. CONCRETE TECHNOLOGY:

MATERIALS FOR CEMENT CONCRETE
PREPARATION OF CONCRETE
CONCRETE MIX DESIGN
QUALITY CONTROL
SPECIAL CONCRETE
DETERIORATION AND RESTORATION OF CONCRETE

5. QUANTITY SURVEYING

DEFINITION OF AN ESTIMATE AND TYPES
SYMMETRICAL & UNSYMMETRICAL BOUNDARY WALL (USING MODULAR & TRADITIONAL BRICKS)
CENTRE LINE, LONG WALL & SHORT WALL METHOD WITH EXAMPLE
DEFINITION OF FLOOR AREA, CARPET AREA, PLINTH AREA, FAR
ESTIMATE OF DIFFERENT ITEMS OF WORKS INVOLVED IN A SINGLE STOREY RESIDENTIAL BUILDING
ESTIMATE OF R.C.C. BEAMS, CHUJIA, LINTEL AND SLAB (ONE WAY & TWO WAY REINFORCEMENT) SHOWING BAR BENDING SCHEDULE)
CALCULATION OF QUANTITY OF MATERIALS OF DIFFERENT ITEMS OF WORKS
CALCULATION OF VOLUME OF EARTH WORK OF DIFFERENT WORKS

QUANTITY & COST ESTIMATE
CONTRACTS
PWD ACCOUNTS
ARBITRATION
VALUATION

CIVIL ENGINEERING
PAPER – II
Total Marks – 200
Duration of Examination – 2 Hours

1.HYDRAULICS

NTRODUCTION
FLUID STATIC
FLUID FLOW
FLUID MEASUREMENT
FLOW THROUGH PIPES
OPEN CHANNEL FLOW

2. IRRIGATION

HYDROLOGY
WATER REQUIREMENT OF CROPS
CANAL IRRIGATION
WELL IRRIGATION
CANAL HEAD WORKS
FLOOD CONTROL
WATER LOGGING
LAND RECLAMATION MAJOR IRRIGATION PROJECTS IN INDIA

3. ENVIRONMENTAL ENGINEERING

AIR POLLUTION
AIR POLLUTION CONTROL MEASURES & EQUIPMENT
METHODS & APPROACH OF AIR POLLUTION CONTROL
DIFFERENT SOURCES OF WATER POLLUTION WATER POLLUTION & ITS CONTROL SOLID WASTE DISPOSAL

4. SURVEYING

LINEAR MEASUREMENTS
CHAIN SURVEYING
COMPASS SURVEYING
LEVELLING
CONTOURING
THEODOLITE SURVEYING
EARTH WORK CALCULATION
PLANE TABLE SURVEYING
COMPUTATION OF AREAS
COMPUTATION OF VOLUME

5. TRANSPORTATION ENGINEERING

PROJECTS & PROFILES
PERMANENT WAY
TRACK GEOMETRICS
POINTS & CROSSINGS
STATIONS & YARDS
PERMANENT WAY MAINTENANCE
ROAD DRAINAGE
TRAFFIC ENGINEERING
HIGHWAY MAINTENANCE

MECHANICAL ENGINEERING
PAPER – I
Total Marks - 200
Duration of Examination – 2 Hours

1.ENVIRONMENTAL ENGINEERING:

AIR POLLUTION
ANALYSIS OF AIR POLLUTANTS
AIR POLLUTION CONTROL MEASURES & EQUIPMENT
METHODS & APPROACH OF AIR POLLUTION CONTROL

WATER&ENVIRONMENT
WATER SOURCES
DIFFERENT SOURCES OF WATER POLLUTION WATER POLLUTION & ITS CONTROL
NOISE & ENVIRONMENTAL MANAGEMENT SYSTEM
NOISE POLLUTION & CONTROL
ENVIRONMENTAL LEGISLATIONS, AUTHORITIES & SYSTEMS

2. MECHANICS OF MATERIALS

Stress and strain
Thin cylinder and spherical shells Deflections of beams
Torsion of solid and hollow circular shafts Springs
Riveted joints

3. MACHINE TOOL

GENERAL INTRODUCTION
METAL CUTTING
LATHE AND LATHE WORKS
DRILLING MACHINE

BORING MACHINE SHAPER & PLANNER
MILLING MACHINE
GRINDING MACHINE
4. FLUID MECHANICS
PHYSICAL PROPERTIES OF FLUIDS
FLUID STATICS
FLUID KINEMATICS
FLUID MEASUREMENTS
IMPACT OF JET
PUMPS
HYDRAULIC TURBINE

MECHANICAL ENGINEERING
PAPER – II
Total Marks – 200
Duration of Examination – 2 Hours

1.AUTOMOBILE ENGINEERING

CONSTRUCTIONAL FEATURES
FUEL SUPPLY SYSTEM
COOLING SYSTEM
LUBRICATION SYSTEM
INTAKE & EXHAUST SYSTEM
FUELS
COMBUSTION IN ENGINE
AUTOMOBILE EMISSION & ITS CONTROL

ELECTRICAL SYSTEM
CHASSIS & BODY
TRANSMISSION SYSTEM
GEAR BOX
PROPELLER SHAFT & FINAL DRIVE
SUSPENSION SYSTEM
STEERING SYSTEM
BRAKING SYSTEM
WHEEL & TYRE
GARAGE AND SERVICE STATION

2. NON CONVENTIONAL ENERGY SOURCES

SOLAR POWER PLANTS
SOLAR ENERGY
SOLAR RADIATION
WIND POWER PLANTS
WIND ENERGY
ENERGY FROM BIO-MASS

3. REFRIGERATION & AIR-CONDITIONING

AIR REFRIGERATION SYSTEM
VAPOUR COMPRESSION REFRIGERATION SYSTEM
VAPOUR ABSORPTION SYSTEM
REFRIGERANTS
REFRIGERATION COMPONENTS, CONTROL AND SAFETY DEVICES
APPLICATION OF REFRIGERATION

ELECTRICAL ENGINEERING

PAPER – I

Total Marks - 200

Duration of Examination – 2 Hours

1.POWER PLANT ENGINEERING

Conventional sources of Energy – Fossil fuels, Hydroelectric and nuclear.
Thermal Power Station:
Hydro-electric Power Stations:
Nuclear Power Plants:
Diesel Power Plant & Gas-turbine Plants:
Elementary idea about Major Electrical Equipments used in Power Stations:
Combined working of power plants
Control of Active and Re-active power-Load-frequency control
Performance of power stations and Economic considerations:

2. ELECTRICAL DESIGN & ESTIMATING

Design and Specification:
Design of an electrical installation of machines in a workshop (Maximum 4 machines)
[out of 4 machines at least 1 no. should be of 1-phase]
I.E. rules related to Power Sub-circuit.
Design of Electrical Machine:

Design of a 3-phase transformer up to 200 KVA: -
Estimation of a small residential complex.
Estimation of lighting scheme of a large Auditorium and Public Health Centre,
Estimation of electrical installation of machines (not more than four) in a workshop
Estimation for giving 3 – phase O.H. service connections to a residential building.

3. ELECTRICAL MACHINES

GENERAL INTRODUCTION OF ROTATING MACHINE
D.C Machines:
D.C. Generator
D.C. Motors:
TRANSFORMERS
1-phase Transformers:
Principles of 1-phase Autotransformer
Three-phase transformer
Alternator
3-Phase Induction Motor
Synchronous Motor:
Fractional H.P. Motors:

4. TRANSMISSION & DISTRIBUTION POWER

Transmission System
Constructional Features of Transmission & Distribution Lines
Mechanical Features of Overhead lines
Spacing of conductors, length of span, Relevant I.E. Rules
Electrical features of Overhead lines
Power Factor Improvement
Using Static condenser and Synchronous condenser – related problems
Distribution System
Sub-stations
Extra High Voltage DC System of Transmission

ELECTRICAL ENGINEERING

PAPER – II

Total Marks - 200

Duration of Examination – 2 Hours

1.BASIC ELECTRONICS

Passive & Active Circuit Elements
Familiarity with the following components: —
RESISTORS, FUSES, CAPACITORS, INDUCTOR,
Voltage source and current source
AC and DC signals, Transformer

RELAYS, SWITCHES, CABLES AND CONNECTORS ZENER DIODE
BIPOLAR TRANSISTOR
FIELD EFFECT TRANSISTOR
UNIJUNCTION TRANSISTOR
THYRISTOR
OPTOELECTRONICS
INTEGRATED CIRCUITS

2. ELECTRICAL MEASUREMENT & MEASURING INSTRUMENTS

Definition & brief explanations of:
Range, sensitivity, true & indicated value, Errors
(including limiting errors), Resolutions, Accuracy, Precision and instrument efficiency.
Classification of instruments:

Basic Requirements for measurements:
Different types of instruments:
voltmeter, ammeter, multimeter, energy-meter.
Multi-range ammeter and voltmeter
Methods of measuring diff. Electrical quantities:
1-phase Induction type energy meter.
Errors adjustments
Phantom loading
Testing of energy meters.
lassifications of resistances
Description of Meggar.
Measurement of capacitance:
Magnetic measurements:
Instrument Transformers:
CT
PT or VT
Diff. Types of faults

3. CIRCUIT THEORY

NETWORKS & A.C. FUNDAMENTALS
Single-phase A.C. Circuits:
R-L-C Series Circuit:
Parallel Circuit:
RESONANCE & SELECTIVITY

SERIES RESONANCE:
PARALLEL RESONANCE:
TRANSIENTS (FOR ELECTRICAL ENGINEERING ONLY)
Steady State & Transient Response.
POLYPHASE CIRCUITS:
COUPLED CIRCUITS:
LAPLACE TRANSFORMATIONS:
FILTERS:
LAPLACE TRANSFORMATIONS

4. ELECTRICAL MEASUREMENT & CONTROL

Measurement of Power/Energy & Industrial Metering:
Digital energy-meter
Operation & Utility of Tri-vector meter.
Digital frequency meter
(i)Mech. Resonance type (ii) Electrical resonance type Frequency meter
Power manager.
Synchroscope:
Phase-sequence meter
Digital multimeter
C.R.O.—block diagram representation & operation, applications
Use of dual trace oscilloscope.
Function generator—
Frequency Counter—
Elements of Servomechanism:
Stepper Motor—

Measurement of Non-electrical quantities: Study of the following transducers:
Piezo-electric crystal.
Thermistor.
Strainguage.
Proximity switch.
Thermocouple.
LVDT.
Tachogenerator(a.c.& d.c.)
Capacitive transducers—
Seismic transducers.

CONTROL SYSTEM:

Brief descriptions with physical example (alongwith schematic diagram) of:
On-off controller.
Proportional controller.
Proportional plus derivative controller.
P+I controller.
P + D + I controller.

5. ELECTRICAL INSTALLATION, MAINTENANCE AND TESTING

General guidelines for Installation:
Loading & unloading of heavy electrical m/c:
Electrical Installation requirements:
Earthing Installation:
General requirement of electric installation according to I.E. Rules:
Motor generator set for battery charging and to supply various loads.
Synchronization of two alternators.
Maintenance of electrical installations
Insulation:
Troubleshooting:
Repair & Maintenance with Maintenance Schedule of:
D.C. machine
Transformer
Induction motor
Switchgear & Substation:
Relays
Brief account of maintenance of contactors.
Storage Batteries
OH lines and Cables:
Testing
Electric Safety Regulations:

ELECTRONICS ENGINEERING
PAPER-I
Total Marks-200
Duration of Examination-2 Hours

1.Basic Electricity:

Concept of potential deference;Concept of capacitance and capacitors;Ohm's Law,Power & energy,Kirchoff's Voltage,Current loss,concept of alternating voltage current;cells and Batteries;voltage & current sources;Thevenin's theorem.

2.Electronics devices and circuits:
Classification of materials into conductor,semi conductor,Insulator etc;Conventional representation of electrical & electronic circuit elements,Semi conductor theory,semiconductor diode,Bipolar junction transistor,Transistor biasing technique,Single Stage transistor amplifier,Multi stage transistor amplifier,Field effect transistor,MOSFET,UJT,Operational Amplifier,Oscillators,Regulated Power supply.

3.Digital Electronics:
Application & advantages of digital systems;Numbering system (Binary,Decimal,Hexadecimal);Logic gates,Simplification of logic circuits,Encoders,Decoders,Display devices;Multiplexers & Demultiplexers;Flip-flops;Counters,A/D & D/A converters.

ELECTRONICS ENGINEERING
PAPER-II
Total Marks-200
Duration of Examination-2 Hours

1.Electrical Technology:
Three phases/Single phase supply,Star-Delta connections,Relation between phase & Line voltage,Power factor,All types of motors,Generator AC & DC,Transformer.

2.Communication:
Modulation & Demodulation technique-Principles & operation of AM,FM & PM;pulse Molulation-TDM,PAM,PPM,PWM,PCM.

3.Network,Filters & Transmission Line:
Two port network,Filters,Transmission lines,Characteristic impedance of line,Concept of standing wave,Bandwidth consideration of a transmission line.

4.Control System:
Basic elements of control system,Open & closed loop system,Time response of system,Stability analysis ,Routh Hurwitz criterion,Root locus techniques.

5.Microprocessors & Computer:
Architecture of Microprocesors & Microcomputer systems;Brief idea of Assembly languages,Mchines & Mnemonic codes,Instruction format & addressing mode.
Programming concept in "C" language.

36.Substituted by the Tripura Power Engineering Service (5th Amendment) Rules,2007 w.e.f.15-10-2007.

Tripura Gazette, Part-1, December 31, 1988 A. D.

Government of Tripura
Public Works Department

Dated, Agartala the 16th Sept,1988.

No. F. 6(14)-PWD(E)/83

NOTIFICATION

In exercise of the Powers conferred by the provision to article-309 of the constitution of India, the Governor of Tripura, in consulation with the Tripura Public Service Commission, is pleased to make the following amendment in the Tripura Engineering Service Rules. 1987 & Tripura Power Engineering Service Rules, 1987 namely:-

1. Short title and Commencement
2. Amendment to the rules.

1. These rules may be called the Tripura Engineering Service Rules & Tripura Power Engineering Service Rules, 1987. (Fist amendment)
2. They shall come into force on and from the date of this notification.
For the item No.6 (E) (i) shall be Substituted, namely:-
Qualification for direct recruitment.
Degree in the appropriate branch of Engineering of a Recognised University or equivalent.Desireable:-
Knowledge in Bengali.

By order of the Governor,
N.K. Sinha
Secretary PWD.

Tripura Gazette, Part-I, September 15, 1990 A.D.

GOVERNMENT OF TRIPURA
DEPARTMENT OF POWER
TRIPURA, AGARTALA.

No F. 6(10)-CEE/87/12905-24 Dated, Agartala, the 12th June, 1990.

NOTIFICATION

In exercise of the powers conferred by proviso to article 309 of the constitution of the India and all on power enabling him in this behalf, the Governor, in consultation with the Tripura Public Service commission here-by makes the following rules further to amend the Tripura Power Engineering Service Rules, 1987, namely:-

Short title and commencement.

1. (i) These rules may be called the Tripura Power Engineering Service (2nd Amendment) Rules, 1987 (ii) They shall come into force from the date of Publication in the Official Gazette.

Amendment of Rule-3.

2. In the Rule 3 of part-II, Gradation of Tripura Power Engineering Service for the existing Grade-V, the following shall be substituted namely:- Grade: V posts of (i) Jr. Engineer (Elect.). Gr. I & (II) Jr. Engineer (Elect.) Gr. II

Amendment of Rule-6

3(a) In Rule 6 part IV of the Tripura Power Engineering Service Rules (here in after referred to as the Principle Rules) for the existing clause (E) The following shall be substituted, namely:- (i) 48% of the vacancies in the grade of Assistant Engineer will be filled up by promotion from amongst the Jr. Engineers Gr. I (Diploma holders).

(ii) 40% of the vacancies in the grade of Asstt. Engineer will be filled up by promotion from amongst the Junior Engineers Gr. I (Degree holders).

(iii) 12% of the vacancies in the grade of Asstt. Engineer will be filled up by promotion from amongst the Jr. Engineers Gr. I (Degree holders) through Departmental competitive examination on Engineering Subjects of appropriate branches to be conducted through Tripura Public Service Commission.

(iv) Separate Seniority list shall be maintained for Junior Engineers (Diploma holders) and Jr. Engineer (Degree holders).

(v) A Degree holder Jr. Engineer will be eligible for promotion to the grade of Asstt. Engineer after a minimum service of one year and a Diploma holder Jr. Engineer will be eligible for promotion to the grade of Asstt. Engineer after a minimum service of 5 years as Jr. Engineer.

NOTE: For eligibility of promotion to the grade of Asstt. Engineer, Jr. Engineer should have passed the Departmental examination prescribed for them.

4. In Rule of part IV of the Tripura Power Engineering Service Rules, (here in after referred to as the principle Rules) for the existing clause (F) & (G) following shall be substituted namely:-

(i) Both Degree holders and Diploma holders will be recruited initially as Jr. Engineers. Recruitment shall be made 100% by direct recruitment through Tripura Public Service Commission.

(ii) Vacancies of Jr. Engineers (Degree holders) and (Diploma holders) Jr. Engineers will be combined.

(iii) Percentage of either Jr. Engineer (Degree holder) or Jr. Engineer (Diploma holder) will not at any point of recruitment be less then 40% of the total recruitment in the grade of Jr. Engineer.

(iv) A Degree holder in Engineering of the concerned branch will be recruited directly as Jr. Engineer, Gr. I.

(v) A Diploma holder in Engineering of the concerned branch will be initially recruited as Jr. Engineer, Gr. II, after completing 4 years of service, he /she shall be designated as Jr. Engineer, Gr. I.

(vi) No furture recruitment of persons who are neither diploma holder nor degree holder shall be made for the post of Jr. Engine

ABSORPTION IN THE GRADE JR. ENGINEER. GR-I.

(i) A Jr. Engineer Gr. II, who possesses, qualification of degree in Engineering of recognized University of Institution and already, in service under the Power Department on the date of Publication of these rules shall be absorbed in the grade of Jr. Engineer Gr. I.

(ii) A Jr. Engineer Gr. II, who possesses such a degree in Engineering or equivalent qualification who is already in service under the Government of Tripura in a Department other than Power Department shall be also absorbed provided he / she exercised on option with prior consent of his employer to come over to the cadre of Jr. Engineering Gr. I, within a period of six months from the date of publication of the rules.

(iii) A Jr. Engineer Gr. II of the Power Department who obtains such degree in Engineering or Equivalent qualification subsequent to the date of publication of the rules shall be absorbed in the Gr. of Jr. Engineer Gr. I from the date of publication of the results.

(iv) A Jr. Engineer Gr. II Serving in a Department other than the Power Department who obtains such a degree in engineering of equivalent qualification subsequent to the date of publication on the rules shall be absorved in the grade of Jr. Engineer Gr. I provided he exercised an option with the prior consent of his employer within 6(six) months from the date of publication of the results of the final examination for such degree in Engineering or Equivalent qualification.

(v) The date of publication of the results of the final examination for degree in Engineering or an equivalent qualification shall be taken in to consideration in determining the seniority in the grade of Jr. Engineer Gr. I, of a Jr. Engineer Grade II who obtains such a degree or qualification.

Age limit for direct recruits. Not below 18 years and not above 35yrs. On the first date of the month in which application are invited maximum age is relax able by 5(five) years, for ST/SC candidates and Government servants.

PART-VI SCALES OF PAY.

Amendment of Rule-10.

4 Rule 10 of the principal shall be substituted by the following:-

The scales of pay attached to the different grade(s) shall be as follows:-

Grade-I A) Rs. 4000-140-4700-150-5000/-

B) Rs. 3600-130-4900-150-5800/-plus special pay Rs.100/-P.M.

Grade-II Rs. 3600-130-4900-150-5800/-

Grade-III Rs.3200-95-3960-100-4760-105-5600/-

Grade-IV A) Rs. 3000-90-3720-95-4100-100-5000/-for promotees.

B) Rs.2100-75-2250-80-2490-85-3000-90-3720-95-4100-100-5000/-for direct recruit.

Grade-V A) Rs. 2000-4410/-

B) Rs.1450-3710/-
But may change as per Govt. orders from time to time .

Amendment of Schedule.

5. In the existing Schedule appended to the Principal Rules authorised strength of the service and the nature of the posts included in it are as follows:-

		No. of posts.
Grade-I		
(i) Chief Engineer(E)		1No.
(ii) Chief Engineer(P.P.)		1No.
(iii) Addl. Chief Engineer (Elect.)		3Nos.
(iv) Deputation /leave Reserve/training.		1No.
	Total	6 Nos.
Grade-II		
(i) Superintending Engineer (Elect)		4 Nos.
(ii) Deputation /leave Reserve/training.		1 No.
	Total	5 Nos.
Grade-III		
(i) Executive Engineer (Elect.)		I6 Nos.
(ii) E. O. to C. E. (Elect.)		1 No.
(iii) Executive Engineer (Civil)		2 Nos.
(iv) Deputation /leave Reserve/training.		6 Nos.
	Total	25 Nos.
Grade-IV		
(i) Assistant Engineer (Elect.)		58 Nos.
(ii) T. A. to S.E. (Elect.)		2 Nos.
(iii) Asstt. Engineer (Electronics)		1 No.
(iv) Assistant Engineer (Civil)		7 Nos.
(v) Assistant Engineer (Mech.)		3 Nos.
(vi) Jr. Engineer (Elect.) post upgraded as A. E.(Elect.)		58 Nos.
(vii) Deputation /leave Reserve/training.		21 Nos.
	Total	150 Nos.
Grade-V		
(i) Jr. Engineer (Elect.)		188 Nos.
(ii) Jr. Engineer (Civil)		30 Nos.
(iii) Jr. Engineer (Electronics)		3 Nos.
(iv) Jr. Engineer (Mech.)		17 Nos.
	Total	238 Nos.
10T%_Deputation		
10% Leave Reserve		72 Nos.
10% Training	Total	310 Nos.

N. K. SINHA
SECRETARY (POWER)
GOVERNMENT OF TRIPURA.

Government of Tripura
Department of Power
Tripura : Agartala.

No. F. 6(10)-CEE/87/356-74 Dated, Agartala, the 26th February, 2001.

NOTIFICATION

In exercise of the powers conferred by the proviso to Article 309 of the Constitution of India, the Governor in consultation with the Tripura Public Service Commission hereby makes the following rules to further amend the Tripura Power Engineering Service Rules, 1987, namely:-

Short title and Commencement

1. i.) These rules may be called the Tripura Power Engineering Service (3rd Amendment) Rules, 1987

ii.) They shall come into force from the date of publication in the Official Gazette.

Amendment Rule-27, Part-XX.

2. i.) In the Rule-27 of Part-XX of the Tripura Power Engineering Service Rules (here-in-after referred to as the Principle Rules) for the existing Rule the following shall be substituted, namely:-

ii) The posts of Assistant Engineer which was in the Group-B category was subsequently included in Group-A posts when the ROP Rules, 1988 was introduced. With this change in categorization from Group-B to Group-A the Departmental Promotion Committee for Grade-IV posts shall be made on the recommendation of a Selection Committee consisting of:

a) Chairman of TPSC	-Chairman
b) One of the available senior Secretaries of Tripura to be nominated by Chief Secretary	-Member
c) Secretary, Department of power	-Member
d) An Officer not below the rank of Director each from the Departments of Welfare for ST/SC	-Member

By order of the Governor.
M. R. Debnath
Deputy Secretary. (Power)
Government of Tripura.

Government of Tripura
Department of Power

No. F.6(10)-CEE/87/2775-81 Dated, Agartala, the 27th July, 2002.

NOTIFICATION

In exercise of the powers conferred by the proviso to Article 309 of the Constitution of India and all other powers enabling him in this behalf, the Governor, in consultation with the Tripura Public Service Commission, hereby makes the following Rules further to amend the Tripura Power Engineering Service Rules, 1987, namely:-

Short title & Commencement.

1. These Rules may be called the Tripura Power Engineering Service (4th Amendment) Rules, 2002.

2. They shall come into force from the date of publication in the Official Gazette.

Amendment of Rule 6

3. In part IV of "The Tripura Power Engineering Service Rules, 1987", for subclause (V) of Clause F of rule 6, the following subclause shall be substituted, namely:-

"A Diploma holder in Engineering of the concerned branch will be initially recruited as Junior Engineer, Grade-II. After completion of 8 years of service, he/she shall be designated as Junior Engineer,Grade-I."

By order of the Governor,
Ajai Srivastava
Commissioner-cum-Secretary to the
Government of Tripura.

No. 212.

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PART– I–Orders and Notifications by the Government of Tripura.
The High Court, Government Treasury etc.

GOVERNMENT OF TRIPURA
DEPARTMENT OF POWER

No.F. 2(25) /POWER / 2007/848-57 Dated, Agartala, the 5th, October, 2007

NOTIFICATION

In exercise of the powers conferred by Article 309 of the Constitution of India and all other powers enabling him in this behalf, the Governor, Tripura is pleased to make the following rules further to amend the Tripura Power Engineering Service Rules, 1987, namely –

1. **Short Title and Commencement**

(1) These rules may be called the **"Tripura Power Engineering Service (5th amendment) Rules, 2007".**

(2) They shall come into force on and from **the date of Notification.**

2. **Amendment of the heading of PART-I**

In the Tripura Power Engineering Service Rules, 1987 (hereinafter referred to as the "Principal Rules") for the heading **"Preamble and definitions"** the following shall be substituted, namely –

"GENERAL".

3. **Amendment of Rule-1**

For sub-rule (b) of rule-1 of the Principal Rules the following shall be substituted, namely –

"(b) These Rules shall apply to the members of the Engineering service of the Department of Power, Government of Tripura which presently consist of Electrical wing and other unit placed or as may be placed under it."

4. **Amendment of Rule-2**

(i) Sub-rule (a) of rule-2 of the Principal Rules shall be deleted.

(ii) Sub-rule (b) of rule-2 of the Principal rules shall be re-numbered as "(a)".

(iii) After re-numbering sub-rule (b) as sub-rule (a) of the Principal Rules the following shall be inserted, namely –

"(b) 'Duty post' means any post specified in the **First Schedule (Annexure – I)** appended to these rules and includes a temporary post carrying the same designation as any of the posts specified in the schedule and the scale of pay of which is identical to that attached to any Grade of the Service."

(vi) For (e) of rule-2 of the Principal Rules the following shall be substituted, namely –

"(e) "Member of the Service" means a person appointed in a substantive capacity to any Grade of the Service and includes a person appointed on probation."

(vii) Sub-rule (f) of rule-2 of the Principal Rules shall be deleted.

(viii) Sub-rule (h) of the Principal Rules shall be re-numbered as sub-rule "(f)".

(ix) In the renumbered sub-rule (f) of the Principal Rules, for the word "attached" the following shall be substituted, namely –

"appended"

5. Amendment of the heading of "PART-II"

For the heading "Gradation" in **PART-II** of the Principal rules the following shall be substituted, namely –

"CONSTITUTION OF THE SERVICE, ITS CLASSIFICATION AND AUTHORIZED STRENGTH"

6. Amendment of rule 3 and 4.

For rule-3 and 4 of the Principal Rules the following shall be substituted, namely–

"3. Constitution of the Service and its classification.

(1) There shall be constituted a State Civil Service to be known as the Tripura Power Engineering Service.

(2) The Service shall have the following seven Grades, namely -

(i) Grade-I (A) – Group-A, gazetted

(ii) Grade-I(B)– Group-A, gazetted

(iii) Grade-II – Group-A, gazetted

(iv) Grade-III – Group-A, gazetted

(v) Grade-IV – Group-A, gazetted

(vi) Grade-V(A) – Group-B, Non-gazetted; and

(vii) Grade-V(B) – Group–C, Non-gazetted.

4. Strength of the Service

(1) The authorized permanent strength of the service and the duty posts included therein shall be as specified in the **First Schedule (Annexure – I)** to these rules.

(2) The Government may, by order, create duty posts for such period as may be specified therein.

(3) Distribution of posts of Grade – V between Grade – V(A) and Grade – V(B)shall be 70:30.

(4) Distribution of posts between Degree holder and Diploma holder in Grade – V [Grade – V(A) and Grade – V(B) together] shall be 50:50".

7. Amendment of heading of PART-III

For the heading **"CONSTITUTION OF THE SERVICE"** in **PART-III** of the Principal Rules, the following shall be substituted, namely –

"METHODS OF RECRUITMENT"

8. Amendment of Rule-5

For Rule-5 of the Principal Rules the following shall be substituted, namely –

"5. Appointment to the service shall be made by the following methods namely

(1) Direct recruitment

(a) 20% of the posts in the authorized permanent strength of Grade-IV of the Service shall be filled by **direct recruitment** from **candidates who have at least a degree in an appropriate branch of engineering from a recognized University or its equivalent academic qualification** and at

least 2 years' experience of service under the Government or a Government Undertaking or a registered Public Sector Unit in the manner as specified in PART-IV of these rules;

Provided that the candidates having a Post Graduate Degree in engineering shall be given preference.

(b) 71% of the posts in the authorized permanent strength of Grade-V(A) of the service shall be filled by direct recruitment from candidates **who have at least a degree in an appropriate branch of engineering from a recognized University or its equivalent academic qualification in the manner as specified in PART-IV of the these Rules.**

(c) All the posts in the authorized permanent strength of Grade-V(B) of the Service shall be filled by **direct recruitment only from candidates who have a Diploma in an appropriate branch of engineering or its equivalent academic qualification from a recognized institution** in the manner as specified in PART-IV of these rules.

(2) Recruitment by selection

The remaining substantive vacancies in the permanent strength of various Grades of the Service shall be filled by selection in the manner as specified in PART-V of these rules;

Provided that —

(a) 70% of the posts in Grade-III of the service shall be filled by Degree holder engineers and the remaining 30% by Diploma holder engineers;

(b) 40% of the posts in Grade-IV of the service shall be filled by Degree holder engineers of Grade-V(A) and the remaining 40% of the posts in Grade-IV of the service shall be filled by Diploma holder engineers of Grade-V(A).

(c) 29% of the posts in Grade-V(A) of the service shall be filled by Diploma-holder engineers of Grade-V(B)."

9. Amendment of the heading of PART-IV

For the heading "Method of Recruitment" in PART-IV of the Principal Rules, the following shall be substituted, namely –

"DIRECT RECRUITMENT"

10. Amendment of Rule-6

For Rule-6 of the Principal Rule, the following shall be substituted, namely –

"6. Selection to be made by the Commission

Selection of candidates for direct recruitment to the Service shall be made by the Commission.

7. Competitive Examination

A competitive examination for direct recruitment to the service shall be held at such intervals in the manner laid down in the **Second schedule (Annexure – II)** to these rules to be conducted by the Commission from time to time. The dates on which and the place at which the examination shall be held shall be fixed by the Commission.

8. Admission to competitive examination

The qualification for admission to the examination and the conduct thereof shall be in accordance with such regulations as the Government may, from time to time, issue in this behalf in consultation with the Commission.

9. Decision of the Commission to be final

The decision of the Commission as to the eligibility or otherwise of a candidate for admission to the examination shall be final and no candidate to whom a certificate of admission has not been issued by the Commission shall be admitted to the examination.

10. Commission to forward a list in order of merit

The Commission shall forward to the Government a list arranged in order of merit of the candidates who have qualified by such standard as the Commission may determine and of the candidates belonging to the Scheduled Castes and the Scheduled Tribes who, though not qualified by that standard, are declared by the Commission to be suitable for appointment to the Service with due regard to the maintenance of efficiency in administration.

11. Inclusion in the list not to confer right to appointment

The inclusion of a candidate's name in the list referred to in rule-10 above confers no right to appointment unless the Government is satisfied, after such inquiry as it may consider necessary, that the candidate is suitable in all respects for appointment to the Service and an actual offer of appointment is made.

12. Physical fitness

No candidate shall be appointed to the Service unless he is declared, after such medical examination as the Government may prescribe, to be in good mental and bodily health and free from such mental or physical defect which is likely to interfere with the discharge of the duties of the Service.

13. Appointment of candidates included in the list

Subject to the provision of these rules the candidates will be considered for appointment to the available vacancies in the order in which their names appear in the list referred to in rule –10 above."

11. Amendment of the heading of PART-V

For the heading "Probation" in Part-V of the Principal Rules, the following shall be substituted, namely –

"RECRUITMENT BY SELECTION"

12. Amendment of Rule-7

For Rule-7 of the Principal Rules, the following shall be substituted, namely –

"14. Constitution of Selection Committees

(1) Recruitment to Grade –I(A), Grade-I(B), Grade-II, Grade-III and Grade –IV of the Service under sub-rule (2) of rule-5, shall be made on recommendation of a Selection Committee (hereinafter referred to as the Committee) consisting of :-

(i)	Chairman of the Commission	-	Chairman,
(ii)	One senior Secretary to the Government to be nominated by the Chief Secretary	-	Member,
(iii)	Secretary, Power Department	-	Member,
(iv)	Secretary, Tribal Welfare Department	-	Member,
(v)	Secretary, SC, OBC & Minority Welfare Department.	-	Member

(2) Recruitment to Grade-V(A) of the Service under sub-rule(2) of rule-5 shall be made on recommendation of a Selection Committee consisting of :-

(i) The Secretary, Power Department - Member,

(ii) The Secretary, Tribal Welfare Department, - Member

(iii) The Secretary, SC, OBC & Minority Welfare Department. - Member.

(3) The Senior-most Secretary shall preside over the meeting of the Selection Committee constituted under sub-rule (2) above.

15. Conditions of eligibility for selection

Other than direct recruitment posts, all substantive posts in various Grades of the service shall be filled by selection from officers as shown below:-

(1) **Grade-I(A) posts** shall be filled :-

(i) by officers who hold Grade-I(B) posts and have rendered not less than one year's regular service in the Grade; and

(ii) failing that, by officers who hold Grade-I(B) posts and have rendered not less than 5 years' regular service both in Grade-I(B) and Grade-II taken together; and

(iii) failing both, by officers who hold Grade-II post and have rendered not less than 5 years' regular service in the Grade.

(2) **Grade-I(B) posts** shall be filled by officers who hold Grade-II posts and have rendered not less than **4 years' regular service** in the Grade.

(3) **Grade-II posts** shall be filled by officers who hold Grade-III posts, have rendered not less than **7 years' regular service** in the Grade and have at least a degree in an appropriate branch of engineering from a recognized University or its equivalent academic qualification.

(4) **Grade-III posts** shall be filled in the manner as specified in sub-rule (2) of rule-5 by officers who hold **Grade-IV** posts and have rendered not less than **7 years' regular service** in the Grade;

(5) **Grade-IV posts** shall be filled in the manner as specified in sub-rule (2) of rule-5 by officers who hold Grade-V(A) posts and have rendered not less than **3 years' regular service** in the Grade; and

(6) **Grade-V(A)** posts shall be filled in the manner as specified in sub-rule (2) of rule-5 by officers who are Diploma holder engineers holding **Grade-V(B)** posts and have rendered not less than **4 years' regular service** in the Grade.

16. Procedure for selection

(1) The Committee constituted under sub-rule (1) and sub-rule-(2), as the case may be, of rule-14 shall consider from time to time, cases of those officers who are eligible **under rule -15** for promotion to a higher Grade and prepare a list of persons recommended taking into account the actual number of vacancies at the time of selection and those likely to occur during a year. The selection for inclusion in the list shall be based on merit and suitability in all respects for appointment to the Service with due regard to seniority.

Provided that where a person is considered for such appointment to a higher grade from a lower Grade, all persons senior to him in the lower feeder grade shall also be considered irrespective of whether or not they fulfill the requirement of the minimum period of regular service in the lower grade as provided in rule-15.

(2) The names of persons included in the list shall be arranged in the order of merit and be forwarded to the government.

17. Consultation with the Commission.

(1) The list prepared under sub-rule (2) of rule-16 shall be forwarded by the Government to the Commission along with the relevant records, where consultation with the Commission is necessary or where the Chairman of the Commission desires that a reference be made to the Commission.

(2) If the Commission considers it necessary to make any change in the list received from the Government, the Commission shall inform the Government of the changes proposed.

(3) The list shall finally be approved by the Government after taking into account the changes, if any, proposed by the Commission.

(4) The list thus finally approved shall ordinarily be in force until a fresh list is prepared for the purpose in accordance with these rules.

18. **Appointment to the Service.**

Appointment to the Service shall be made in the order of merit as shown in the list referred to in sub-rule (3) of rule 17."

13. **Amendment of Rule 8 & 9**

Rule 8 and 9 of the Principal Rules shall be deleted.

14. **Amendment of the heading of PART-VI**

For the heading "Scales of Pay" in PART-VI of the Principal Rules, the following shall be substituted, namely–

"ELIGIBILITY FOR DIRECT RECRUITMENT"

15. **Amendment of Rule-10**

For Rule-10 of the Principal Rules, the following shall be substituted, namely –

"19. Candidates for direct recruitment to the Service must fulfill the following conditions: -

(1) **Common eligibility conditions**

For direct recruitment to any Grade of the Service a candidate:-

(i) must be a citizen of India; and

(ii) must not be less than 18 and more than 37 years of age;

Provided that the Scheduled Caste, Scheduled Tribe and physically handicapped category of candidates and the Government servants shall get an upper age relaxation of 5 (five) years.

Provided further that the Government servants of Scheduled Caste, Scheduled Tribe and physically handicapped category shall not get the upper age relaxation of 5 years over and above the upper age relaxation 5 years admissible to them as Scheduled castes, Scheduled Tribes and Physically Handicapped.

(2) **Educational qualification**

(a) For direct recruitment **to Grade-IV and Grade-V(A)** of the Service a candidate must have at least a degree in an appropriate branch of engineering from a recognized University or its equivalent academic qualification.

(b) For direct recruitment to Grade-V(B) of the service a candidate must have a Diploma in an appropriate branch of engineering or its equivalent academic qualification from a recognized Institution."

16. Amendment of the heading of PART-VII

For the heading "Pay & Allowances" in PART-VII of the Principal Rules, the following shall be substituted, namely –

"APPOINTMENT, PROBATION, TRAINING AND CONFIRMATION"

17. Amendment of Rule-11

For Rule-11 of the Principal Rules, the following shall be substituted, namely –

"**20. Appointment:**

All appointments to the Service shall be made to the Grade and not against any specific post included in the Service.

21. Disqualification:

(a) No person who has more than one spouse living or who, having a spouse living, marries in any case in which such marriage is void by reason of its taking place during the life time of such spouse, shall be eligible for appointment to the service, and;

(b) No woman whose marriage is void by reason of the husband having a wife living at the time of such marriage or who has married a person who has a wife living at the time of such marriage, shall be eligible for appointment to the service.

Provided that the State Government may, if satisfied that there are special grounds for so ordering, exempt any person from the operation of this rule.

(c) No officer who has not passed a Departmental examination prescribed by the Government shall be eligible for selection to a higher Grade of the Service.

22. Special provision for Scheduled Castes and Scheduled Tribes

Appointment to every Grade of the Service made by direct recruitment or by selection or otherwise shall be subject to the laws in force in the State regarding

special representation of the Scheduled castes and Scheduled Tribes in the services under the State.

23. Period of Probation:-

(1) Every person appointed to Grade-IV under rule-5(1)(a), to Grade-V(A) under rule-5(1)(b) and to Grade-V(B) of the Service under rule-5(1)(c) shall be on probation for a period of two years.

(2) The State Government may in the case of any person extend the period of probation in consultation with the Commission.

(3) The Government may, in consultation with the Commission, discharge, at any time, a probationer from service without assigning any reason therefore.

(4) A person on probation who holds a lien on any permanent post under the Central or State Government may, if he so desires during the period of probation, has the option to be reverted to his parent Department or Government after giving such notices as may be prescribed by the Government.

24. Training and Departmental Examination:

(1) Every person appointed to the service under Rule-5 shall pass, during the period of probation, such Examination and complete successfully such training as may be prescribed.

(2) Every person appointed to the service under rule-5 shall pass such Departmental Examination as the Government may, from time to time, prescribe.

25. Confirmation in Service:

A person appointed to the service under Rule –5 may be confirmed in the Service on the basis of general assessment of his performance during the period of probation and his performance in the training and the examinations as provided in Rule-24."

18. Amendment of heading of PART-VIII

For the heading "Deputation" in PART-VIII of the Principal Rules, the following shall be substituted, namely –

"MISCELLANEOUS"

19. **Amendment of Rule-12**

For Rule-12 of the Principal Rules, the following shall be substituted, namely –

"26. **Posting of members of the Service**

Every member of the service shall, unless he is appointed to an ex-cadre post, or is otherwise not available for holding a duty post owing to the exigencies of service, be posted against a duty post under the Government.

27. **Deputation**

A member of the Service may, on deputation, be transferred to any post or be allowed deputation to any post outside the Service under the Central or State Government, any company or organization.

28. **Private practice**

No member of the service shall undertake private practice of any kind in any form or manner without previous permission of the competent authority.

29. Seniority –

The State Government shall prepare a list of members of the Service arranged in order of seniority as determined in the manner specified below:-

(i) Seniority of officers in each grade of the service shall be determined separately;

(ii) Seniority of Degree-holder engineers and Diploma-holder engineers shall be determined separately and not clubbed together;

(iii) In the case of persons appointed on the results of a competitive examination, under rule-5(1) or by selection under rule-5(2) seniority in the Service shall be determined by the order in which appointments are made to the Service.

Provided that-

(a) Persons recruited on the results of a competitive examination in any year shall be ranked inter se in the order of merit in which they are placed at the competitive examination on the result of which they are recruited, those recruited on the basis of an earlier examination being ranked senior to those recruited on the basis of later examination.

(b) The relative seniority inter se of persons recruited by selection shall be determined on the basis of the order in which their names are arranged in the list prepared under rule-16.

(iv) The relative seniority of direct recruits and of promotees shall be determined according to the rotation of vacancies filled in a recruitment year between the direct recruits and the promotees which shall be based on the quotas of vacancies reserved for direct recruitment and promotion under rule-5.

30. Pay and Allowances:

(1) The scales of pay attached to various grades of the service shall be as follows:

(i) Grade –I(A) – Rs. 14,150/ – 20,000/-

(ii) Grade-I(B) - Rs. 14,150/ – 20,000/-

(iii) Grade-II - Rs. 12,000/–18,400/-

(iv) Grade-III :- Rs. 11,000/–18,000/-

(v) Grade-IV :-

(a) For direct recruits at the entry stage - Rs. 10,000 – 15,100/-

(b) For promotees at the entry stage - Rs.10,000 –15,100/-

(vi) Grade-V(A) :-

(a) For Degree-holder direct recruits at the entry stage- - Rs. 7,450 - 13,000/-

(b) For Diploma holders promotees - Rs. 7,450 - 13,000/-

(c) For Degree holders after 8 years of service (under the Career Advancement Scheme) - Rs. 10,000 - 15,100/-

(vii) Grade-V(B) -

(a) For the direct recruits at the entry stage - Rs. 5,000 - 10,300/-

(b) After 8 year of service (under the Career Advancement Scheme) - Rs. 7,450 - 13,000/-

Provided that the Government may from time to time revise the scales of pay.

(2) Dearness and other allowances shall be paid to persons holding duty posts at such rates as may be determined by the Government from time to time.

(3) When a member of the Service gets, under the Career Advancement Scheme or any other scheme, the benefit of a higher scale of pay which is equal to the pay and allowances of a higher Grade of the Service, the member of the Service shall be entitled to the pay and allowances at the higher rate; but he shall not be entitled to the rank and status of that higher Grade or the duty posts included in that higher Grade.

31. Transitional arrangement:

Transitional arrangement for adjustment of existing members of the service, wherever found in excess, shall be considered in the following manner: -

(1) Degree holders found in excess in Grade – IV, if any, shall immediately be adjusted against both direct recruitment and promotion posts for Degree holders. These shall be adjusted finally as per amended rules hereby on availability of future vacancies.

(2) Diploma holders, found in excess in Grade – IV, if any, shall immediately be adjusted against the vacancies of the direct recruitment posts for Degree holders in Grade – IV, the same shall be adjusted finally as per amended rules hereby on availability of future vacancies.

(3) The Degree holders found in excess, in Grade – V(A), if any, shall immediately be adjusted against the vacancies in Grade – V(A) for Diploma holders and shall be adjusted finally as per amended rules hereby on availability of future vacancies.

(4) The Diploma holders found in excess, in Grade – V(A), if any, shall immediately be adjusted against the vacancies in Grade – V(B) for Diploma holders, and the same shall be adjusted finally as per amended rules hereby on availability of future vacancies.

32. Any occupied posts not possible to be adjusted in this service in accordance with the provisions of these rules as per transitional arrangement provided in rules – 31 may continue to be held by the officer(s) who are holding such posts before introduction of these amendments as if these amendments had not come into force.

33. Residuary matters:

In regard to matters not specifically covered by these rules or by regulations or orders issued thereunder or by special orders, the members of the Service shall be Governed by the rules, regulations and orders applicable to the officers of same status serving in connection with affairs of the State Government.

34. Interpretation:

If any question arises as to the interpretation of these rules, the same shall be decided by the Government."

20. Amendment of the heading of PART-IX

For the heading "Leave, Pension, etc." of PART-IX of the Principal Rules the following shall be substituted, namely –

"RELAXATION"

21. Amendment of Rule-13

For Rule –13 of the Principal Rules, the following shall be substituted, namely –

"35. Power to Relax :

Where the Government is of the opinion that it is necessary or expedient to do so, it may, by order, for reasons to be recorded in writing and, in consultation with Commission, relax any of the provisions of these rules with respect to any class or category of persons or posts."

22. Amendment of Part- X, XI, XII, XIV, XV, XVI, XVII, XVIII, XIX, XX, XXI and XXII.

PART- X, XI, XII, XIV, XV, XVI, XVII, XVIII, XIX, XX, XXI and XXII along with their heading in the Principal Rules shall be deleted.

23. Amendment of Rule –14,15, 16, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30 and 31

Rule –14, 15, 16, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30 and 31 of the Principal Rules shall be deleted.

24. **Amendment of the Schedule**

For the Schedule appended to the Principal Rules, the following shall be substituted, namely –

i. First Schedule – Annexure – I
ii. Second Schedule – Annexure – II

By order,

Sajal Das Gupta 5/x/07

(Sajal Das Gupta)
Under Secretary to the
Government of Tripura

Annexure - I

FIRST SCHEDULE

(See Rule-4)

TRIPURA POWER ENGINEERING SERVICE GRADE – I(A)

1. Chief Engineer (Electrical) – 1 no.
2. Chief Engineer (Power Project) – 1 no.

TOTAL = 2 NOS.

Degree Holder – 2 nos.

TRIPURA POWER ENGINEERING SERVICE GRADE – I(B)

1. Additional Chief Engineer (Electrical) & sole arbitrator – 3 nos.

Leave Reserve @ 30% - 1 no.

TOTAL = 4 NOS.

Degree Holder – 4 nos.

TRIPURA POWER ENGINEERING SERVICE GRADE – II

1. Superintending Engineering (Electrical) – 4 nos.

Leave Reserve @ 30% - 1 no.

TOTAL = 5 NOS.

Degree Holder – 5 nos.

TRIPURA POWER ENGINEERING SERVICE GRADE – III

1. Executive Engineer (Electrical) – 18 nos.
2. Engineering Officer to Chief Engineer (Electrical)- 1 no.

TOTAL = 19 nos.

Leave Reserve @ 30% - 6 nos.

TOTAL = 25 NOS.

Degree Holder – 18 nos.
Diploma Holder – 7 nos.

Executive Engineer (Civil) – 1 no.

Degree Holder – 1 no.

TRIPURA POWER ENGINEERING SERVICE GRADE – IV

Assistant Engineer (Electrical)	– 58 nos.
Technical Assistant to Superintending (Electrical)	– 2 nos.
Sub-total	– 60 Nos.
Leave Reserve @ 30%	- 18 nos.
Jr. Engineer (Elect.) post Upgraded as A.E. (Elect.)	- 58 nos.

TOTAL = 136 NOS.

Degree Holder – 28 nos. (Direct recruitment)
Degree Holder – 54 nos. (Promotion)
Diploma Holder – 54 nos. (Promotion)

Assistant Engineer (Electronics) – 1 no.
Degree Holder – 1 no. (Promotion)

Assistant Engineer (Civil) – 7 nos.
Leave Reserve @ 30% - 2 nos.
TOTAL = 9 NOS.

Degree Holder – 2 nos. (Direct recruitment)
Degree Holder – 3 nos. (Promotion)
Diploma Holder – 4 nos. (Promotion)

Assistant Engineer (Mechanical) – 3 nos.
Leave Reserve @ 30% - 1 no.
TOTAL = 4 NOS.
Degree Holder – 1 no. (Direct recruitment)
Degree Holder – 1 no. (Promotion)
Diploma Holder – 2 no. (Promotion)

TRIPURA POWER ENGINEERING SERVICE GRADE – V

Junior Engineer (Electrical) – 188 nos.
Leave Reserve @ 30% - 56 nos.
TOTAL = 244 NOS.

Junior Engineer (Electrical) Gr.-V (A) – 171 nos.
Degree Holder Gr.-V (A) – 122 nos. (Direct recruitment)
Diploma Holder Gr.-V (A) – 49 nos. (Promotion)

Junior Engineer (Elect.) Gr. – V (B) – 73 nos.
Diploma Holder Gr. – V (B) – 73 nos. (Direct recruitment)

Junior Engineer (Civil) – 30 nos.
Leave Reserve @ 30% - 9 nos.
TOTAL = 39 NOS.

Junior Engineer (Civil) Gr.-V (A) – 27 nos.
Degree Holder Gr.-V (A) – 20 nos. (Direct recruitment)
Diploma Holder Gr.-V (A) – 7 nos. (Promotion)

Junior Engineer (Civil) Gr. – V (B) – 12 nos.
Diploma Holder Gr. – V (B) – 12 nos. (Direct recruitment)

Junior Engineer (Mechanical) – 17 nos.
Leave Reserve @ 30% - 5 nos.
TOTAL = 22 NOS.

Junior Engineer (Mechanical) Gr.-V (A) – 15 nos.
Degree Holder Gr.-V (A) – 11 nos. (Direct recruitment)
Diploma Holder Gr.-V (A) – 4 nos. (Promotion)

Junior Engineer (Mechanical) Gr. – V (B) – 7 nos.
Diploma Holder Gr. – V (B) – 7 nos. (Direct recruitment)

Junior Engineer (Electronics) – 3 nos.
Leave Reserve @ 30% - 1 no.
TOTAL = 4 nos.

Junior Engineer (Electronics) Gr.-V (A) – 3 nos.
Degree Holder Gr.-V (A) – 2 nos. (Direct recruitment)
Diploma Holder Gr.-V (A) – 1 no. (Promotion)

Junior Engineer (Electronics) Gr.–V(B)–1 no.
Diploma Holder Gr. – V (B) – 1 no. (Direct recruitment)

Total no. of posts in TPES – 497 nos.

Note: - 188 nos. supernumerary post (UR – 98 + SC – 32 + ST – 58) for Gr.–V(A) & V(B) has been created by Finance Department vide U.O. No. 1121 / Fin (G) / 07 dated 24.09.2007. In future when post in TPES becomes vacant in case of Gr. – V(A) & V(B) those postswill be adjusted against supernumerary post created and those supernumerary posts will stand abolished.

Annexure - II

SECOND SCHEDULE

(Rule-7)
COMPETITIVE EXAMINATION

1. Competitive examination for direct recruitment

(1) As provided in **Part –IV** of the Rules, selection of candidates for direct recruitment to the service shall be made by the Commission on the basis of a competitive examination to be conducted by it.

(2) Every year, ordinarily by April, the Public Works Department of the Government will send to the Commission a requisition for selection of candidates to fill vacancies against the direct recruitment quota of Grade – IV, Grade – V (A) or Grade –V(B) of the Tripura Engineering Service. Having regard to the number of vacancies mentioned in the requisition, the Commission shall conduct a competitive examination for direct recruitment to of the service in the manner as provided in **Part-IV** of these regulations. The Commission will complete the process of selection of the candidates through the examination ordinarily within a period of 6 (six) months and recommend to the Government a list of selected candidates.

(3) Before holding the examination, the Commission shall issue an advertisement notifying, inter alia, the vacancies with the break up of the posts earmarked for the unreserved and reserved category of candidates and inviting applications from the candidates willing to appear in the examination. The advertisement shall also indicate that the number of vacancies so notified may increase or decrease according to necessity.

(4) In case a communication is received by the Commission from the employer of a candidate withholding permission to appear at the examination, his application shall be rejected/ candidature shall be cancelled by the Commission;

Provided that a candidate who gets appointment to any post after submission of his application for admission to the examination must furnish forthwith evidence to show that his employer has no objection to his being selected for a post on the results of the examination.

2. Number of Chances shall allowed to a candidate

1) No candidate who does not belong to Scheduled Castes or Scheduled Tribes shall be permitted to compete more than 3 times in the examination.

2) A candidate shall be deemed to have competed in the examination, if he has actually appeared in any of the subjects/papers.

3. Admission Certificate

1) A candidate who has paid application fees as prescribed and fulfilled the terms of advertisement will receive an Admit Card and a time table for the examination. The admission will be deemed to be provisional subject to determination of his eligibility in all respects;

2) No candidate shall be admitted to the examination unless he holds an Admit Card. If at any stage after issue of the Admit Card, a candidate is found to be ineligible for admission in terms of the regulations of the examination; his candidature shall be cancelled without further reference to him.

4. Consequences of violation of rules, regulations, instructions etc.

A candidate who violates the rules, regulations and instructions issued by the Commission, Supervisor or Invigilator on duty in the Examination Hall, be liable to expulsion from the Examination Hall and/or other penalties as provided in the regulation of the commission.

5. Matters for which no specific provision has been made in the regulations shall be decided by the Commission.

PART-I

Nature and syllabus of the examination

6. The examination shall have the following two parts, namely –

(i) a written part carrying 500 marks ; and

(ii) an interview –cum- personality test carrying 50 marks.

7. Written part of the examination

(1) The written part of the examination shall consist of the following 3(three) compulsory subjects/papers:-

Subject/paper	Full marks	Duration of the examination
i) General Studies	100	1 hour
ii) two of the following papers a) Civil Engineering paper –I b) Civil Engineering paper – II	200 each paper	2 hours

c) Mechanical Engineering paper –I d) Mechanical Engineering paper –II e) Electrical Engineering paper –I f) Electrical Engineering Paper –II g) Electronics Engineering Paper – I h) Electronics Engineering Paper –II		

(2) As shown in the above table General Studies is compulsory for candidates of all Grades i.e. Grade-IV, Grade-V(A) and Grade-V(B) of the Service. Civil Engineering papers are compulsory for candidates who apply for posts in civil Engineering Branch, Mechanical Engineering papers are compulsory for candidates who apply for posts in Mechanical Engineering Branch, Electrical Engineering papers are compulsory for candidates who apply for posts in Electrical Engineering Branch and Electronics Engineering papers are compulsory for candidates who apply for posts in Electronics Engineering Branch.

(3) Detailed syllabus and group-wise break up of marks for each of the above-mentioned subjects/papers for Grade-IV, Grade-V(A) and Grade-V(B) have been given in **Schedule-I, Schedule-II, Schedule-III** and **Schedule–IV** respectively to these regulations.

(4) Qualifying marks for unreserved category shall be minimum40% in each subject and that of reserve category shall be minimum 30% each subject.

(5) In exception circumstances categories the Commission, at its discretion, shall fix the minimum qualifying marks for a paper and the minimum qualifying aggregate marks for all the papers otherwise;

Provided that in case a candidate fails to secure the qualifying marks, so fixed in any paper compulsory or optional, marks in that paper shall not be considered for calculating the aggregate.

(6) Questions in all the papers shall be answered only in English and in no other language.

8. Interview-cum-personality test

(1) The Commission shall conduct an Interview-cum-personality test of those candidates who have obtained qualifying marks in the written part of the examination. The

pattern of the Interview-cum-personality test shall be decided by the Commission in accordance with the requirement of the service and the post for which the examination is conducted.

(2) The personality test shall be to assess the personal qualities of a candidate e.g., his intellectual ability, social traits, interest in current affairs, critical power of judgment, variety and depth of interest, ability for leadership, moral integrity etc.

(3) In no case shall a candidate be called for personality test unless he appears in all the papers of the examination.

9. Final Selection and validity of the Select List

(1) Final selection shall be made in order of merit on the basis of the marks obtained by a candidate in aggregate in the written examination and the marks obtained by him in the personality test. If a candidate remains absent in the personality test, his candidature shall not be considered for final selection.

(2) The Select List recommended by the Commission shall remain valid for a period of 6 months from the date of recommendation and in no case for more than a period of one year, if so extended by the Government in consultation with the Commission.

SCHEDULE – I

GENERAL STUDIES (COMPULSORY FOR ALL GRAD BRANCHES) **TOTAL MARKS – 100**

Duration of examination – 1 hour

The break up of marks on various topics will be as follows:-

Topic	Marks
i) Comprehension of a given passage	20
ii) Usage (corrections)	10
iii) Vocabulary (synonyms & antonyms, idioms & phrases	10
iv) General knowledge (Questions will include knowledge of Indian and geography of such a nature which the candidates should be able to answer without any special study. Questions on Tripura, its historian topography will also be included.)	20
v) Current Affairs	20

(The questions will include knowledge of Indian current events and of such matters of every day observation and experience in their scientific aspects as may be expected of an educated person who has not made a special study of any scientific subject.)

vi) Mental Ability. 20

ENGINEERINGS SUBJECT PAPER – I & II

(OPTIONAL FOR ALL GRADES / BRANCHES)

TOTAL MARKS – 200(each paper)
Duration of examination – 2 hour
The break up of marks will be as follows:

Topic	Marks
i) 20 questions of 6 marks each	120
ii) 40 questions of 2 marks each	80

SCHEDULE-II

Syllabus for Grade IV
CIVIL ENGINEERING
PAPER - I

Total Marks – 200

Duration of Examination – 2 Hours

1. BUILDING MATERIALS

Timber : Different types and species of structural timber, density-moisture relationship, strength in different directions, defects, influence of defects on permissible stress, preservation, dry and wet rots, codal provisions for design, Plywood.

Bricks: Types, Indian Standard classification, absorption, saturation factor, strength in masonry, influence of mortar strength on masonry strength.

Cement: Compounds of, different types, setting times, strength.

Cement Mortar: Ingredients, proportions, water demand, mortars for plastering and masonry.

Concrete: Importance of W/C Ratio, Strength, ingredients including admixtures, workability, testing for strength, elasticity, non-destructive testing, mix design methods.

2. **SOLID MECHANICS**

Elastic constants, stress, plane stress, Mohr's circle of stress, strains, plane strain, Mohr's circle of strain, combined stress; Elastic theories of failure; Simple bending, shear; Torsion of circular and rectangular sections and simple members.

3. **DESIGN OF STEEL STRUCTURES**

Principles of working stress method. Design of connections, simple members, Built-up sections and frames, Design of Industrial roofs. Principles of ultimate load design. Design of simple members and frames.

4. **DESIGN OF CONCRETE AND MASONRY STRUCTURES**

Limit state design for bending, shear, axial compression and combined forces. Codal provisions for slabs, beams, walls and footings. Working stress method of design of R.C. members.

Principles of prestressed concrete design, materials, methods of prestressing, losses. Design of simple members and determinate structures. Introductions to prestressing of indeterminate structures.

Design of brick masonry as per I.S. Codes.

5. **CONSTRUCTION PRACTICES, PLANNING AND MANAGEMENT**

Concreting Equipment: Weight Batcher, Mixer, vibrator, batching plant, concrete pump. Cranes, hoists, lifting equipment.

Earthwork Equipment: Power shovel, hoe, dozer, dumper, trailers and tractor, rollers, sheep foot rollers, pumps.

Construction, Planning and Management: Bar chart, linked bar chart, work-break down structures, Activity-on - arrow diagrams. Critical path, probabilistic activity durations; Event-based networks.

PERT network: Time-cost study, crashing; Resource allocation.

CIVIL ENGINEERING
PAPER – II
Total Marks - 200

Duration of Examination – 2 Hours

1. (a) **FLUID MECHANICS, OPEN CHANNEL FLOW, PIPE FLOW:**

Fluid Properties, Pressure, Thrust, Buoyancy; Flow Kinematics; Integration of flow equations; Flow measurement; Relative motion; Moment of momentum; Viscosity, Boundary layer and Control, Drag, Lift; dimensional Analysis, Modeling; Cavitation; Flow oscillations; Momentum and Energy principles in Open channel flow, Flow controls, Hydraulic jump, Flow sections and properties; Normal flow, Gradually varied flow; Surges; Flow development and losses in pipe flows,

Measurements; Siphons; Surges and Water hammer; Delivery of Power Pipe networks.

(a) **HYDRAULIC MACHINES AND HYDROPOWER:**

Centrifugal pumps, types, performance parameters, scaling, pumps in parallel; Reciprocating pumps, air vessels, perform.ance parameters; Hydraulic ram;

Hydraulic turbines, types, performance parameters, controls, choice; Power house, classification and layout, storage, pondage, control of supply.

2. (a) **HYDROLOGY :**

Hydrological cycle, precipitation and related data analyses, PMP, unit and synthetic hydrographs; Evaporation and transpiration; Floods and their management, PMF; Streams and their gauging; River morphology; Routing of floods; Capacity of Reservoirs.

(b) **WATER RESOURCES ENGINEERING :**

Multipurpose uses of Water: Soil-Plant-Water relationships, irrigation systems, water demand assessment; Storages and their yields, ground water yield and well hydraulics; Water logging, drainage design; Irrigation revenue; Design of rigid boundary canals, lining of canals; Sediment transport in canals; Non-Overflow and overflow sections of gravity dams and their design, Energy dissipaters and tail water rating; Design of head works, distribution works, falls, cross-drainage works, outlets; River training.

3. **ENVIRONMENTAL ENGINEERING**

(a) **WATER SUPPLY ENGINEERING :**

Sources of supply, yields, design of intakes and conductors; Estimation of demand; Water quality standards; Control of Water-borne diseases; Primary and secondary treatment, detailing and maintenance of treatment units; Conveyance and distribution systems of treated water, leakages and control; Rural water supply; Institutional and industrial water supply.

(b) **WASTE WATER ENGINEERING:**

Urban rain water disposal; Systems of sewage collection and disposal; Design of sewers and sewerage systems; pumping; Characteristics of sewage and its treatment, Disposal of products of sewage treatment, stream flow . Plumbing Systems, Rural and semi-urban sanitation.

(c) **SOLID WASTE MANAGEMENT:**

Sources, classification, collection and disposal; Design and Management of landfills

4 (a) **SOIL MECHANICS:**

Properties of soils, classification and interrelationship; Compaction behavior, methods of compaction and their choice; Permeability and seepage, flow nets, Inverted filters; Compressibility and consolidation; Shearing resistance, stresses and

failure; soil testing in laboratory and in-situ; Stress path and applications; Earth pressure theories, stress distribution in soil; soil exploration, samplers, load tests, penetration tests.

(b) **FOUNDATION ENGINEERING:**

Types of foundations, Selection criteria, bearing capacity, settlement, laboratory and field tests; Types of piles and their design and layout, Foundations on expansive soils, swelling and its prevention, foundation on swelling soils.

5. (a) **SURVEYING :**

Classification of surveys, scales, accuracy; Measurement of distances - direct and indirect methods; optical and electronic devices; Measurement of directions, prismatic compass, local attraction; Theodolites - types; Measurement of elevations - Spirit and trigonometric leveling; Relief representation; Contours; Digital elevation modeling concept; Establishment of control by triangulations and traversing - measurements and adjustment of observations, computation of coordinates; Field astronomy, Concept of global positioning system; Map preparation by plane tabling and by photogrammetry; Remote sensing concepts, map substitutes.

(b) **TRANSPORTATION ENGINEERING:**

Planning of highway systems, alignment and geometric design, horizontal and vertical curves, grade separation; Materials and construction methods for different surfaces and maintenance: Principles of pavement design; Drainage.

Traffic surveys, Intersections, signaling: Mass transit systems, accessibility, networking.

MECHANICAL ENGINEERING
PAPER – I
Total Marks – 200

Duration of Examination – 2 Hours

1. **STRENGTH OF MATERIALS:**

Stress and strain in two dimensions, Principal stresses and strains, Mohr's construction, linear elastic materials, isotropy and anisotropy, stress-strain relations, uniaxial loading, thermal stresses. Beams: Bending moment and shear force diagram, bending stresses and deflection of beams. Shear stress distribution.

Torsion of shafts, helical springs. Combined stresses, thick-and thin-walled pressure vessels. Struts and columns. Strain energy concepts and theories of failure.

2. **FLUID MECHANICS:**

Properties and classification of fluids, Manometer, forces on immersed surfaces, Center of pressure, Buoyancy, Elements of stability of floating bodies. Kinematics and Dynamics. Irrotational and incompressible. Inviscid flow. Velocity potential, Pressure field and Forces on immersed bodies. Bernoulli's equation, fully developed flow through pipes, Pressure drop calculations, Measurement of flow rate and Pressure drop. Integral approach, Laminar and tubulent flows, Separations. Flow over weirs and notches. Open channel flow, Hydraulic jump. Dimensionless numbers, Similitude and modelling. One–dimensional isentropic flow, Normal shock wave, Flow through convergent - divergent ducts, Oblique shock-wave.

3. **THEORY OF MACHINES:**

Cams. Gears and gear trains. Flywheels. Governors. Balancing of rigid rotors and field balancing. Balancing of single and multicylinder engines. Critical speeds and whirling of shafts Automatic controls.

4. **MACHINE DESIGN :**

Design of Joints: Cotters, keys, Splines, Welded joints, Threaded fasteners, joints formed by interference fits. Design of friction drives: couplings and clutches, belt and chain drives, power screws.

Design of Power transmission Systems: gears and gear drives shaft and axle, wire ropes.

Design of Bearings: hydrodynamics bearings and rolling element bearings.

5. **FLUID MACHINERY AND STEAM GENERATORS:**

Performance, Operation and control of hydraulic Pump, impulse and reaction Turbines, Specific speed, Classification. Energy transfer, Coupling, Power transmission, Steam generators, Fire-tube and water-tube boilers. Flow of steam through Nozzles and Diffusers, Wetness and condensation. Various types of steam and gas Turbines. Partial admission. Reciprocating, Centrifugal and axial flow Compressors, Multistage compression, role of Mach Number, Reheat, Regeneration, Efficiency, Governance.

MECHANICAL ENGINEERING
PAPER – II
Total Marks –200
Duration of Examination – 2 Hours

1. **THERMODYNAMICS:**

Cycles and IC Engines, Basic concepts, Open and Closed systems. Heat and work. Zeroth, First and Second Law, Application to non-Flow and Flow processes. Entropy, Availability. Properties of ideal gases and vapours. Standard vapour, Gas power and Refrigeration cycles. Two stage compressor. C-I and S.I. Engines. Pre-

ignition, Detonation and Diesel-knock, Fuel injection and Carburetion, Supercharging. Turbo-prop and Rocket engines, Engine Cooling, Emission & Control. Measurement of Calorific values. Conventional and Nuclear fuels, Elements of Nuclear power production.

2. **HEAT TRANSFER, REFRIGERATION AND AIR-CONDITIONING:**

Modes of heat transfer. One dimensional steady and unsteady conduction. Composite slab and Equivalent Resistance. Heat dissipation from extended surfaces. Heat exchangers, Overall heat transfer coefficient, Empirical correlations for heat transfer in laminar and turbulent flows and for free and forced Convection, Thermal boundary layer over a flat plate. Fundamentals of diffusive and connective mass transfer, Black body and basic concepts in Radiation, Enclosure theory, Shape factor.. Heat pump and Refrigeration cycles and systems, Refrigerants. Condensers, Evaporates and Expansion devices, Psychrometry, Charts and application to air conditioning, Sensible heating and cooling, Effective temperature, comfort indices, Load calculations, Solar refrigeration, controls, Duct design.

3. **ENGINEERING MATERIALS:**

Basic concepts on structure of solids. Crystalline materials. Detects in crystalline materials. Alloys and binary phase diagrams. Structure and properties of common engineering materials. Heat treatment of steels. Plastics, Ceramics and composite materials. Common applications of various materials.

4. **INDUSTRIAL ENGINEERING:**

Production Planning and Control: Forecasting - Moving average, exponential smoothing, Operations, scheduling; assembly line balancing, Product development, Break-even analysis, Capacity planning, PERT and CPM.

Control Operations: Inventory control ABC analysis, EOQ model, Materials requirement planning. Job design, Job standards, Work measurement, Quality Management - Quality analysis and control.

Operations Research: Linear Programming - Graphical and Simplex methods, Transportation and assignment models.

Value Engineering: Value analysis for cost/value.

ELECTRICAL ENGINEERING

PAPER – I

Total Marks – 200

Duration of Examination – 2 Hours

1. **EM THEORY:**

Electric and magnetic fields. Gauss's Law and Amperes Law. Fields in dielectrics, conductors and magnetic materials. Time varying fields. Plane-Wave propagating in dielectric and conducting media. Transmission lines.

2. **ELECTRICAL MATERIALS:**

Conductors, Semi-conductors and Insulators. Super-conductivity. Insulators for electrical and electronic applications. Magnetic materials. Ferro and ferri magnetism. Ceramics, Properties and applications. Hall effect and its applications. Special semi conductors.

3. **ELECTRICAL CIRCUITS:**

Circuits elements. Kirchoff's Laws. Mesh and nodal analysis. Network Theorems and applications. Natural response and forced response. Transient response and steady state response for arbitrary inputs. Properties of networks in terms of poles and zeros. Transfer function. Resonant circuits. Threephase circuits. Two-port networks. Elements of two-element network synthesis.

4. **MEASUREMENTS AND INSTRUMENTATION:**

Units and Standards. Measurement of current, Voltage, power, Power-factor and energy. Indicating instruments. Measurement of resistance, inductance, Capacitance and frequency. Bridge measurements. Electronic measuring instruments. Digital Voltmeter and frequency counter. Transducers and their applications to the measurement of non-electrical quantities like temperature, pressure, flow-rate displacement, acceleration, noise level etc. Data acquisition systems. A/D and D/A converters.

5. **CONTROL SYSTEMS.**

Block diagrams and signal flow graphs and their reduction. 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 and Nicols chart and the estimation of gain and phase margin. Basic concepts of compensator design. State variable matrix and its use in system modelling and design. Sampled data system and performance of such a system with the samples in the error channel. Stability of sampled data system. Elements of non-linear control analysis. Control system components, electromechanical, hydraulic, pneumatic components.

ELECTRICAL ENGINEERING
PAPER – II
Total Marks - 200
Duration of Examination – 2 Hours

1. **ELECTRICAL MACHINES AND POWER TRANSFORMERS:**

Magnetic Circuits. Construction and testing. Equivalent circuits. Losses and efficiency. Regulation. Auto-transformer, 3-phase transformer. Parallel operation.

Basic concepts in rotating machines. EMF, torque, basic machine types. Construction and operation, leakage losses and efficiency.

B.C. Machines. Construction, Excitation methods. Circuit models. Armature reaction and commutation. Generators and motors. Starting and speed control. Testing, Losses and efficiency.

Synchronous Machines. Construction. Circuit model. Operating characteristics. Synchronous reactance. Efficiency. Voltage regulation. Salient-pole machine, Parallel operation. Hunting. Short circuit transients.

Induction Machines. Construction. Principle of operation. Rotating fields. Characteristics and performance analysis. Determination of circuit model. Circle diagram. Starting and speed control. Fractional KW motors. Single-phase synchronous and induction motors.

2. **POWER SYSTEMS:**

Types of Power Stations, Hydro, Thermal and Nuclear Stations. Pumped storage plants. Economics and operating factors. Power transmission lines. Modeling and performance characteristics. Voltage control. Load flow studies. Optimal power system operation. Load frequency control. Symmetrical Components. Per Unit representation. Fault analysis. Transient and steady-state stability of power systems. Equal area criterion. Power system Transients. Power system Protection Circuit breakers. Relays. HVDC transmission.

3. **ANALOG AND DIGITAL ELECTRONICS AND CIRCUITS:**

Semiconductor device physics, PN junctions and transistors, circuit models and parameters, FET, Zener, tunnel, Schottky, photo diodes and their applications, rectifier circuits, voltage regulators and multipliers, switching behavior of diodes and transistors. Small signal amplifiers, biasing circuits, frequency response and improvement, multistage amplifiers and feed-back amplifiers, D.C. amplifiers, Oscillators. Large signal amplifiers, coupling methods, push pull amplifiers, operational amplifiers, wave shaping circuits. Multivibrators and flip-flops and their applications. Digital logic gate families, universal gates-combination circuits for arithmetic and logic operational, sequential logic circuits. Counters, registers, RAM and ROMs.

4. **MICROPROCESSORS**

Microprocessor architecture-Instruction set and simple assembly language programming. Interfacing for memory and I/O. Applications of Micro-processors in power system.

5. **COMMUNICATION SYSTEMS**

Types of modulation; AM, FM and PM. Demodulators. Noise and bandwidth considerations. Digital communication systems. Pulse code modulation and demodulation. Elements of sound and vision broadcasting. Carrier communication. Frequency division and time division multiplexing, Telemetry system in power engineering.

6. POWER ELECTRONICS

Power Semiconductor devices. Thyristor. Power transistor, GTOs and MOSFETS. Characteristics and operation. AC to DC Converters; 1-phase and 3-phase DC to DC Converters; AC regulators. Thyristor controlled reactors; switched capacitor networks. Inverters; single-phase and 3-phase. Pulse width modulation. Sinusoidal modulation with uniform sampling. Switched mode power supplies.

ELECTRONICS ENGINEERING
PAPER - I
Total Marks – 200

Duration of Examination – 2 Hours

1. Electronics devices and circuits:

Semiconductor physics, The P – N junction; The basic transistors, Hybrid model & parameters of Transistors. Transistor biasing techniques, Transistor characteristics, Load line & DC bias circuits, operation of Field effect transistor, MOSFET, Zener diode.

Single stage amplifier – Class A, Class B, Class C, Class AB configuration, Multistage amplifier, Feedback amplifier, Push-pull amplifier, Sinusoidal oscillators, Differential amplifier, Linear integrated circuit (Such as 555 timer, Phase locked loop).

Power Electronics –Thyristor, Triac, Diac, Single phase AC to DC converter, DC to DC converter, Switching Mode Power Supply.

2. Measurement & instrumentation: -

Units & standards, Measurement of current, Voltage, Power; Measurement of resistance, inductance, capacitance; Digital voltmeter, Transducer & their application to the measurement of temperature, Pressure & acceleration, Data acquisition system.

3. Digital Electronics & Microprocessors:

Advantages of Digital system, Logic families, Number system & codes, Logic gates, Karnaugh map representation of logical function, Simplification of logical function using Karnaugh map; Multiplexers & Demultiplexers and their usage in combinational logic design, Flip-flops; Counters, shift registers, A / D & D / A converters.

Microprocessor architecture, Instruction set and Simple assembly language programming, Interrupts, Stack & subroutines, Application of Microprocessor.

4. EM Theory:
Analysis of Electrostatic & Magnetostatic fields, Gauss's Law and Amperes Law, Maxwell's equation, Fields in dielectrics, Conductors and magnetic materials, Plane-Wave propagation in dielectric and conducting media.

ELECTRONICS ENGINEERING
PAPER – II
Total Marks - 200
Duration of Examination – 2 Hours

1. **Electrical Technology:**

Three phases / Single phase supply, Star-Delta connections, Relation between Phase & Line voltage, Power factor, All types of motors, Generator AC & DC, Transformer, starters, rectifiers, inverters, battery charger, servo and stepper motors, switchgear, relays, protection devices and schemes, sub-station, circuit breaker, feeder & lightening protections, feeder & bus bar protection, Lightening arrestor, Earthing.

2. **Communication:**

Modulation & Demodulation technique – Principles & operation of AM, FM & PM; Pulse Modulation – TDM, PAM, PPM, PWM, PCM.

Operation of Power line carrier communication & its applicaton, Microwave Communication- Microwave devices, wave-guides, microwave antennas, microwave communication system – block diagram and working principle of microwave communication link.

Elements of television system, composite video signal, AGC & noise canceling circuit, Sync processing & AFC circuits, "S" correction, Essential of colour television, three-colour theory, Hue & saturation, Weighting factor, PAL colour television system.

Importance of satellite communication, satellite frequency band, Satellite Transponder Model, Satellite signal processing, FDMA,TDMA,CDMA technique, Propagation of signals at HF, VHF, UHF & Microwave frequency range.

Elements of an optical fibre transmission system, fibre types, web representation, fibre fabrication technique, Signal degradation in Optical fibre (Attenuation, Absorption, Losses & Signal distortion in optical Waveguide), Application of optical fibre.

3. **Network Theorem, filters and transmission lines:**

Two port network, Network theorem-Superposition, Thevenins, Norton & Maximum power transfer; attenuators, Filters, Transmission lines and their applications, characteristic impedance of line, concept of voltage standing wave ratio on a transmission line, principles of impedance matching, bandwidth consideration of a transmission line.

4. **Control System:**

Basic elements of control system, Open & closed loop system, Transfer function of simple control components, Time response of system, Stability analysis, Routh Hurwitz criterion, Nyquist criteria, Bode plot, Gain margin & Phase margin, Root locus techniques.

5. **Computer Engineering**:

Computer and its working, Types of computers, Concept of file, Directory, Folder, Data representation, Local area network, Communication Protocols standard – TCP / IP, X.25 Modem, Router, Switches, Programming, Elements of a high level programming language PASCAL / C.

SCHEDULE – III
Syllabus for Grade V (A)
CIVIL ENGINEERING
PAPER – I
Total Marks – 200
Duration of Examination – 2 Hours

1. BUILDING MATERIALS

Timber: Different types and species of structural timber, density-moisture relationship, strength in different directions, defects, influence of defects on permissible stress, preservation, dry and wet rots, codal provisions for design, Plywood.

Bricks: Types, Indian Standard classification, absorption, saturation factor, strength in masonry, influence of mortar strength on masonry strength.

Cement: Compounds of, different types, setting times, strength.

Cement Mortar: Ingredients, proportions, water demand, mortars for plastering and masonry.

Concrete: Importance of W/C Ratio, Strength, ingredients including admixtures, workability, testing for strength, elasticity, non-destructive testing, mix design methods

2. SOLID MECHANICS:

Elastic constants, stress, plane stress, Mohr's circle of stress, strains, plane strain, Mohr's circle of strain, combined stress; Elastic theories of failure; Simple bending, shear; Torsion of circular and rectangular sections and simple members.

3. DESIGN OF STEEL STRUCTURES:

Principles of working stress method. Design of connections, simple members, Built-up sections and frames, Design of Industrial roofs. Principles of ultimate load design.

4. DESIGN OF CONCRETE AND MASONRY STRUCTURES:

Limit state design for bending, shear, axial compression and combined forces. Codal provisions for slabs, beams, walls and footings. Working stress method of design of R.C. members.

Principles of prestressed concrete design, materials, methods of prestressing, losses. Design of simple members and determinate structures.

5. CONSTRUCTION PRACTICES, PLANNING AND MANAGEMENT:

Concreting Equipment: Weight Batcher, Mixer, vibrator, batching plant, concrete pump. Cranes, hoists, lifting equipment.

Earthwork Equipment: Power shovel, hoe, dozer, dumper, trailers and tractor, rollers, sheep foot rollers, pumps.

Construction, Planning and Management: Bar chart, linked bar chart, work-break down structures, Activity - on - arrow diagrams. Critical path, probabilistic activity durations; Event-based networks.

CIVIL ENGINEERING
PAPER – II
Total Marks – 200
Duration of Examination – 2 Hours

1. (a) FLUID MECHANICS, OPEN CHANNEL FLOW, PIPE FLOW:

Fluid Properties, Pressure, Thrust, Buoyancy; Flow Kinematics; Integration of flow equations; Flow measurement; Relative motion; Moment of momentum; Viscosity, Boundary layer and Control, Drag, Lift; dimensional Analysis, Modeling; Cavitation; Flow oscillations; Momentum and Energy principles in Open channel flow, Flow controls, Hydraulic jump, Flow sections and properties; Normal flow, Gradually varied flow; Surges; Flow development and losses in pipe flows, Measurements; Siphons; Surges and Water hammer.

(b) HYDRAULIC MACHINES AND HYDROPOWER:

Centrifugal pumps, types, performance parameters, scaling, pumps in parallel; Reciprocating pumps, air vessels, performance parameters; Hydraulic ram;

Hydraulic turbines, types, performance parameters, controls, choice; Power house, classification and layout, storage, pondage, control of supply.

2. (a) HYDROLOGY :

Hydrological cycle, precipitation and related data analyses, PMP, unit and synthetic hydrographs; Evaporation and transpiration; Floods and their management, PMF; Streams and their gauging.

(b) WATER RESOURCES ENGINEERING :

Multipurpose uses of Water: Soil-Plant-Water relationships, irrigation systems, water demand assessment; Storages and their yields, ground water yield and well hydraulics; Water logging, drainage design; Irrigation revenue.

3. ENVIRONMENTAL ENGINEERING

(a) WATER SUPPLY ENGINEERING :

Sources of supply, yields, design of intakes and conductors; Estimation of demand; Water quality standards; Control of Water-borne diseases; Primary and secondary treatment, detailing and maintenance of treatment units; Conveyance and distribution systems of treated water, leakages and control; Rural water supply; Institutional and industrial water supply.

(b) WASTE WATER ENGINEERING:

Urban rain water disposal; Systems of sewage collection and disposal; Design of sewers and sewerage systems; pumping; Characteristics of sewage and its treatment, Disposal of products of sewage treatment, stream flow . Plumbing Systems, Rural and semi-urban sanitation.

(c) SOLID WASTE MANAGEMENT:

Sources, classification, collection and disposal; Design and Management of landfills.

4 (a) SOIL MECHANICS:

Properties of soils, classification and interrelationship; Compaction behaviour, methods of compaction and their choice; Permeability and seepage, flow nets, Inverted filters; Compressibility and consolidation; Shearing resistance, stresses and failure; soil testing in laboratory and in-situ; Stress path and applications; Earth pressure theories, stress distribution in soil; soil exploration, samplers, load tests, penetration tests.

(b) FOUNDATION ENGINEERING:

Types of foundations, Selection criteria, bearing capacity, settlement, laboratory and field tests; Types of piles and their design and layout, Foundations on expansive soils, swelling and its prevention, foundation on swelling soils.

5. (a) SURVEYING :

Classification of surveys, scales, accuracy; Measurement of distances - direct and indirect methods; optical and electronic devices; Measurement of directions, prismatic compass, local attraction; Theodolites - types; Measurement of elevations - Spirit and trigonometric leveling; Relief representation; Contours; Digital elevation modelling concept; Establishment of control by triangulations and traversing - measurements and adjustment of observations, computation of coordinates; Field astronomy, Concept of global positioning system.

(b) TRANSPORTATION ENGINEERING:

Planning of highway systems, alignment and geometric design, horizontal and vertical curves, grade separation; Materials and construction methods for different surfaces and maintenance: Principles of pavement design; Drainage.

MECHANICAL ENGINEERING
PAPER – I
Total Marks – 200
Duration of Examination – 2 Hours

1. STRENGTH OF MATERIALS:

Stress and strain in two dimensions, Principal stresses and strains, Mohr's construction, linear elastic materials, isotropy and anisotropy, stress-strain relations, uniaxial loading, thermal stresses. Beams : Bending moment and shear force diagram, bending stresses and deflection of beams. Shear stress distribution. Torsion of shafts, helical springs. Combined stresses, thick-and thin-walled pressure vessels. Struts and columns.

2. FLUID MECHANICS:

Properties and classification of fluids, Manometer, forces on immersed surfaces, Center of pressure, Buoyancy, Elements of stability of floating bodies. Kinematics and Dynamics. Irrotational and incompressible. Inviscid flow. Velocity potential, Pressure field and Forces on immersed bodies. Bernoulli's equation, fully developed flow through pipes, Pressure drop calculations, Measurement of flow rate and Pressure drop. Integral approach, Laminar and tubulent flows, Separations. Flow over weirs and notches. Open channel flow, Hydraulic jump. Dimensionless numbers, Similitude and modelling.

3. THEORY OF MACHINES:

Cams. Gears and gear trains. Flywheels. Governors. Balancing of rigid rotors and field balancing. Balancing of single and multicylinder engines. Critical speeds and whirling of shafts Automatic controls.

4. MACHINE DESIGN:

Design of Joints: cotters, keys, splines, welded joints, threaded fasteners, joints formed by interference fits. Design of friction drives: couplings and clutches, belt and chain drives, power screws.

Design of Power transmission systems: gears and gear drives shaft and axle, wire ropes.

Design of bearings: hydrodynamics bearings and rolling element bearings.

5. FLUID MACHINERY AND STEAM GENERATORS:

Performance, Operation and control of hydraulic Pump, impulse and reaction Turbines, Specific speed, Classification. Energy transfer, Coupling, Power transmission, Steam generators, Fire-tube and water-tube boilers. Flow of steam through Nozzles and Diffusers, Wetness and condensation. Various types of steam and gas Turbines. Partial admission. Reciprocating, Centrifugal and axial flow Compressors, Multistage compression, role of Mach Number, Reheat, Regeneration, Efficiency, Governance.

MECHANICAL ENGINEERING
PAPER – II
Total Marks – 200
Duration of Examination – 2 Hours

1. THERMODYNAMICS:

Cycles and IC Engines, Basic concepts, Open and Closed systems.Heat and work. Zeroth, First and Second Law, Application to non-Flow and Flow processes. Entropy, Availability. Properties of ideal gases and vapours. Standard vapour, Gas power and Refrigeration cycles. Two stage compressor. C-I and S.I. Engines. Pre-ignition, Detonation and Diesel-knock, Fuel injection and Carburation, Supercharging. Turbo-prop and Rocket engines, Engine Cooling, Emission & Control. Measurement of Calorific values.

2. HEAT TRANSFER, REFRIGERATION AND AIRCONDITIONING:

Modes of heat transfer. One dimensional steady and unsteady conduction. Composite slab and Equivalent Resistance. Heat dissipation from extended surfaces, Heat exchangers, Overall heat transfer coefficient, Empirical correlations for heat transfer in laminar and turbulent flows and for free and forced Convection, Thermal boundary layer over a flat plate. Fundamentals of diffusive and connective mass transfer, Black body and basic concepts in Radiation, Enclosure theory, Shape factor.. Heat pump and Refrigeration cycles and systems, Refrigerants. Condensers, Evaporates and Expansion devices, Psychrometry, Charts and application to air conditioning, Sensible heating and cooling, Effective temperature, comfort indices, Load calculations, Solar refrigeration, controls, Duct design.

3. ENGINEERING MATERIALS:

Basic concepts on structure of solids. Crystalline materials. Detects in crystalline materials. Alloys and binary phase diagrams. Structure and properties of common engineering materials.

4. INDUSTRIAL ENGINEERING:

Production Planning and Control: Forecasting - Moving average, exponential smoothing, Operations, scheduling; assembly line balancing, Product development, Break-even analysis, Capacity planning, PERT and CPM. Control Operations: Inventory control ABC analysis, EOQ model, Materials requirement planning. Job design, Job standards, Work measurement.

ELECTRICAL ENGINEERING
PAPER – I
Total Marks – 200

Duration of Examination – 2 Hours

1. EM THEORY:

Electric and magnetic fields. Gauss's Law and Amperes Law. Fields in dielectrics, conductors and magnetic materials. Time varying fields. Plane-Wave propagating in dielectric and conducting media. Transmission lines.

2. ELECTRICAL MATERIALS:

Conductors, Semi-conductors and Insulators. Super-conductivity. Insulators for electrical and electronic applications. Magnetic materials. Ferro and ferri magnetism. Ceramics, Properties and applications. Hall effect and its applications. Special semi conductors.

3. ELECTRICAL CIRCUITS

Circuits elements. Kirchoff's Laws. Mesh and nodal analysis. Network Theorems and applications. Natural response and forced response. Transient response and steady state response for arbitrary inputs. Properties of networks in terms of poles and zeros. Transfer function. Resonant circuits. Threephase circuits. Two-port networks. Elements of two-element network synthesis.

4. MEASUREMENTS AND INSTRUMENTATION

Units and Standards. Measurement of current, Voltage, power, Power-factor and energy. Indicating instruments. Measurement of resistance, inductance, Capacitance and frequency. Bridge measurements. Electronic measuring instruments. Digital Voltmeter and frequency counter. Transducers and their applications to the measurement of non-electrical quantities like temperature, pressure, flow-rate displacement, acceleration, noise level etc. Data acquisition systems. A/D and D/A converters.

5. CONTROL SYSTEMS.

Block diagrams and signal flow graphs and their reduction. 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 and Nicols chart and the estimation of gain and phase margin. Basic concepts of compensator design. State variable matrix and its use in system modelling and design. Sampled data system and performance of such a system with the samples in the error channel. Stability of sampled data system. Elements of non-linear control analysis. Control system components, electromechanical, hydraulic, pneumatic components.

ELECTRICAL ENGINEERING
PAPER – II
Total Marks – 200
Duration of Examination – 2 Hours

1. ELECTRICAL MACHINES AND POWER TRANSFORMERS.

Magnetic Circuits. Construction and testing. Equivalent circuits. Losses and efficiency. Regulation. Auto-transformer, 3-phase transformer. Parallel operation.

Basic concepts in rotating machines. EMF, torque, basic machine types. Construction and operation, leakage losses and efficiency.

B.C. Machines. Construction, Excitation methods. Circuit models. Armature reaction and commutation. Generators and motors. Starting and speed control.Testing, Losses and efficiency.

Synchronous Machines. Construction. Circuit model. Operating characteristics.Synchronous reactance. Efficiency. Voltage regulation. Salient-pole machine, Parallel operation.Hunting. Short circuit transients.

Induction Machines. Construction. Principle of operation. Rotating fields. Characteristics and performance analysis. Determination of circuit model. Circle diagram. Starting and speed control. Fractional KW motors. Single-phase synchronous and induction motors.

2. POWER SYSTEMS

Types of Power Stations, Hydro, Thermal and Nuclear Stations. Pumped storage plants. Economics and operating factors. Power transmission lines. Modeling and performance characteristics. Voltage control. Load flow studies. Optimal power system operation. Load frequency control. Symmetrical Components. Per Unit representation. Fault analysis. Transient and steady-state stability of power systems. Equal area criterion. Power system Transients. Power system Protection Circuit breakers. Relays. HVDC transmission.

3. ANALOG AND DIGITAL ELECTRONICS AND CIRCUITS

Semiconductor device physics, PN junctions and transistors, circuit models and parameters, FET, Zener, tunnel, Schottky, photo diodes and their applications, rectifier circuits, voltage regulators and multipliers, switching behavior of diodes and transistors. Small signal amplifiers, biasing circuits, frequency response and improvement, multistage amplifiers and feed-back amplifiers, D.C. amplifiers, Oscillators. Large signal amplifiers, coupling methods, push pull amplifiers, operational amplifiers, wave shaping circuits. Multivibrators

and flip-flops and their applications. Digital logic gate families, universal gates-combination circuits for arithmetic and logic operational, sequential logic circuits. Counters, registers, RAM and ROMs.

4. MICROPROCESSORS

Microprocessor architecture-Instruction set and simple assembly language programming. Interfacing for memory and I/O. Applications of Micro-processors in power system.

5. COMMUNICATION SYSTEMS

Types of modulation; AM, FM and PM. Demodulators. Noise and bandwidth considerations. Digital communication systems. Pulse code modulation and demodulation. Elements of sound and vision broadcasting. Carrier communication. Frequency division and time division multiplexing, Telemetry system in power engineering.

6. POWER ELECTRONICS

Power Semiconductor devices. Thyristor. Power transistor, GTOs and MOSFETS. Characteristics and operation. AC to DC Converters; 1-phase and 3-phase DC to DC Converters; AC regulators. Thyristor controlled reactors; switched capacitor networks. Inverters; single-phase and 3-phase. Pulse width modulation. Sinusoidal modulation with uniform sampling. Switched mode power supplies.

ELECTRONICS ENGINEERING
PAPER – I
Total Marks – 200

Duration of Examination – 2 Hours

1. Basic Electricity:

Electrostatics, Circuit fundamentles, Kirchhoffs laws, Network theorems – Superposition, Nortons, Thevenans, Maximum power transfer theorem; AC fundamentals, Energy sources.

2. Electronics devices and circuits:

Semiconductor physics, The P – N junction, Semiconductor diode; The basic transistors, Transistor biasing techniques, Transistor characteristics, Load line & DC bias circuits, Field effect transistor, MOSFET circuit application, Transistor equivalent circuits & models of CB, CE & CC configuration

Single stage amplifier – Class A, Class B, Class C, Class AB configuration, Multistage amplifier, Feedback amplifier, Breakdown devices, Sinusoidal oscillators, Differential amplifier, Linear integrated circuit (Such as 555 timer, Phase locked loop).

Power Electronics – Silicon Control Rectifier, Thyristor, Triac, Diac, Single phase AC to DC converter, DC to DC converter, Switching Mode Power Supply.

3. Digital Electronics & Microprocessors:

Fundamental concepts of Digital system, Logic families, Number system & codes, Logic gates, Karnaugh map representation of logical function, Simplification of logical function using Karnaugh map; Multiplexers & Demultiplexers and their usage in combinational logic design, Flip-flops; Counters, shift registers, A / D & D / A converters.
Microprocessor architecture and microcomputer systems: Assembly languages, machine language and Mnemonics codes, high-level language, instruction and timings, concept of instruction sets and programming exercises.

ELECTRONICS ENGINEERING
PAPER – II
Total Marks – 200

Duration of Examination – 2 Hours

1. **Electrical Technology:**

Three phases / Single phase supply, Star-Delta connections, Relation between Phase & Line voltage, Power factor, All types of motors, Generator AC & DC, Transformer, starters, rectifiers, inverters, battery charger, servo and stepper motors, switchgear, relays, protection devices and schemes, sub-station, circuit breaker.

2. **Communication:**

Modulation & Demodulation technique – Principles & operation of AM, FM & PM; Pulse Modulation – TDM, PAM, PPM, PWM, PCM.

Microwave devices, wave-guides, microwave antennas, microwave communication system – block diagram and working principle of microwave communication link.

Elements of television system, composite video signal, television picture tube, television camera tubes, basic television broadcasting, television receiver, video detector, necessity of colour television, three-colour theory, PAL colour television system.

Importance of satellite communication, satellite frequency band, satellite transponder, application of satellite communication.

Elements of an optical fibre transmission system, fibre types, web representation, fibre fabrication technique, attenuation and absorption, losses in optical fibre communication, application of optical fibre.

3. **Network, filters and transmission lines:**

Two port network, attenuators, filters, transmission lines and their applications, characteristic impedance of line, concept of voltage standing wave ratio on a transmission line, principles of impedance matching, bandwidth consideration of a transmission line.

4. **Control System:**

Basic elements of control system, Open & closed loop system, Transfer function of simple control components, Time response of system, Stability analysis, Routh Hurwitz criterion, Nyquist criteria, Bode plot, Gain margin & Phase margin, Root locus techniques.

5. **Computer Engineering:**

Computer and its working, Types of computers, Concept of file, Directory, Folder, Data representation, Programming, Elements of a high level programming language PASCAL / C.

SCHEDULE - IV

Syllabus for Grade V (B)
CIVIL ENGINEERING
PAPER – I
Total Marks – 200
Duration of Examination – 2 Hours

1. BUILDING MATERIALS & CO

BRICKS AND TILE
STONES, SAND
CEMENT
MORTAR
CONCRETE
TIMBER
METALS AND OTHER ENGINEERING MATERIALS
PAINTS AND VARNISHES
BUILDING CONSTRUCTION
CONSTRUCTION PLANNING AND STORAGE OF MATERIAL FOUNDATION

BRICKS AND STONE MASONRY
DAMP PROOFING
LINTEL AND ARCHES
ROOFS AND ROOF COVERINGS
DOORS AND WINDOWS
SCAFFOLDING
STAIR AND STAIRCASES
FLOORING
WALL FINISH

2. STRENGTH OF MATERIALS & THEORY OF STRUCTURE:

STRENGTH OF MATERIALS

BENDING MOMENT & SHARE FORCE IN BEAMS
BENDING STRESS IN BEAMS
SHEARING STRESSES IN BEAMS
COLUMNS & STRUTS
COMBINED BENDING & DIRECT STRESS
COMPOUND & COMPLEX STRESS
STRAIN ENERGY & IMPACT LOADING

THEORY OF STRUCTURES

DEFINITIONS & GENERAL PRINCIPLES
PRIMARY STRESS ANALYSIS FOR STATICALLY DETERMINATE PIN JOINTED STRUCTURES
FIXED & CONTINUOUS BEAMS, PROPPED CANTILEVER
MOMENT DISTRIBUTION METHOD
RETAINING WALLS (EARTH RETAINING STRUCTURES)

3. FOUNDATION ENGINEERING:

GENERAL CONSIDERATIONS FOR DESIGN OF FOUNDATIONS
TYPES OF FOUNDATION

BEARING CAPACITY OF SOILS SETTLEMENT OF FOUNDATION
PILE FOUNDATION
SOIL STABILISATION
SOIL EXPLORATION
STRESS DISTRIBUTION IN SOILS
EARTH PRESSURE

4. CONCRETE TECHNOLOGY:

MATERIALS FOR CEMENT CONCRETE
PREPARATION OF CONCRETE
CONCRETE MIX DESIGN
QUALITY CONTROL
SPECIAL CONCRETE
DETERIORATION AND RESTORATION OF CONCRETE

5. QUANTITY SURVEYING

DEFINITION OF AN ESTIMATE AND TYPES
SYMMETRICAL & UNSYMMETRICAL BOUNDARY WALL (USING MODULAR & TRADITIONAL BRICKS)
CENTRE LINE, LONG WALL & SHORT WALL METHOD WITH EXAMPLE

DEFINITION OF FLOOR AREA, CARPET AREA, PLINTH AREA, FAR
ESTIMATE OF DIFFERENT ITEMS OF WORKS INVOLVED IN A SINGLE STOREY RESIDENTIAL BUILDING
ESTIMATE OF R.C.C. BEAMS, CHUJIA, LINTEL AND SLAB (ONE WAY & TWO WAY REINFORCEMENT) SHOWING BAR BENDING SCHEDULE)
CALCULATION OF QUANTITY OF MATERIALS OF DIFFERENT ITEMS OF WORKS
CALCULATION OF VOLUME OF EARTH WORK OF DIFFERENT WORKS

QUANTITY & COST ESTIMATE
CONTRACTS
PWD ACCOUNTS
ARBITRATION
VALUATION

CIVIL ENGINEERING
PAPER – II
Total MARKS – 200
Duration of Examination – 2 Hours

1. HYDRAULICS

INTRODUCTION
FLUID STATIC
FLUID FLOW
FLUID MEASUREMENT
FLOW THROUGH PIPES
OPEN CHANNEL FLOW

2. IRRIGATION

HYDROLOGY
WATER REQUIREMENT OF CROPS
CANAL IRRIGATION
WELL IRRIGATION
CANAL HEAD WORKS
FLOOD CONTROL
WATER LOGGING
LAND RECLAMATION
MAJOR IRRIGATION PROJECTS IN INDIA

3 ENVIRONMENTAL ENGINEERING

AIR POLLUTION
AIR POLLUTION CONTROL MEASURES & EQUIPMENT
METHODS & APPROACH OF AIR POLLUTION CONTROL
DIFFERENT SOURCES OF WATER POLLUTION WATER POLLUTION & ITS CONTROL
SOLID WASTE DISPOSAL

4. SURVEYING

LINEAR MEASUREMENTS
CHAIN SURVEYING
COMPASS SURVEYING
LEVELLING
CONTOURING
THEODOLITE SURVEYING
EARTH WORK CALCULATION
PLANE TABLE SURVEYING
COMPUTATION OF AREAS
COMPUTATION OF VOLUME

5. TRANSPORTATION ENGINEERING

PROJECTS & PROFILES
PERMANENT WAY
TRACK GEOMETRICS
POINTS & CROSSINGS
STATIONS & YARDS
PERMANENT WAY MAINTENANCE
ROAD DRAINAGE
TRAFFIC ENGINEERING
HIGHWAY MAINTENANCE

MECHANICAL ENGINEERING
PAPER – I
Total Marks – 200
Duration of Examination – 2 Hours

1. ENVIRONMENTAL ENGINEERING:

AIR Pollution
ANALYSIS OF AIR POLLUTANTS
AIR Pollution CONTROL MEASURES & EQUIPMENT
METHODS & APPROACH OF AIR POLLUTION Control

WATER & ENVIRONMENT

WATER SOURCES
Different SOURCES OF WATER POLLUTION Water POLLUTION & ITS CONTROL
Noise & ENVIRONMENTAL Management SYSTEM
NOISE POLLUTION & CONTROL
Environmental LEGISLATIONS, AUTHORITIES & SYSTEMS

2. MECHANICS OF MATERIALS

Stress and strain
Thin cylinder and spherical shells Deflections of beams
Torsion of solid and hollow circular shafts Springs
Riveted joints

3. MACHINE TOOL

General INTRODUCTION
Metal CUTTING
Lathe AND LATHE WORKS
DRILLING MACHINE

BORING MACHINE SHAPER & PLANNER

Milling MACHINE
Grinding MACHINE

4. FLUID MECHANICS

PHYSICAL PROPERTIES OF FLUIDS
FLUID STATICS
FLUID KINEMATICS
FLUID MEASUREMENTS
IMPACT OF JET
PUMPS
HYDRAULIC TURBINE

MECHANICAL ENGINEERING
PAPER – II
Total Marks – 200
Duration of Examination – 2 Hours

AUTOMOBILE ENGINEERING

CONSTRUCTIONAL FEATURES
FUEL SUPPLY SYSTEM
COOLING SYSTEM
LUBRICATION SYSTEM
INTAKE & EXHAUST SYSTEM
FUELS
COMBUSTION IN ENGINE
AUTOMOBILE EMISSION & ITS CONTROL

ELECTRICAL SYSTEM
CHASSIS & BODY
TRANSMISSION SYSTEM
GEAR BOX
PROPELLER SHAFT & FINAL DRIVE
SUSPENSION SYSTEM
STEERING SYSTEM
BRAKING SYSTEM
WHEEL & TYRE
GARAGE AND SERVICE STATION

2. NON CONVENTIONAL ENERGY SOURCES

SOLAR POWER PLANTS
SOLAR ENERGY
SOLAR RADIATION
WIND POWER PLANTS
WIND ENERGY
ENERGY FROM BIO-MASS

3. REFRIGERATION & AIR-CONDITIONING

AIR REFRIGERATION SYSTEM
VAPOUR COMPRESSION REFRIGERATION SYSTEM
VAPOUR ABSORPTION SYSTEM
REFRIGERANTS
REFRIGERATION COMPONENTS, CONTROL AND SAFETY DEVICES
APPLICATION OF REFRIGERATION

ELECTRICAL ENGINEERING
PAPER – I
Total Marks – 200
Duration of Examination – 2 Hours

1. POWER PLANT ENGINEERING

Conventional sources of Energy – Fossil fuels, Hydroelectric and nuclear.
Thermal Power Station:
Hydro-electric Power Stations:
Nuclear Power Plants:
Diesel Power Plant & Gas-turbine Plants:
Elementary idea about Major Electrical Equipments used in Power Stations:
Combined working of power plants
Control of Active and Re-active power-Load-frequency control
Performance of power stations and Economic considerations:

2. ELECTRICAL DESIGN & ESTIMATING

Design and Specification:
Design of an electrical installation of machines in a workshop (Maximum 4 machines)
[out of 4 machines at least 1 no. should be of 1-phase]
I.E. rules related to Power Sub-circuit.
Design of Electrical Machine:

Design of a 3-phase transformer up to 200 KVA: -

Estimation of a small residential complex.
Estimation of lighting scheme of a large Auditorium and Public Health Centre,
Estimation of electrical installation of machines (not more than four) in a workshop
Estimation for giving 3 – phase O.H. service connections to a residential building.

3. ELECTRICAL MACHINES

GENERAL Introduction OF ROTATING MACHINE
D.C Machines:
D.C. Generator
D.C. Motors:
TRANSFORMERS
1-phase Transformers:
Principles of 1-phase Autotransformer
Three-phase transformer
Alternator
3-Phase Induction Motor
Synchronous Motor:
Fractional H.P. Motors:

4. TRANSMISSION & DISTRIBUTION POWER

Transmission System
Constructional Features of Transmission & Distribution Lines
Mechanical Features of Overhead lines
Spacing of conductors, length of span, Relevant I.E. Rules
Electrical features of Overhead lines
Power Factor Improvement
Using Static condenser and Synchronous condenser – related problems
Distribution System
Sub-stations
Extra High Voltage DC System of Transmission

ELECTRICAL ENGINEERING
PAPER – II
Total Marks – 200
Duration of Examination – 2 Hours

1. BASIC ELECTRONICS

Passive & Active Circuit Elements
Familiarity with the following components: —
Resistors, FUSES, CAPACITORS, INDUCTOR,
Voltage source and current source
AC and DC signals, Transformer
RELAYS, SWITCHES, CABLES AND CONNECTORS Zener DIODE
Bipolar TRANSISTOR
FIELD EFFECT TRANSISTOR
UNIJUNCTION Transistor
Thyristor
Optoelectronics
INTEGRATED CIRCUITS

2. ELECTRICAL MEASUREMENT & MEASURINGINSTRUMENTS

DEFINITION & brief explanations of:
Range, sensitivity, true & indicated value, Errors (including limiting errors),
Resolutions, Accuracy, Precision and instrument efficiency.
CLASSIFICATION of instruments:

Basic REQUIREMENTS for measurements:
Different types of instruments:
VOLTMETER, ammeter, multimeter, energy-meter.
Multi-range ammeter and voltmeter
Methods of measuring diff. Electrical quantities:
1-PHASE Induction type energy meter.
Errors adjustments
PHANTOM loading
TESTING of energy meters.
LASSIFICATIONS of resistances
DESCRIPTION of Meggar.
MEASUREMENT of capacitance:
MAGNETIC measurements:
INSTRUMENT Transformers:
CT
PT or VT
DIFF. Types of faults

3. CIRCUIT THEORY

NETWORKS & A.C. FUNDAMENTALS

Single-PHASE A.C. Circuits:
R-L-C Series Circuit:
PARALLEL Circuit:
RESONANCE & SELECTIVITY
SERIES RESONANCE:
PARALLEL RESONANCE:
TRANSIENTS (FOR ELECTRICAL ENGINEERING ONLY)
Steady State & Transient Response.
POLYPHASE CIRCUITS:
COUPLED CIRCUITS:
LAPLACE TRANSFORMATIONS:
FILTERS:
LAPLACE TRANSFORMATIONS

4. ELECTRICAL MEASUREMENT &CONTROL

Measurement of POWER/Energy & Industrial Metering:
Digital energy-meter
Operation & UTILITY of Tri-vector meter.
Digital FREQUENCY meter
(i) Mech. Resonance type (ii) Electrical resonance type Frequency meter
Power manager.
SYNCHROSCOPE:
Phase-sequence meter
Digital multimeter
C.R.O.—block diagram representation & operation, applications
USE OF dual trace oscilloscope.
FUNCTION generator—
FREQUENCY Counter—
ELEMENTS of Servomechanism:
Stepper Motor—

Measurement of Non-electrical quantities:
Study of the following transducers:

Piezo-electric crystal.
THERMISTOR.
STRAINGUAGE.
PROXIMITY switch.
THERMOCOUPLE.
LVDT.
TACHOGENERATOR(a.c.& d.c.)
CAPACITIVE transducers—

SEISMIC transducers.

CONTROL SYSTEM:

Brief descriptions with physical example (alongwith schematic diagram) of:

On-off controller.
Proportional controller.
Proportional plus derivative controller.
P+I controller.
P + D + I controller.

5. ELECTRICAL INSTALLATION, MAINTENANCE AND TESTING

General guidelines for Installation:
Loading & unloading of heavy electrical m/c:
Electrical Installation requirements:
Earthing Installation:
General requirement of electric installation according to I.E. Rules:
Motor generator set for battery charging and to supply various loads.
Synchronization of two alternators.
Maintenance of electrical installations
Insulation:
Troubleshooting:
Repair & Maintenance with Maintenance Schedule of:
D.C. machine
Transformer
Induction motor
Switchgear & Substation:
Relays
Brief account of maintenance of contactors.
Storage Batteries-
OH lines and Cables:
Testing
Electric Safety Regulations:

ELECTRONICS ENGINEERING
PAPER – I
Total Marks – 200

Duration of Examination – 2 Hours

1. **Basic Electricity:**

Concept of potential deference; Concept of capacitance and capacitors; Ohm's Law, Power & energy, Kirchoff's Voltage, current loss, concept of alternating voltage current; cells and Batteries; voltage & current sources; Thevenin's theorem .

2. **Electronics devices and circuits:**

Classification of materials into conductor, semi conductor, Insulator etc.; Conventional representation of electrical & electronic circuit elements, Semi conductor theory, semiconductor diode, Bipolar junction transistor, Transistor biasing technique, Single Stage transistor amplifier, Multi stage transistor amplifier, Field effect transistor, MOSFET, UJT, Operational Amplifier, Oscillators, Regulated Power supply.

3. **Digital Electronics:**

Application & advantages of digital systems; Numbering system (Binary, Decimal, Hexadecimal); Logic gates, Simplification of logic circuits, Encoders, Decoders, Display devices; Multiplexers & Demultiplexers; Flip-flops; Counters, A / D & D / A converters.

ELECTRONICS ENGINEERING
PAPER – II
Total Marks – 200
Duration of Examination – 2 Hours

1. **Electrical Technology:**

Three phases / Single phase supply, Star-Delta connections, Relation between Phase & Line voltage, Power factor, All types of motors, Generator AC & DC, Transformer.

2. **Communication:**

Modulation & Demodulation technique – Principles & operation of AM, FM & PM; Pulse Modulation – TDM, PAM, PPM, PWM, PCM.

3. **Network, Filters & Transmission line:**

Two port network, Filters, Transmission lines, Characteristic impedance of line, Concept of standing wave, Bandwidth consideration of a transmission line.

4. **Control System:**

Basic elements of control system, Open & closed loop system, Time response of system, Stability analysis, Routh Hurwitz criterion, Root locus techniques.

5. **Microprocessors & Computer:**

Architecture of Microprocessors & Microcomputer systems; Brief idea of Assembly languages, Machines & Mnemonic codes, Instruction format & addressing mode.
Programming concept in 'C' language.

No. 173

Registered No. N. E. 930.

TRIPURA GAZETTE

Published by Authority

EXTRAORDINARY ISSUE

Agartala, Tuesday, May 31, 2011 A. D., Jyaistha 10, 1933 S. E.

PART--I-- Orders and Notifications by the Government of Tripura, The High Court, Government Treasury etc.

No.F.2 (25)/Power/2007/1961-67
Government of Tripura
Department of Power
Tripura, Agartala.

Dated, Agartala, the, 22nd February,2011.

NOTIFICATION

In exercise of the powers conferred by the proviso to Article 309 of the Constitution of India and all other powers enabling him in this behalf, the Governor, Tripura in consultation with the Tripura Public Service Commission, hereby makes the following rules further to amend the Tripura Power Engineering Service Rules, 1987, namely:-

1. Short title and commencement:-

(i) These rules may be called the Tripura Power Engineering Service (6th Amendment) Rules,2011.

(ii) They shall come into force on the date of their publication in the Official Gazette.

2. Amendment of the First Schedule:-

The First Schedule to the Tripura Power Engineering Service Rules, 1987 shall be substituted with the following:-

FIRST SCHEDULE
(see rule 4)

Sl. No.	Tripura Power Engineering Services Grade-I(A)	No. of posts	Total No. of posts in the Grade
01	Chief Engineer(Electrical)	01	03 (For Degree Holders only)
02	Chief Engineer(Power Project)	01	
03	Deputation/ Leave reserve/Training	01	

Sl. No.	Tripura Power Engineering Services Grade-I(B)	No. of posts	Total No. of posts in the Grade
01	Additional Chief Engineer(Electrical) & Sole Arbitrator	3	04 (For Degree Holders only)
02	Deputation/ Leave reserve/Training	1	

Sl. No.	Tripura Power Engineering Services Grade-II	No. of posts	Total No. of posts in the Grade
01	Superintending Engineer(Electrical)	08	10 (For Degree Holders only)
02	Deputation/ Leave reserve/Training	02	

Sl. No.	Tripura Power Engineering Services Grade-III	No. of posts	Total No. of posts in the Grade
01	Executive Engineer(Electrical)	32	44 (30 no. of posts for Degree Holder only and 13 no. of posts for Diploma Holders only)
02	Engineering Officer attached to Chief Engineer(Electrical)	01	
03	Deputation/ Leave reserve/Training	10	
04	Executive Engineer(Civil)	01	(For Degree Holder only)

Sl. No.	Tripura Power Engineering Services Grade-IV	No. of posts	Total No. of posts in the Grade
01	Assistant Engineer(Electrical)	180	237
02	Technical Assistant attached to Superintending Engineer(Electrical)	02	47 no. of posts for Degree Holders only by way of direct recruitment,95 no. of posts for Degree Holders only by way of promotion and 95 no. of posts for Diploma Holders only by way of Promotion.
03	Deputation/ Leave reserve/Training	55	
04	Assistant Engineer(Civil)	08	10
05	Deputation/ Leave reserve/Training	02	2 no. of posts for Degree Holders only by way of direct recruitment, 4 No. of posts for Degree Holders only by way of promotion and 4 no. of posts for Diploma Holders only by way of promotion.
06	Assistant Engineer(Mechanical)	06	08
07	Deputation/ Leave reserve/Training	02	2 no. of posts for Degree Holders only by way of direct recruitment, 3 no. of posts for Degree Holders only by way of promotion and 3 no. of posts for Diploma Holders only by way of promotion.
08	Assistant Engineer(Electronics)	03	04
09	Deputation/ Leave reserve/Training	01	1 no. of post for Degree Holder only by way of direct recruitment, 1 no. of post for Degree Holder only by way of promotion and 2 no. of posts for Diploma Holders only by way of promotion.

Sl. No.	Tripura Power Engineering Services Grade-V	No. of posts	Total No. of posts in the Grade
01	Junior Engineer(Electrical)	188 56	244 Gr.V(A):171 posts 122 no. of posts for Degree Holders only by way of direct recruitment, and 49 No. of posts for Diploma Holders only by way of promotion. Gr.V(B):73 posts 73 No. of posts for Degree Holders only by way of direct recruitment
02	Leave Reserve		
03	Junior Engineer(Civil)	30 09	39 Gr.V(A):27 posts: 20 no. of posts for Degree Holders only by way of direct recruitment and 07 no. of posts for Diploma Holders only by way of promotion. Gr.V(B):12 posts: 12 no. of posts for Diploma Holders only by way of direct recruitment.
04	Leave Reserve		
05	Junior Engineer(Mechanical)	17 05	22 Gr.V(A):15 posts: 11 no. of posts for Degree Holders only by way of direct recruitment, and 4 no. of posts for Diploma Holders only by way of promotion. Gr.V(B):7 posts: 7 no. of posts for Diploma Holders only by way of direct recruitment.
06	Leave Reserve		

07	Junior Engineer(Electronics)	03	04
08	Leave Reserve	01	Gr.V(A):3 posts: 2 no. of posts for Degree Holders only by way of direct recruitment, and 1 no. of posts for Diploma Holders only by way of promotion. Gr.V(B):1 post: 1 no. of post for Diploma Holder only by way of direct recruitment.

Total No. of posts in TPES : 629

Explanatory Note: 188 no. of supernumerary posts (UR : 98; SC : 32; ST : 58) for Gr.V(A) & V(B) have been created by the Finance Department vide., UO.No.1121/Fin(G)/07, dated 24-09-2007. In future when post in TPES becomes vacant in case of Gr.V (A) & V(B), those posts will be adjusted against the supernumerary posts created and those supernumerary posts will stand abolished.

By order of the Governor,

22.2.11

(U.K. Chakma)
Deputy Secretary to the
Government of Tripura.

Registered No. N. E. 930.

No. 456

TRIPURA GAZETTE

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EXTRAORDINARY ISSUE

Agartala, Tuesday, December 12, 2017 A. D., Agrahayana 21, 1939 S. E.

PART--I-- Orders and Notifications by the Government of Tripura, The High Court, Government Treasury etc.

TRIPURA POWER ENGINEERING SERVICE RULES, 1987

Agartala, Wednesday, March 11, 1987 A.D.
Phalguna 20, 1908 S.E.

GOVERNMENT OF TRIPURA
DEPARTMENT OF POWER

No.F. 2(25)/Power/2007/Vol-II/1005-16 Dated, Agartala, the 24th November, 2017.

NOTIFICATION

In exercise of the powers conferred by the provision to article 309 of the Constitution of India and all other powers enabling him in this behalf the Governor. Tripura, in consultation with the Public Service Commission, makes the following rules further to amend the Tripura Power Engineering Service Rules, 1987, namely —

PART-I
[GENERAL]*

1. **Short Title and commencement**

a) These rules may be called the Tripura Power Engineering Service Rules, 1987 (7th Amendment 2017)

b) These rules shall apply to the members of the Engineering Services of the Department of Power, Govt. of Tripura which presently consists of Electrical Wing, & other Wing placed or as may be placed under it and shall come into force with effect from the date of their publication in Official Gazette. *

2. **Definition**

In these rules, unless the context otherwise requires:-

a) "Commission" means Tripura Public Service Commission.

b) "Duty post" means any post specified in the Schedule appended to these rules and includes a temporary post carrying the same designation as any of the posts specified in the schedule and the scale of pay of which is identical to that attached to any Grade of the Service].**

c) "Government" means the Government of Tripura.

d) " Governor" means the Governor of Tripura

e) "Member of the Service" means a person appointed in a substantive capacity to any Grade of the Service and includes a person appointed on probation].*

f) "Schedule" means Schedules appended to these rules *

g) "Service" means Tripura Power Engineering Service

Note- *Substituted by the TPES (5th Amendment) Rules, 2007.
** Inserted by TPES (5th Amendment) Rules, 2007

PART-II
CONSTITUTION OF THE SERVICE, ITS CLASSIFICATION AND AUTHORISED STRENGTH##

3. Constitution of the Service and its classification##

1). There shall be constituted a State Civil Service to be known as the Tripura Power Engineering Service.

2). [The service shall have the following (6six) Grades, namely –

i) Grade-I - Group – A, gazetted
ii) Grade-II - Group – A, gazetted
iii) Grade-III - Group – A, gazetted
iv) Grade-IV - Group – A, gazetted
v) Grade-V(A) - Group – B, gazetted*
vi) Grade-V(B) - Group – C, Non gazetted##

4. Strength of the Service

1) The authorized permanent strength of the service and the duty posts included therein shall be as specified in the Schedule to these rules.
2) The Government may, by order, create duty posts for such period as may be specified therein.
3) Distribution of posts of Grade-V between Grade V (A) and V (B) shall be 70:30.
4) Distribution of posts between Degree Holder and Diploma Holder in Grade-V [Grade-V (A) and Grade-V (B) together] shall be 50:50.]##

PART-III
[METHODS OF RECRUITMENT]##

5. Appointment to the service shall be made by the following methods, namely –

1) Direct recruitment

(a) 20% of the posts in the authorized permanent strength of Grade-IV of the Service shall be filled by direct recruitment from candidates who have at least a degree in an appropriate branch of engineering from a recognized university or its equivalent academic qualification and at least 2(two) years' experience of service in the respective field of engineering under the Government, or Government undertaking or registered Public Sector Unit in the manner as specified in part IV of these rules. ##

Provided that the candidates having a post graduate degree in engineering shall be given preference.

(b) 71% of the posts in the authorized permanent strength of Grade-V(A) of the service shall be filled by direct recruitment from candidates who have at least a degree in an appropriate branch of engineering from a recognized University or its equivalent academic qualification in the manner as specified in PART-IV of these rules.

(c) All the posts in the authorized permanent strength of Grade-V(B) of the service shall be filled by direct recruitment only from candidates who have a diploma in an appropriate branch of engineering or its equivalent academic qualification from a recognized Institution in the manner as specified in Part-IV of these rules.

Note: - * Substituted by the TPES (7th Amendment) Rules, 2017 (Proposed)
Substituted by the TPES (5th Amendment) Rules, 2007.

2. Recruitment by selection

The remaining substantive vacancies in the permanent strength of various Grades of the Service shall be filled by selection in the manner as specified in PART-V of these rules;

Provided that –

(a) 70% of the posts in Grade-III of the service shall be filled by Degree holder engineers and the remaining 30% by Diploma holder engineers;
(b) 40% of the posts in Grade-IV of the service shall be filled by Degree holder engineers of Grade-V(A) and the remaining 40% of the posts in Grade-IV of the service shall be filled by Diploma holder engineers of Grade-V(A);
(c) 29% of the posts in Grade-V (A) of the service shall be filled by Diploma holder engineers of Grade-V (B).]*

PART-IV
[DIRECT RECRUITMENT]*

6. Selection to be made by the Commission*

Selection of candidates for direct recruitment to the service shall be made by the Commission.

7. Competitive Examination

The Competitive examination for direct recruitment to the service shall be held in the manner laid down in the Rules and syllabus to be conducted by the Commission from time to time. The dates on which and the place at which the examination shall be held shall be fixed by the Commission.*

8. Admission to competitive examination

The qualification for admission to the examination and the conduct thereof shall be in accordance with such Rules and Syllabus as the Government. may from time to time, issue in this behalf in consultation with the Commission.*

9. Decision of the Commission to be final

The decision of the Commission as to the eligibility or otherwise of a candidate for admission to the examination shall be final and no candidate to whom a certificate of admission has not been issued by the Commission shall be admitted to the examination.*

10. Commission to forward a list in order of merit

The Commission shall forward to the Government a list arranged in order of merit of the candidates who have qualified by such standard as the Commission may determine and of the candidates belonging to the Scheduled Castes and the Scheduled Tribes who, though not qualified by that standard, are declared by the Commission to be suitable for appointment to the Service with due regard to the maintenance of efficiency in administration.*

Note:- * Substituted by the TPES (5th Amendment) Rules, 2007

11. Inclusion in the list not to confer right to appointment

The inclusion of a candidate's name in the list referred to in rule-10 above confers no right to appointment unless the Government is satisfied, after such inquiry as it may consider necessary, that the candidate is suitable in all respects for appointment to the Service and an actual offer of appointment is made.

12. Physical fitness

No candidate shall be appointed to the Service unless he is declared, after such medical examination as the Government may prescribe, to be in good mental and bodily health and free from such mental or physical defect which is likely to interfere with the discharge of the duties of the Service.

13. Appointment of candidates included in the list

Subject to the provision of these rules the candidates will be considered for appointment to the available vacancies in the order in which their names appear in the list referred to in rule -10 above.*

PART-V
[RECRUITMENT BY SELECTION]*

14. Constitution of Selection Committees

1. Recruitment to Grade-I, Grade-II, Grade-III & Grade-IV of the service under Sub-Rule (2) of Rule-5 shall be made on the recommendation of a Selection Committee (hereinafter referred to as the Committee) consisting of :-

i)	Chairman of the Commission	Chairman
ii)	One senior Secretary to the Government To be nominated by the Chief Secretary	Member
iii)	Secretary, Department of Power	Member
iv)	Secretary, Tribal Welfare Department	Member
v)	Secretary, SC, OBC & Minority Welfare Department	Member]*

2. Recruitment to Grade-V(A) of the service under sub-rule(2) of rule-5 shall be made on recommendation of a Selection Committee consisting of :-

i)	The Secretary, Department of Power	Member
ii)	The Secretary, Tribal Welfare Department	Member
iii)	The Secretary, SC, OBC & Minority Welfare Department	Member

3. The senior most Secretary shall preside over the meeting of the Selection Committee constituted under sub-rule (2) above.

Note:- *Substituted by the TPES (5th Amendment) Rules, 2007

15. Conditions of eligibility for selection

Other than direct recruitment posts, all substantive posts in various Grades of the service shall be filled by selection from officers as shown below:-

1. Grade-I posts shall be filled by officers who hold Grade II posts and have rendered not less than 5 years regular service.*

2. Grade-II posts shall be filled by officers who hold Grade-III posts and have rendered not less than 7 years regular service in the Grade and have at least a degree in an appropriate branch of engineering from a recognized University or its equivalent academic qualification.

3. Grade-III posts shall be filled in the manner as specified in sub-rule (2) of rule-5 by officers who hold Grade-IV posts and have rendered not less than 7 years regular service in the Grade.

4. Grade-IV posts shall be filled in the manner as specified in sub-rule (2) of rule-5 by officers who hold Grade-V(A) posts and have rendered not less than 3 years regular service in the Grade; and

5. Grade-V(A) posts shall be filled in the manner as specified in sub-rule (2) of rule-5 by officers who are Diploma holder engineers holding Grade-V(B) posts and have rendered not less than 4 years regular service in the Grade.]#

16. Procedure for selection

1. The Committee constituted under sub-rule (1) and sub-rule (2), as the case may be, of rule-14 shall consider from time to time, cases of those officers who are eligible under rule-15 for promotion to a higher Grade and prepare a list of persons recommended taking into account the actual number of vacancies at the time of selection and those likely to occur during a year. The selection for inclusion in the list shall be based on merit and suitability in all respects for appointment to the Service with due regard to seniority;

   Provided that where a person is considered for such appointment to a higher grade from a lower grade, all persons senior to him in the lower feeder grade, shall also be considered irrespective of whether or not they fulfill the requirement of the minimum period of regular service in the lower grade as provided in rule-15.

2. The names of persons included in the list shall be arranged in the order of merit and be forwarded to the Government.

17. Consultation with the Commission.

1. The list prepared under sub-rule (2) of rule-16 shall be forwarded by the Government to the Commission along with the relevant records, where consultation with the Commission is necessary or where the Chairman of the Commission desires that a reference be made to the Commission.

Note:- *Substituted by the TPES (7th Amendment) Rules, 2017 (Proposed)
Substituted by the TPES (5th Amendment) Rules, 2007

2. If the Commission considers it necessary to make any change in the list received from the Government, the Commission shall inform the Government of the changes proposed.
3. The list shall finally be approved by the Government after taking into account the changes, if any, proposed by the Commission.
4. The list thus finally approved shall ordinarily be in force until a fresh list is prepared for the purpose in accordance with these rules.

18. Appointment to the Service.

Appointment to the Service shall be made in the order of merit as shown in the list referred to in sub-rule (3) of rule 17.]*

PART-VI
ELIGIBILITY FOR DIRECT RECRUITMENT*

19. Candidates for direct recruitment to the Service must fulfill the following conditions: - *

1. Common eligibility conditions

For direct recruitment to any Grade of the Service a candidate:-

i) Must be a citizen of India; and;
ii) Must not be less than 18 and more than 40 years of age;

Provided that the Scheduled Castes, Scheduled Tribes and Physically Handicapped category of candidates and the Government servants shall get an upper age relaxation of 5(five) years;

Provided further that the Government servants of Scheduled Castes, Scheduled Tribes and Physically Handicapped category shall not get the upper age relaxation of 5 years over and above the upper age relaxation of 5 years' admissible to them as Scheduled Castes, Scheduled Tribes and Physically Handicapped.

2. Educational qualification

a) For direct recruitment to Grade-IV and Grade-V (A) of the Service a candidate must have at least a Degree in an appropriate branch of engineering from a recognized University or its equivalent academic qualification.

b) For direct recruitment to Grade-V (B) of the service a candidate must have a Diploma in an appropriate branch of engineering or its equivalent academic qualification from a recognized Institution.*

Note- *Substituted by the TPES (5th Amendment) Rules, 2007

PART-VII

APPOINTMENT, PROBATION, TRAINING AND CONFIRMATION*

20. Appointment:

All appointments to the Service shall be made to the Grade and not against any specific post included in the Service.

21. Disqualification:

(a) No person who has more than one spouse living or who, having a spouse living, marriages in any case in which such marriage is void by reason of its taking place during the life time of such spouse, shall be eligible for appointment to the service; and

(b) No woman whose marriage is void by reason of the husband having a wife living at the time of such marriage or who has married a person who has a wife living at the time of such marriage, shall be eligible for appointment to the service;

Provided that the state Government may, if satisfied that there are special grounds for so ordering, exempt any person from the operation of this rule.

(c) No officer except officers in Grade-V(B) who has not passed departmental examination prescribed by the Government in TPES rules 1987 for the respective posts shall be eligible for selection to a higher grade of the service.*

[(d) i) Diploma holder Gr-V (B) and above have to pass Accounts and Simple Rules Papers to get promotion to Gr-IV and above.

ii) Degree Engineers Gr-V(A) have to pass Accounts and Simple Rules papers to get promotion to Gr-IV and shall have to pass Law & Arbitration Papers to get promotion to Gr-III and above.

(e) Degree Engineers who are appointed directly in Gr-IV also have to pass the Departmental Examination as specified for Grade –V(A) Degree holders to get promotion to the next higher grade, if not yet passed.

(f) To get promotion to the next higher grade the existing Engineering officer of TPES Gr-V, Gr-IV & Gr-III have to pass their specified papers/subjects viz. Accounts, Simple Rules and Law & Arbitration, if they had not passed earlier in any grade.

(g) Engineering officers who have attained the age of 55 years and above are exempted from appearing and passing departmental examinations to get promotion to next higher grades.]##

(h) The Syllabus for Departmental Examination under TPES rule 1987 is placed in "Annexure I"

Note: *Substituted by the TPES (5th Amendment) Rules, 2007
Inserted by the TPES (7th Amendment) Rules, 2017 (Proposed)

22. Special provision for Scheduled Castes and Scheduled Tribes

Appointment to every Grade of the Service made by direct recruitment or by selection or otherwise shall be subject to the laws in force in the State regarding special representation of the Scheduled Castes and Scheduled Tribes in the Services under the State.

23. Period of probation:-

(1) Every person appointed to Grade-IV, under Rule-5(I) (a) to Grade-V (A) under Rule-5(I) (b) and to Grade-V (B) of the service under Rule-5(1) (c) shall be on probation for a period of two years.

(2) The State Government may in the case of any person extend the period of probation in consultation with the Commission.

(3) The Government may, in consultation with the Commission, discharge, at any time, a probationer from service without assigning any reason therefor.

(4) A person on probation who holds a lien on any permanent post under the Central or State Government may, if he so desires during the period of probation, has the option to be reverted to his parent Department or Government after giving such notice as may be prescribed by the Government.

24. Training and Departmental Examination :

(1) Every person appointed to the service under Rule-5 shall pass, during the period of probation, such examination and complete successfully such training as may be prescribed.

(2) Every person appointed to the service under Rule-5 shall pass such Departmental Examination as the Government may, from time to time, prescribe.

25. Confirmation in Service:

A person appointed to the service under Rule-5 may be confirmed in the service on the basis of general assessment of his performance during the period of probation and his performance in the training and the examinations as provided in Rule-24.]*

PART-VIII
[MISCELLANEOUS]*

[26. Posting of members of the Service

Every member of the service shall, unless he is appointed to an ex-cadre post, or is otherwise not available for holding a duty post owing to the exigencies of service, be posted against a duty post under the Government.

27. Deputation

A member of the Service may, on deputation, be transferred to any post or be allowed deputation to any post outside the service under the Central or State Government, any company or organization.

Note- *Substituted by the TPES (5th Amendment) Rules, 2007

28. Private practice

No member of the service shall undertake private practice of any kind in any form or manner without previous permission of the competent authority.

29. Seniority –

The State Government shall prepare a list of members of the service arranged in order of seniority as determined in the manner specified below:-

(i) Seniority of officers in each grade of the service shall be determined separately.
(ii) Seniority of Degree-holder engineers and Diploma-holder engineers shall be determined separately and not clubbed together;
(iii) In the case of persons appointed on the results of a competitive examination, under rule-5(1) or by selection under Rule-5(2) seniority in the service shall be determined by the order in which appointments are made to the Service;

Provided that-

(a) Persons recruited on the results of a competitive examination in any year shall be ranked inter se in the order of merit in which they are placed at the competitive examination on the result of which they are recruited, those recruited on the basis of an earlier examination being ranked senior to those recruited on the basis of later examination.

(b) The relative seniority inter se of persons recruited by selection shall be determined on the basis of the order in which their names are arranged in the list prepared under Rule-16.

(iv) [The seniority of direct recruits and of promotes shall be determined according to the rotation of vacancies filled in a recruitment year between the direct recruits and the promotes or the promotes and the direct recruits as the case may be in a calendar year.
For example:-
(a) It may be 1:2 if appointment to the service were made on the basis of direct recruitment first.
(b) It may be 1:2 if appointment to the service were made on the basis of promotion first. ##

[30. Pay and allowances:

[Pay, other benefits, Dearness and other allowances shall be paid to persons holding duty posts in respective grades at such rates as may be determined by the Government from time to time.] ##

a) [Engineers recruited in TPES Gr-V (B) shall move to the pay scale of Rs. 9570/- to Rs 30000/-, G.P. Rs 3500/- under PB-3 (Pre-revised) on completion of 10 years of continuous and satisfactory service.][##

Note- ## Inserted by the TPES (7th Amendment) Rules, 2017 (Proposed)

31. Transitional arrangement :

Transitional arrangement for adjustment of existing members of the service, wherever found in excess, shall be considered in the following manner:-

(1) Degree-holder found in excess in Grade-IV, if any, shall immediately be adjusted against both the direct recruitment and promotion posts for Degree holders. These shall be adjusted finally as per amended rules hereby on availability of future vacancies.

(2) Diploma-holders, found in excess in Grade-IV, if any, shall immediately be adjusted against the vacancies of direct recruitment posts for Degree holders in Grade-IV. The same shall be adjusted finally as per amended rules hereby on availability of future vacancies.

(3) Degree-holders found in excess, in Grade-V (A), if any, shall immediately be adjusted against the vacancies in Grade- V (A) for Diploma holders and shall be adjusted finally as per amended rules hereby on availability of future vacancies.

(4) Diploma-holders found in excess, in Grade-V (A), if any, shall immediately be adjusted against the vacancies in Grade-V (B) for Diploma holders and the same shall be adjusted finally as per amended rules hereby on availability of future vacancies.

32. Any occupied posts not possible to be adjusted in this service in accordance with the provisions of these rules as per transitional arrangement provided in Rule-31 may continue to be held by the officer(s) who are holding such posts before introduction of these amendments as if these amendments had not come into force.

33. Power to make regulations :

The Government may make regulations not inconsistent with these rules to provide for all matters for which provision is necessary or expedient for the purpose of giving effect to these rules.

34. Residuary matters :

In regard to matters not specifically covered by these rules or by regulations or orders issued there under or by special orders, the members of the service shall be governed by the rules, regulations and orders applicable to the officers of the same status serving in connection with the affairs of the State Government.

35. Interpretation:

If any question arises as to the interpretation of these rules, the same shall be decided by the Government.]*

Note: - * Substituted by the TPES (5th Amendment) Rules, 2007.

PART-IX
[RELAXATION]*

36. Power to Relax

Where the Government is of the opinion that it is necessary or expedient so to do, it may, by order, for reasons to be recorded in writing and in consultation with the Commission, relax any of the provisions of these rules with respect to any class or category of persons or posts.]*

Note: - * Substituted by the TPES (5th Amendment) Rules, 2007.

Schedule

Sl. no.	Tripura Power Engineering Services Grade – I	No. of posts	Total nos. of posts in the Grade
1	Chief Engineer (Electrical)	01	07 (For Degree Holders only)
2	Chief Engineer (Power Project)	01	
3	Additional Chief Engineer (Electrical) & sole Arbitrator	03	
4	Sub-total	05	
5	Deputation / Leave Reserve / Training @ 30%	02	
6	Total	07	

Sl. no.	Tripura Power Engineering Services Grade – II	No. of posts	Total no. of posts in the Grade
1	Superintending Engineer (Electrical)	10	13 (For Degree Holders only)
2	Deputation / Leave Reserve / Training @ 30%	03	
3	Total	13	
4	Superintending Engineer (Mechanical)	01	01 (For Degree Holders only)
5	Deputation / Leave Reserve / Training @ 30%	00	
6	Total	01	
7	Superintending Engineer (Civil)	01	01 (For Degree Holders only)
8	Deputation / Leave Reserve / Training @ 30%	00	
9	Total	01	

Sl. no.	Tripura Power Engineering Services Grade – III	No. of posts	Total no. of posts in the Grade
1	Executive Engineer (Electrical)	51	67 (47 nos. of posts for Degree Holder only and 20 nos. of posts for Diploma Holders only)
2	Engineering Officer attached to Chief Engineer (Electrical)	01	
3	Sub-total	52	
4	Deputation / Leave Reserve / Training @ 30%	15	
5	Total	67	
6	Executive Engineer (Mechanical)	3	04 (3 nos. of posts for Degree Holder only and 1 no. of posts for Diploma Holders only)
7	Deputation / Leave Reserve / Training @ 30%	01	
8	Total	4	
9	Executive Engineer (Civil)	3	04 (3nos. of posts for Degree Holder only and 1 no. of posts for Diploma Holders only)
10	Deputation / Leave Reserve / Training @ 30%	01	
11	Total	04	
12	Executive Engineer (Electronics)	01	01 (For Degree Holders only)
	Deputation / Leave Reserve / Training @ 30%	00	
	Total	01	

Sl. no.	Tripura Power Engineering Services Grade – IV	No. of posts	Total no. of posts in the Grade
1	Assistant Engineer (Electrical)	230	314 (62 nos. of posts for Degree Holder only by way of direct recruitment, 126 nos. of posts for Degree Holders only by way of promotion and 126 nos. of posts for Diploma Holders only by way of promotion)
2	Technical Assistant attached to Superintending Engineer (Electrical)	12	
3	Sub-total	242	
4	Deputation / Leave Reserve / Training @ 30%	72	
5	Total	314	

6	Assistant Engineer (Mechanical)	42	55 11 nos. of posts for Degree Holder only by way of direct recruitment, 22 nos. of posts for Degree Holders only by way of promotion and 22 nos. of posts for Diploma Holders only by way of promotion)
7	Deputation / Leave Reserve / Training @ 30%	13	
8	**Total**	55	
9	Assistant Engineer (Civil)	20	26 (5 nos. of posts for Degree Holder only by way of direct recruitment, 10 nos. of posts for Degree Holders only by way of promotion and 11 nos. of posts for Diploma Holders only by way of promotion)
10	Deputation / Leave Reserve / Training @ 30%	6	
11	**Total**	26	
12	Assistant Engineer (Electronics)	04	05 (1 no. of posts for Degree Holder only by way of direct recruitment, 2 nos. of posts for Degree Holders only by way of promotion and 2 nos. of posts for Diploma Holders only by way of promotion)
13	Deputation / Leave Reserve / Training @ 30%	01	
14	**Total**	05	

Sl. no.	Tripura Power Engineering Services Grade – V (A)	No. of posts	Total no. of posts in the Grade
1	Junior Engineer (Electrical)	112	Gr. V (A) : 171 posts 132 nos. of posts for Degree Holder only by way of direct recruitment and 39 nos. of posts for Diploma Holders only by way of promotion.
2	Deputation / Leave Reserve / Training @ 30%	39	
3	**Total**	171	
4	Junior Engineer (Civil)	21	Gr. V (A) : 27 posts 20nos. of posts for Degree Holder only by way of direct recruitment and 7 no. of posts for Diploma Holders only by way of promotion.
5	Deputation / Leave Reserve / Training @ 30%	6	
6	**Total**	27	
7	Junior Engineer (Mechanical)	12	Gr. V (A) : 15 posts 11 no. of posts for Degree Holder only by way of direct recruitment and 4 no. of posts for Diploma Holders only by way of promotion.
8	Deputation / Leave Reserve / Training @ 30%	3	
9	**Total**	15	
10	Junior Engineer (Electronics)	02	Gr. V (A) : 03 posts 2 no. of posts for Degree Holder only by way of direct recruitment and 1 no. of posts for Diploma Holders only by way of promotion.
11	Deputation / Leave Reserve / Training @ 30%	01	
12	**Total**	03	

Sl. no.	Tripura Power Engineering Services Grade – V (B)	No. of posts	Total no. of posts in the Grade
1	Junior Engineer (Electrical)	56	Gr. V (B) : 73 posts 73 no. of posts for Diploma Holders only by way of direct recruitment
	Deputation / Leave Reserve / Training @ 30%	17	
	Total	73	

	Junior Engineer (Civil)	09	Gr. V (B) : 12 posts 12 no. of posts for Diploma Holders only by way of direct recruitment.
	Deputation / Leave Reserve / Training @ 30%	03	
	Total	12	
	Junior Engineer (Mechanical)	05	Gr. V (B) : 7 posts 7 no. of posts for Diploma Holders only by way of direct recruitment.
	Deputation / Leave Reserve / Training @ 30%	02	
	Total	07	
	Junior Engineer (Electronics)	01	Gr. V (B) : 01 posts 1 no. of posts for Diploma Holders only by way of direct recruitment.
	Deputation / Leave Reserve / Training @ 30%	0	
	Total	01	

Total No. of Post in TPES: 807

Explanatory note: -
188 no. of supernumerary post (UR : 98, SC : 32, ST : 58) for Gr. – V (A) & V (B) have been created by Finance Department vide U. O. no. 1121 / Fin (G) / 07 dated 24.09.2007. In future when post in TPES becomes vacant in case of Gr. – V (A) & V (B) those posts will be adjusted against supernumerary posts created and those supernumerary posts will stand abolished.

24/11/17

(S.R. Das)
Joint Secretary to the
Government of Tripura,
Power Department.

Annexure I

THE SYLLABUS FOR DEPARTMENTAL EXAMINATION OF TPES RULES, 1987 IS AS UNDER

A. FOR DEGREE AND DIPLOMA (ELECTRICAL / CIVIL / MECHANICAL / ELECTRONICS)

Subject: - Accounts Paper (Without Book)

Time: - 3 Hours

Full Marks: - 100, Pass Marks: - 50

i) CPWA Code with appendices except appendices 1, 4 & 6.
30 Marks (15 MCQ / Objective type questions of 2 marks each)

ii) CPWD Code
30 Marks (15 Objective type questions of 2 marks each)

iii) Specification of works on Tripura Schedule of works
20 Marks (10 Objective type questions of 2 marks each)

iv) PWD Works Manual, 2007
20 Marks (10 MCQ / Objective type questions of 2 marks each)

B. FOR DEGREE AND DIPLOMA (CIVIL / MECHANICAL)

C. **Subject: - Simple Rules (Without Book)**

D. **Time: - 3 Hours**

Full Marks: - 100, Pass Marks: - 50

i) **Fundamental Rules :-**
Chapter II ----------Rule - 9
Chapter V ----------Rule- 45
Chapter VIII -------Rule – 52 to 55
Chapter IX ---------Rule- 105-108
30 Marks (15 MCQ / Objective type questions of 2 marks each)

ii) **Supplementary Rules :-**
17,21,24,29,55,59to 78, 114, to 116, 293, 294 & 318 to 325 and Travelling allowance Rules of the Government of Tripura published under Finance Department O.M. No. F.5(16)-FIN(G)/75 dated 30-1-1976 as amended from time to time.
30 Marks (6 questions of 5 marks each)

iii) **The Factories Act, 1948**
10 Marks (2 questions of 5 marks each)

iv) **The Delegation of Financial Power Rules, Tripura 2011**
20 Marks (10 MCQ / Objective type questions of 2 marks each)

v) **Duties & responsibilities of Sub-ordinate employees**
10 Marks (2 questions of 5 marks each)

C. FOR DEGREE AND DIPLOMA (ELECTRICAL / ELECTRONICS)

E. Subject: - Simple Rules (Without Book)

F. Time: - 3 Hours

Full Marks: - 100, Pass Marks: - 50

i) Fundamental Rules :-

Chapter II ----------Rule - 9

Chapter V ----------Rule- 45

Chapter VIII -------Rule – 52 to 55

Chapter IX ---------Rule- 105-108

20 Marks (10 MCQ / Objective type questions of 2 marks each)

ii) Supplementary Rules :-

17,21,24,29,55,59to 78, 114, to 116, 293, 294 & 318 to 325 and Travelling allowance Rules of the Government of Tripura published under Finance Department O.M. No. F.5(16)-FIN(G)/75 dated 30-1-1976 as amended from time to time.

20 Marks (4 questions of 5 marks each)

iii) The Factories Act, 1948

10 Marks (2 questions of 5 marks each)

iv) The Delegation of Financial Power Rules, Tripura 2011

10 Marks (5 MCQ / Objective type questions of 2 marks each)

V) Duties & responsibilities of Sub-ordinate employees

10 Marks (2 questions of 5 marks each)

VI) Electricity Act, 2003

10 Marks (5 MCQ / Objective type questions of 2 marks each)

VII) Indian Electricity Rules, 1956& Tripura Regularity Commission Regulation, 2005(TERC Regulation)

10 Marks (5 MCQ / Objective type questions of 2 marks each

VIII) Procedures regarding payment of charges by consumers for obtaining electric supply connections

10 Marks (2 questions of 5 marks each)

D. FOR DEGREE ENGINEER (ELECTRICAL / MECHANICAL / CIVIL / ELECTRONICS)

A. Subject: - Law of Contract and Arbitration (Without Book)

B. Time: - 3 Hours

Full Marks: - 100, Pass Marks: - 50

i) Law of Contract :- The Indian Contract Act, 1872

Chapter I, II except Section 26, 27 & 30

Chapter III, IV, V except Section 68

Chapter VI & X

40 Marks (2 questions of 5 marks each& 15 MCQ / Objective type questions of 2 marks each)

ii) The Arbitration and Conciliation Act, 1996

20 Marks (2 questions of 5 marks each& 5 MCQ / Objective type questions of 2 marks each)

iii) The Limitation Act, 1963

a. Object or Law of Limitation
b. Section – 3, 9, 18, 19 & 30 of the Indian Limitation Act, 1963
c. Articles 1, 7, 10, 14, 15, 18, 19, 21, 22, 26, 42, 52, 54, 55, 59, 64, 65, 68, 69, 71, 72, 78, 80, 90(a), 119(b), and 136 of the Indian Limitation Act, 1963

20 Marks (2 questions of 5 marks each& 5 MCQ / Objective type questions of 2 marks each)

iv) Workmen's Compensation Act, 1923

10 Marks (2 questions of 5 marks each)

v) Tripura Value Added Tax Rules.

10 Marks (2 questions of 5 marks each)

Printed at the Tripura Government Press, Agartala.

iii) The Limitation Act, 1963

a. Object or Law of Limitation
b. Section – 3, 9, 18, 19 & 30 of the Indian Limitation Act, 1963
c. Articles 1, 7, 10, 14, 15, 18, 19, 21, 22, 26, 42, 52, 54, 55, 59, 64, 65, 68, 69, 71, 72, 78, 8
90(a), 119(b), and 136 of the Indian Limitation Act, 1963

20 Marks (2 questions of 5 marks each& 5 MCQ / Objective type questions of 2 marks each)

iv) Workmen's Compensation Act, 1923

10 Marks (2 questions of 5 marks each)

v) Tripura Value Added Tax Rules.

10 Marks (2 questions of 5 marks each)