

GOVERNMENT OF ARUNACHAL PRADESH  
DEPARTMENT OF POWER

The 1st November, 1993

No. SPWD-427/90-91/Pt.— In exercise of the powers conferred by the proviso to Article 309 of the constitution of India, the Governor of Arunachal Pradesh is pleased to make the following rules to regulate the method of recruitment and conditions of service of persons appointed to the Arunachal Pradesh Power Engineering Service, namely:

THE ARUNACHAL PRADESH POWER  
ENGINEERING SERVICE RULES 1993  
PRELIMINARY

Rule: 1. Short title and commencement :— (i) These rules may be called the Arunachal Pradesh Power Engineering Service Rules, 1993.

- (ii) They shall come into force on the date of their publication in the Official Gazette.
- (iii) They shall apply to the posts specified in rule 4 of these rules.

Rule: 2. Definition :—In these rules, unless the context otherwise requires:—

- (a) "Appointing authority" means the Governor of Arunachal Pradesh and such other authority as may be notified by the Governor:

**NOTE** :— The terms 'Junior Engineer', 'Assistant Engineer', 'Executive Engineer' and 'Superintending Engineer' wherever used in these rules, would also include their equivalent known by any other designation in the Power Department.

- (b) "Committee" means the Departmental Promotion Committee constituted under these rules;
- (c) "Commission" means the Arunachal Pradesh Public Service Commission;
- (d) "Department" means the Department of Power, Government of Arunachal Pradesh;
- (e) "Direct Recruitment" means the recruitment through a competitive examination and interview etc. held/conducted by the Commission;
- (f) "Government" means the Government of Arunachal Pradesh;
- (g) "Member of Service" means of person appointed under these rules to any post as regular basis in the service;
- (h) "Rules" means the Arunachal Pradesh Power Engineering Service Rules, 1993 as amended from time to time;
- (i) "Schedule" means the Schedule appended to these rules;
- (j) "Service" means the Arunachal Pradesh Power Engineering Service;
- (k) "Selection" means selection on the basis of merit-cum-seniority (as to requirement of the job and with due regard to seniority);
- (l) "Year" means a calendar year.

PART—I

Rule: 3. Constitution of the Service :— There shall be constituted a service to be known as the Arunachal Pradesh Power Engineering Service consisting of the following persons, namely:—

- (a) Persons who immediately before the commencement of these rules are holding any of the posts, on regular basis, shown in the Schedule and every such person shall deemed to be appointed under these rules: and

**EXPLANATION:** For the purpose of these rules, a person who would have held a post mentioned in Rule 4 of these rules but for his being on temporary or officiating appointment to an equivalent or higher post, shall be deemed to be holding such a post.

(b) Persons appointed to the service in accordance with the provisions of these rules.

**Rule 4. Composition of the service:**—(1) The service shall consist of such categories of posts as the Governor may determine from time to time.

(2) At the commencement of these rules the service shall consist of the following categories of posts, namely:—

Group 'A' (i) Chief Engineer;

(ii) Superintending Engineer and/or its equivalent known by any other designation;

(iii) Executive Engineer and/or its equivalent known by any other designation;

Group 'B' (iv) Assistant Engineer and/or its equivalent known by any other designation;

Group 'C' (v) Junior Engineer and/or its equivalent known by any other designation; Each of the categories of the posts mentioned in sub-rule (2) above shall form an independent cadre of the service. Members of the lower cadre shall have no claim for appointment to any higher cadre (s) except in accordance with the provisions made under these rules.

**Rule 5. Scale of pay etc:** The scale of pay for each category of posts included in the service shall be such as may be determined by the Government from time to time.

However, at the commencement of these rules, the scale of pay for each category of posts included in the service, shall be as follows —

Nature of post	Scale of pay
1. Chief Engineer	Rs. 5900-200-6700 p.m.
2. Superintending Engineer	Rs. 3700-125-4700-EB-150-5000 p.m.
3. Executive Engineer	Rs. 3000-100-3500-EB-125-4500 p.m.
4. Assistant Engineer	Rs. 2000-60-2300-EB-75-3200-100-3500 p.m.
5. Junior Engineer	Rs. 1400-40-1800-EB-50-2300 p.m.

(2) A person recruited on the basis of results of competitive examination shall, on appointment to the service, draw pay at the minimum of the time-scale:

Provided that if he held a permanent post, other than a tenure post, in a substantive capacity prior to his appointment to the service, his pay during the period of his probation in service shall be subject to rule 22 of these rules, regulated under the provisions of F.R. 22 (B) as made applicable to the employee of the State Government. The pay and increment (s) in the case of other persons appointed to the service shall be subject to rule 22 of these rules, regulated in accordance with the general provisions of F.R. as made applicable to the corresponding officers in the Government.

(3) Dearness and other allowance (s) shall be paid to persons holding any post mentioned in sub-rule (2) of rule 4 of these rules, at such rates as may be determined by the Government from time to time.

**Rule 6. Strength of service:** (1) The number of posts under each of the cadre mentioned in sub-rule (2) of rule 4 of these rules, shall be such as may be determined by the Government from time to time.

(3) At the commencement of these rules, the strength of each cadre of the service shall be such as shown in Schedule I appended to these rules.

#### PART - II

**Rule 7. Method of recruitment, etc:** (1) The method of recruitment, age limit qualifications and other requirements in respect of each category of the posts included in various cadres of the service shall be such as specified in rules 8,9,10,11 and 12 of these rules.

Rule 8. Recruitment to the post of Chief Engineer: Appointment to the post of Chief Engineer shall be made by promotion on the principle of selection, from the Select list prepared under rule 13 from amongst the Superintending Engineer or equivalent who have rendered not less than 8 (eight) years of regular service in the grade of Superintending Engineer and who have educational and other requisite qualifications prescribed for direct recruitment of the post of Assistant Engineer.

Provided that if no eligible person is available, the post may be filled up by transfer on deputation in consultation with commission from the officers holding the post of Superintending Engineer (Electrical) or analogous post in any State or Central Government Department organisation or any public undertaking for a 5 (five) years in the grade with 10 (ten) years experience in the field of generation/transmission of power and who has the educational and other requisite qualifications prescribed for direct recruitment to the post of Assistant Engineer.

Period of deputation shall not ordinarily exceed 3 (three) years.

Rule 9. Recruitment to the post of Superintending Engineer: Appointment to the post of Superintending Engineer shall be made by promotion on the principle of selection, from the select list prepared under Rule 13 from amongst the Executive Engineer or equivalent who have atleast 5 (five) years of regular service in the grade of Executive Engineer or equivalent and have educational and other requisite qualifications prescribed for direct recruitment to the post of Assistant Engineer :

Provided that if no person is eligible, the post shall be filled up by transfer on deputation in consultation with the commission from the following categories of officers.

- (i) any officer holding the post of Superintending Engineer (Electrical) or analogous post in State/Central Government department/organisation or public undertaking for a minimum period of 2 (two) years in the grade with atleast 10 (ten) years experience in the field of generation/transmission of power and who has the educational and other requisite qualification prescribed for direct recruitment to the post of Assistant Engineer :
- (ii) any officer holding the post of Executive Engineer (Elect.) or analogous post in State/Central Government Department/Organisation or public undertaking for a minimum period of 6 (six) years with atleast 12 (twelve) years experience in the field of generation/transmission of power and who has educational and other qualification prescribed for direct recruitment to the post of Assistant Engineer.

Period of deputation shall not ordinarily exceed 3 (three) years.

Rule 10. Recruitment to the post of Executive Engineer: Appointment to the post of Executive Engineer shall be made by promotion on the principle of selection, from the 'Selection List' prepared under Rule 13, from amongst the Assistant Engineer or equivalent who have rendered atleast 8 (eight) years of regular service in the grade of Assistant Engineer or its equivalent, and have the educational and other requisite qualifications prescribed for direct recruitment to the post of Assistant Engineer. In case of these Assistant Engineers who are diploma holders, the period of regular service in the grade shall be 10 (ten) years.

Provided that if no eligible person is available the post may be filled up in, consultation with the commission by 'transfer and deputation' from the following categories of posts :—

- (i) any officers holding the post of Executive Engineer (Elect./ Mechanical) or any analogous post in State/Central Government Department/Organisation or public undertaking for a minimum period of 2 (two) years with atleast 6 (six) years of experience in the field of generation/transmission of power and who has educational and other requisite qualifications prescribed for direct recruitment to the post of Assistant Engineer or Junior Engineer as the case may be, and/or
- (ii) any officers holding the post of Assistant Engineer (Electrical/Mechanical) or any analogous post in State/Central Government Department/Organisation or public undertaking for a period of 6 (six) years with atleast 8 (eight) years experience in the field of generation/transmission of power and having the educational and other requisite qualification prescribed for direct recruitment to the post of Assistant Engineer or Junior Engineer as the case may be.

The period of deputation shall not ordinarily exceed 3 (three) years.

Rule 11. Recruitment to the post of Assistant Engineer :

- (I) There shall be two branches of this cadre, namely :
  - (i) Assistant Engineer (Electrical/Mechanical), and
  - (ii) Assistant Engineer (Electronics/Telecommunication, Computer).

(2) Recruitment to both the branches mentioned in sub-rule (1) above, shall be made in the manner indicated hereafter :

- (i) 50% by direct recruitment on the basis of a written examination and viva-voce test, both conducted by the Commission as per syllabus mentioned in brief in schedule II appended to these rules ; and
- (ii) 50% by **Promotion on 'Selection'** basis in consultation with the Commission from amongst the eligible Junior Engineers of the service, as mentioned in sub-rule (8).

(3) For direct recruitment, only such candidates shall be eligible for appearing at the examination etc. who have atleast an Engineering Degree qualification in Electrical/Mechanical for the post mentioned in sub-rule (i) above, and Engineering Degree qualification in Electronic/Telecommunication/Computer for the post of mentioned in sub-rule (i) (ii) above. However, in case of Scheduled Tribes candidates of Arunachal Pradesh minimum aggregate marks in degree qualification shall be relaxable by 5%.

(4) In the case of posts to be filled in by direct recruitment on the basis of a written examination and a viva-voce test as mentioned in sub-rule (2) (i) above, the Commission shall prepare a penal of names of qualified candidates, in order of merit as obtained by them in the examination/viva-voce test conducted by the APPS Commission. The penal would contain the names equal to the number of vacancies notified to the Commission by the Appointing Authority. The Commission shall thereafter, forward such penal or list to the Appointing Authority for further action.

(5) If the Appointing Authority considers in necessary to make any change in the list referred to in sub-rule (4) above, he shall inform the Commission of the change (s) proposed and the reasons therefore and after taking into account the comments, if any, of the Commission, may approve the list with or without such modification.

(6) **Reservation :** (i) Reservation of posts meant for direct recruitment in respect of Scheduled Tribes of Arunachal Pradesh shall be as determined/prescribed by the Government of Arunachal Pradesh from time to time.

⊕ ↕ *Note :* If there is only one vacancy or post in any recruitment year in direct recruitment quota, that vacancy shall be filled in from Scheduled Tribes candidates only irrespective of the point of reservation for reservation.

(7) The subject of each paper, the number of question papers ; and maximum marks allotted to each paper ; and also the marks allotted to viva-voce test etc shall be such as specified in Schedule II of these rules.

However, the Government may, at any time, vary/modify the nature of subject (s), marks allotted to question papers or other matters relating to examination etc. The Government shall, in addition to publishing such modification/change in the Official Gazette, also notify the same to the Commission as and when such modification (s) are made.

(8) For vacancies to be filled in by **Promotion** under sub-rule (2) (ii) above, such Junior Engineers or equivalent of the posts mentioned in rule 4(2) (v) of these rules, who have rendered at least 8 (eight) years of regular service in the grade of Junior Engineer or its equivalent in the service, shall be eligible for consideration for such promotion. However in the case of such Junior Engineers who are Diploma holders as their educational qualification, the period of regular service as Junior Engineer in the service would be 10 (ten) years.

⊕ ↕ *Note :* Promotion from the post of Junior Engineer to the post of Assistant Engineer shall be made branch-wise separately as indicated below and eligibility of the candidate would be determined with reference to the educational qualifications prescribed for that branch :—

<u>Category of post</u>	<u>Eligible field of choice for promotion</u>
(a) Assistant Engineer (Elect)	Junior Engineer with degree or diploma in Electrical Engineering.
(b) Assistant Engineer (Mech)	Junior Engineer with degree or diploma in Mechanical Engineering.
(c) Assistant Engineer (Computer/Telecommunication/Electronics)	Junior Engineer with degree or diploma in computer Telecommunication/Electronics).

(9) If there is only one vacancy of post (promotion and direct recruitment quota taken together) in any recruitment year, that vacancy shall be filled in by promotion by "Selection" only in the manner prescribed in this rule. In case of failure to fill up the said vacancy promotion, then it can be filled in by direct recruitment.

(10) For the purposes mentioned in sub-rule 2 (ii) above, Select List or the penal as the case may be, shall be prepared by a Committee as constituted under rule 14 of these rules.

(11) If the Appointing Authority considered it necessary to make any change in the list referred to in sub-rule 10 above, he shall inform the Commission of the Change(s) proposed and the reasons therefore, and after taking into account the comments, if any, of the Commission, may approve the list with or without such modification.

(12) The officers appointed against the posts mentioned in Rule 4 (2) (iv) of these rules read with sub-rule (1) above, by promotion and by direct recruitment separately for each branch of the cadre, while preparing the combined seniority list of such officers will subject to the provision of rule 27 of these rules, be placed in the seniority list in the ratio of 1:1 starting with the promotee. However, this principle would not apply in case of carry-forward vacancy in either promotion quota or direct recruitment quota (i. e. bunching of vacancies occurring against DR or DP quota at the time of their filling up). In that case seniority of Officers so appointed will be determined in accordance with the instructions issued in this regard by the Government from time to time.

Once the seniority list (s) in each branch of the cadre are drawn, these seniority list (s) will thereafter be merged into one seniority list for the entire cadre on the basis of the length of regular service (i. e. with reference to the date of appointment on regular basis for the purposes of rule 10 of these rules.

(13) Nothing in this rule shall preclude the Appointing Authority from making any appointment to this Cadre of the service, on 'transfer on deputation' basis for the reasons to be recorded is writing, provided that the Officer so appointed fulfills the educational and other qualifications prescribed for direct recruitment to the post of Assistant Engineer of the service as mentioned in rule 11(3) of these rules. Each such case for appointment on deputation will be decided on merits and the Appointing Authority shall also consult the Commission before making such appointment. The term of deputation shall not exceed the maximum period of 3 (three) years.

12. Recruitment to the post of Junior Engineer : (1) There shall be three (3) branches of this cadre, namely—

- (i) Junior Engineer (Electrical) ;
- (ii) Junior Engineer (Mechanical) ; and
- (iii) Junior Engineer (Computer/Telecommunication/Electronics).

(2) Recruitment to each of the branches mentioned in sub-rule 1 above, shall be made in the manner indicated below :—

(a) For the post Junior Engineer (Electrical) —

(i) 95% by Direct Recruitment on the basis of a written examination and viva-voce test, both conducted by the Commission as per syllabus mentioned in brief in Schedule II appended to these rules ; and

(ii) 5% by promotion by 'Selection' i.e. merit-cum-seniority from amongst the eligible senior Electricians working in the department. If no suitable candidate is available to be appointed as (Junior Engineer Electrical) against promotion quota, the said vacancy shall be filled-up by direct recruitment in the manner specified in sub-rule (2) (a) (i) above.

(b) For the post of Junior Engineer (Mechanical)

(i) 95% by direct recruitment on the basis of a written examination and viva-voce test, both conducted by the Commission as per syllabus mentioned in brief in schedule II appended to these rules, and

(ii) 5% by promotion by 'Selection' i.e. merit-cum-seniority from amongst the eligible Foreman (Mechanical) working in the department. If no suitable candidate is available to be appointed as Junior Engineer (Mechanical) against the promotion quota, the said vacancy shall be filled in by direct recruitment in the manner specified in sub-rule (2) (b) (i) above.

(c) For the post of Junior Engineer (Computer/Telecommunication/Electronics) :- 100% by direct recruitment on the basis of a written examination and viva-voce test, both conducted by the Commission as per syllabus mentioned in brief in Schedule II appended to these rules.

(3) For direct recruitment, only such candidate (s) shall be eligible for appearing at the examination who fulfill the criteria laid down as below for each branch of the cadre separately :-

Post	Educational qualification	Age limit
Junior Engineer (Elect)	Matric/Senior Secondary (10+2) with three years diploma in Electrical Engineering from a recognised institution,	Between 18—28 years (relaxable in case of Arunachal Pradesh Scheduled tribes) and other category of persons as specified by the Government from time to time other category include Government servants
Junior Engineer (Mechanical)	Matric/Senior Secondary (10+2) with three years diploma in Mechanical Engineering from recognised Institution	As above
Junior Engineer (Computer/Tele-Communication/Electronics)	Matric/Senior Secondary (10+2) with three years Diploma in Computer/Telecommunication/Electronics from a recognised Institution	As above

(4) In case of post to be filled by direct recruitment as mentioned in sub-rule (2) above, the Commission shall prepare a penal/list of names of qualified candidate (s) in order of their merit as obtained by them in the examination/viva-voce test conducted by the Commission. The penal would contain the names equal to the number of vacancies as notified to the Commission by the Appointing Authority. The Commission shall, thereafter, forward such list/penal to the Appointing Authority for further action.

(5) If the Appointing Authority considers it necessary to make any change (s) in the list referred to in sub-rule (4) above he shall inform the Commission of the change (s) proposed and the reasons therefore and after taking into account the comments, if any, of the Commission, may approve the list with or without such modifications.

(6) Reservations :-

(i) Reservation of the post meant for direct recruitment in respect of Scheduled Tribes of Arunachal Pradesh shall be such as determined/prescribed by the Government of Arunachal Pradesh from time to time.

Note :-

If there is only one vacancy/post in any recruitment year to be filled in by direct recruitment, that vacancy shall be filled from Scheduled Tribes candidates only irrespective of the point of roster meant for reservation.

7. The subject of each paper, the number of question-papers, maximum marks allotted to each paper and the marks allotted to viva-voce test, etc. shall be such as specified in Schedule II appended to these rules.

However, the Government may, at any time, vary/modify the nature of such paper (s), marks allotted to the question papers or other matters relating to examination etc. The Government shall, in addition to publishing such modification/change in the official Gazette, also notify the same to the Commission as and when such modifications are made.

8. For vacancies to be filled in by promotion under sub-rule 2 (a) (ii) and sub-rule 2 (b) (ii) above, such Senior Electricians or Foreman (Mechanical), as the case may be, working in the Department, who fulfill the eligibility criteria laid down below would be eligible for consideration for promotion against the promotion quota referred to in sub-rule 2 (a) (ii) and sub-rule 2 (b) (ii) above.

For Junior Engineer (Electrical). Senior Electrician having passed Matric from a recognised Board/Institution and who has rendered at least 5 years regular service as Senior Electrician in the Department; with requisite technical qualification. \* /

**For Junior Engineer (Mechanical) :** Foreman (Mechanical) having passed Matric from a recognised Board/Institution and who has rendered atleast 5 (five) years regular service as Foreman in the Department, with requisite technical qualification.

9. Vacancies/Posts in the grade of Junior Engineer in each branch of the Cadre, to be filled in by direct recruitment and promotion together, shall be filled in the ratio of 19:1 between direct recruitment and promotion, first vacancy starting with the promotion.

10. For the purposes mentioned in sub-rule (8) above, a 'Select List' or the panel, as the case may be prepared by a Committee constituted under rule 14 of these rules.

11. The Appointing Authority, if it considers necessary to make any change (s) in the list or panel prepared by the Committee referred to in sub-rule (10) above, he may do so after recording the reasons therefore in writing and under intimation to the Government.

12. The officers appointed against the posts mentioned in rule 4 (2) (v) of these rules read with sub-rule (1) above, by promotion and by direct recruitment separately for each branch of the Cadre, while preparing the combined seniority list of such officers will, subject to the provisions of rule 27 of these rules, be placed in the seniority list in the ratio of 1:19 starting with the promotee. However, this principle would not apply in case of carry-forward vacancies in either promotion quota or direct recruitment quota i.e. bunching of vacancies occurring against DP or DR quota, at the time of their filling up. In that case, seniority of officers so appointed will be determined in accordance with the instructions issued in this regard by the Government from time to time.

13. Consideration and recommendation by the Committee or Commission for appointment

As soon as a case for promotion to any post in the service arises, the Appointing Authority shall send for the post/cadre of Junior Engineer (s) to the Committee and for other posts/cadres, to the Commission, the character rolls, service records and other relevant records of the officers concerned and such other available information as may be required by the Committee or the Commission as the case may be to enable to consider such eligible candidates for promotion.

(2) After consideration of the merit and seniority of the candidates the Committee or the Commission as the case may be, shall make its recommendation in respect of such persons considered fit for promotion and place their names in order of preference in the respective 'Select' list. Subject to provisions of Rule 15 of these rules, the 'Select' list shall be forwarded by the Committee or the Commission as the case may be, to the Appointing Authority.

(1) The composition of the Departmental Promotion Committee for the posts mentioned in rule 4 (2) shall be as follows:—

**For the post of Chief Engineer/Superintending Engineer/Executive Engineer/Assistant Engineer :**

1. Chairman or Member of the Commission	—	Chairman
2. Secretary of a Department/Government not with the works of the department	—	Member
3. Commissioner/Secretary of the Department	—	Member
4. An Officer belonging to ST category but not below the rank to Secretary to Government	—	Member
5. An Officer of requisite technical competence from the Department concerned or outside as deemed fit by the Commission.	—	Member

**the post of Junior Engineer :**

Superintending Engineer (Coordination)	—	Chairman
Senior-most Executive Engineer of the Department, available at the Headquarter at the time of meeting of the committee	—	Member
An Officer belonging to Scheduled Tribes	—	Member

(2) In case of Constitution of Selection Board for personality test of Assistant Engineer/Junior Engineer, recruited through open competitive examination conducted by the Commission, the composition of the Board shall be decided by the Commission in terms of government order in force from time to time.

Rule: 15. Approval of the list by the Commission :— The list so prepared by the Committee referred to in Rule 14(1) (i) of these rules, shall be forwarded to the Commission alongwith the Character Rolls of such persons and other relevant record. The Commission shall consider the list alongwith other documents required and approve the list unless it considers to make any change (s).

Rule: 16. Approval of the list by the Appointing Authority :— The Appointing Authority shall consider the list forwarded by the Commission under sub-rule (2) of Rule 13 alongwith the Character Rolls and Service records of such persons and approve the list unless it considers any change necessary. If the Appointing Authority considers any change necessary in the list, he shall inform the Commission of the changes proposed and after taking into consideration of the comments, if any, of the Commission, may approve the list finally with such modifications as may, in his opinion, considered to be just and proper.

Rule: 17. Period of validity of Select List :— The 'Select' list or the panel, as the case may be, shall ordinarily be in force for a period of one year until it is rescinded or revised, provided that in the event of any lapse in the conduct or performance of duties on the part of any person included in the Select list or the panel, the Appointing Authority may, if he thinks fit, omit/remove the name of any such person from the Select list or the panel, in consultation with the Commission. The reason for such omission/removal is to be recorded in writing.

### PART—III

#### GENERAL PROVISIONS

Rule: 18. Competitive examination : (1) A competitive examination for direct recruitment to the cadres of Assistant Engineer or Junior Engineer, as the case may be, shall be held at such intervals as the government may, in consultation with the Commission, from time to time, determine. The day (s) on which and the place (s) at which the examination shall be held would be fixed by the Commission.

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

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

(4) The Commission shall forward to the government or the Appointing Authority, as the case may be, a list or panel arranged in order of merit of the candidates who have qualified by such standard as the Commission may determine.

(5) The Commission may relax the standard to make up the deficiency for the reservation quota subject to fitness of the candidate (s) belonging to any of the reserved category for selection to the appropriate grade/cadre of the service if the number of otherwise qualified candidate (s) belonging to any of the Scheduled/Tribes category on the basis of the general standard, do not match the number of vacancies reserved for the Scheduled Tribes.

Rule: 19. Physical Fitness : No candidates shall be appointed to the respective grade/cadre of the service unless he is declared after such medical examination as the Appointing Authority may prescribe to be free from any mental or physical defect likely to interfere with the discharge of the duties of the service, unless he has already been examined by the competent medical authority at the time of his initial appointment to any grade/cadre of the service and declared fit.

Rule: 20. Inclusion in the list not to confer right to appointment : The inclusion of a candidate's name in the list (s) referred to in rule 11(4), 12(4) and 13(2) as the case may be, of these rules, shall confer no right to appointment unless the government or the Appointing Authority, as the case may be, is satisfied after such enquiry is it may consider necessary that the candidate is suitable in all respect for appointment to the service and an actual offer of appointment is made to the candidate :

Provided that where the candidate whose name is included in the list (s) referred to in rule 12(4), 11(4) of these rules is not appointed to the service or any cadre of the service, the reason for the same shall be recorded in writing by the government or the Appointing Authority as the case may be.

**Rule 21. Appointment to the service :** Subject to the provisions of these rules, the candidate (s) included in the list (s) referred to in rule 11(4), 12(4) and 13(2) of these rules, shall be appointed to various cadre (s) of the service in order of merit with due regard to the proportion specified for direct recruitment or promotion, as the case may be for each cadre of the service.

**Rule 22. Probation :** (1) Every person appointed to any cadre of the service under rules 8, 9, 10, 11 and 12 of these rules shall be on probation for a period of two years.

(2) The government or the Appointing Authority, as the case may be, may in the case of any person, extend or reduce the period of probation but the total period of extension of probation shall not, save where it is necessary by reasons of any departmental or legal proceedings pending against the officer concerned, exceed twice the period specified as probation period.

(3) A probationer who has no lien on any post under the department or the government, shall be liable to be discharged from the service at any time without notice if :—

(i) On the basis of his performance or conduct during probation, he is considered unfit for further retention in the service; or

(ii) if on the receipt of any information relating to his nationality, age, health or antecedents, the appointing authority is satisfied that he is in-eligible or otherwise unfit for being a member of the service.

(4) A probationer who holds a lien on a post under the department or the government may be reverted to such post at any time in any of circumstances specified in sub-rule (3) above.

(5) A probationer who is not considered suitable for confirmation at the end of the period of probation prescribed in sub-rule (1) or at the end of extended period of probation, if any, under sub-rule (2) above, shall be discharged or reverted in accordance with sub-rule (3) or sub-rule (4) as the case may be.

**Rule 23. Departmental examination :** A person appointed through a competitive examination against the grade/post of Assistant Engineer in the service under rule 11 (2) (i) and against the grade/post of Junior Engineer in the service under rule 12 of these rules, shall undergo such training and/or pass during the period of probation such departmental examination in Accounts, as the Appointing Authority may, from time to time, prescribe. Such person shall not be allowed to draw his second and subsequent increment in his time scale of pay unless he clears/pass the said departmental examination by such standard as the Appointing Authority may prescribe; and

A person appointed against the grade/post of Assistant Engineer in the service under rule 11 (2) (ii) and against the grade/post of Executive Engineer in the service under rule 10 of these rules, shall have to pass such departmental examination in Accounts as the Appointing Authority may, from time to time, prescribe, before he is allowed to cross the Efficiency Bar in his time scale of pay :

Provided that the government may, subject to such conditions, as it may impose and having regard to his past service, experience or academic qualifications, exempt any person appointed as Assistant Engineer or Executive Engineer in the service by Promotion under rules 10 and 11 (2) (ii) of these rules either wholly or partly, from such training or departmental examination.

**Rule 24. Disqualification :** No person, —

(a) who has entered into or contracted a marriage with a person having a spouse living, or

(b) who, having a spouse living, has entered into or contracted a marriage with any person,

shall be eligible for appointment to the service : \*

Provided that the State Government may, if satisfied that such marriage is permissible under the personal law applicable to such persons and the other party to the marriage and there are other grounds for so doing, exempt any person from the operation of this rule.

**Rule 25. Date of eligibility :** Eligibility of a candidate either for direct recruitment or promotion to any post included in the service, shall be determined, with reference to 1st day of that calendar year (1st January) in which such recruitment process is initiated.

**Rule 26. Confirmation in service :—**A person, who has been declared to have satisfactorily completed his period of probation may be confirmed in the service if otherwise not confirmed in any other grade/post/cadre of the service. If a person, who had confirmed in any lower

grade/post/cadre of the service, has also been declared to have satisfactorily completed his period of probation, necessary declaration in writing to that effect from by the Competent Authority may be made and kept in his service record.

Rule 27 Seniority : The government shall prepare a list of members of each cadre in order of seniority as determined in the manner specified below :—

(1) Members of the service appointed at the initial constitution of each cadre (in case of Junior Engineer Cadre such list would be branch/category-wise of the cadre), under rule 3 of these rules, shall be ranked inter-se in the order of their relative seniority in that grade/cadre existing prior to commencement of these rules :

Provided that if the seniority of any such officer had not been specifically determined before the commencement of these rules, it shall be determined by the government.

(2) Unless otherwise provided in these rules, the seniority of persons recruited to each cadre/grade of the service after initial constitution shall be determined in accordance with the general instructions issued by the government in the matter from time to time, keeping in view the following general principles :—

(a) In case of equal length of service, older in age will rank senior to younger one.

(b) Direct recruits shall be assigned seniority from the date of appointment with due regard to their position in the merit list as obtained through the competitive examination.

(c) Promoted officials shall be given seniority from the date of their appointment if they have been selected by a regular constituted Departmental Promotion Committee under these rules and have held the appointment continuously thereafter without any break. While determining the inter-se seniority of promoted officials, the date of appointment in their respective cadre with due regard to merit shall be taken in consideration as determined by the D.P.C. at the time of recommending them for such promotion. Wherever it is found that the D.P.C. while recommending their promotion, has not decided inter-se merit of officials, then the inter-se seniority of such officials shall be fixed on the basis of their placement in the lower grade/cadre.

(3) Where the strict application of these principles results in hardship, government may assign seniority in such a manner as may be considered appropriate and necessary by the government.

Rule 28 Powers of the government for making temporary arrangements : (1) Notwithstanding anything contained in these rules, if appointment to a post/grade of any cadre included in the service is to be made purely as local agreement (ad-hoc) for short period, such appointment may be made by the government or the Appointment Authority, as the case may be from the persons who are otherwise eligible for promotion to such post under these rules, subject to their merit-cum-seniority in all respects as to recruitment of the post.

(2) Any appointment made under sub-rule (1) above, shall be reported by the Appointing Authority or the government as the case may be, to the Commission.

(3) Any appointment made under this rule shall not continue beyond a period of six (6) months without prior approval of the Commission.

Rule 29 Regulation : The government may make regulation or issue instructions, not in consistence with these rules, to provide for all matter or such provision as necessary or expedient for the purposes of giving effect to these rules.

Rule 30 Residuary matters : In regard to matters not specifically covered by these rules or by regulation or orders issued thereunder or by special orders, the members of the service shall be governed by rules, regulations and orders applicable to corresponding officers serving in connection with the affairs of the government.

Rule 31 Interpretation : If any question arises as to the interpretation of these rules, the same shall be decided by the government.

Rule 32 Transitional provision : (1) On and from the commencement of these rules and until persons are appointed to hold the posts included in the service in accordance with the provisions of these rules, such post (s) may continue to be held by officers appointed thereto as if these rules had not come into force. Persons appointed to posts included in the service, on regular basis in accordance with the provisions of the recruitment rules as existed prior to commencement of these rules, shall be deemed to have been appointed to posts included in the service under these rules.

(2) This rule shall cease to be in force after a period of 2 (two) years from the date of commencement of these rules.

**Rule: 33. Power to relax :** Where the State 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 the Commission, relax any of the provision of these rules with respect to any class or category of persons or posts.

**Rule: 34. Saving :** Unless otherwise specifically provided under these rules, nothing in these rules shall affect reservation and other concession required to be provided for the Scheduled Tribes of Arunachal Pradesh and other special categories of persons in accordance with the orders issued by the government from time to time in this regard.

**Rule: 35. Repeal :** (1) All recruitment rules for the post (s)/grades included in the service, as in force prior to commencement of these rules, in the department are hereby repealed.

(2) Notwithstanding such repeal, anything done or any action taken under the provisions of recruitment rules existing prior to commencement of these rules in respect of posts/grades included in the service, shall be deemed to have been validly done or taken under these rules.

By Order and under the name of the  
Governor of Arunachal Pradesh.

### SCHEDULE—I

[ Rule 6 (2) ]

Post/Cadre	Number of Posts
1. Chief Engineer (Power)	1 (one)
2. Superintending Engineer and its equivalent.	3 (three)
3. Executive Engineer (Electrical/Mechanical) and its equivalent.	14 (fourteen)
4. Assistant Engineer and its equivalent :	
(a) Electrical	— 34
(b) Mechanical	— 17
(c) Computer/Telecommunication/ Electronics.	— 5
	56 (fiftysix)
5. Junior Engineer and its equivalent :	
(a) Electrical	— 106
(b) Mechanical	— 53
(c) Computer/Telecommunication/ Electronics.	— 18
	177 (one hundred and seventy seven)

Ashok Nath,  
Commissioner/Secretary (Power),  
Government of Arunachal Pradesh,  
Itanagar.

### SCHEDULE—II

(Rules 11 and 12)

#### Part—A EXAMINATION AND ITS SYLLABUS FOR RECRUITMENT TO THE POST OF AEs

1. The examination shall be conducted according to the following plan :—

**PART—I** The written examination will comprise two sections—Section I consisting only of objective type questions and Section II of conventional papers. Both sections will cover the entire syllabus of the relevant engineering disciplines viz. Mechanical Engineering, Electrical Engineering, Electronics/Telecommunication/Computer Engineering. The standard and syllabi prescribed for these papers are given in Appendix to the Schedule. The details of the written examination i.e. subjects, duration and maximum marks allotted to each subject are given in para 2 below :

**PART II**—Personality test carrying a maximum of 100 marks of such of the candidates qualify on the basis of the written examination.

2. The following will be the subjects for the written examination :-

**Category—I—ELECTRICAL ENGINEERING  
(IF PREAMBLE TO THE RULES)**

Subject	Duration	Maximum Marks
<b>Section I—Objective Papers</b>		
(i) General Ability Test (Part A : General English and Essay) (Part B : General Studies)	3 Hours	200
(ii) Electrical Engineering	3 Hours	300
<b>Section II—Conventional Papers.</b>		
Electrical Engineering Paper—I	3 Hours	200
Electrical Engineering Paper—II	3 Hours	200
Total		900

**CATEGORY—II—MECHANICAL ENGINEERING  
(6f. PREAMBLE TO THE RULES)**

Subject	Duration	Maximum Marks
<b>Section I—Objective Papers</b>		
(i) General Ability Test (Part A : General English and Essay) (Part B : General Studies)	3 Hours	200
(ii) Mechanical Engineering	3 Hours	300
<b>Section —II—Conventional Papers</b>		
Mechanical Engineering Paper—I	3 Hours	200
Mechanical Engineering Paper—II	3 Hours	200
Total :-		900

**CATEGORY—III : ELECTRONIC/TELECOMMUNICATION/COMPUTER  
ENGINEERING  
(6f. PREAMBLE TO THE RULE)**

Subject	Duration	Maximum Marks
<b>Section I—Objective Papers</b>		
(i) General Ability Test (Part A : General English and Essay) (Part B : General Studies)	3 Hours	200
(ii) Electronics/Telecommunication/Computer Engineering Paper—I	3 Hours	300
Electronics/Telecommunication/ Computer Engineering Paper—II	3 Hours	200
Electronic/Telecommunication/Computer Engineering Paper—II	3 Hours	200
Total :-		900

3. In the personality test special attention will be paid to assessing the candidate's capacity for leadership, initiative and intellectual curiosity, tact and other social qualities, mental and physical energy, power of practical application and integrity of character.
4. Conventional papers must be answered in English : Question papers will be set in English only.
5. Candidates must write the papers in their own hand. In no circumstances will they be allowed the help of a scribe to write the answers for them.
6. The Commission have discretion to fix qualifying marks in any or all the subjects of the examination.

### APPENDIX

#### Standard and Syllabus

The standard of paper in General Ability Test will be such as may be expected of an Engineering/Science Graduate. The standard of papers in other subjects will approximately be that of an Engineering Degree Examination of an Indian University. There will be no practical examination in any of the subjects.

#### GENERAL ABILITY TEST

**Part A : General English and Essay :** The question paper in General English will be designed to test the candidates understanding of English and Workmanlike use of words.

**Part B : General Studies :** The paper in General Studies will include knowledge of current events and of such matters as of everyday observation and experience in their scientific aspects as may be expected of an educated person. The paper will also include questions on History of India and Geography of a nature which candidates should be able to answer without special study.

#### MECHANICAL ENGINEERING

(For both objective and conventional type papers)

##### Paper I

1. **Thermodynamics :** Laws, properties of ideal gases and vapours, Power cycles, Gas Power cycles, Gas Turbine cycles, Fuels and Combustion.
2. **I.C. Engines :** C.I. and S.I Engines Detanation. Fuel injection and Carburation. Performance and Testing. Turbe Jet and Turbo-prop, Engines, Rocket Engines Elementary Knowledge of Nuclear Power Plants and Nuclear Fuels.
3. **Steam Boilers, Engines, Nozzles and Steam Turbines** Modern boilers. Steam Turbines types, Flow of Steam through nozzles. Velocity diagrams for impulse and Reaction Turbines. Efficiencies and Governing.
4. **Compressors Gas, Dynamics and Gas Turbines, Reciprocating, Centrifugal and azial** flow compressors, Velocity diagrams, Efficiency and performance. Effect of Mechin number of flow, Isentropic flow, Normal Shock and Flow through nozzles. Gas Turbine cycle with multistage compression, Reheating and Regeneration.
5. **Heat Transfer, Refrigeration and Air Conditioning** Conduction, convection and Radiation. Heat exchangers, types combined Heat Transfer. Overall Heat Transfer coefficient Refrigeration and heat pump cycles, Refrigeration system Coefficient of performance, Psychrometies and psychrometric chart. Comfort indices. Cooling and dehumidification methods. Industrial Air-conditioning Processes. Cooling and heating loads calculations.
6. **Properties and classifications of fluids. Fluid statics, kinematics and dynamics ;** principles and applications. Menometry and Buoyancy. Flow of ideal fluids. Laminar and turbulent flows. Boundary layer theory. Flow over immersed bodies. Flow through pipes and Open Channels. Dimensional analysis and similitude technique. Non-dimensional specific speed and classification of fluid machines in general. Energy transfer relation performance and operation of pumps and of impulse and reaction water turbines. Hydranamic power transmission.

**Paper II**

7. **Theory of Machines** : Velocity and acceleration (i) of moving bodies, (ii) in machines. Klein's construction Inertia forces in machines. Cams, Gears and Gearing. Fly wheels and Governors, Balancing of Rotating and Reciprocating masses. Force and forced vibrations of systems. Critical speeds and whirling of shafts.

8. **Machine Design** : Design of : Joints—Threaded fasteners and Power Screws—Keys, Cotter, Coupling—Welded Joints—Transmission system : Belt and Chain drives—Wire ropes—Shafts. Gears—Sliding and Rolling bearings.

9. **Strength of Materials** : Stress and strain in two dimensions ; Mohr's circles relations between Elastic Constants. Beams ; Bending moments, shearing forces and deflection. Shafts : Combined bending, direct and torsional stresses. Thick Walled cylinders and spheres under Pressure, Spring, Struts and columns, Theories of failure.

10. **Engineering Materials** : Alloys and Alloying Materials, heat treatment; composition ; properties and uses. Plastics and other newer engineering materials.

11. **Production Engineering** : Metal Machining : Cutting Tools, Tool Materials water and Machinability, measurement of cutting forces. process : Machining—Grinding, Boring, Gear, Manufacturing, Metal forming, Metal casting and joining, Basic, Special Purpose, Programme and numerically—Controlled Machine Tools, Jigs and fixtures (locating elements)

12. **Industrial Engineering** : Works study and work measurement Wage incentive. Design of production System and Product Cost, Principles of Plant layout. Production Planning and Control. Material handling, Operations Research. Linear Programming Queuing Theory, Value Engineering Network Analysis, CPM and PERT. Use of Computers.

**ELECTRICAL ENGINEERING**

(For both objective and conventional type papers)

**PAPER—I****1. Electrical Circuits**

Network theorems, Response of Network to step, ramp, impulse and sinusoidal inputs. Frequency domain analysis. Two port networks elements of network synthesis. Signal-flow graphs.

**2. EM Theory**

Electrostatics Magnetostatics using vector methods Fields in dielectrics in conductors and in magnetic materials. Time varying fields, Maxwell's equations Planewave Propagation in conducting and Dielectric media) properties of Transmission lines.

**3. Material Science : (Electric Materials)**

Band Theory. Behaviour of dielectrics in static and alternating fields. Piezoelectricity. Conductivity of Metals. Super conductivity. Magnetic properties of materials. Ferro and ferri-magnetism. Conduction in Semiconductors, Hall effect.

**4. Electrical Measurements :**

Principles of Measurement. Bridge measurement of Circuit parameters. Measuring Instruments. VTVM and CRO, Q-Meter, Spectrum analyser. Transducers and measurement of non-electrical quantities, digital measurement, telemetering data recording and display.

**Paper—II****5. Elements of Computation :**

Digital system algorithms, flow-charting. Storage : type statements, array storage Arithmetic expression logical expressions, Assignments statements. Programme structure Scientific and Engineering applications, should be included in, Electronics/Telecommunication as well.

**6. Power Apparatus and Systems :**

**Electromechanics** : Principles of electro mechanical energy conversion. Analysis of D.C. synchronous and Induction Machines. Fractional horse-power motors. Machines in Control Systems. Transformers, Magnetic Circuits and Selection of motors for drives. Power System Power generation : Thermal Hydro, and Nuclear Power Transmission. Corona Bundle conductors, Power Systems Protection. Economic operation. Load frequency control, stability analysis.

**7. Control Systems**

Open-loop and closed-loop systems. Response analysis Rootlocus technique, stability, compensation and design technique, State variable approach.

**8. Electronic and Communications**

**Electronics :** Solid state devices and circuits. Small signal amplifier design, feedback amplifiers Oscillators and operational amplifiers, FET circuit and linear ICs Switching circuit Boolean Algebra. Logic circuits. Combinational and sequential digital circuit. **Communications :** Signal analysis Transmission of signals. Modulation and Detection. Various types of communication systems. Performance of communication system.

**ELECTRONICS/TELECOMMUNICATION**  
(For both objective and conventional type papers)

**PAPER—I**

✓1. **Materials Components and Devices :** Structure and properties of electrical engineering materials. Passive components types and properties. ACTIVE components- types and properties solid State Devices- Physics, Characteristics and models.

**2. Network Theory**

Network Theorems. Steady State and transient response of electric circuits. Network analysis Elementary network synthesis.

**3. Electromagnetic Theory**

Field theory. Transmission line theory, Antenna Theory. Propagation of electromagnetic waves in bounded and unbounded media.

✓4. **Measurements and Instrumentation**

Measurement of basis, electrical quantities. Measuring instruments and their principles of working. Transducers. Measurement of non-electrical quantities.

**5. Elements of Computation**

Digital system algorithms, flow-charting. Storage : Type statement, array storage Arithmetic expression logical expressions, Assignments statements, Programme structure Scientific and Engineering applications.

**PAPER—II**✓1. **Linear and Non-linear Analog Circuits.**

Basic Linear electronics circuits, Pulse shaping circuits. Wave form Generators, Stabilizers.

✓2. **Digital Circuits**

Logic circuits and Gates. Computing Circuits Combinational and sequential circuits.

**3. Control Systems**

Feedback theory, Control system components. Response of Control Systems. Design of Practical System.

**4. Communication System**

Basic Information Theory. Modulation and Detection processes. Various types of communication systems. Radio and Line communications. Television and Radar Navigational aids Satellite Communication principles.

**5. Microwave Engineering**

Microwave Sources, Microwave Components and networks. Measurement at Microwave frequencies Microwave communication Systems.

**COMPUTER ENGINEERING**

(For both objective and conventional type papers)

**PAPER—I****1. Electronics :**

Solid State device-Physics, characteristic and model logic families-DTL, RTL, TTL, CMOS, nMOS, logic design-Binary arithmetic, Number system, Codes Boolean algebra circuit minimisation, combinational circuits, synchronous, sequential circuits, Asynchronous sequential circuits, flip flops, counters and shift registers.

**2. Computer Programming and Data structures :**

Programming in FORTRAN, PASCAL and C, Syntax and semantics, variables, control flow, arithmetic and Boolean expression, structural programming, Sub-programming, Algorithms, Array, stack, queue, linked lists, tree, binary tree, B-tree, tree traversal, internal sorting techniques.

**3. Microprocessor :**

Organisation and programming of 8 bit microprocessors, microprocessor support chips, (PPI, PIC, DMA controller etc.) intergacing memory and I/O devices, microprocessor development tools, microprocessor based system design Introduction to 16 and 32 bit microprocessors.

**4. System Software :**

Microprocessor and assemblers, linker, loader, monitor, editor, relocation, re-entrant routine, co-routine.

**PAPER—II****1. Computer Architecture :**

Micro instructions, memory organisation, cache memory, virtual memory, stack array processor, pipeline processor, interconnection scheme for parallel processing, data flow machines.

**2. Operating System :**

Function and Component of OS. , Batch processing, time sharing Device driver, File system, process scheduling, concurrent processes, memory management. swapping segmentation and paging, virtual memory, disk scheduling, deadlock, case study of DOS and UNIX.

**3. Compiler Design Programming languages :**

Lexical analysis, grammer, syntax analysis, topdown and bottom up parsing, semantic analysis symbol table, error detection and recovery, code generation and optimisation. Data abstraction Design philosophy of pascal, functional languages.

**4. Data Processing :**

File organisation techniques, performance of sequential, indexed sequential, indexed, hashed, inverted and multiring files, DBMS, relational data model, integrity constraints, relational algebra, relational calculus, normalisation, concurrency control.

**5. Computer Graphics :**

Graphics I/O devices, Display adapters, CGA, EGA, VGA; 2D line and curve drawing, 2D transformation, windowing, curves of 3D surfaces. 3D modelling and transformation, 3D viewing, Hidden line and surface removal, shading, device independant graphics system.

**Part—B : Examination and its syllabus for recruitment to the post of J Es**

The examination shall be conducted according to the following plan :

**Part—I :** The written examination will comprise two sections - Section-I consisting of General English including Essay or letter writing ; and objective type of question in General knowledge ; and Section-II of conventional papers covering the entire syllabus of the relevant Diploma Engineering disciplines, viz. Electrical, Mechanical, Telecommunication/Electronics and Computer Engineering. The standard and syllabi prescribed for the conventional papers are given in Appendix to the schedule. Other details of the written examination are given in para 2 below.

Part—II : Personality test carrying a maximum of 100 marks on the basis of the such of the candidates who qualify on the basis of written examination.

2. The following will be the subjects for the written examination :

Subject	Duration	Maximum marks
<b>SECTION—I</b>		
1. General ability test (Part A—General English) (Part B—General knowledge)	2 Hours	100
Note : Equal number allotted to each part of this paper.	2 Hours	200
2. Electrical/Mechanical/Electronics/Tele-Communication/Computer Engineering.		
		Total : <u>300</u>

3. In personality test, special attention will be paid to assessing the candidate's capacity for leadership, initiative and intellectual curiosity, tact and other social qualities, mental and physical energy and integrity of character.

4. Conventional papers must be answered in English. All question papers will be set in English only.

5. Candidates must write the papers in their own hand. In no circumstances, will they be allowed the help of a scribe to write the answers for them.

6. Standard of the questions of General English will be that Senior Secondary (10+2) standard whereas that of conventional papers in various subjects would be that of conventional papers in various subjects would be that of Diploma level in relevant Engineering disciplines. There shall be no practical examination in any of the subjects.

7. The Commission have discretion to fix qualifying marks in any or all the subjects of the examination.

#### APPENDIX

##### Syllabus

1. General ability Test :

Part (A) : General English—The question paper in General English will be designed to test the candidate's understanding of English and workmanlike use of words—Level—Senior Secondary (10+2).

Part (B) : General knowledge—The paper in General studies will include knowledge of current events and of such matters as of everybody observation and experience in their scientific aspects. The paper will also include questions on History of India and Geography.

2. Conventional paper in relevant Engineering Subjects :

#### DIPLOMA ELECTRICAL ENGINEERING

##### PART : I

1. Electrical Material

**Conducting Material :** Atomic structure, properties, composition and application of conductor, semiconductor and insulator.

**Magnetic Materials :** Type and uses, B H Curve, hysteresis loop, Ferrite cores.

**Insulating Material :** Electrical, thermal and mechanical properties of various insulators, air, transformer oil, SF<sub>6</sub>, PVC, bitumens, quartz etc.

**Electrical Components :** Different types of resistors, capacitor choke and reactors, electro-magnetic and electrostatic shielding.

**2. Electrical Circuits :**

**Electromagnetism :** Laws and rules, Single phase and 3 phase circuits, phase algebra, Q-factor, resonance, Balanced and unbalanced polyphase circuits, Mesh current and node voltage analysis, Thevenin, Star-delta transformation, Network theorems.

**Electromagnetic Circuits,** Amperes law, induced emf, self inductance, mutual inductance.

**3. Electrical Measurement :**

Principles of measurement classification accuracy and sensitivity damping and control forces, shunt and multiplier, losses, measurement of resistance, DC Potentiometer, AC Potentiometer, AC Bridge, multimeter, PF meters, frequency meters, synchroscope, ballistic galvanometer and flux meter.

**4. Electrical Machines :**

Electrical machine classification, Generalised treatment of electrical machines,  
**Transformer :** Induced emf equivalent circuits, regulation, different efficiencies.

Auto and instrument transformers, paralleling, phase transformer.

**DC Machines :** Construction, emf torque excitation, motor performance, speed power size consideration speed control, efficiency.

**PART—II****1. Generation, Transmission and Distribution :**

**Generation :** Layout, site, auxiliaries of conventional power plants. Conventional power plants, ratings of prime movers and alternators.

**Transmission :** Voltage levels, mechanical consideration of tower, sag, line conductors, electrical line parameters of short lines, voltage regulation corona.

**Distribution :** DC and AC system, voltage levels type of distribution feeders and distributors voltage drop and effects, power factor improvement plant, distribution substation, planning of residential and industrial systems.

**2. Electrical Machines II :**

**Three phase Induction Machines :** Rotating field, torque characteristics, starting, circle diagram, equivalent circuits, Induction generator.

Three phase synchronous machines, generation, voltage regulation, parallel operation synchronous motor, starting and V-curves.

**Single phase motors :** Relevant field theories types, starting characteristics.

**3. Instrumentation :**

**Accuracy, precision types :** Classification and probability of errors, Gaussian error curve-sensitivity resolution and stability.

Mathematical model for instrumentation, calibration transducers.

Measurement of temperature, flow, pressure, vibratic and strain, Nucleonic measurement.

Fundamentals of RF telemetry, basic telemetry system components, methods of coding, modulation.

**Bio-Electronics :** Equipment and principles.

**4. Power Electronics :**

Power diodes and Darlington pair.

**Thyristor :** Principle, thyristor family, triggering, communication and characteristics of SCR, firing circuits applications.

Selenium rectifiers, uncontrolled and controlled rectification.

Electronic speed control of D.C. shut motor.

Time delay relay A.C. operated photo-tube relay, electronic timers and switches applications. Inverters cycloconverters, choppers and their applications.

#### 5. Rural Electrification :

Rural electrification in India, regulation; transmission and distribution of electricity in farms, installation of motors, safety rules etc. 3-phase energy meter and lightning systems, SWER systems,

## MECHANICAL ENGINEERING

### PART—I

#### 1. Principles of Mechanical Engineering

Study of hand tools for workshop practice, machine components. Transmission systems-belt, chain, rope and gear drives. Process equipments like compressors, blowers and fans. Automobiles and their components and auxiliary systems. Practice on welding, automobile maintenance and dismantling and assembling of machine components.

#### 2. Applied Mechanics

Static analysis of simple structures, virtual work, combined motion of rotation and translation, balancing of rotation masses, central force motion and satellite motion, transmission of power by belt and gear drives.

#### 3. Basics of Hydraulics

Properties of liquid, Hydraulic pressure and its measurement, flow of liquids. steady, unsteady, laminar and turbulent flows Orifice, mouthpiece and nozzles, flow through pipes, fundamentals of channel flow.

#### 4. Hydraulics Machinery

Flow measurements : different types of pumps ; reciprocating and rotary pumps ; operation and maintenance of pumps ; characteristic curves of pumps efficiency of pumps ; different types of turbines) Francis, Kaplan and Pelton turbines operation and maintenance of turbines ; flow through turbines, characteristic curves, work done and efficiency of turbines.

#### 5. Machine Drawing II

Drawing of gears, gear boxes, lathe and milling machine components, Drawing of miscellaneous machine parts of pumps, engines, compressors, etc.

#### 6. Fundamentals of Mechanical Engineering

Introduction to engineering thermodynamics, power generating equipments like boiler, turbines and IC engines, Power transmission device : belt, rope and gear drives. Study of power plants, materials handling equipments, fabrication methods like riveting and welding.

#### 7. Materials and Material Science

Engineering materials, mechanical, thermal, chemical and manufacturing properties, structure of materials, alloys, phase diagram.

### PART—II

#### 1. Basics of Mechanical Engineering

Introduction to engineering thermodynamics, Power generating equipments like boiler, turbines and I.C. engines. Power transmission devices. Introduction to fluid and fluids machineries.

#### 2. Machining Processes

Fundamentals of metal cutting, calculations of cutting forces and tool life, general purpose machine tools and their operations. Newer and advanced machining processes like EDM, ECM, and CNC machines.

#### 3. Thermal Engineering

Ideal gas compression and compressors, steam generators. Fuel and combustion. IC engines, cycles, calculation of efficiencies, open and closed gas turbine cycles. Introduction to heat and mass transfer. Refrigeration cycles. Testing of IC Engines, turbines and compressors. Determination of fuel properties.

**4. Refrigeration and Air Conditioning**

Principles of refrigeration, air refrigeration systems, vapour compressed and absorption refrigeration system, refrigerating equipments, psychometry, refrigerants, Principles of air conditioning, humidification and dehumidification, summer and winter air conditioning, industrial and comfort air conditioning, effective temperature, ventilation requirements. Experiments related to vapour compression, vapour absorption systems, vortex tube, cooling tower.

**5. Power Plant Engineering**

Types of Power plants, components of steam power plants, details of diesel generating set, gas turbine power plants, nuclear power plants, hydel power plants, non-conventional sources of power generation, load distribution and calculation of power tariffs. Design and drawing of plant layout, power plant equipments, and other related factors.

**ELECTRONICS AND COMMUNICATION ENGINEERING****PART—I****1. Electrical Material**

**Conducting Material :** Atomic structure, properties, composition and application of conductor, semiconductor and insulator.

**Magnetic Material :** Type and uses, B H Curve, hysteresis loop, Ferrite cores.

**Insulating Material :** Electrical, thermal and mechanical properties of various insulators, air, transformer oil, SF<sub>6</sub>, PVC, bitumens, quartz etc.

**Electrical Components :** Different types of resistors, capacitor choke and reactors, electromagnetic and electrostatic shielding.

**2. Fundamental of Electronics and Measurements :**

**Electronics components :** Types, colour codes, ratings of resistors, inductor and capacitors. Introduction to semi conductor diodes and transistors.

**Electronic devices :** Introduction to rectifiers, voltage regulators, amplifiers, oscillators.

**Binary number system :** Logic gate, truth table.

**Instruments :** Systems of units of measurements, standards. working principle of Ammeter and voltmeters, ohmmeters, Use of multimeter and CRO.

**3. Digital Electronics :**

Binary number codes logic gates, simplification of logic gates concepts of error correction, working of display devices, Fundamentals of TTL logic counters, registers, shift registers.

Study of logic families, A to D and D to A converters. Arithmetic circuits, ICL7106/7107, ALU and its operations, Binary multiplications. Introduction of Computer, Organisation of Computers, Microprocessors Architecture, peripherals.

**4. Fundamentals of Networks, Filters and Transmission Lines :**

**Network Theorems :** Superposition, Thevenin's Nortons Maximum power transfer.

**Networks :** One part and two part, balanced and unbalanced active and passive T-pie, Lattice, ladder.

Concepts and significance of characteristic impedance, loss, propagation constant, phase shift constant. Star delta transformation, equivalent T and pi networks, characteristics impedance of T and pi networks.

**Attenuator :** Symmetrical and other types.

**Filter :** Brief idea of their use and types and characteristics simple design problem.

**Transmission lines :** Types, induction to characteristics and application.

**PART—II****1. Industrial Electronics :**

Power Diodes Transistors, Thyristor principle and various characteristics, Power conversion, Electronic relay and timer circuits, Electronic motor control. Servomechanism. Transducer, signal processing, Electronic instrumentation, Data recorders, Microprocessor applications in industry.

**2. Trouble shooting of Electronic Systems :**

Electronic components and systems—Symbols, identification of terminals, ratings and limitations, Types of troubles cause and effects of troubles.

**Circuit Assembly :** Type of printed circuit Boards, precautions in handling discrete and I.Cs.

**Technical Manuals :** Understanding technical and operating manuals different diagrams and applications.

**Measuring and test equipments :** Multimeters, other meters for current, voltage, frequency, radio and microwave frequency measurements.

**Testing and Alignment :** Of rectifiers audio, video, DC and radio amplifiers.

**Trouble shooting procedure for receivers :** Radio and Video. Reliability and safety : condition affecting reliability and serviceability of electronic components and equipments, Electrical safety.

**3. Audio Systems :**

Review black and white TV, Colour TV : Relative sensitivity of eye to different colours. NTSC SECAM and PAL, their advantages and disadvantages. Delta gun and PIL type of colour picture tubes. Sub carrier frequency. Synchronous quadratic modulation and representation of colour by a vector. Block diagram of PAL TV.

**Audio System :** Acoustics, loudness, pitch and quality of the sound wave, recording and reproduction of sound wave spectra, tape recorder, recorder player, PA system.

**4. Communication Engineering :**

Analog signals—types and representation, Amplitude modulation, Frequency modulation and phase modulation.

Typical digital communication system design, sampling theorem. Time multiplexing of signals, A/D conversion and quantization noise. Delta modulation time Division multiplexing of digital signals. Error detection correction or partial response coding. Basic on Binary communication by on-off keying frequency shift keying.

Introduction to modulation techniques for digital communication.

**COMPUTERS****PART—I****1. Electronics**

**Solid state devices :** Physics, characteristics and model logic design, Binary arithmetic, Boolean algebra, circuit minimization, combinational and sequential circuits, flip flops, counters and shift registers.

**2. Computer Programming**

Computer programming in FORTRAN AND PASCAL, syntax and Semantics, variable, control flow, Arithmetic and Boolean expression, structured programming, subprogramming.

**3. Data Structures**

Array, stack, queue, linked lists, tree Binary tree, B-tree, sorting techniques.

**4. Data Processing**

Usage of popular data processing programmes l. g. DBASE AND LOTUS etc., various commands, functions and programming.

PART-II

1. Microcomputer

Organisation and programming 8 bit microprocessor, memory and CPU of microcomputer, interfacing memory and I/O devices microprocessor support chips, Microprocessor Development tools, microprocessor based system design and application.

2. Design and Maintenance of computer Installation

Component and accessories of micro, mini and Mainframe computer room layout and space design.

Air conditioning and dehumidifier requirement, electrical work power requirements, electrical installations, isolation earthing, protection, servo stabilizers, CVT, UPS, inverter, computer installation, start up and shutdown process, virus detection and protection.

3. Peripheral devices and Fault Diagnosis

Input devices e.g: Key board, mouse, joystick, lightpen, digitiser, scanner, output devices, e.g. VDU, Dot matrix printer, line printer laser printer, inkjet printer, thermal printer, plotter, Hard disk Drive, Floppy disk Drive. Trouble shooting process, various diagnostic tools, maintenance checklist, reliability.

4. Programming languages and Algorithms

Performance analysis of sorting algorithms, e.g. bubblesort, selection sort, insertion sort, quicksort, heapsort, and merge sort. Search algorithms, graphs, shortest path, transitive closure. Block structured languages, design principles. abstraction parameter passing, recursion, functional languages, design philosophy of PASCAL.

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Arunachal Pradesh

persons who immediately on regular posts, on regular Govt. Press-479/93-DIPR-550-5-94.  
to be appointed under