

**ANDHRA PRADESH PUBLIC SERVICE COMMISSION: HYDERABAD**

**NOTIFICATION NO. 20/2011, Dt:- 22/12/2011**

**LECTURERS IN GOVERNMENT POLYTECHNIC COLLEGES (ENGINEERING AND NON-ENGINEERING) IN A.P. TECHNICAL EDUCATION SERVICE  
(GENERAL RECRUITMENT)**

**PARA – 1:**

Recruitment applications are invited On-line through the proforma Application to be made available on WEBSITE ([www.apspsc.gov.in](http://www.apspsc.gov.in)) in from **04/01/2012 to 03/02/2012 (Note: 01/02/2012 is the last date for payment of fee)** for recruitment to the post of **Lecturers in Government Polytechnic Colleges (Engg. & Non Engg).**

The desirous eligible Candidates may apply ON-LINE by satisfying themselves with the terms and conditions of this recruitment. The details are as follows:-

Post Coe	Name of the Post	No. of Vacancies	Age as on 01/07/2011 Min. Max.	Scale of Pay
01	Lecturer in Civil Engineering	11	18 –36	Rs. 8,000- 13,500 AICTE Scales (50% DA merged scales)
02	Lecturer in Mechanical Engineering	03		
03	Lecturer in Electronics & Communication Engineering	16		
04	Lecturer in Computer Engineering	19		
05	Lecturer in Electrical & Electronics Engineering	09		
06	Lecturer in Electronics and Instrumentation Engineering.	05		
07	Lecturer in Automobile Engineering	05		
08	Lecturer in metallurgical Engineering	03		
09	Lecturer in Mining Engineering	01		
10	Lecturer in Bio-Medical Engineering	04		
11	Lecturer in Geology	01		
12	Lecturers in Pharmacy	09		
13	Lecturer in English	24		
14	Lecturer in Mathematics	10		
15	Lecturer in Physics	08		
16	Lecturer in Chemistry	04		
<b>TOTAL</b>		<b>132</b>		

(The details of Break up of Vacancies viz., Community, Zone Wise and Gender wise (General/Women) may be seen at Annexure-I.)

**NOTE:**

1. THE APPLICANTS ARE REQUIRED TO GO THROUGH THE USER GUIDE AND DECIDE THEMSELVES AS TO THEIR ELIGIBILITY FOR THIS RECRUITMENT CAREFULLY BEFORE APPLYING AND ENTER THE PARTICULARS COMPLETELY ONLINE. ALL CANDIDATES HAVE TO PAY RS. 100/- (RUPEES ONE HUNDERED ONLY) TOWARDS APPLICATION PROCESSING FEE AND ALL THOSE WHO ARE NOT EXEMPTED FROM PAYMENT OF FEE HAVE ALSO TO PAY RS. 120/- (RUPEES ONE HUNDERED AND TWENTY ONLY) TOWARDS EXAMINATION FEE.
2. APPLICANT MUST COMPULSORILY FILL-UP ALL RELEVANT COLUMNS OF APPLICATION AND SUBMIT APPLICATION THROUGH WEBSITE ONLY. THE PARTICULARS MADE AVAILABLE IN THE WEBSITE SHALL BE PROCESSED THROUGH COMPUTER AND THE ELIGIBILITY DECIDED IN TERMS OF NOTIFICATION AND CONFIRMED ACCORDINGLY.
3. THE APPLICATIONS RECEIVED ONLINE IN THE PRESCRIBED PROFORMA AVAILABLE IN THE WEBSITE AND WITHIN THE TIME SHALL ONLY BE CONSIDERED AND THE COMMISSION WILL NOT BE HELD RESPONSIBLE FOR ANY KIND OF DISCREPANCY.
4. APPLICANTS MUST COMPULSORILY UPLOAD HIS/HER OWN SCANNED PHOTO AND SIGNATURE THROUGH J.P.G FORMAT.
5. THE APPLICANTS SHOULD NOT FURNISH ANY PARTICULARS THAT ARE FALSE, TAMPERED, FABRICATED OR SUPPRESS ANY MATERIAL INFORMATION WHILE MAKING AN APPLICATION THROUGH WEBSITE.
6. IMPORTANT:- HAND WRITTEN/TYPED/PHOTOSTAT COPIES/PRINTED APPLICATION FORM WILL NOT BE ENTERTAINED.
7. ALL THE ESSENTIAL CERTIFICATES ISSUED BY THE COMPETENT AUTHORITY SHALL COMPULSORILY BE KEPT WITH THE APPLICANTS TO PRODUCE AS AND

WHEN REQUIRED, ON THE DAY OF VERIFICATION DATE ITSELF FOR VERIFICATION. IF CANDIDATES FAIL TO PRODUCE THE SAME, THE CANDIDATURE IS REJECTED / DISQUALIFIED WITHOUT ANY FURTHER CORRESPONDENCE.

The following blank formats (Proforma) are available in the Commission's Website ([www.apspsc.gov.in](http://www.apspsc.gov.in)) The candidates can use, if required.

- i) Community, Nativity and Date of Birth Certificate
- ii) Declaration by the Un-Employed
- iii) School Study Certificate
- iv) Certificate of Residence
- v) Creamy Layer Certificate

**IMPORTANT NOTE:** Distribution of vacancies among roster points is subject to variation and confirmation from the Unit Officer/ Appointing authority.

**NOTE ON IMPORTANT LEGAL PROVISIONS GOVERNING THE RECRUITMENT PROCESS:**

- 1) **Vacancies:** The recruitment will be made to the vacancies notified only. There shall be no waiting list as per G.O.Ms.No. 81 General Administration (Ser.A) Department, Dated 22/02/1997 and Rule 6 of APPSC Rules of procedure. The vacancies are subject to variation and confirmation by the Unit Officer, till such time as decided by the Commission. In any case, no cognisance will be taken by Commission of any vacancies arising or reported after the completion of the selection and recruitment process or the last date as decided by the Commission as far as this Notification is concerned, and these will be further dealt with as per G.O. & Rule cited above.
- 2) The Recruitment will be processed as per this Notification Instructions issued by the Government and also as decided by the Commission from time to time in terms of respective Special Rules/Adhoc Rules governing the Recruitment and G.O.Ms.No. 178, Higher Education (TE-1) Department, dated 09/12/2005 and as per Government orders issued from time to time, and other related G.Os, Rules etc., applicable in this regard.
- 3) **Rules:** All are informed that the various conditions and criterion prescribed herein are Governed by the General Rules of A.P. State and Subordinate Service Rules, 1996 read with the relevant Special Rules applicable to any particular service in the departments. Any guidelines or clarification is based on the said Rules, and in case of any necessity, any matter will be processed as per the relevant General and Special Rules cited as in force.
- 4) The Commission is empowered under the provisions of Article 315 and 320 of the Constitution of India read with relevant Laws, Rules, Regulations and executive instructions and all other enabling legal provisions in this regard to conduct examination for appointment to the posts notified herein, duly following the principle of order of merit as per Rule 3(vi) of the APPSC Rules of Procedure read with relevant statutory provisions and ensuring that the whole recruitment and selection process is carried out with utmost regard to maintain more of secrecy and confidentiality so as to ensure that the principle of merit is scrupulously followed. A candidate shall be disqualified for appointment, if he himself or through relations or friends or any others has canvassed or endeavored to enlist for his candidature, extraneous support, whether from official or non-official sources for appointment to this service.
- 5) **Zonal/Local:** In terms of Para 8 of the G.O., A.P. Public Employment (Organisation of Local Cadres and Regulation of Direct Recruitment) Order, 1975 (G.O.Ms.No. 674, G.A. (SPF-A) Dept., dated: 28/10/1975) read with G.O.Ms.No.124, General Administration (SPF-A) Department, dated: 07/03/2002, and other orders/instructions issued by the Government in this regard, 70% of posts are to be filled by local cadre candidates and 30% of posts are open for which local and non-local are to be considered on the basis of combined merit list.
- 6) The persons already in Government Service/ Autonomous bodies/ Government aided institutions etc., whether in permanent or temporary capacity or as work charged employees are however required to inform in writing, their Head of Office/ Department, that they have applied for this recruitment.
- 7) The Commission is also empowered to invoke the penal provisions of the A.P. Public Examinations (Prevention of Malpractices) and unfair means Act 25/97 and for matters connected therewith or incidental thereto in respect of this Notification.
- 8) **Caste & Community:** Community Certificate issued by the competent authority in terms of G.O.Ms No. 58, SW (J) Dept., dt: 12/5/97 should be submitted at appropriate time. As per General Rules for State and Subordinate Service Rules, Rule-2(28) Explanation: No person who professes a religion different from Hinduism shall be deemed a member of Scheduled Caste. **BCs, SCs & STs belonging to other States are not entitled for reservation, All Candidates belonging to other States shall pay the prescribed Fee.**
- 9) Reservation and eligibility in terms of General Rule 22 & 22 (A) of A.P. State and Subordinate Service Rules are applicable.
- 10) Reservation to Disabled persons is not applicable as per the Departmental Special Rules.

- 11) The Reservation to Women will apply as per General Rules and Special Rules.
- 12) Reservation to BC-E group will be subject to the adjudications of the litigation before the Honorable Courts including final orders in Civil Appeal No: (a) 2628-2637 of 2010 in SLP. No. 7388-97 of 2010, dated. 25/03/2010 and orders from the Government.
- 13) Government have issued orders in G.O. Ms. No. 3, Backward Classes Welfare(C-2) Department, dated 4/4/2006, laying down the criteria to determine Creamy Layer among Backward Classes in order to exclude from the provisions of reservations. Government of Andhra Pradesh has adopted all the criteria to determine the Creamy Layer among Backward Classes as fixed by the Government of India. In view of the Government orders, in G.O. Ms. No. 3, Backward Classes Welfare(C-2) Department, dated 4/4/2006, the candidates claiming as belong to Backward Classes have to produce a Certificate regarding their exclusion from the Creamy Layer from the competent authority (Tahasildar). Certificate excluding from Creamy Layer has to be produced at an appropriate time. In case of failure to produce the same on day of verification, the Candidature is rejected without further correspondence.
- 14) The Candidates who have obtained Degrees through Open Universities / Distance Education mode are required to have recognition by the Distance Education Council, IGNOU. Unless such Degrees had been recognised by the D.E.C. they will not be accepted for purpose of Educational Qualification. The onus in case of doubt, of Proof of recognition by the D.E.C. that their Degrees / Universities have been recognised, rests with the Candidate.

**PARA-2: EDUCATIONAL QUALIFICATIONS:**

Applicants must possess the qualifications from a recognized University/Board as detailed below or equivalent thereto, subject to various specifications in the relevant Service Rules and as indented by the department as on the date of Notification.

PC. No.	Name of the Post	Educational Qualifications
01	Lecturer in Civil Engineering	Must possess a First Class Bachelor's Degree in the appropriate Branch of Engineering/Technology as recognized by All India Council for Technical Education or its equivalent.
02	Lecturer in Mechanical Engineering	
03	Lecturer in Electronics & Communication Engineering	
04	Lecturer in Computer Engineering	
05	Lecturer in Electrical & Electronics Engineering	
06	Lecturer in Electronics and Instrumentation Engineering.	
07	Lecturer in Automobile Engineering	
08	Lecturer in metallurgical Engineering	
09	Lecturer in Mining Engineering	
10	Lecturer in Bio-Medical Engineering	
11	Lecturer in Geology	A First Class Master's Degree in Geology from an University in India recognized by UGC or AICTE
12	Lecturers in Pharmacy	A First Class Bachelor's Degree in Pharmacy from an University in India recognized by UGC or AICTE
13	Lecturer in English	A First Class Master's Degree in English from an University in India recognized by UGC.
14	Lecturer in Mathematics	A First Class Master's Degree in Mathematics from an University in India recognized by UGC.
15	Lecturer in Physics	A First Class Master's Degree in Physics from an University in India recognized by UGC.
16	Lecturer in Chemistry	A First Class Master's Degree in Chemistry from an University in India recognized by UGC.

**Note:** Relaxation of 5% marks is available for the candidates belonging to SC/ST, i.e., 55% marks is enough for the purpose of eligibility.

**PARA-3 AGE:** Minimum 18 years & Maximum 36 years as on 01/07/2011

N.B: The Candidate shall complete 18 years and shall not be more than 36 years of age.

**NOTE:** The upper age limit prescribed above is relaxable in the following cases:

Sl. No.	Category of candidates	Relaxation of age permissible
1	2	3
1.	Retrenched temporary employees in the State Census Department with a minimum service of 6 months.	3 Years
2.	A.P. State Government Employees (Employees of APSEB, APSRTC, Corporations, Municipalities etc. are not eligible).	5 Years based on the length of regular service.
3.	Ex-Service men	3 years & length of service rendered in the armed forces.
4.	N.C.C.(who have worked as Instructor in N.C.C.)	3 Years & length of service rendered in the N.C.C.
5.	SC/ST and BCs	5 Years

**EXPLANATION:**

After provision of the relaxation of Age in Col. No. 3 of table above; the age shall not exceed the maximum age prescribed for the post for the candidates at Sl.No. 3 & 4.

The age relaxations for Ex-Servicemen is applicable for those who have been released from Armed Forces otherwise than by way of dismissal or discharge on account of misconduct or inefficiency.

**PARA-4: (a) FEE:** (Remittance of Fee) Each applicant must pay Rs. **100/- (Rupees One Hundred Only)** towards Application Processing Fee and Examination Fee **RS.120/- (RUPEES ONE HUNDRED AND TWENTY ONLY)** (if Candidates are not exempted from payment of Fee). Payment of **Rs. 100/- (Rupees One Hundred Only)** towards application processing fee is compulsory for all Applicants.

**b) Mode of Payment of Fee:**

I Step:-The Candidate has to logon to the WEBSITE ([www.apspsc.gov.in](http://www.apspsc.gov.in)) and enter his/her Basic Personal Details like Name, Father's Name, Date of Birth, and Community.

II Step:-Immediately on entering the above details the Applicant will get (downloadable)- Challan Form to pay the Fee at AP Online centers /State Bank of India.

III Step:-The Applicant should pay the prescribed Fee in any one of the A.P. Online centers / State Bank of India and obtain Fee paid challan with Journal Number in the first instance.

IV Step:-**On the next working day** after payment of Fee the Applicant should again visit WEBSITE and enter the Journal Number to get the format of Application. The applicant has to invariably fill all the columns in the Application and should submit ON-Line. Even after making payment of fee, candidate fails to submit the bio-data particulars, such applications shall be rejected without giving any notice.

V Step:- If any candidate fails to enter "Community" for any reason, they will be treated as an OC without giving any notice.

**NOTE ON EXEMPTIONS:** The following category of candidates are exempted from payment of fee:

- SC, ST, BC, & Ex-Service Men.
- Families having Household Supply White Card issued by Civil Supplies Department, A.P. Government. (Residents of Andhra Pradesh)
- Un employed youth in the age group of 18 to 36 years as per G.O.Ms.No. 439, G.A.(Ser.A) Dept., dated: 18/10/1996 should submit declaration at an appropriate time to the Commission.
- Applicants belonging to the categories mentioned above (except Ex-Service Men) hailing from other States are not entitled for exemption from payment of fee and not entitled for claiming any kind of reservation.

**PARA-5: PROCEDURE OF SELECTION:**

THE SELECTION OF CANDIDATES FOR APPOINTMENT TO THE POSTS WILL BE MADE IN TWO SUCCESSIVE STAGES VIZ.,

- Written Examination (Objective Type)
- and

- Oral Test in the shape of Interview only for those qualified as per Rules.

THE FINAL SELECTION OF THESE POSTS WILL BE BASED ON THE WRITTEN AND ORAL MARKS PUT TOGETHER.

1. Only those candidates who qualify in the Written Examination by being ranked high will be called for interview in 1:2 ratio. The minimum qualifying marks for interview / selection are OCs 40%, BCs 35% SCs, and STs 30% or as per Rules. The minimum qualifying marks are relaxable in the case of SC/ST/BC at the discretion of the Commission.
2. The candidates will be selected and allotted to the Service as per their rank in the merit list and as per zonal preference for allotment of candidates against vacancies and for the vacancies available.  
N.B.: Mere securing minimum qualifying marks does not vest any right in a candidate for being called for interview.
3. The appearance in all the papers at the Written Examination and also for interview in case called upon, if qualified, as per Rules is compulsory. Absence in any of the above tests will automatically render his candidature as disqualified.
4. Candidates have to produce Original documents and other particulars for verification as and when required and called for. If the particulars furnished in the Application do not tally with the Original documents produced by the candidate, the candidature will be rejected. As candidature for the recruitment is processed through Computer/Electronic devices based on the particulars furnished in the Application Form, the candidate is advised to fill in all the relevant particulars carefully.
5. While the Commission calls for preference of candidates in respect of posts, zones etc., in the Application Form, it is hereby clarified that the said preferences are only indicative for being considered to the extent possible but not binding or limiting the Commission's powers enjoyed under Article 315 and 320 of the Constitution of India. Therefore, the Commission has the power to assign a successful candidate to any of the notified posts for which he is considered by them to be qualified and eligible, subject to fulfilling the selection criterion. Mere claim of preference for any Zone for allotment against vacancy does not confer a right to selection for that Zone in particular or any Zone in general.
6. The appointment of selected candidates will be subject to their being found medically fit in the appropriate medical classification, and if he is of sound health, active habits, free from any bodily infirmity.

**PARA-6: RESERVATION TO LOCAL CANDIDATES:** Reservation to the Local candidates is applicable as provided in the Rules and as amended from time to time as in force on the date of notification. The candidates claiming reservation as Local candidates should obtain the required Study certificates (from IV Class to X Class or SSC) OR Residence Certificate in the Proforma only for those candidates who have not studied in any Educational Institutions as the case may be. The relevant certificates may be got ready with authorized signature and kept with the candidates to produce as and when required.

**DEFINITION OF LOCAL CANDIDATE:**

- (A) (i) "LOCAL CANDIDATE" means a candidate for direct recruitment to any post in relation to that Local areas where he/she has studied in Educational Institution(s) for not less than four consecutive academic years prior to and including the year in which he/she appeared for S.S.C or its equivalent examination. If however, he/she has not studied in any educational institution during the above four years period, it is enough if he/she has resided in that area which is claimed as his/her local area during the above said period.
- (ii) In case Candidate does not fall within the scope of above then, if he/she has studied for a period of not less than seven years prior to and inclusive of the year in which he/she has studied SSC or its equivalent, he/she will be regarded as local candidate on the basis of the maximum period out of the said period of seven years AND where the period of his/her study in two or more local areas or equal such local area where he/she has studied last in such equal periods will be taken for determining the local candidature. Similarly, if he/she has not studied during the above said period in any Educational Institution(s) the place of residence during the above period will be taken into consideration and local candidature determined with reference to the maximum period of residence or in the case of equal period where he/she has resided last in such equal periods.
- (iii) If the claim for local candidature is based on study, the candidate is required to produce a certificate from the Educational Institution(s) where he/she has studied during the said 4/7-year period. If, however, it is based on residence, a certificate should be obtained from an officer of the Revenue Department not below the rank of a Mandal Revenue Officer in independent charge of a Mandal.
- (iv) If, however, a candidate has resided in more than one Mandal during the relevant four/seven years period but within the same District or Zone as the case may be separate certificates from the Mandal Revenue Officers exercising jurisdiction have to be obtained in respect of different areas.

**NOTE:**

- (A) Single certificate, whether of study or residence would suffice for enabling the candidate to apply as a "**LOCAL CANDIDATE**".
- (B) RESIDENCE CERTIFICATE WILL NOT BE ACCEPTED, IF A CANDIDATE HAS STUDIED IN ANY EDUCATIONAL INSTITUTION UPTO S.S.C. OR EQUIVALENT EXAMINATION, SUCH CANDIDATES HAVE TO PRODUCE STUDY CERTIFICATES INVARIABLY. THE CANDIDATES, WHO ACQUIRED DEGREE FROM OPEN UNIVERSITIES WITHOUT STUDYING SSC/ MATRICULATION OR EQUIVALENT IN EDUCATIONAL INSTITUTIONS, HAVE TO SUBMIT RESIDENCE CERTIFICATE ONLY. EDUCATIONAL INSTITUTIONS MEANS A RECOGNIZED INSTITUTION BY THE GOVERNMENT/UNIVERSITY/COMPETENT AUTHORITY.
- (C) Candidates are advised to refer provisions of the PRESIDENTIAL ORDER 1975 in this regard
- (D) Each of the following Zones comprises the Districts mentioned against each Zone.

**Zones:**

1. Srikakulam, Visakhapatnam and Vizianagaram. (SKM, VSP, VZM)
2. East Godavari, West Godavari and Krishna. (EG, WG, KST)
3. Guntur, Prakasam and Nellore. (GNT, PKM, NLR)
4. Chittoor, Cuddapah, Anantapur and Kurnool. (CTR, CDP, ATP, KNL)
5. Adilabad, Karimnagar, Warangal and Khammam. (ADB, KRMN, WGL, KMM)
6. Hyderabad, Ranga Reddy, Nizamabad, Mahaboobnagar, Medak and Nalgonda. (HYD, RRD, NZB, MBNR, MDK, NLG)

City Cadre: City of Hyderabad consists of Hyderabad Division, Secunderabad Division of Municipal Corporation of Hyderabad, Secunderabad Contonment area, O.U.Campus, Fatehnagar, Bowenpally, Macha Bolarum, Malkajgiri, Uppal Khalsa, Alwal, Balanagar, Moosapet, Kukatpally Panchayat Areas and Zamistanpur and Lallaguda villages. (HYD)

NB: Where City Cadre is not organized separately Candidates belonging to City Cadre – City of Hyderabad will be considered under Zone-VI

**PARA-7: SCHEME OF EXAMINATION:-** The Scheme & Syllabus for the examination has been shown in Annexure-II.

**PARA-8: HOW TO APPLY:****A) HOW TO UPLOAD THE APPLICATION FORM:**

- i) The Applicants have to read the User Guide for Online Submission of Applications and then proceed further.

I Step: The Candidate has to logon to the WEBSITE ([www.apspsc.gov.in](http://www.apspsc.gov.in)) and enter his/her Basic Personal Details like Name, Father's Name, Date of Birth, and Community.

II Step: Immediately on entering the above details the Applicant will get (downloadable)- Challan Form to pay the Fee at AP Online centers /State Bank of India.

III Step: The Applicant should pay the prescribed Fee in any one of the A.P. Online centers / State Bank of India and obtain Fee paid challan with Journal Number in the first instance.

IV Step: **On the next working day** after payment of Fee the Applicant should again visit WEBSITE and enter the Journal Number to get and fill the format of Application and should submit ON-LINE.

V Step: Affix your recent Colour Passport Size Photograph on a White Paper and then sign below the photograph with Black Pen. Scan the above Photo and Signature and Upload in the appropriate space provided (JPG Format) in Application Form.

VI Step: The applicants have to invariably fill all the relevant columns in the Application and should submit ON-LINE.

- ii) **Hand written/ Typed/ Photostat copies/ outside printed Application Form will not be accepted and liable for rejection.**

iii) Only applicants willing to serve anywhere in the Andhra Pradesh should apply.

iv) For any problems related to Online submission and downloading of Hall-Tickets please contact 040-23557455 ((Call Time: 9.30 A.M to 1.00 P.M & 1.30 P.M to 5.30 P.M) or mail to [appschelpdesk@gmail.com](mailto:appschelpdesk@gmail.com).

**NOTE:**

1. The Commission is not responsible, for any discrepancy in submitting through Online. The applicants are therefore, advised to strictly follow the instructions and User guide in their own interest.



entertained from the candidates. The candidature and conditions specified here are subject to latest rules / orders come into force during the process of recruitment.

- 7) The Commission would be analyzing the responses of a candidate with other appeared candidates to detect patterns of similarity. If it is suspected that the responses have been shared and the scores obtained are not genuine/ valid, the Commission reserves the right to cancel his/ her candidature and to invalidate the Answer Sheet.
- 8) If the candidate noticed any discrepancy printed on Hall ticket as to community, date of birth etc., they may immediately bring to the notice of Commission's officials/Chief Superintendent in the exam centre and necessary corrections be made in the Nominal Roll for being verified by the Commission's Office.

**PARA-11:DEBARMENT:**

- a) Candidates should make sure of their eligibility to the post applied for and that the declaration made by them in the format of application regarding their eligibility is correct in all respects. Any candidate furnishing in-correct information or making false declaration regarding his/her eligibility at any stage or suppressing any information is liable TO BE DEBARRED FOR FIVE YEARS FROM APPEARING FOR ANY OF THE EXAMINATIONS CONDUCTED BY THE COMMISSION, and summarily rejection of their candidature for this recruitment.
- b) The Penal Provisions of Act 25/97 published in the A.P. Gazette No. 35, Part-IV.B Extraordinary dated: 21/08/1997 shall be invoked if malpractice and unfair means are noticed at any stage of the Recruitment.
- c) The Commission is vested with the constitutional duty of conducting recruitment and selection as per rules duly maintaining utmost secrecy and confidentiality in this process and any attempt by anyone causing or likely to cause breach of this constitutional duty in such manner or by such action as to violate or likely to violate the fair practices followed and ensured by the Commission will be sufficient cause for rendering such questionable means as ground for debarment and penal consequences as per law and rules as per decision of the Commission.
- d) Any candidate is or has been found impersonating or procuring impersonation by any person or resorting to any other irregular or improper means in connection with his / her candidature for selection or obtaining support of candidature by any means, such a candidate may in addition to rendering himself/ herself liable to criminal prosecution, will be liable to be debarred permanently from any exam or selection held by the Service Commission's in the country.
- e) **MEMORANDUM OF MARKS:** Memorandum of Marks is issued on payment of Rs.25/- (Rupees twenty five only) through crossed Indian Postal Order only drawn in favour of the Secretary, A.P. Public Service Commission, Hyderabad. Request for Memorandum of Marks from candidates, will be entertained within two months from the date of publication of the selections. Such a request must necessarily be accompanied by a Xerox copy of the Hall-ticket. Request for revaluation or recounting will not be under taken under any circumstances. Invalid, disqualified, ineligible candidates will not be issued any Memorandum of Marks and fees paid by such candidates, if any, will be forfeited to Government account, without any correspondence in this regard.

If any candidate fails to mark the Booklet Series, Roll Number etc., in the OMR Answer Sheet, the Commission reserves the right to invalidate such Answer Sheets as Answer Sheets are valued by Optical Mark Scanner. In case of rejection/ invalidation due to omission on the part of the candidate, the decision of the Commission is final and such request for Memorandum of Marks in such cases will be intimated accordingly. No request for reconsideration of such rejected/invalidated cases will be entertained under any circumstances whatsoever.

**PARA-12: COMMISSION'S DECISION TO BE FINAL:**

The decision of the Commission in all aspects and all respects pertaining to the application and its acceptance or rejection as the case may be, conduct of examination and at all consequent stages culminating in the selection or otherwise of any candidate shall be final in all respects and binding on all concerned, under the powers vested with it under Article 315 and 320 of the Constitution of India. Commission also reserves its right to alter and modify regarding time and conditions laid down in the notification for conducting the various stages up to selection, duly intimating details thereof to all concerned, as warranted by any unforeseen circumstances arising during the course of this process, or as deemed necessary by the Commission at any stage.

HYDERABAD,  
DATE: 22/12/2011

Sd/-  
SECRETARY



**ANNEXURE – I  
NOTIFICATION NO. 20/2011**

**Breakup of provisional vacancies for Lecturers in Government Polytechnic Colleges  
(Engineering and Non-Engineering) in A.P. Technical Education Service  
(General Recruitment)**

**FOR PC.NO.1: LECTURER IN CIVIL ENGINEERING**

Zone	OC		BC-A		BC-B		BC-C		BC-D		BC-E		SC		ST		Total		Grand Total
	G	W	G	W	G	W	G	W	G	W	G	W	G	W	G	W	G	W	
I		1	1							1		1					1	3	4
II																			
III		1			1										1		2	1	3
IV																			
V	1								1								2		2
VI	1														1		1	1	2
<b>Total</b>	<b>2</b>	<b>2</b>	<b>1</b>		<b>1</b>				<b>1</b>	<b>1</b>					<b>1</b>	<b>1</b>	<b>6</b>	<b>5</b>	<b>11</b>

**FOR PC.NO.2: LECTURER IN MECHANICAL ENGINEERING**

Zone	OC		BC-A		BC-B		BC-C		BC-D		BC-E		SC		ST		Total		Grand Total
	G	W	G	W	G	W	G	W	G	W	G	W	G	W	G	W	G	W	
I	1																1		1
II			1														1		1
III																			
IV	1																1		1
V																			
VI																			
<b>Total</b>	<b>2</b>		<b>1</b>														<b>3</b>		<b>3</b>

**FOR PC.NO.3: LECTURER IN ELECTRONICS & COMMUNICATION ENGINEERING**

Zone	OC		BC-A		BC-B		BC-C		BC-D		BC-E		SC		ST		Total		Grand Total
	G	W	G	W	G	W	G	W	G	W	G	W	G	W	G	W	G	W	
I	1	1															1	1	2
II		1	1														1	1	2
III	2	1					1										3	1	4
IV																			
V																			
VI	2	1		1		1			1		1			1			4	4	8
<b>Total</b>	<b>5</b>	<b>4</b>	<b>1</b>	<b>1</b>		<b>1</b>	<b>1</b>		<b>1</b>		<b>1</b>			<b>1</b>			<b>9</b>	<b>7</b>	<b>16</b>

**FOR PC.NO.4: LECTURER IN COMPUTER ENGINEERING**

Zone	OC		BC-A		BC-B		BC-C		BC-D		BC-E		SC		ST		Total		Grand Total
	G	W	G	W	G	W	G	W	G	W	G	W	G	W	G	W	G	W	
I	1	1			1									1			2	2	4
II																			
III	4	2	1										1		1		7	2	9
IV	2	1															2	1	3
V																			
VI	2													1			2	1	3
<b>Total</b>	<b>9</b>	<b>4</b>	<b>1</b>		<b>1</b>									<b>1</b>	<b>2</b>	<b>1</b>	<b>13</b>	<b>6</b>	<b>19</b>

**FOR PC.NO.5: LECTURER IN ELECTRICAL & ELECTRONICS ENGINEERING**

Zone	OC		BC-A		BC-B		BC-C		BC-D		BC-E		SC		ST		Total		Grand Total
	G	W	G	W	G	W	G	W	G	W	G	W	G	W	G	W	G	W	
I																			
II																			
III																			
IV	3			1		1			1		1		1	1			6	3	9
V																			
VI																			
<b>Total</b>	<b>3</b>			<b>1</b>		<b>1</b>			<b>1</b>		<b>1</b>		<b>1</b>	<b>1</b>			<b>6</b>	<b>3</b>	<b>9</b>

**FOR PC.NO.6: LECTURER IN ELECTRONICS AND INSTRUMENTATION ENGINEERING**

Zone	OC		BC-A		BC-B		BC-C		BC-D		BC-E		SC		ST		Total		Grand Total
	G	W	G	W	G	W	G	W	G	W	G	W	G	W	G	W	G	W	
I													1				1		1
II																			
III																			
IV	1														1		1	1	2
V								1									1		1
VI	1																1		1
Total	2							1				1			1		3	2	5

**FOR PC.NO.7: LECTURER IN AUTOMOBILE ENGINEERING**

Zone	OC		BC-A		BC-B		BC-C		BC-D		BC-E		SC		ST		Total		Grand Total
	G	W	G	W	G	W	G	W	G	W	G	W	G	W	G	W	G	W	
I																			
II																			
III		1											1				2		2
IV																			
V																			
VI	1	1	1														2	1	3
Total	1	2	1										1				2	3	5

**FOR PC.NO.8: LECTURER IN METALLURGICAL ENGINEERING**

Zone	OC		BC-A		BC-B		BC-C		BC-D		BC-E		SC		ST		Total		Grand Total
	G	W	G	W	G	W	G	W	G	W	G	W	G	W	G	W	G	W	
I	1												1				2		2
II																			
III																			
IV																			
V																			
VI				1														1	1
Total	1			1									1				2	1	3

**FOR PC.NO.9: LECTURER IN MINING ENGINEERING**

Zone	OC		BC-A		BC-B		BC-C		BC-D		BC-E		SC		ST		Total		Grand Total
	G	W	G	W	G	W	G	W	G	W	G	W	G	W	G	W	G	W	
I																1		1	1
II																			
III																			
IV																			
V																			
VI																			
Total																1		1	1

**FOR PC.NO.10: LECTURER IN BIO-MEDICAL ENGINEERING**

Zone	OC		BC-A		BC-B		BC-C		BC-D		BC-E		SC		ST		Total		Grand Total
	G	W	G	W	G	W	G	W	G	W	G	W	G	W	G	W	G	W	
I																			
II																			
III																			
IV	1					1						1					3		3
V																			
VI													1					1	1
Total	1					1						1	1				3	1	4

**FOR PC.NO.11: LECTURER IN GEOLOGY**

Zone	OC		BC-A		BC-B		BC-C		BC-D		BC-E		SC		ST		Total		Grand Total
	G	W	G	W	G	W	G	W	G	W	G	W	G	W	G	W	G	W	
I																			
II																			
III																			
IV																			
V	1																	1	1
VI																			
Total	1																	1	1

**FOR PC.NO.12: LECTURER IN PHARMACY**

Zone	OC		BC-A		BC-B		BC-C		BC-D		BC-E		SC		ST		Total		Grand Total	
	G	W	G	W	G	W	G	W	G	W	G	W	G	W	G	W	G	W		
I	1																	1	1	
II																				
III																				
IV	1					1												2	2	
V																				
VI	1	1	1						1		1		1					2	4	6
Total	3	1	1			1			1		1		1					5	4	9

**FOR PC.NO.13: LECTURER IN ENGLISH**

Zone	OC		BC-A		BC-B		BC-C		BC-D		BC-E		SC		ST		Total		Grand Total
	G	W	G	W	G	W	G	W	G	W	G	W	G	W	G	W	G	W	
I	2					1							1			1	3	2	5
II	2																2		2
III	3			1									1			1	4	2	6
IV	1																1		1
V	1	1					1			1		1	1				3	3	6
VI	2	1				1											2	2	4
Total	11	2		1		2	1			1		1	3			2	15	9	24

**FOR PC.NO.14: LECTURER IN MATHEMATICS**

Zone	OC		BC-A		BC-B		BC-C		BC-D		BC-E		SC		ST		Total		Grand Total
	G	W	G	W	G	W	G	W	G	W	G	W	G	W	G	W	G	W	
I	1															1	1	1	2
II																			
III	2					1										1	2	2	4
IV	1															1	1	1	2
V	1																1		1
VI		1																1	1
Total	5	1				1										3	5	5	10

**FOR PC.NO.15: LECTURER IN PHYSICS**

Zone	OC		BC-A		BC-B		BC-C		BC-D		BC-E		SC		ST		Total		Grand Total
	G	W	G	W	G	W	G	W	G	W	G	W	G	W	G	W	G	W	
I	1	1		1													1	2	3
II																			
III													1				1		1
IV	1																1		1
V	1														1		1	1	2
VI	1																1		1
Total	4	1		1									1		1		5	3	8

**FOR PC.NO.16: LECTURER IN CHEMISTRY**

Zone	OC		BC-A		BC-B		BC-C		BC-D		BC-E		SC		ST		Total		Grand Total
	G	W	G	W	G	W	G	W	G	W	G	W	G	W	G	W	G	W	
I	1																1		1
II																			
III																			
IV	1						1										2		2
V																			
VI	1																1		1
<b>Total</b>	<b>3</b>						<b>1</b>										<b>4</b>		<b>4</b>

## ANNEXURE – II

### Notification No. 20/2011

#### SCHEME AND SYLLABUS FOR THE POST OF LECTURERS IN GOVERNMENT POLYTECHNICS (ENGINEERING & NON ENGINEERING) IN A.P. TECHNICAL EDUCATION SERVICE

#### SCHEME

<b><u>PART-A:</u> Written (Objective Type) Examination:</b>				
<b>Paper-1</b>	General Studies & Mental ability	150 Marks.	150 Qns.	150 Minutes
<b>Paper-2</b>	Concerned Subject	300 Marks.	150 Qns.	150 Minutes
<b><u>PART-B:</u></b>	<b>ORAL TEST</b> (Interview)	50 Marks		

- N.B:** 1. The paper in concerned subject for Engineering streams is of Engineering **Bachelor's degree** standard.  
2. The paper in the concerned subject for Non-Engineering streams is of **P.G. Degree standard**  
3. The Question papers will be in English only.

Name of the Subject	
1) Civil Engineering	9) Mining Engineering
2) Mechanical Engineering	10) Bio-Medical Engineering
3) Electronics & Communication Engineering	11) Geology
4) Computer Engineering	12) Pharmacy
5) Electrical & Electronics Engineering	13) English
6) Electronics & Instrumentation Engineering	14) Mathematics
7) Automobile Engineering	15) Physics
8) Metallurgical Engineering	16) Chemistry

### SYLLABUS

#### **GENERAL STUDIES AND MENTAL ABILITY**

I. General Science – Contemporary developments in Science and Technology and their implications including matters of every day observation and experience, as may be expected of a well-educated person who has not made a special study of any scientific discipline.

II. Current events of national and international importance.

III. History of India – emphasis will be on broad general understanding of the subject in its social, economic, cultural and political aspects with a focus on AP Indian National Movement.

IV. World Geography and Geography of India with a focus on AP.

V. Indian polity and Economy – including the country's political system- rural development – Planning and economic reforms in India.

VI. Mental ability – reasoning and inferences.

#### VII. DISASTER MANAGEMENT (Source : CBSE Publications)

1. Concepts in disaster management and vulnerability profile of India / State of A.P.
2. Earth quakes / Cyclones / Tsunami / Floods / Drought – causes and effects.
3. Man made disasters - Prevention strategies.
4. Mitigation strategies / Mitigation measures.

## CIVIL ENGINEERING

### 01. ANALYSIS OF STRUCTURES:

Sending stresses and shear stresses in beams;

Deflection and slope of beams;

Combined bending and direct stresses; axially and eccentrically loaded columns;

Close-Coiled and open-coiled; helical springs under axial load and axial twist; carriage springs;

Analysis thin and thick cylinders; compound cylinders;

Analysis of statically determinate plane trusses; method of joints and method of sections.

Analysis of statically indeterminate beams; proposed canti-levers, fixed beams and continuous beams.

Strain energy method, slope-deflection method, moment distribution method and Kaini's method of analysis of indeterminate structures.

Influence lines and moving loads on beams and simple bridge trusses.

### 02. STRUCTURAL DESIGN:

Reinforced concrete, concrete technology, R.C.C. Design, working stress method and limit state method, Design of beams, Design of one-way and two-way slabs, design of axially loaded columns, design of continuous beams and slabs; Design of wall footings and isolated footings, combined footings, raft foundations, and retaining walls by limit state method, water tanks, Deck-slab and T-beam bridges by working stress method. Structural Steel – design of riveted and welded joints, design of tension members;

Compression members, simple and compound beams. Design of plate girders, crane girders and roof-trusses. Elements of pre-stressed concrete.

### 03. FLUID MECHANICS AND HYDRAULIC MACHINES:

Fluid properties; fluid static's; fluid-flow concepts; Laminar and turbulent flow; steady and unsteady-flow, uniform and non-uniform flow; Fundamental EQUATIONS; CONTINUITY EQUATION; Euler's equation of motion; Bernoulli's equation, Analysis of liquid jets; flow through orifices and mouth pieces; radial flow, flow along a curved path; Momentum equation and applications; Moment of Momentum equation. Dimensional analysis and similitude; Viscous flow-laminar flow through circular pipes; velocity distribution in laminar flow. Turbulent flow in pipes, velocity distribution in turbulent flow; Flow measurement – pressure moment, velocity measurement and discharge measurement, venturimeter, Orifice, meter, notches and weirs. Hydraulic machines; Turbines and pumps; basic equations; Orifice, performance, selection, specific speed.

### 04. WATER RESOURCES ENGINEERING:

Steady flow through open channels. Uniform flow in channels; Chezy and Manning's formulae. Specific energy and critical depth. Hydraulic jump – Momentum equation for a hydraulic jump. Surface Water hydrology; Hydrologic cycle, hydrologic data- measurement of precipitation, evaporation, transpiration, and infiltration. Runoff, determination of run-off. Stream gauging; flood-Studies, Hydrograph and unit hydrograph, flood routing. Ground water resources, Darcy's law, Dupuits equation, yield of wells, recuperation test.

### 05. SURVEYING:

Chain surveying; compass surveying, plane table surveying; leveling and contouring, Minor instruments; Areas and Volumes; Theodolite surveying and traversing; Tachometry; Curve ranging; setting out works.

Principles and uses of triangulation, hydrographic surveying, Aerial photogrammetry and photo interpretation, remote sensing and electromagnetic distance measurement.

### 06. GEO-TECHNICAL ENGINEERING:

Physical properties of soils; identification and classification of soils; permeability and seepage; consolidation; shearing strength of soil; stability of earth slopes; site investigation and sub soil exploration.

Stress distribution in soil; soil; compaction; lateral earth pressure and retaining walls; bearing capacity and shallow foundations; pile foundations; well foundations; Machine foundations.

### 07. TRANSPORTATION ENGINEERING:

Highway Engineering; classification of roads; highway alignment and surveys; geometric design of highways; elements of traffic engineering; highway materials and testing; elements of pavement design; construction and maintenance of earth gravel, W.B.M., bitumenous and concrete roads; highway drainage.

Railway Engineering; engineering surveys for a new railway route, gauge and gauge problem; track components; ballast; sleepers; rails anrail fastenings; Station and station yards;

requirements and requirement for station yards; signaling and inter locking. Elements of cross drainage works; causeways; culverts; bridges.

**08 ENVIRONMENTAL ENGINEERING:**

Water supply engineering; sources of water supply, conveyance of water, distribution systems; quality of water; treatment of water; filtration; dis-infection; methods of water treatment.

Sanitary engineering; sewerage and sewage disposal; house fittings; design of sewers; characteristics of sewage, primary and secondary treatment of sewage' methods of disposal of sewage.

## MECHANICAL ENGINEERING

### 01. FLUID MECHANICS:

Fluid Properties, fluid static's, Kinematics and Dynamics, Euler's equation, Bernoulli's energy equation, flow of ideal fluids, Viscous in compressible flows – laminar flow, boundary layer, basic features of turbulent flow, flow through pipes, fluid machinery, Specific speed and classification of fluid machines. Performance and operation of pumps, impulse and reaction turbines, velocity triangles and degree of reaction.

### 02. THERMO DYNAMICS:

Thermo dynamic systems, measurements of temperature work, heat and internal energy. First law of thermodynamics, ideal gas equation Air standard cycles, Carnot, Otto, Diesel, dual and Joule cycle. Energy and Enthalpy. Second law of Thermo dynamics. Available and Unavailable energies. Reversible and irreversible processes. Psychrometry, Properties of pure substances.

### 03. MATERIAL SCIENCE:

Structure of metal and alloys, Bonding in solids. Imperfections of metals and in crystals, fracture, creep, fatigue and corrosion. Phase Rule, phase transformation diagrams and lever rule.

### 04. ENGINEERING MECHANICS AND STRENGTH OF MATERIALS:

Equivalent force systems, free body concepts and equations of equilibrium, frictional forces. Kinematics and dynamics of rigid bodies. Stress and strain, elastic limit, yield point and ultimate stress, shear force and bending moment diagrams for beams. Calculation of stress slope and deflection in beams, theories of failure, torsion of circular shaft, thin cylinders, equivalent bending moment for solid and hollow shafts.

### 05. MANUFACTURING PROCESSES:

Classification of manufacturing processes. Fundamentals of casting. Classification of casting process. Sandcasting – patterns, molding, melting and pouring solidification, cleaning and finishing casting defects. Metal forming – hot and cold working, forging, rolling extrusion, wire and tube drawing, deep drawing, blanking and stamping processes. Fundamentals of welding arc and gas welding, brazing and soldering, heat treatment – annealing – normalizing, hardening and tempering.

### 06. APPLIED THERMO DYNAMICS:

Internal combustion engines classification, working and performance of C.I. and S.I. engines combustion process in I.C. Engines Rating of fuels, pre ignition and knocking in I.C. Engines, Carburation and injection, Reciprocating air compressors – Single and multi stage compressors, inter cooling, volumetric efficiency.

Rotary Compressors – fans blowers and compressors Axial and Centrifugal compressors – merits and demerits.

Boilers and condensers – types of boilers and condensers, calculation of boiler efficiency and equivalent evaporation, feed water heaters.

Steam and Gas turbines Impulse and reaction turbines degree of reaction velocity triangles, ranking cycle for steam turbine power plant reheating and regeneration Gas turbine cycles methods of improving gas turbine cycle efficiency.

### 07. HEAT TRANSFER AND REFRIGERATION:

Modes of heat transfer, one dimensional steady and unsteady heat conduction convective heat transfer forced convection over flat plates and tubes, free convection over cylinders and flat plates radiative heat transfer-black and grey surfaces. Types of heat exchangers – heat exchanger performance LMTD and NTU methods vapor compression cycle analysis. COP; and its estimation vapor absorption refrigeration cycle properties of refrigerators.

### 08. MACHINE DESIGN:

Design for static and dynamic loading fatigue strength stress concentration, factor of safety designing of bolted, riveted and welded joints, hydro dynamic lubrication, journal and roller bearings design of spur and helical gears, clutches and breaks. Belt and rope drives Design of shafts, keys and couplings.

### 09. THEORY OF MACHINES:

Constrained motion, plane mechanisms, velocity acceleration analysis, Flywheel and their applications, Balancing of reciprocating and rotating masses cams and followers, Tooth profiles Types of gears Principles of gyroscope, vibration of free and forced one degree of freedom systems with and without damping, critical speed of shaft.



**10. PRODUCTION ENGINEERING:**

Metal cutting and machining types of chips, chip formation tool wear and tool life, machine ability single point and multi point cutting operations machining processes shaping, planing, turning, milling, grinding, hobbling and drilling operating unconventional machining processes – USM, EDM, ECM and LBM. Basic features of NC Machines tools linear and angular measurements, Comparators, limit gauges, screw and gear measurements.

**11. INDUSTRIAL ENGINEERING AND MANAGEMENT:**

Industrial organisations and plant layout production planning and control cost of manufacturing. Break even analysis. Time and motion study, basic linear programming and queing theory. PERT / CPM in production systems.

**ELECTRONICS & COMMUNICATION ENGINEERING**

01. Network analysis, Topology, Tree Tieset out set, first and Second order Circuits. Steady State and Transient response, Sinusoidal steady State Analysis. Series and parallel Resonance, Network Theorems, Laplace Transforms, Fourier series, Fourier Transforms – Applications, Two port. Network Parameters, Interconnection of two ports, Image Impedance, Image Parameters. Filters – constant K and M derived sections. Electronics Devices – Diodes, Transistors, FET biasing, and characteristics, Frequency, Response, Amplifier circuits. Electro Magnetic Theory – Maxell's Equations. Coulomb's law, Amper's law , Faraday's law, Poynting Energy Theorem, Stoke's theorem, uniform plane waves. Transmission Line Theory – Standing waves & Travelling waves, Reflection, VSWR.

02. Feedback Amplifiers and oscillator Circuits Wave Shaping circuits, Logic Gates, Boolean Theorems, Adders & Subtractors. Antennas & Propagation – Radiation Principle, Antenna parameters. Definitions. Directional Antennas, Linear Antenna Arrays, Broadside & End fire Arrays, Gain, Directivity, Radiation pattern. Ground Wave, Sky Wave, Ionosphere Propagation, Guided Waves, Rectangular Wave-Guide Analysis, Microwave Circuits and Components. Microwave Tubes, Klystron, Magnetron, and TWT. Modulation Techniques – AM, FM, PM. Channel capacity, Noise, AM, FM, Transmitters, Radio Receivers. TV and Satellite Communication – Principles Radar Equation and Applications of Radar Computer Programming, FORTRAN, BASIC, PASCAL, Are Programming languages.

## **COMPUTER ENGINEERING**

01. Logic families, gates, flip-flops, Multiplexers, decoders, registers, counters, adder circuits, Boolean algebra, Combinational circuit design, minimisation, sequential circuit design, number systems, inter conversion, number representation, computer organisation, instruction formats, addressing modes, micro-programming, ALU organisation, multiplication and division algorithms, memory hierarchy, cache and associate memories, virtual memory, memory IC's, I/O organisation schemes, interrupts, arbitration, DMA, IOP, micro processors, interfacing, pipeline, SIMD and MIMD organisations, proposition and predicate logic's, methods of deduction, set theory, relations, functions, algebraic structures, lattices, recursion, combinatorics, graph theory, representation, path matrix, warshall's algorithm, cyclic and bipartite graphs, planner graphs, Hamiltonian graph, chromatic number, trees, binary tree traversals, representation of expressions, spanning trees, breadth-first and depth-first algorithms, finite automation, pushdown automation, Turing machine, grammars, type 0, 1, 2, and 3, LL and LR grammars.

02. Algorithms, flow-charts, programming methodology, data structures, PASCAL, FORTRAN, COBAL and 'C' languages, theory of programming languages, file organisation, searching and sorting; methods, DBMS, database models, query languages, operating system, directory concept, processor scheduling, memory allocation, paging and segmentation, device management, deadlocks and prevention, concurrent processing. DOS and UNIX features, language processors, syntax and semantic analysis, code generation, optimisation, assemblers, loaders and linkers, algorithm design techniques, Computer networks, digital modulation techniques, modems, error detection and error correction, BISYNC and HDLC protocols, OSI model, network routing algorithms, LAN operation methods, Computer graphics, DDA algorithms, graphic primitives, 2-D transformations, graphic input devices, software engineering development life-cycle, system analysis, modular design, testing and validation, CASE tools, AI techniques, natural language understanding, learning, knowledge representation, expert systems, LISP, PROLOG.

## ELECTRICAL AND ELECTRONICS ENGINEERING

### 01. ELECTRIC CIRCUITS, FIELDS & MEASUREMENTS:

Network elements – Ohm's law and Kirchoff's laws – formation of mesh and nodal equations – topological description of networks – response of R, L and C elements to arbitrary excitations – Laplace transform method of analysing networks.

Network theorems – superposition, Thevenin's Norton's theorems – Maximum power transfer theorem – reciprocity theorem – applications – two port parameters – Z, Y, ABCD, H parameters – their relationships.

A.C. Circuits – single phase circuits – J-notation – calculations – resonance – Polyphase – circuits – measurements of polyphase power.

Electromagnetic theory – general relations in static fields – potential gradient and field intensity – flux density – Gauss's law – Poisson and Laplace equations – relations in electromagnetic fields – ampere's law – flux and flux density – divergence and curl – vector magnetic potential.

Electrical measurements – Types of measuring instruments – Principles of operation – extension of ranges – instrument transformers.

### 02. CONTROL SYSTEMS, COMPUTATION AND ELECTRONICS

Control systems – Types of servo mechanisms – equations and models of linear systems – block diagrams – time response of second order systems – stability criteria – root locus technique – frequency response – Nyquist criterion – Bode plots.

Elements of computation: Digital systems – flow charts and algorithms – FORTRAN – types of statements – logical expressions – Assignment statements – program structure – Scientific and Engineering applications.

Electronics: Solid-state devices and circuits – small signal amplifier design – feedback amplifiers – Oscillators – FETS – Thyristors.

### 03. ELECTRICAL MACHINES:

Principles of Electromechanical Energy Conversion: Basic ideas of production of torque – concepts of generation of voltages – formulae for voltage and torque production.

Three phase induction motors: The revolving field theory – Principles of operation of induction motor – torque equation – Computation of performance – torque speed characteristics – motor starters – conventional and thyristor controllers for speed control of induction motors.

Single phase motors: Revolving field theory – types of single-phase motors – equivalent circuits – speed control – applications.

Synchronous machines: Generation of 3-phase voltages – types of synchronous machines – equivalent circuit – experimental determination of reactances – voltage regulation and efficiency – parallel operation – transient and subtransient reactances – synchronous motors – theory of operation - -phase of diagram – equivalent circuit – performance and power factor control – applications.

Special machines: Two phase servomotors – stepper motors – methods of operation – metadyne and amplidyne – operating characteristics and applications.

D.C. Machines and Transformers.

### 04. POWER SYSTEMS:

Generation: Methods of power generation – steam, hydro, nuclear, diesel – selection of site for each – general layout of each type – function of each component – economics of different types – base and peak load stations – pumped stations – simple calculations in hydro station design.

Transmission: A.C. Vs. D.C. transmission – criteria for selection of voltages – transmission line parameters – G.M.D. and G.M.R – concepts for short, medium and long lines – line calculations – A.B.C and D constants – load flow analysis – surge impedance loading.

Corona and insulators: production of corona – disruptive and visual corona – corona loss – methods to avoid corona – types of insulators – string efficiency.

Fault analysis: Per unit representation: fault analysis – Symmetrical and unsymmetrical faults – application of symmetrical components – reactors.

Protection: Switch gear – methods of arc extinction – classification of circuit breakers – definitions – calculations in switch gear – testing of circuit breakers – Relaying principles – primary and back up relaying – definitions – operation of different types of relays – applications to line, transformer and generator protection – protection of lines and equipment against voltage surges – travelling wave theory.

Utilisation: Industrial drives – motors for various applications – braking – methods of heating and welding – welding transformer – Economics and other aspects of track electrification.

**ELECTRONICS AND INSTRUMENTATION ENGINEERING**

01. **FUNDAMENTALS:** Coulomb's law – Ohms law – Faradays laws of electromagnetic induction, Kirchoff's laws, Ampere's law Resistance, Capacitance and Inductance.
02. **ELECTRONIC CIRCUITS:** Graph, tree and links – Loop currents, node voltages two port net works, Z, Y and Hybrid parameters. Alternating currents, RMS value, form factor, R.L.C. in AC Circuits power; and power factor, network theorms – Harmonic analysis.
03. **ELECTRONIC CIRCUITS:** Logic circuits – Universal gates Booleans functions and their realisation – Product of sums and sums of product forms – Combinational circuits – Sequential circuits, SR & JK flip flops, Series and parallel Counters Registers.
04. **ELECTRICAL MEASUREMENTS:** Indicating instruments, D1 Arsonval type Galvanometer, Vibration Galvanometer, Ballistic Galvanometer, Measurement of resistance, DC & AC Potentio meters, Wheetstone Bridge, Kelvin's bridge, AC Bridges, Maxwell's, Andunar, Heavinide and Scheing bridges.
05. **ELECTRONIC INSTRUMENTS:** Cathode Ray Oscilloscope and its applications, Electronic Voltmeters – Balanced bridge type, transistor Voltmeter, Choper amplifier type Voltmeter, High Frequency measurements.
06. **INSTRUMENTATION:** Transducers – Primary and Secondary – Classification of transducers, Potentiometers as displacement transducers, strain gauges, Induction and capacitive transducers, LVDT, Rotary variable differential transformer, Piezo electric transducer, Digital Voltmeters, Digital frequency meters, measurement of displacement, strain gauge circuits, measurement of pressure, Measurement of Velocity, measurement of temperature and measurement of flow.

## AUTOMOBILE ENGINEERING

01. Thermodynamics: systems – Zeroth Law of thermodynamics – First law of thermodynamics – Second Law of thermodynamics – Entropy – Statistical thermodynamics – Air Compressors I.C. Engines cycles and Process – Combustion in I.C. Engines – Engine performance – Scavenging and supercharging of Engines – Modern development in I.C. Engines – I.C. Engine plant layout.
02. Heat Transfer: Conduction Convection – Thermal Radiation – Heat Exchangers.
03. Fluid Mechanics and Machinery: Fluid properties – Dimensional analysis – Fluid static's – Flow past immersed bodies – Centrifugal pumps – Axial flow pumps – Rotary pumps – Reciprocating pumps – Oil Hydraulic systems.
04. Instrumentation: Transducers – Flow measuring transducers – Temperature measurement – Strain gauges – Mechanical measuring devices – Slip gauges – Plug gauge – Micrometers in bars optical flat etc.
05. Automobile chasis & Systems: Chasis layout – Shock absorbers in dependent suspension – torsion bars – gear suspension – wheel balancing – tyres and tubes – constructional details of the engine – Ignition system – Fuel system – Lubrication system – Cooling system – Transmission system – Brakes steering mechanism – Electrical circuits and equipment's – Engine troubles – Air conditioning system – Modern trends in automobiles & Engines.
06. Material Science: Crystallography of metals – Binary alloys – Constitution and equilibrium diagram – methods of studying metal structure – Heat treatment – of steels – Casehardening and surface treatment of steels – Non Ferrous metals and alloys – Creep – Fatigue.
07. Kinematics of Machines: Kinematics – Velocity and Acceleration – Properties of instaneous centre – Gears – Gears trains – Oams – Governors – Brakes and dynamometers – Clutches – Power transmission – Chain drives.
08. Dynamics of Machines: Static force Analysis – Dynamic Force Analysis – Dynamics of Reciprocating Engines – Balancing – Vibration Analysis of Single degree freedom systems – Torsional Vibrations – Vibration isolation.
09. Design of Automobile Machine Parts: Design of welded joints Design of bolts & nuts – Shafts and Axles – Curved beams – Springs – Bearings – clutches – Brakes – Design of connecting rod – Crank shaft fly wheel.
10. Production Technology: Machine tools – Lathes – Shaper, planner and slotting machines – Drilling and boring machine – Milling – Lapping – Tool room – Electro machining – Welding – Brazing – Foundry.
11. Industrial Engineering: Industrial management – personnel function – Production facilities – Production Planning and control – Wages and incentives – Cost Control – Marketing and Sales Promotion.

## METALLURGICAL ENGINEERING

### PHYSICAL METALLURGY

Crystal structure and bonding characteristics of metals,  
 Solid solutions, Constitution of Alloys,  
 Solidification of pure metals and alloys , constitutional super cooling,  
 Phase diagrams-interpretation of binary phase diagrams, zone refining.  
 important phase diagrams-Fe-C,Cu-Zn, Cu-Sn, Al-Si, Al-Cu, Pb-Sn. Sb-Sn,  
 effect of alloy elements- alloy steels and cast irons,  
 industrially important non-ferrous metals and alloys-Types, properties,and applications.  
 industrial ceramics and composites;  
 Diffusion and Fick's laws, mechanisms  
 Metallurgical Microscope and electron Microscopy.  
 Macro and Micro examination of examination of metals and alloys,  
 Principles of X-ray diffraction- Diffraction Methods - Applications

### HEAT TREATMENT TECHNOLOGY

Principles of heat treatment-Phase transformations in steels;  
 Isothermal transformation diagrams, transformations on continuous cooling.  
 Heat treatment processes for steels,Hardenability of steels, Quenchants,  
 Heat treatment of plain carbon ,alloy and tool steels.  
 Surface hardening methods and techniques,  
 Thermo mechanical treatments: Importance of grain size and its determination.  
 Heat treatment of Non-ferrous metals and alloys - Precipitation hardening.  
 Heat Treatment Furnaces and atmospheres.Temperature measurement and control, Defects in  
 heat treated parts and remedies,

### FUELS, FURNACES AND REFRACTORIES

Solid fuels-Classification,types and properties,Carbonization of coal,Metallurgical Coke, Liquid  
 fuels-Classification,Petroleum refining,Distillation.  
 Gaseous fuels-Classification,Production,industrial gasification processes.,  
 Liquid and gaseous fuel burners,Combustion problems.

Furnaces.- Classification and use in metallurgical industries.  
 Heat transfer – conduction, convection and heat transfer coefficient relations, radiation, Heat  
 utilization and heat losses in furnaces.

Refractories-Classification,properties and testing, modes of failure and  
 prevention,manufacturing methods,applications in the metallurgical industries.  
 Pyrometry-Thermo electric pyrometry- resistance thermometers.Optical pyrometers-Total  
 radiation pyrometer and Temperature controllers.

### METALLURGICAL THERMODYNAMICS & KINETICS

Basic concepts in thermodynamics. Laws of thermodynamics.  
 Entropy. Free energy functions. Maxwell's relations.  
 Fugacity, activity and equilibrium constant. Vant Hoff's isotherm.  
 Phase equilibria-Clausius-Clapeyron equation. Ellingham diagrams and applications.  
 Thermodynamic solutions . Gibbs Duhem equation. Excess thermodynamic properties.

Kinetics of Metallurgical reactions-Laws, Order of reactions, rate constants.  
 Thermodynamics of Electrochemical cells.-Electrode potential,polarizations,  
 Reversible cells, galvanic cells, Nernst equation.  
 Aqueous corrosion and protection of metals,  
 Oxidation and high temperature corrosion – characterization and control;

### PRINCIPLES OF EXTRACTIVE METALLURGY

Minerals of economic importance, unit processes in extractive metallurgy,  
 Mineral beneficiation-comminution techniques, concept of liberation. nits  
 size classification, Laboratory sizing units. equipment used in industry.  
 Screening,Sedimentation.  
 Principles of flotation. Stokes and Newtons laws. Free and hindered settling. Differential  
 flotation. Flotation circuits. application in mineral dressing.  
 Heavy media separation, Tabling. Jigging. Magnetic and Electro static separation.

Methods of extraction and refining of metals  
agglomeration, pyro- hydro- and electro-metallurgical processes;  
Pyrometallurgy-calcination, Roasting, smelting, metallothermic reduction  
material and energy balances;

### **IRON AND STEEL MAKING**

iron making- Raw materials. Occurrence and distribution of iron ores in India. Beneficiation of iron ores and agglomeration techniques.

Blast furnace profile and designs, Blast furnace and accessories- Stoves, Gas cleaning system. Charging system. refractories . Distribution of burden . Physical chemistry. blast furnace slag, Blast furnace operation and control, irregularities and corrections. Modern developments in blast furnace practice.

Alternate routes of production of pig iron. Production of sponge iron  
Production of wrought iron.

Principles of Steel making.

Pneumatic steel making process. Bessemer process, OHF, Developments in converter steel making process: LD, LD-AC, Kaldo, Rotor, Q-BOP processes.

Electric furnace steel making. Manufacture of alloy steels. Production of Ferro alloys, continuous steel making process: - BISRA, IRSID & WORCA Process.

Teeming Practices, Ingot moulds secondary steel making processes.  
Vacuum degassing, Continuous casting of steel.

### **NON-FERROUS EXTRACTIVE METALLURGY**

Non-ferrous mineral wealth of India.

General Methods of Extraction and refining,

Extraction of metals from oxide ores—Aluminum, Magnesium,

Extraction of metals from sulphide ores—copper. Zinc. Lead, Nickel

Extraction of metals from halides—Titanium, Uranium, Zirconium,

Nuclear Reactor Materials.

### **METAL JOINING**

Metal joining-welding, brazing and soldering, Different welding processes, types of tooling, equipment. and applications- Gas welding, Arc welding, submerged arc welding, TIG, MIG, Plasma arc welding, Electron Beam welding, Laser welding, diffusion welding.

Microstructure of fusion and heat affected zone, welding stresses, pre and post weld treatments.

Weldability of structural steels, cast iron, stainless steels and other high-alloyed steels.

Weldability of copper and its alloys, aluminum and its alloys, joining of dissimilar alloys.

Welding defects and remedies.

### **METAL CASTING**

Types of foundries. Patterns: materials, types and pattern allowances

Moulding materials: properties and selection of materials and additives used.

Casting processes and equipment, investment casting, die casting, centrifugal casting, Core moulds and cores

Solidification- Crystallisation and development cast structure, Dendritic freezing. Foundry characteristics.

Principles of gating and risering. Casting design considerations.

General principles of melting Cupola and its operation. Modern developments in cupola. Melting practices of Al, Cu and Mg alloys. Defects in castings, Inspection and quality control of castings,

Metallurgy of cast irons. Foundry practices of white cast iron gray cast iron, S.G. and malleable iron. Alloy cast iron. Steel foundry practice.

Modernization and mechanization of foundries.

### **MECHANICAL METALLURGY**

Metallurgical Fundamentals: Elasticity, yield criteria and plasticity, Defects in crystalline materials, Elements of dislocation theory-types of dislocations, dislocation Interactions and



reactions, Partial dislocations, Forces on dislocations., Frank Reed source, slip and twinning. strengthening mechanisms; Recovery, recrystallisation and grain-growth.

Fundamentals of metal working. Classification of forming processes. Temperature in metal working . Strain-rate effects. Metallurgical Structure Friction and Lubrication.

Forging- classification, equipment. Forging defects.

Rolling -classification. Rolling mills ,roll pass design. Forces and geometric relationships in rolling, Rolling variables . Problems and defects in rolled products.

Extrusion -. Classification. Equipment . Extrusion variables, lubrication and defects in extrusion, Extrusion of tubing.

Miscellaneous working operations . Drawing of rods wires and tubes.. Sheet metal forming.

Powder Metallurgy. Methods of production of metal powders. Particle size analysis. Characterization of metal powders. Compacting, sintering and their mechanisms. Industrial applications.

### **MATERIAL TESTING**

Tension test- stress- strain relations, Flow curve. Instability in tension. Effect of temperature and strain rate. Yield point phenomena. Strain ageing. Compression test.

Hardness test-principle and types, Hardness at elevated temperatures.

Brittle fracture and impact testing-Notched bar impact tests. Transition temperature. Metallurgical factors affecting transition temperature. Plane strain fracture toughness(K<sub>IC</sub>) .

Fatigue- Stress cycles, S-N diagram, Structural features, Fatigue crack propagation. Factors affecting fatigue.

Creep and stress rupture. The creep curve. Structural changes during creep. Mechanism of creep deformation. Stress rupture test, High temperature alloys..

Fracture . Types, Griffith theory of brittle fracture. Metallographic aspects of fracture . Fractography .

Non-destructive testing- Principles, methods and applications of visual, liquid penetrant and dye penetrant tests. Fluorescent test. Radiography. X-ray, Gamma ray and Neutron methods. ultrasonic methods of inspection. Magnetic methods. Magna flux and magna glow methods. acoustic emission methods, Eddy current tests, Pressure testing.

## **MINING ENGINEERING**

1. **GEOLOGY:** Structural Geology: Definition and scope. Recognition of faults, folds, joints, unconformities etc., Primary and induced structures, their importance in Mining, Bedding, Lamination, foliation, fracture, Cleat etc., field Geology; importance and scope of field Geology, field techniques, geological mapping. Use of survey equipment.
2. Principles of Stratigraphy.
3. **EXPLORATORY DRILLING:** Principles, selection of site, layouts, details of equipment, methods of drilling and their variation, interpretation of bore hole data.
4. **EXPLOSIVES AND BLASTING:** Classification, types and use of explosives storage and transport. Blasting techniques in UG and open cast mines.
5. **SUPPORTS:** Objectives, limitations of mine supports, Types of mine supports and systematic timbering.
6. **OPENING AND CHOICE OF MINING METHODS:** Opening, development of mineral deposits, classification of mining methods, merits, demerits and application. Bord and pillar mining. Long wall mining. Open cast mining and their variations. Design of suitable methodology of mining for specific conditions like thickness, depth, inclination, annual production etc.,
7. **METAL MINING:** Scope and limitations of U/G mining methods, Classification of U/G metal mining systems and their applications in different conditions.
8. **MINE SURVEYING:** Principles of surveying. Different methods and their importance. Chain surveying. Compass surveying, theodolite surveying, plane tabling, levelling, triangulation, correlation. Astronomical terms and definitions. Mine plans and sections. Regulations pertaining to plans and sections.
9. **MINING MACHINERY:** Elements of transport system, classification and techno economic indices. Rope haulage, locomotive haulage, conveyers, Aerial rope ways, trackless haulage, Winding. Drainage and pumping.
10. **MINE ENVIRONMENTAL ENGINEERING:** Mine air and environment. Natural and mechanical ventilation, Types, design variables, selection, installation and maintenance. Mine fires, explosions and inundations, Rescue and recovery.
11. **MINE LEGISLATION AND SAFETY:** Regulations pertaining to conservation's, exploitation of mineral deposits. Safety welfare and hygiene of mine workers.

## BIO-MEDICAL ENGINEERING

Respiratory Measurements and Aid; Principles and techniques of impedance pneumography and pneumotachograph.

Ventilators : Parameters, system Concepts, Flow Gauges, Valves Humidifiers. Birds, Emerson, Bear Ventilators.

Audiometry: Common Tests and procedures, Airconduction, Bone Conduction, Masking, Schematic Functional Diagram of an Audiometer.

Hearing Aids: Different Types, Comparison of Microphones, Receivers and Amplifiers.

Electro-Surgical Equipment.

Electro - Surgical Units: Principles of Cutting, Coagulation, Spark Gap, Valve Transistorized Generators, Safety Features.

Laser: Basic Principles of Laser, Different types of Laser Equipment used in Surgery, Safety.

Fibre Optics: Principles and Applications : Endoscopes, Neonatural instrumentation, Incubators, Apnoea Monitor, Ophthalmic Instrumentation : Intra - ocular Pressure Measurement, Contacting and Non-contacting Types, Refractometers.

Anaesthesia Equipment, Boyle's Apparatus, Gas Distribution Systems.

Ultrasound Applications for Surgery: Lithotripsy, Principles and Applications.

Introduction to Bio-Medical Instrumentation. General Characteristics of medical instrumentation like linearity, range, frequency response, signal-to-noise ratio and stability.

Amplifiers for Bio-Medical applications: Differential, Carrier amplifiers, Phase sensitive detector for LVDT. Principles of wave generation and shaping. Recorders and play devices for Bio-Medical applications. General features of ink-jet, thermosensitive and optical recorders. General features of display devices for bio-signals. Data acquisition and display using micro computers. ECG recording system. Block schematic diagram of ECG machine; amplifiers : circuits for ECG. Special types of ECG recorders. Noise problems and their elimination.

Electro-encephalography: Block schematic diagram of EEG recording system. General features of different blocks : specification of EEG amplifiers : qualitative requirements, 10-20 electrode system, Resting Rhythms and sleep stages.

Electro Myography: Block schematic diagram of EMG recording system. EMG amplifiers. Design considerations of EMG amplifiers. Data display for EMG.

Blood Pressure and blood flows. Electronic techniques for indirect and direct measurement of blood pressure: measurement of blood flow by electromagnetic, doppler and plethysmographic methods.

Phonocardiography: Origin of heart sounds. Phonocardiographic instrumentation consisting of microphone, filters and signal conditioners.

Introduction to Radiography: Physical properties of; X-rays. Principles of generation of x-rays. Radiation energy distribution. Collimators and grids, Fluoroscopy. Image intensifiers.

Methods of Chemical analysis: Absorption photometry: Emission photometry; Fluorometry, Introduction to autoanalyzer. Chromatography for blood gas analysis, Colorimeters., Spectrophotometers, Electrophoresis.

Electrical hazards during Bioelectric monitoring: safety, Codes, Standards. Micro and Macroshock and their physiological effects. Leakage currents and protection by use of isolation transformers. Equipotential grounding and earth free monitoring.

Electrical factors in Hospital Design : Electrical power supply systems in a hospital building, Proper installation and grounding for providing safe patient - electrical environment.

Ultrasonics: Basic principles of Medical Ultrasonics, Echo Techniques, Functional Block Diagram of Basic Pulse-Echo System for Diagnostic Purposes. Different Display Modes A-

Mode, B-Mode, M-Mode, Types of Scan-B Scan, Principles of Echocardiography and Echoencephalography with Schematic Block Diagrams. Sector Scanners, and phased array scanners.

Introduction to Doppler Ultrasound, Blood flow through heart valves, peripheral vessels - Doppler flow meter. Display Devices for Ultrasonic Echo Imaging. Biological Effects of Ultrasound and Safety Precautions.

Magnetic Resonance Imaging : Basic Principles of Magnetic Resonance Imaging. Signal Excitation and Detection. Schematic Functional Diagram of MRI Scanner with its sub-systems. Magnet, Gradient system. R.F. Transmitter Receiver system, Computer and Image Display, Medical Applications and safety precautions.

Computed Tomography: Basic Principles, System Components and Functions of Scanning System, Processing Unit, Reconstruction Techniques - Viewing systems, storage and documentation. Medical applications and safety precautions.

Radio Nuclide Imaging: Principle, Schematic functional diagram and Components of Gamma Camera. Medical Applications, safety and precautions.

Medical Thermography: Basic Principle, Functional Block Diagram of thermo graphic equipment, scanning and display arrangements for Infra-Red Imaging, Medical applications.

Position emission tomography: Basic Principles, Nuclear Reactions and production of precursors. Detector Materials reconstruction techniques.

Defibrillators : D.C. Defibrillators of capacitive discharge and delay line capacitive discharge with basic circuit diagrams. Types of electrodes and their features. Testing and safety.

Cardioverters : Working Principles, Scheme of synchronizing D.C. Defibrillators with the R-wave of ECG. Testing and safety. Cardiac pacemakers : Types -  
 i. Asynchronous and Synchronous (demand) mode of operation.  
 ii. External and implantable, Asynchronous Pacemakers.

Working principles, block diagram and circuit diagram of blocking oscillator asynchronous pacemaker.

Synchronous / Demand Pacemaker: Working principles, modes of triggering-ventricular triggered (QRS triggered) and atrioventricular synchronized pacemaker (P wave triggered).

Implantable pacemaker: Technical and qualitative requirements of power supplies, lead wires and electrodes. Transcutaneous R.F. powered Cardiac pacemaker system. Susceptibility of implanted pacemaker to electrical interference and remedial measure. Assist Devices for the Heart : Principles of external counter-pulsation techniques. Infra-aortic Balloon pump. Auxilliary ventricle and schematic for temporary by-pass of left ventricle.

Prosthetic Heart Valves: Qualitative requirements. Categories Mechanical and tissue valves. Types of mechanical Valves - ball and cage, tilting disc and bileaflet valves. Types of tissue valves - Homografts or allograft (human cadaver) and Heterografts or Xenografts (Porcine or Bovine). In vitro performance testing of prosthetic heart valves using a pulse duplicator.

Heart- Lung Machine: Governing principles, qualitative requirements, functional details of bubble, thin film and membrane - Type of blood oxygenators.

Haemodialyser: Qualitative requirements. General Scheme of operation. Types of Exchangers, block diagram, electronic control and monitoring systems.

Intensive Coronary Care Concepts: Systems organisation, Critical Physiological parameters to be monitored. Layout and safety precautions.

Physical Therapy Equipment. Short wave, Microwave and Ultrasonic diathermy.

Nernst equation - derivation and its significance. Refractory period. Characteristics of stimulus. Strength-duration relationship. Electrical equivalent circuit of an axon. Membrane time and space constants. HodgkinHuxley formulation. Membrane conductance. Nerve conduction membrane properties from current voltage relations, models of squid axon. Propagation of impulses in unmyelinated and myelinated nerve fibre. Electrical properties of receptors. Generator potential of Receptors. Intensity-frequency relationship. Electrical properties of synaptic junctions - EPSP and IPSP.

Electrical Activity of the heart. Conduction system of the heart. Characteristics of Action potentials at SA node, Atria, AV Node, Purkinje fibres and ventricles, ECG complexes. The international standard 12 leads of ECG. Standard leads of Einthoven, precordial leads and augmented limb leads. Relationship between unipolar extremity leads and standard bipolar leads. Volume conductor fields : Bio-electric sources, Volume-conductor formulation. Solid angle computation. Infinite cylindrical axon, core conductor model non-homogeneous media, integral equations.

Electrical activity of skeletal muscles-motor unit potentials. EMG wave form. Surface and needle electrodes for EMG. Velocity and their changes in normal and abnormal states. Fatigue and conduction - chemical significance.

Introduction to bioelectric Phenomena of hearing - Mechanical equivalent schematic diagram of the ear. Mechanical transformer of the middle ear. Frequency analysis of sound by the basilar membrane. Cochlear microphonics.

Interaction between Engineering and life sciences. Definition of Biomedical Engineering, its scope. The role of Biomedical Engineer in Health care delivery systems. Medical Electronics Industry Research, Development and education.

Application of Engineering concepts and methods for understanding Physiological systems. Basic electrical and Mechanical properties skeletal systems, muscular system, heart and brain. Nervous system as an internal communication system of the human body, Sense Organs.

Electrophysiology : Functional structure of a cell. Basis of biopotentials. Resting potential of a nerve cell and its ionic mechanisms. Properties of excitable membranes. Action potential generation, its ionic mechanism and its characteristics.

Physiological signals, Characteristics, Basis of ECG, EMG, EEG and qualitative treatment of instrumentation for measuring these signals.

Biopotential, Electrodes, Electrode - Electrolyte Interface. Internal electrodes like needle electrodes and microelectrodes.

Equivalent circuit Properties.

Transducers for physiological application. Strain-types like variable R.L. & C, LVDT, Thermocouples, Thermistors Photo electric and Dynamic types like piezoelectric and moving coil type and their applications. Special requirements.

Development of instrumentation for Clinical practice and Medical Research, Introduction. Comparative study of industrial and Medical Instrumentation. Basic classification of Medical Instruments, Instrument characteristics, linearity, range, frequency response, signal to noise ratio and stability.

Broad classification of Biomedical Instrumentation for Clinical practice that is:

1. Instrumentation for Diagnosis, ECG, EEG, EMG, PCG etc.,
2. Therapeutic Devices - Stimulators, diathermy equipments etc.,
3. Prosthetic Devices - Pacemakers, Artificial Organs.
4. Visualising Devices - X-ray, Ultrasound etc., fibre optic endoscope.
5. Electrosurgical Devices - HF Surgery, Laser Surgery.
6. Data Storage & Analysis - Computers in medicine.
7. Analytical Instruments - Photocolorimetry, Spectrophotometer, Electrophoresis, Centrifuges, Waterbath etc., Hospital illumination, Theatre illumination, Requirements and typical arrangements. Miscellaneous equipment's.

## GEOLOGY

### MINERALOGY, INSTRUMENTATION AND ANALYTICAL TECHNIQUES

Fundamentals and principles of Optical mineralogy, Uniaxial and biaxial minerals, optic axial angle. Orthoscopic and conoscopic examination, dispersion in minerals. Determination of sign of elongation, birefringence, optic sign, pleochroic scheme, and anorthite content of plagioclase by extinction method. Structure, chemistry, physical and optical characters and paragenesis of the following mineral groups and minerals: Olivine, pyroxene. Amphibole, mica, tourmaline, zircon, apatite and spinel group. Structure, chemistry, physical and optical characters and paragenesis of the following mineral groups and minerals: feldspars, quartz, feldspathoids, aluminium silicates, sphene group, epidote group, garnet group, beryl, talc, corundum and scapolite.

Petrographic techniques: sampling thinsection and polished section making, point counter techniques, etching and staining. Analytical techniques; Sample preparation. Principles and geological application of AAS/ICP-AES, XRE, EPMA, ICP-MS

### STRUCTURAL GEOLOGY AND GEOTECTONICS

Projection diagrams: stress-strain relationships of elastic, plastic and viscous materials. Measurement of strain in deformed rocks. Behaviour of minerals and rocks under deformation conditions. Folds: classification and causes of folding. Diapirs and salt domes. Shear zones & Recognition of faults & shear zones in the field. Mechanics of shearing & faulting geometry of thrust sheets. Block faulted and rifted regions. Wrench faults and associated structures. Tectonic mélanges. Dome and basing structures. Structural behaviour of igneous rocks. Foliations and Lineations: classification, origin and significance. Petrofabric analysis (microfabrics): data collection, plotting, symmetry and interpretation. Concept of symmetry of fabric of tectonites. Tectonic framework of Earth's crust. Interior of earth. Isostasy convection currents. Wilson cycle. Continental drift: Computer fitting, geological and palaeontological evidences in support of continental drift and insitu theories. Sea-floor spreading: Hess's concept and evidences of sea-floor spreading. Vine-matthew's magnetic tape recorder. Divergent and Convergent plate margins. Plate tectonics: Concept of plate and plate movements. Plate model of Morgan. Plate tectonics in relation to igneous, sedimentary and metamorphic processes and mineralization. Triple junctions. Aulocogens. Plume theory. Island arcs. Nature and origin of earth's magnetic field.

Aerial Photography- Definition, photogrammetry- cameras, lenses, films and filters, flight mission and planning, flight height and scale of photographs, overlap and sidelaps. Identification of different land forms on aerial photos and imageries. Terrain evaluation for strategic purpose. Types of aerial photographs, geometry, stereopairs and mosaics. Study and interpretation of aerial photographs. Recent advancements and application, Remote Sensing- Definition, methods, scope and limitations energy source and its interaction with atmosphere and earth features. Electro magnetic spectrum. Laws of radiation, black body radiation. Remote sensing platforms. Active and passive systems. High level and low level satellites- geosynchronous and sunsynchronous satellites. Types of sensors and scanners. Global and Indian space missions. Different satellite exploration programmes and their characteristics: LANDSAT, METEOSAT, SEASAT, SPOT, IRS. Spectral, spatial, radiometric and temporal resolutions. IFOV, swath, Satellite orbits, types of imageries, visual interpretation. Principles and application of geographic information system.

### PALAEONTOLOGY and STRATIGRAPHY

Classification and uses of micro fossils Origin and evolution of life Detailed study of microfossils such as Foraminifera, Radiolaria, Conodonta, Ostracoda, Bacteria, Diatoms, dinoflagellata, charophyta gondwana flora and their significance. Classification and evolution of Agnaths, placoderms, chondrichthys and osteichthyes General characters of amphibians, reptiles and mammals. Classification, evolution and extinction of dinosaurs classification and evolution of horse, elephant and man.

Nomenclature and the modern stratigraphic code. Litho, bio and chrono stratigraphic units and their inter relationships. Geological time scale. Magneto-stratigraphy. Dating of rocks. Modern methods of stratigraphic correlation. Precambrian stratigraphy-a) Archean stratigraphy- tectonic framework, geological history & evolution of Dharwar, and their equivalents (b) proterozoic stratigraphy – tectonic framework, geological history and evolution of Cuddapah, and their equivalents and Eastern Ghats mobile belt. Stratigraphy of the palaeozoic and Mesozoic formations of India with special reference to type localities. Palaeozoic and Mesozoic formations of India with special reference to their history of sedimentation, fossil content and palaeogeography. Gondwana system. Cenozoic formations of India Rise of the Himalayas and evolution of siwalik basin and Deccan volcanics. Boundary problems in Indian stratigraphy **Geomorphological studies – Definition. Dynamics of geomorphology. Diastrophism.**

Landforms resulting due to various geomorphic processes-via-rock weathering, mass wasting, fluvial geomorphic cycle-stream deposition, valley development, peneplanation, faulted and folded structures, topography and related structure, desert and Aeolian landforms, coastal geomorphology, Morphometric analysis.

### **IGNEOUS PETROLOGY & GEOCHEMISTRY**

Classification of igneous rocks, Mode, Norm, CIPW norm Calculations, IUGS Classification, Irvine – Baragar Classification. Structures and Textures of Igneous rocks phase equilibrium igneous systems: Phase Rule, Two Component systems, Lever Rule; Binary systems with complete solid solutions – Fo – Fa, An – Ab; Ternary systems – Di – An – Ab, Ab – Or –Silica, Fo- Di – An. Inter relationship between tectonic settings and igneous rock suites. Petrography and petrogenesis of the following rocks: Granites, Basalts, Layered Intrusions, Anorthosites, Alkaline rocks, Carbonatites, Lamprophyres, Kimberlites Mineralization associated with magmatic activity Origin and abundance of elements in the solar system and in the earth and its constituents. Classification, mineralogy, chemical composition, origin and age of Meteorites. Composition of Crust. Primary differentiation of earth. Geochemical classification of elements. Periodic table, special properties of transition and rare earth elements. Goldschmidt's rules governing distribution of elements during magmatic crystallization. Stable isotopes: Isotopic variations and significance of O, S, C, and H in minerals, rocks and water. Radiogenic isotopes: Geochronology and a brief outline on pb- pb, K – Ar, Sm – Nd, Rb – Sr and C methods of dating.

### **SEDIMENTOLOGY**

Stability and distribution of heavy minerals in different source rocks. Heavy minerals as provenance indicators. Sedimentary textures: Grain Size, Grain shape and Grain Fabric. Sedimentary structures; Important sedimentary structures and their significance. Classification of clastic and non-clastic sedimentary rocks: classification of sandstones; Classification of Limestones and Dolomites Diagenesis of clastic and non-clastic sedimentary rocks and dolomites Origin of Carbonates Sedimentary Environments: Classification of sedimentary Environments. Non-marine environments: Fluvial, glacial, Eolian and Lacustrine Transitional: Deltaic, Beach & Tidal Flats. Marine: shelf (Clastic and Non-Clastic) & Deep Sea Sediments. Evolution of Sedimentary basins Sedimentary basins in the light of Geosynclinal theory and the concept of Plate Tectonics. Tectonics and Sedimentation” Pre-flysch, Flysch, Molasses and Turbidites Application of trace element, rare earth element and stable isotope geochemistry to sedimentological problems.

### **METAMORPHIC PETROLOGY & THERMODYNAMICS**

Definition, scope and historical background of Metamorphic Petrology; metamorphic processes. Classification, Nomenclature, structures and Textures of metamorphic rocks Zones, Grades, and Facies of metamorphism. ACF – AFM – AKF phase diagrams. Contact metamorphic facies: Hornfels and Sandinite. Regional metamorphic facies: Zeolite Greenschist, Blueschist, Amphibolite, Granulite, and Eclogite. Goldschmidt's Mineralogical phase rule petrogenetic grids Geothermobarometry Paired metamorphic belts, Ultrametamorphism. Internal energy of a system and First law of thermodynamics. Entropy and Second law of thermodynamics. Reversible and irreversible processes. Enthalpy and Gibbs free energy. Chemical potential, fugacity, activity and activity coefficient.

### **COAL, PETROLEUM, AND ATOMIC MINERALS**

Coal: Origin of Coal – drift and insitu theories. Brief sedimentology of coal bearing strata. Rank, grade and type of coal. Indian and international classifications. Chemical characterization: proximate and ultimate analyses. Concept of ‘maceral’ and ‘microlithotypes’. Coal forming epochs in the geological past. Geological and geographical distribution of coal deposits in India. Detailed geology of Sone-Damuda-Mahanadi-Godavari, coalfields. Methods of coal prospecting and estimation of coal reserves. Coal production and problems of coal industry in India. Coal bed methane: a new energy resource. Maturation of coal and generation of methane in coal beds. Coal as reservoir. Fundamentals of coal bed methane exploration and production. Principles of Coal petrology. Preparation of coal for industrial purposes, coal carbonization (coke manufacture), coal gasification and coal hydrogenation. Petroleum: Origin, nature and migration (Primary and secondary) of oil and gas CHARACTERISTICS OF RESERVOIR ROCKS – STRUCTURAL, STRATIGRAPHIC TRAPS. Oil field fluid – water, oil and gas occurrence. Prospecting for oil and gas. Marine sedimentary basins of India and the world. Geology of the productive oilfields of India. Position of oil and natural gas in India, future prospects and economic scenario. Gas-hydrates. Atomic Fuel: Mode of occurrence and association of atomic minerals in nature. Atomic minerals as source of energy. Methods of

prospecting and productive geological horizons in India. Beach sand deposits of India. Nuclear Power Plants of the country and future prospects. Atomic fuels and environment.

### **ENGINEERING GEOLOGY AND ENVIRONMENTAL GEOLOGY**

Engineering Geology – Physico- mechanical properties of rocks: compressive strength, tensile strength, shear strength, point load test, Protodyaknov tests, Relevance of these properties in the evaluation of rocks. Physical characters of building and decorative stones, concrete aggregates. Role of Geologist in engineering constructions. Geological considerations for the selection of dam sites and types of dams, Case histories of some major dams – Ngarjuna Sagar, Srisailam and Bhakranangal. Geological considerations and investigations in reservoir site selection, Leakage problems and silting of reservoirs. Geological considerations in the selection of tunnels and their alignment, Study of foundations, and Bridges. Coastal erosion, its impact on engineering structures. Engineering aspects of chemical weathering. Roads, Highways and Railway communications.

Engineering properties of soils. Groundwater implications on civil engineering constructions. Fundamental concepts of geological hazards. Environmental degradation and crisis. Earth Processes: River flooding. Flash Floods – Nature and extent of flood disaster. Flood control and preventive steps. Case histories. Coastal hazards, Tropical Cyclones, Tsunamis, Protection of coastline from erosion. Landslides and related phenomena –terminology and characteristics of debris fall, mudflows, triggering mechanisms of solifluction, creep and slide. Prevention and control of landslides. Natural land subsidence. Earthquakes: Intensity of vibrations and disasters. Human causes of earth quakes – Dams, Reservoirs and injections of effluents. Case histories of earthquakes disasters. Management of earthquake devastation. Fundamental concepts of Environmental Geology: Environmental geoscience – it's scope, objectives, and aims. Earth's thermal environment and Climates. Global warming, Green house effect. Ozone depletion. Ice sheets and fluctuation in sea levels. Concepts of ecosystems. Earth's major ecosystems – terrestrial and aquatic. Meteorology as environmental science. Earth resources – Air – Pollution – sources – Ambient – workplace – Pollution due to dust, waste disposal – water – Surface and sub-surface water – quality – Water logging – construction of canals – dams – reservoirs. Land use – land degradation – conservation – reclamation – Impact of Mineral Explotation. Slope stability, stability of waste dumps and overburden Environmental sampling – Instruments – Analysis. Generation of base line data – Concept of environmental Impact Assessment (EIA) – Scope – Objective – Need. Environmental Protection – Issues – National – International – Article – 21 – Article – 48A – Article – 51A (g) – Agenda – 21 of Rio- conference – Environmental law in India.

### **HYDROGEOLOGY**

Origin, type and age of Ground Water, importance. Hydrological Cycle. Hydrographs, water table contour maps. Rock properties affecting Ground Water. Porosity, Permeability, specific yield, specific retention, hydraulic conductivity, transmissivity, storage coefficient. Well hydraulics: General flow equations, Steady Unidirectional flow, Steady radial flow to a well, Unsteady radial flow in a confined aquifer, Unsteady radial flow in an – unconfined aquifer. Water level fluctuation, causative factors. Methods of pumping tests and analysis of test data, evaluation of aquifer parameters . Artificial recharge of Ground Water. Ground Water legislation. Water Well technology. Well types, drilling methods, construction, design, development and maintenance of wells. Surface and subsurface geophysical and geological methods of Ground Water exploration Ground Water quality: source of salinity, estimation of major elements, reporting of chemical analysis. Ground Water Pollution, problems of Arsenic and fluoride. Ground Water quality map of India. Quality criteria for ground Water use. Salt Water intrusion in coastal aquifers, remedial measures.

### **EXPLORATION**

Geological exploration: Scope and objective of geological exploration. Controls of mineralization. Guides to ore search physiographic, lithologic, stratigraphic, structural and mineralogical guides. Some important government mineral concession rules for obtaining prospecting licenses. Geologic techniques and procedures of Exploration: Evaluation of out crop; Trenching; pitting, Channeling. Method of sampling. Calculation of average grad. Drilling and its application: Types of drills and drill bits; Core / Sludge recovery; Core logging. Resources and reserves: classification. Of ore reserves – UNFWC classification (IBM) Geophysical Exploration: Concepts, objectives and significance of geophysical exploration. Simple types of measuring instruments, field procedures and interpretation of data from various methods of geophysical prospecting viz. Gravimetric, Magnetic, electrical and Radiometric methods. Well logging an interpretation. Geochemistry in mineral exploration: Geochemical environments; Dispersion and mobility: Geochemical associations and pathfinders and their



application. Primary environment; Primary dispersions and halos. Secondary environment; Chemical weathering; Significance of Eh & PH; Absorption; Mobility of elements in secondary environment. Sampling and interpretation of data; Geochemical anomalies; Significant, non-significant and displaced anomalies. Ore Geology Concepts of ore genesis. Mineralization through geological time, plate tectonics and ore deposits. Concept of ore bearing fluids, their origin and migration; wall-rock alteration; structural, physico-chemical controls of ore localization. Fluid inclusions in ores: Stratiform and stratabound deposits Ore microscopy-Ore microscopy: Study of diagnostic optical properties of ores under reflected light. Principles of application Geothermobarometry; Stable isotopes in ore genesis. Ore deposition: physical and chemical controls. Ore bearing fluids and their migration. Petrological ore associations with Indian examples wherever feasible: Orthomagmatic ores of mafic-ultramafic association: - diamonds in kimberlite; chromite deposits, Ores of sedimentary affiliation – chemical and clastic sedimentation, stratiform and stratabound ore deposits (Mn, Fe, non-ferrous ores), placers deposits. Ores of metamorphic affiliations. Ores related to weathering and weathered surfaces-laterite, bauxite, Study of geology, nature of occurrence and the genesis of the following with case studies in India: 1. Iron formations and deposits 2. Chromite deposits. 3. Manganese deposits. 4. copper deposits. 5. Pb and Zn deposits. 6. Bauxite deposits. 7. Magnesite deposits. 8. Barite deposits 9. Mica deposits. 10. Asbestos deposits. 11. Dimension and decorative stones.

### **MINERAL ECONOMICS, MINING GEOLOGY AND ORE BENEFICIATION**

Mineral Economics-Definition-mining lease and regulations in brief. National mineral policy, conservation of minerals Renewable and non-renewable resources. Recoverable reserves preparation of Mine plans and Mine closure Planning, exploration and exploratory mining of surface and underground mineral deposits involving diamond drilling, shaft sinking, drifting, crosscutting, winzing, stoping, room and pillaring, top-slicing, sub-level caving and block caving. Cycles of surface and underground mining operations. Open pit mining.

Mining Geology – Basic concepts, terminology – terms and definitions of Mining broad classification of mining methods Geological factors considered for the selection of mining method viz- Alluvial/Surface mining, Quarrying, Open – cast mining, and Underground mining methods Geological conditions for – Types of openings, their position, shape and size – adits, inclines, shafts, level, cross-cuts, winzes and raises Application of rock mechanics in mining Ocean bottom mining.

Types of drilling methods. Alluvial mining methods, hydraulicking, dredging and fore-poling Quarrying-controls of topography and methods of working Opencast mining-factors considered for mechanization and transportation. Advantages and disadvantages Under ground mining methods for epigenetic deposits and bedded deposits. Advance and retreat mining – development, production and retreat stage Board and pillar, Room and pillar, Longwall mining. Mine supports-factors considered for types of supports used. Mine ventilation- planning, its significance and effects. Drainage-planning, its significance and its effect. Mining hazards: mine inundation, fire and rock burst.

Mineral Beneficiation: Mineral processing principles, objectives and advantages of mineral processing. Crushing, Grinding, and Sizing. Concentration techniques- Gravity methods of separation( Jigging, tabling, heavy media separation, Himpfrey's spiral), Magnetic, High Tension Separation, and Floatation. Flow-sheets- Beneficiation of copper, lead-zinc, iron and coal.

## PHARMACY

- I.
  - i) History of Pharmacy: Code of ethics in Pharmacy, Posclogy; Principles of dispending of mixtures, emulsion, powers and suppositories; Different types of Incompatibilities.
  - ii) Pharmacy Act; Drugs and Cosmetics Act and Rules; Drugs price control order including amendments.
  - iii) Methods of Sterilization and test for sterility; Preparation of vaccines, Sera and Anti-toxins; Manufacture of Penicillin and Streptomycin.
  - iv) Methods of classification of crude drugs; Adulteration and evaluation of crude drugs.
  - v) Pharmacognosy of Senna, Digitalis, Ispaghula, Cinchona, Cinnamon, Renwolfia, Podophyllu, Ergot Cod liver oil and Geletin.
  - vi) Principles, instrumentation and applications of colorimetry. Spectrophotometry, fluorimetry, gas chromatography and High performance liquid chromatography.
- II.
  - i) Theory and applications of rheology (Newtonian and Non-Newtonian); Colloidal and interfacial phenomenon and their applications; Coarse dispersion (emulsions and suspensions)
  - ii) Physics-Chemical, formulation and biological factors effecting drug absorption.
  - iii) Formulation, technology and quality control of tablets, capsules, liquid crias, aercsols, creams and cintments, injectables and sustained telease medicaments.
  - iv) Structure activity relationship, synthesis, chemical nomenclature and uses of following classes of drugs – dypnotics and Sedatives; trauqulizers; Analgesics and Autipyretics; Anti-inflammatory drugs; Diuretics; anti-hypertensives and Chemotherapeutic Agents.
  - v) Pharmacology of Local anesthetics; Diuretics; Hormones; Hypeglyeemic agents; Anti-histaminics; Drugs acting on central pervious system; Adrenergic and Cholingrgic drugs and Cardio-vascular agents.
  - vi) Pharmacokinetic and Pharmacodynamic drug interactions with suitable examples; Terratogenicity; Drug-induced diseases.

## ENGLISH

Detailed Study of literary age (19<sup>th</sup> Century) viz.,

The period of English Literature from 1798 to 1900 with special reference to the works of the major writers including Words worth, Coleridge, Byron, Keats, Shelley, Lamb, Hazlitt, Thackeray, Dickens, Tennyson, Browning, Arnold George Eliot, Calyle and Ruskin.

Study of the following Texts:

- |     |                     |   |   |
|-----|---------------------|---|---|
| 1.  | William Shakespeare | : | ‘Macbeth’, ‘Hamlet’, ‘Julius Vrsdst’, ‘Tempest’ |
| 2.  | John Milton         | : | ‘Paradise Lost’, -Books I & II                  |
| 3.  | Alexander Pope      | : | .‘The Rape of the Lock’                         |
| 4.  | William Wordsworth  | : | ‘The Immorality Ode’, ‘The Tin Tern Abbey’      |
| 5.  | John Keats          | : | ‘Ode to a Nightingale’                          |
| 6.  | P.B. Shelley        | : | ‘Ode to the West Wing’                          |
| 7.  | Jane Austen         | : | ‘Pride and Prejudice’.                          |
| 8.  | Charles Dickens     | : | ‘A Tale of Two Cities’                          |
| 9.  | Thomas Hardy        | : | ‘The mayor of Casterbridge’                     |
| 10. | W.B. Yeats          | : | “Byzantium”, ‘The Second Coming’.               |
| 11. | T.S. Eliot          | : | ‘The Waste Land’.                               |
| 12. | D.H. Lawrence       | : | ‘Sons and Lovers’.                              |
| 13. | Mulk Raj Anand      | : | ‘The Big heart’                                 |
| 14. | R.K. Narayan        | : | ‘The Man eater of Malgudi’                      |

## MATHEMATICS

**Real Analysis:** Continuity and differentiability of real functions.; Uniform continuity, Sequences and series of functions. Uniform convergence. Functions of bounded variation. Riemann integration.

**Complex Analysis:** Analytic functions. Cauchy's theorem Cauchy's integral formula. Laurent's series. Singularities. Theory of residues – Conformal mapping.

**Abstract Algebra:** Groups – Sub-groups – normal subgroups Quotient group Homomorphism – Fundamental theorem of Homomorphism, Permutation groups: Cayley's theorem – Rings – Subrings – Ideals – Fields – Polynomial rings.

**Linear Algebra:** Vector spaces – Basis and dimension – Linear transformations – Matrices – Characteristic roots and characteristic vectors – systems of linear equations – Canonical forms – Cayley – Hamilton theorem.

**Differential Equations:** First order ordinary differential equations (O.D.E) and their solutions – Singular solutions. Initial value problems for first order O.D.E. General theory of homogeneous and non-homogeneous linear differential equations, variation of parameters. Elements of first order partial differential equations (PDE).

Co-ordinate Geometry of Three Dimensions: The Plane – The straight-line – Sphere and cone.

## PHYSICS

### I. **Mathematical Physics:**

Vectors: Vector operators like DCI & grad, div. & curl. Surface and volume integrals – Theorems of Gauss, Stokes, & Green.

Matrices : Quality, addition and subtraction, multiplication of matrices, inverse of a matrices, similarity and unitary transformation Characteristic equation of a matrix Eigen values – Eigen vectors Square, diagonal, unit, symmetric, and skewmatrix - Hermitian and unitary matrix.

Tensors: Tensors of any order –Transformation relation Covariant & Contra-variant tensors-Christoffel symbols.

Fourier Analysis: Trigonometric Fourier series – Evaluation of coefficients – Exponential Fourier series.

### II. **Classical Mechanics:**

General Theorems of mechanics of mass points – Principals of Virtual work – De-Alembert's principle – Lagrange's equation of motion – Hamilton's principle – Hamilton's Equation of motion – Principle of least action – Canonical transformations = Poisson bracket. Rigid body motion – Euler's theorem on rigid body motion – moment of inertia-tensor – heavy Symmetrical top.

### III. **Electromagnetic Theory:**

Generalisation of Ampere's Law – Derivation of Maxwells equation – Pointing theorem – Transverse nature of Electromagnetic waves – propagation & Conducting and non-conducting media – metallic reflection – Propagation of light in crystalline media – Fresnel's Theory of double refraction.

### IV. **Special Theory of Relativity:**

Galilean Transformation – Newtonians Relativity – Michelson's Morley Experiment – Postulates of special theory of relativity Lorentz's transformation – Relativistic particle mechanics Equivalence of mass & energy – Covariance of Maxwell's equation.

### V. **Statistical Mechanics:**

Generalised coordinates & momenta-phase space, Liowellies Theorems – Maxwell Boltzman statistics – Distribution of velocities and energy in ideal gas – Equipartition of energy – Vibrational, rotational, and electronic partition functions for diatomic gas – specific heats of gas – Ortho and para hydrogen's – Bose Einstein & Fermi Dirac statistics – Bose Einstein gas and application to radiation – liquid helium – Free electrons in metals.

### VI. **Quantum Mechanics:**

Shordinger's wave equation – Born interpretation of wave functions – Expectations values of dynamical variables – Ehrenfests' Theorem - Uncertainty Principle – Application of Shordinger's equation to (a) One dimensional squarewell potential (b) Simple harmonic Oscillator (c) Hydrogen atom.

Perturbation theory – First order and second order theories for non degenerate & degenerate systems – Application to normal helium atom – Time dependent & time independent perturbation theory – Application for each. Relativistic quantum mechanics – Klenn Garnian equation Dirac's equation Solution for a free particle meaning of negative energy states – Quantum theory of scattering – Born approximation.

### VII. **Electronics:**

Vacuum: Tubes and semiconductor diodes – Principle and working of rectifier and power supply – Ripple factor L and T section filters voltage stabilisation in power supplies characteristics of triode and pentode and junction transistors their static characteristics – Voltage amplifiers – R.C. coupled amplifiers – and its frequency response Negative feed back in amplifiers – Advantages of – Ve feed back – condition for sinusoidal oscillations in transistor circuits Hartley and Colpitts oscillators – multi vibrators A stable – Monostable and bi-stable type – Pulse generator – Saw tooth voltage generator Cathode – ray oscilloscope (C.R.O).

**VIII. Solid State Physics:**

Crystallography – Classification of solids – Point group and space group – Crystal systems – Specification of planes and directions – Elements of X-ray diffraction – Various crystal bindings – Metallic, ionic, co-valent molecular and hydrogen bonded crystals – Band theory of solids – motion of electrons in periodic potential Bloch's theorem Kronig's penny model – energy bands – Brillouin zones – distinction between insulators – Metals and Semi-conductors on band theory.

**IX. Nuclear Physics:**

Radioactivity, Chain dis-integration, transient and secular equilibrium – Age of rocks and Radio carbon dating – alpha decay or Gamow's theory – Beta decay and neutrino Interaction of gamma rays with matter – Selection rules – nuclear models – Liquid drop model – semi empirical mass formula – criteria for stability against spontaneous decay – Shell model – nuclear detectors – Ionisation – Chambers – G.M. counters – Proportional counters – bubble and spark chambers – Semi-conductor detectors.

**X. Spectroscopy:**

Bohr – Sommerfield theory of Hydrogen atoms – Space quantisation – fine structure of spectral lines – Alkali spectra – Zeeman effect Vector atom model of one electron system – Paschen – Back effect – Stark effect in Hydrogen atoms – Band spectra – Types of band spectra-I.R. and Raman effect. Isotope effect – Franck – Condon Principle.

## CHEMISTRY

### **Inorganic Chemistry :**

1. Atomic structure & Chemical Bonding – Quantum theory Schrodinger – wave equation – Hydrogen atom, Hydrogen molecule – Elements on valence bond – molecular orbital theories.
2. Determination of molecular structure – X – ray and electron diffraction methods.
3. Periodic classification (Classical and modern) periodic functions of elements – atomic volume – atomic radius electronegativity-oxidation states – lattice energy and their applications.
4. Chemistry of d-block elements – Physical and chemical characteristics of the transition elements – Characteristics related to electronic arrangements oxidation states – color magnetic properties – Complex formation – interstitial L-S coupling – Hund's rule. A General study of the first transition series.
5. Chemistry of f-block elements – Lanthanons and Actinons – electronic configurations – oxidation's states – Separation of Lanthanons and Actinons.
6. Chemistry of complex compounds: Jorgenson and Werner's views – effective atomic number – valence bond theory – Introductory treatment of crystalfield theory applied to complexes with co-ordination number 6.
7. Isomerism in complexes : Geometrical and optical isomerism of four and six co-ordinated complexes. Pearson's theory of hard and soft acids and bases.
8. Study of the following elements and their modern Chemistry Be, Ti, Zr, Hf, V, Mo, W, U, and Th.
9. Alloys : Intermetallic compounds.

### **Physical Chemistry :**

10. Radio activity : Elementary account of nuclear structure natural and artificial radio activity – characterisation of relations – decay chains-half-life-decay constant and average life. Radio-active series, atomic transmutation – atomic fission and fusion reactions and their applications – nuclear isomers and their separations.
11. Kinetic theory of gases : Equations of state – critical constants – States of aggregation – liquid states – viscosity – physical properties and chemical constitution – collision theory of derivation of the collision – number from Kinetic theory of gases.
12. Chemical Kinetics : order and molecularity of reaction first order and second order reactions – law of mass action – influence of temperature and pressure – thermodynamic derivation of Law of mass action – unimolecular reactions Lindemann's theory.
13. Thermodynamics : First law of thermodynamics and its applications to ideal gases, energy and enthalpy changes in gases, heat capacities of gases and their inter-relation. Isothermal and adiabatic processes – Kirchoff's equation and its applications – Vant Hoff's isotherm isochore equilibria in heterogeneous system. Second Law of thermodynamics (Joules and Joule Thomson experiments). Entropy change in an isolated system for reversible and irreversible processes – Variation on entropy of a system with temperature and pressure.

### **Organic Chemistry :**

14. Heterocyclic compounds and chemistry of neutral products – Importance of heterocyclic compounds – classification based on the nature of heteroatom, size of the ring and II excessive and II deficient nature of the ring.  
A general and comparative study of Furan pyrrole and thiophene Ring transformations. General comparison with benzenoid compounds, pyridine, quinoline, Isoquinoline and acridine-II deficient nature of heterocyclic rings – case of nucleophilic substitution.

15. Methods of synthesis, reactivity and properties of the following polynuclear aromatic compounds: anthracene, Benzanthracene, Phenanthrene Chrysen and picene.
16. Benzopyrones : Coumarins and Chromones.
17. Alkaloids : General occurrence, reactions and degradations. Chemical and Physico-Chemical methods for the elucidation of structures-synthesis and structural elucidation of the following alkaloids – atropine – cocaine - quinene – Narcotine – papaverine.
18. Organic reaction mechanism: Structure and reactivity of organic molecules – Factors affecting Electron density in a band-inductive, inductive, mesomeric, (resonance) and electrometric effects, hyperconjugation – Dipole moments-acidic and basic strength of organic Compounds.  
Modern concepts of organic reaction mechanisms – Addition, substitution and elimination reactions – simple examples and their mechanism. The intermediate carbonium ion formation and its participation in organic reactions. Addition C-C, system-pinacol-pincolene rearrange rearrangements. Automatic substitution – Formation and hydrolysis of esters.
19. Some name reactions : Wurtz-Friedel-Crafts, Fries-Gattermann – Perin – Beckmann's rearrangements and Grignard reactions.
20. Carbohydrates : General reactions of monosaccharides – configurational studies on glucose, fructose, sucrose, Recent advances in the Chemistry of cellulose and starch.
21. Proteins – Introduction to proteins – their classification – Nomenclature and distribution in nature simple, amino acids – Isolation and their synthesis.
22. General Ideas regarding the chemistry of vitamins & Hormones nicotine, B-Carotene and Vitamin C.
23. Alicyclic compounds : Synthesis and reactions Bayers strain theory – Factors affecting stability of conformation – terpenes – citral – geraniol – limonene – terpinol – pinene and camphor.
24. Stereo Chemistry : Optical and geometric isomerism configuration of saturated molecules – DL and RS configuration of optically active compound-racemic – mixtures – racemisation and resolution.
25. Molecular spectra : NMR, Chemical shift – Spin – Spin-coupling – ESR of simple radicals – Rotational Spectra, diatomic molecules, linear triatomic molecules, isotopic substitution – Vibrational and Raman Spectra.

#### Physical Chemistry :

26. Electro-Chemistry : Equivalent conductance and its measurement. The independent migration of ions – Kohlrausch's Law. Transport number and their determination. Ionic mobilities. Equivalent conductance of weak and strong electrolytes. Inter-ionic attraction theory treated quantitatively-Debye-Huckel-Onsager equation. Determination of solubilities from conductance measurements – Conductometric titration's.  
Ionic product of water and its determination from conductance and EMF methods – theories of acids and bases – Hydrogen ion concentration and its measurements from E.M.F.measurements using Hydrogen quin – hydrogen and glass electrodes – Buffer solutions – Henderson's equation potentiometric titration's – Determinations of equilibrium constant and solubilities from E.M.F.measurements – Gibbs – Helmholtz equation and its application to chemical cells.
27. Photo – Chemistry : Laws on absorption of light – Griess – Draper Laws – Einstein's Law in Chain reactions – Hydrogen chlorine reactions – absorption – Laws of absorption.
28. Surface Chemistry and catalysis – Absorption isotherms, surface area determination, heterogeneous catalysis, acid-base and enzyme catalysis.



ANNEXURE-IIILIST OF SCHEDULED CASTES**(Definition 28 of General Rule - 2)**  
**SCHEDULE - I**

(Substituted with effect from 27-07-1977 through G.O.Ms.No. 838, G.A.(Services-D) Department, dated 15/12/1977)

- 1 Adi Andhra
- 2 Adi Dravida
- 3 Anamuk
- 4 Aray Mala
- 5 **Arundhatiya**
- 6 Arwa Mala
- 7 Bariki
- 8 Bavuri
- 9 Beda Jangam, Budga Jangam (In Districts of Hyderabad, Rangareddy, Mahaboobnagar, Adilabad, Nizamabad, Medak, Karimnagar, Warangal, Khammam and Nalgonda)\*
- 10 Bindla
- 11 Byagara, Byagari\*
- 12 Chachati
- 13 Chalavadi
- 14 Chamar, Mochi, Muchi, Chamar-Ravidas, Chamar-Rohidas\*
- 15 Chambhar
- 16 Chandala
- 17 Dakkal, Dokkalwar
- 18 Dandasi
- 19 Dhor
- 20 Dom, Dombara, Paidi, Pano
- 21 Ellamalwar, Yellammalawandlu
- 22 Ghasi, Haddi, Relli, Chachandi
- 23 Godagali, Godagula(in the Districts of Srikakulam, Vizianagaram & Vishakapatnam) \*
- 24 Godari
- 25 Gosangi
- 26 Holey
- 27 Holey Dasari
- 28 Jaggali
- 29 Jambuwulu
- 30 Kolupulvandlu, Pambada, Pambanda, Pambala \*
- 31 Madasi Kuruva, Madari Kuruva
- 32 Madiga
- 33 Madiga Dasu, Mashteen
- 34 Mahar
- 35 Mala, Mala Ayawaru \*
- 36 Mala Dasari
- 37 Mala Dasu
- 38 Mala Hannai
- 39 Mala Jangam
- 40 Mala Masti
- 41 Mala Sale, Netkani
- 42 Mala Sanyasi
- 43 Mang
- 44 Mang Garodi
- 45 Manne
- 46 Mashti
- 47 Matangi
- 48 Mahter
- 49 Mitha Ayyalvar
- 50 Mundala
- 51 Paky, Moti, Thoti
- 52 (Omitted)\*
- 53 Pamidi
- 54 Panchama, Pariah
- 55 Relli
- 56 Samagara

- 57 Samban
- 58 Sapru
- 59 Sindhollu, Chindollu
- 60 Yatala (Srikakulam Dist. Only) Memo No. 8183/CV-1/2006-10 SW (CV-I) Dept., Dt. 31/03/2008
- 61 Valluvan \* (Chittoor and Nellore Dist. Only) Memo No. 8183/CV-1/2006-10 SW (CV-I) Dept., Dt. 31/03/2008

\* As for the Constitution (Scheduled Caste) orders (Second Amendment) Act 2002, Act No. 61 of 2002

### LIST OF SCHEDULED TRIBES

1. Andh, Sadhu Andh \*
2. Bagata
3. Bhil
4. Chanchu (Chenchwar omitted) \*
5. Gadabas, Boda Gadaba, Gutob Gadaba, Kallayi Gadaba, Parangi Gadaba, Kathera Gadaba, Kapu Gadaba \*
6. Gond, Naikpod, Rajgond, Koitur \*
7. Goudu (in the Agency tracts)
8. Hill Reddis
9. Jatapus
10. Kammara
11. Kattunayakan
12. Kolam, Kolawar \*
13. Konda Dhoras, Kubi \*
14. Konda Kapus
15. Konda Reddis
16. Kondhs, Kodi, Kodhu, Desaya Kondhs, Dongria Kondhs, Kuttiya Konds, Tikiria Khondhs, Yeniy Khondhs, Kuvinga \*
17. Kotia, Bentho Oriya, Bartika, Dulia, Holva, Sanrona, Sidhopaiko (Dhulia, Paiko, Putiya-omitted \*)
18. Koya, Doli Koya, Gutta Koya, Kammara Koya, Musara Koya, Oddi Koya, Pattidi Koya, Rajah, Rasha Koya, Lingadhari Koya (Ordinary), Kottu Koya, Bhine Koya, Raj Koya (Goud-omitted \*)
19. Kulia
20. Malis (excluding Adilabad, Hyderabad, Karimnagar, Khammam, Mahabubnagar, Medak, Nalgonda, Nizamabad and Warangal District)
21. Manna Dhora
22. Nayaks (in the Agency tracts)
23. Mukha Dhora, Nooka Dhora
24. Pardhan
25. Porja, Parangi Perja
26. Reddi Dhoras
27. Rona, Rena
28. Savaras, Kapu Savaras, Maliya Savaras, Khutto Savaras
29. Sugalis, Lambadis, Banjara \*
30. Thoti (in Adilabad, Hyderabad, Karimnagar, Khammam, Mahabubnagar, Medak, Nalgonda, Nizamabad and Warangal Districts)
31. Valmiki (in the Scheduled Areas of Vishakapatnam, Srikakulam, Vizianagaram, East Godavari and West Godavari Districts \*)
32. Yenadis, Chella Yenadi, Kappala Yenadi, Manchi Yenadi, Reddi Yenadi \*
33. Yerukulas, Koracha, Dabba Yerukula, Kunchapuri Yerukula, Uppu Yerukula \*
34. Nakkala Kurivikaran (**Nakkala – A.P. Gazette, Part – III (B) Central Acts ordinance and Regulations Issue No. 05 Dt. 02/10/2003** )
35. Dhulia, Paiko, Putiya (in the districts of Vishakapatnam, Vizianagaram \*)

\* As for the Scheduled Castes and Scheduled Tribes Orders (Amendment) Act 2002, Act No. 10 of 2003

**LIST OF SOCIALLY AND EDUCATIONALLY BACKWARD CLASSES**

(Amended from time to time as on 31/08/2007)

**GROUP- A**

Aboriginal Tribes, Vimuktha Jathis, Nomadic and Semi Nomadic Tribes etc.,

1. Agnikulakshatriya, Palli, Vadabalija, Besta, jalari, Gangavar, Gangaputra, Goondla, Vanyakulakshatriya (Vannekapu, Vannereddi, Pallikapu, Pallireddy Neyyala and Pattapu) \*Mudiraj / Mutrasi / Tenugollu. The G.O. Ms.No. 15 BCW(C2) Dept., dt. 19/02/2009 is suspended. Hence the inclusion of Mudiraj / Mutrasi / Tenugollu is suspended) vide Hon'ble A.P. High Court orders in WP No. 2122/2009 dated: 29-04-2009.
2. Balasanthu, Bahurupi
3. Bandara
4. Budabukkala
5. Rajaka (Chakali Vannar)
6. Dasari (formerly engaged in bikshatana)  
(amended vide G.O.Rt.No. 32, BCW(M1) Department, dated 23/02/1995)
7. Dommara
8. **Gangiredlavaru**
9. Jangam (whose traditional occupation is begging)
10. Jogi
11. Katipapala
12. Korcha
13. Lambada or Banjara in Telangana Area  
(deleted and included in S.T. list vide G.O.Ms.No. 149, SW, dated 3/5/1978)
14. Medari or Mahendra
15. Mondivaru, Mondibanda, Banda
16. Nayee Brahmin (Mangali), Mangala and Bajantri  
(amended vide G.O.Ms.No. 1, BCW(M1) Department, dated 6/1/1996)
17. Nakkala (**Deleted vide G.O. Ms. No. 21, BCW(C2) Dept., Dt. 20/06/2011**)
18. Vamsha Raj (amended vide G.O.Ms.No. 27, BCW(M1) Department, dated 23/06/1995 deleting the Original name Pitchiguntla)
19. Pamula
20. Pardhi (**Mirshikari**)
21. Pambala
22. Peddammavandlu, Devaravandlu, Yellammavandlu, Mutyalammavandlu (Dammali, **Dammala**, Dammula, Damala Castes confined to Srikakulam dist. Vide G.O.Ms. No.: 9 BCW(C2) Dept., Dt. 9/04/2008)
23. Veeramushti (Nettikotala), Veera bhadreeya (Amended vide G.O. Ms. No. 62, BCW (M1) Dept., Dt. 10/12/1996)
24. Valmiki boya (Boya, Bedar, Kirataka, Nishadi, Yellapi, Pedda Boya) Talayari and Chunduvallu  
(G.O.Ms. No. 124, SW, Dt. 24.06.85) Yellapi and Yellapu are one and the same amended vide G.O. Ms. No. 61, BCW(M1) Dept., Dt. 05.12.1996)
25. Yerukalas in Telangana area (deleted and included in the list of S.Ts)
26. Gudala
27. Kanjara - Bhatta
28. Kalinga (Kinthala deleted vide G.O.Ms. No. 53, SW, Dt. 07.03.1980)
29. Kepmare or Reddika
30. Mondipatta
31. Nokkar
32. Pariki Muggula
33. Yata
34. Chopemari
35. Kaikadi
36. Joshinandiwalas
37. Odde (**Oddilu**, Vaddi, Vaddelu)
38. Mandula (Govt. Memo No. 40-VI/70-1, Edn., Dt. 10.02.1972)
39. Mehator (Muslim) (Govt. Memo No. 234-VI/72-2, Edn., Dt. 05.07.1972).
40. Kunapuli (Govt. Memo No. 1279/P1/74-10, E&SW, Dt. 03.08.1975)
41. Patra (included in G.O. Ms. No. 8, BCW(C2) Dept., Dt. 28.08.2006)
42. kurakula of Srikakulam, Vizianagaram and Visakhapatnam Districts only. Included vide in G.O.MS.No. 26 BC W (C2) Dept., Dt. 4/07/08
43. Pondara of Srikakulam, Vizianagaram, and Visakhapatnam Districts only. Included vide G.O.MS.No. 28 BC W (C2) Dept., Dt. 4/07/08
44. Samanthula, Samantha, sountia, Sauntia of Srikakulam District only. Included vide G.O.MS.No. 29 BC W (C2) Dept., Dt. 4/07/08

45. pala-Ekari, Ekila, Vyakula, Ekiri, Nayanivaru, Palegaru, Tolagari, Kavali of Chittoor, Cuddapah, Kurnool, Anantapur, Nellore, Hyderabad and Rangareddy Districts only. Included vide G.O. MS. No. 23 B.C. W (C2) Dept., Dt. 4/07/08
46. Rajannala, Rajannalu of Karimnagar, Warangal, Nizamabad and Adilabad Districts only. (included in vide G.O.Ms. No. 44 B.C.W(C2) Dept., Dt.07/08/2008).
47. Bukka Ayyavars, Included vide G.O.Ms.No. 6 Backward Classes Welfare (C2) Dept., dt. 19/02/2009.
48. Gotrala, Included vide G.O.Ms.No. 7 Backward Classes Welfare (C2) Dept., dt. 19/02/2009. The area of operation shall be confined to Telangana Region only.
49. Kasikapadi / Kasikapudi, Included vide G.O.Ms.No. 8 Backward Classes Welfare (C2) Dept., dt. 19/02/2009. The area of operation shall be confined to Hyderabad, Rangareddy, Nizamabad, Mahaboobnagar and Adilabad Districts of Telangana Region only.
50. Siddula, Included vide G.O.Ms.No. 9 Backward Classes Welfare (C2) Dept., dt. 19/02/2009. The area of operation shall be confined to Telangana Region only.
51. Sikligar / Saikalgar, Included vide G.O.Ms.No. 10 Backward Classes Welfare (C2) Dept., dt. 19/02/2009.
52. Poosala included vide G.O. Ms.No. 16 Backward Classes Welfare (C2) Dept., dt. 19/02/2009.
53. **Aasadula / Asadula, included vide G.O. Ms. No. 13, Backward Classes Welfare (C2) Dept., Dt. 27/05/2011. The area of operation shall be confined to East Godavari and West Godavari Districts only.**
54. **Keuta/Kevuto/Keviti, included vide G.O. Ms. No. 15, Backward Classes Welfare (C2) Dept., Dt. 27/05/2011. The area of operation shall be confined to Srikakulam District only.**

**GROUP – B (Vocational)**

1. Achukatlavandlu in the Districts of Visakhapatnam and Guntur confined to Hindus only as amended vide G.O. Ms. No. 8, BCW(C2) Dept., Dt. 29.03.2000
2. Aryakshatriya, Chittari , Giniyar, Chitrakara, Nakshas (Muchi Telugu Speaking deleted vide G.O. Ms. No. 31, BCW (M1) Dept., 11.06.1996)
3. Devanga
4. Goud (Ediga) Gouda (Gamella) Kalalee, Goundla, Settibalija of Vishaphapatnam, East Godavari, West Godavari and Krishna Districts and Srisayana (Segidi) – (amended vide G.O. Ms. No. 16, BCW (A1) Dept., dt. 19.06.1997
5. Dudekula, Laddaf, Pinjari or Noorbash
6. Gandla, Telikula, Devatilakula (Amended vide G.O. Ms. No. 13, BCW(A1) Dept., dt. 20.05.1997)
7. Jandra
8. Kummara or Kulala, Salivahana (Salivahana added vide G.O. Ms. No. 28, BCW(M1) Dept., 24.06.1995)
9. **Karikalabhakthulu**, Kaikolan or Kaikala (Sengundam or Sengunther)
10. Karnabhakthulu
11. Kuruba or Kuruma
12. Nagavaddilu
13. Neelakanthi
14. Patkar (Khatri)
15. Perika (Perikabaliya, **Puragirikshatriya**)
16. Nessi or Kurni
17. Padmasali (Sali, Salivan, Pattusali, Senapathulu, Thogata Sali)
18. Srisayana ((**sagidi**)- deleted and added to Sl.No. 4 of Group-B)
19. Swakulasali
20. Thogata, Thogati or Thogataveerakshtriya
21. Viswabrahmin, Viswakarma (Ausula or Kamsali, Kammari, Kanchari Vadla or Vadra or Vadrangi and Silpis)  
(Viswakarma added vide G.O. Ms. No. 59 BCW(M1) Dept., Dt. 06.12.1995)
22. Kunchiti, Vakkaliga, Vakkaligara, Kunchitiga of Anantapur Dist. Only vide G.O. Ms.No. 10 BCW(C-2) Dept., Dt. 9-04-2008
23. Lodh, Lodhi, Lodha of Hyderabad, Rangareddy, Khammam and Adilabad Districts only. Included in Vide G.O.MS.No. 22 BC W (C2) Dept., Dt. 4/07/08
24. Bondili (included in vide G.O.Ms. No. 42, B.C.W(C2) Dept., Dt.07/08/2008)
25. Are Marathi, Maratha(Non-Brahmins), Arakalies and Surabhi Natakavallu. (included in vide G.O.Ms. No. 40, B.C.W(C2) Dept., Dt.07/08/2008)
26. Neeli (included in vide G.O.Ms. No. 43, B.C.W(C2) Dept., Dt.07/08/2008).
27. **Budubunjala/Bhunjwa/Bhadbhunja, included vide G.O.Ms. No. 11, Backward Classes Welfare (C2) Dept., Dt. 27/05/2011. The area of operation shall be confined to Hyderabad and Ranga Reddy District only.**

28. **Gudia/Gudiya, included vide G.O.Ms. No. 14, Backward Classes Welfare (C2) Dept., Dt. 27/05/2011. The area of operation shall be confined to Srikakulam, Vizianagaram and Vishakhapatnam, district only.**

**GROUP – C**

**Scheduled Castes converts to Christianity and their progeny**  
(Substituted in G.O.Ms.No.159, G.A.(Ser.D) Dept., dt. 02/04/1981)

**GROUP – D (Other Classes)**

1. Agar
2. Are-Katika, Katika, Are-Suryavamsi(Are-Suryavamsi added vide G.O. Ms. No. 39, B.C. W(C2) Dept., Dt. 7/08/08)
3. Atagara
4. Bhatraju
5. Chippolu (Mera)
6. Gavara
7. Godaba
8. Hatkar
9. Jakkala
10. Jingar
11. Kandra
12. Kosthi
13. Kachi
14. Surya Balija, (Kalavanthulu) Ganika (amended vide G.O.Ms. No. 20, BCW(P2) Dept., Dt. 19.07.1994)
15. Krishanabalija (Dasari, Bukka)
16. Koppulavelama
17. Mathura
18. Mali (Bare, Barai, Marar and Tamboli of all Districts of Telangana Region added as synonyms vide G.O. Ms. No. 3, BCW(C2) Dept., Dt. 09.01.2004 and G.O. Ms. No. 45, B.C.W(C2) Dept., Dt.07/08/2008)
19. **Mudiraj / Mutrasi / Tenugollu.**
20. Munnurukapu (Telangana)
21. Nagavamsam (Nagavamsa) vide G.O.Ms.No. 53, BC Welfare Dept., dated:19/09/1996
22. Nelli(deleted vide G.O.Ms. No. 43, B.C.W(C2) Dept., Dt.07/08/2008)
23. Polinativelmas of Srikakulam and Visakhapatnam districts
24. . . . deleted vide G.O. Ms.No. 16 Backward Classes Welfare (C2) Dept., dt. 19/02/2009
25. Passi
26. Rangrez or Bhavasarakshtriya
27. Sadhuchetty
28. Satani (Chattadasrivaishnava)
29. Tammali (confined to five districts of Nalgonda, Mahaboobnagar, Karimnagar, Nizamabad and Adilabad of Telangana Region only and not to other parts of A.P. as amended vide G.O. Ms. No. 20, BCW(A1) Dept., dt 21.07.1997)
30. Turupukapus or Gajula kapus {... the words "of Srikakulam, Vizianagaram and Vishakhapatnam Districts" were deleted vide G.O.Ms.No. 62, Backward Classes Welfare (C2) Dept., dt. 20/12/2008 and G.O. Ms.No. 19 Backward Classes Welfare (C2) Dept., dt. 19/02/2009} who are subject to Social customs or divorce and remarriage among their women (G.O. Ms. No. 65, E&SW, dt. 18.02.1994)
31. Uppara or Sagara
32. Vanjara (Vanjari)
33. Yadava (Golla)
34. Are, Arevalli and Arollu of Telangana District (Included vide G.O.Ms.No. 11, Backward Classes Welfare (C-2) Department, dt. 13/5/2003 and G.O.Ms. No. 41, B.C.W(C2) Dept., Dt.07/08/2008)
35. Sadara, Sadaru of Anantapur Dist. Only vide G.O.Ms.No. 11 BCW (C-2) Dept., Dt. 9-04-2008
36. Arava of Srikakulam District only. Included in vide G.O. MS. No. 24 BC W (C2) Dept., Dt. 4/07/08
37. Ayyaraka, of Srikakulam, Vizianagaram, Visakhapatnam, East Godavari, West Godavari, Krishna, Guntur, Khammam and Warangal Districts only. Included in vide G.O. MS. No. 25 BC W (C2) Dept., Dt. 4/07/08
38. Nagaralu of Srikakulam, Vizianagaram, Visakhapatnam, Krishna, Hyderabad and Rangareddy Districts only. Included in vide G.O. MS. No. 27 BC W (C2) Dept., Dt. 4/07/08

39. Aghamudian, Aghamudiar, Agamudivellalar and Agamudimudaliar including Thuluva Vellalas of Chittoor, Nellore, Kurnool, Anantapur, Hyderabad and Rangareddy Districts only. Included in vide G.O. MS. No. 20 BC W (C2) Dept., Dt. 4/07/08
40. Beri Vysya, Beri Chetty of Chittoor, Nellore and Krishna Districts only. Included in vide G.O. MS. No. 21 BC W (C2) Dept., Dt. 4/07/08
41. Atirasa included vide G.O. Ms.No. 5 Backward Classes Welfare (C2) Dept., dt. 19/02/2009. The area of operation shall be confined to East Godavari and West Godavari Districts only.
42. Sondi / Sundi included vide G.O. Ms.No. 11 Backward Classes Welfare (C2) Dept., dt. 19/02/2009.
43. Varala included vide G.O. Ms.No. 12 Backward Classes Welfare (C2) Dept., dt. 19/02/2009. The area of operation shall be confined to Telangana region only.
44. Sistakaranam included vide G.O. Ms.No. 13 Backward Classes Welfare (C2) Dept., dt. 19/02/2009.
45. Lakkamari Kapu included vide G.O. Ms.No. 14 Backward Classes Welfare (C2) Dept., dt. 19/02/2009. The area of operation shall be confined to Telangana region only.
46. Veerashaiva Lingayat/Lingabaliya, included vide G.O. Ms.No. 22 Backward Classes Welfare (C2) Dept., dt. 28/02/2009.
47. **Kurmi, included vide G.O.Ms. No. 12, Backward Classes Welfare (C2) Dept., Dt. 27/05/2011. The area of operation shall be confined to Telangana Region and also Krishna District only.**

#### GROUP – E

##### (Socially and Educationally Backward Classes of Muslims)

1. Achchukattalavandlu, Singali, Singamvallu, Achchupanivallu, Achchukattuvaru, Achukatlavandlu.
2. Attar Saibuli, Attarollu
3. Dhobi Muslim/ Muslim Dhobi/ Dhobi Musalman, Turka Chakla or Turka Sakala, Turaka Chakali, Tulukka Vannan, Tskalas or Chakalas, Muslim Rajakas.
4. Faqir, Fhaker Budbudki, Ghanti, Fhaker, Ghanta Fhakerlu, Turaka Budbudki, Derves, Fakeer
5. Garadi Muslim, Garadi Saibulu, Pamulavallu, Kani-Kattuvallu, Garadollu, Garadiga.
6. Gosangi Muslim, Phakeer Sayebulu
7. Guddi Eluguvallu, Elugu Bantuvallu, Musalman Keelu **Gurravallu**
8. Hajam, Nai, Nai Muslim, Navid
9. Labbi, Labbai, Labbon, Labba
10. Pakeerla, Borewale, Deraphakerlu, Bonthala
11. Kureshi/ Khureshi, Khasab, Marati Khasab, Muslim Katika, Khatik Muslim
12. Shaik/ Sheikh
13. Siddi, Yaba, Habshi, Jasi
14. Turaka Kasha, Kakkukotte Zinka Saibulu, chakkitanaveale, Terugadu Gontalavaru, Thirugatiganta, Rollaku Kakku Kottevaru, Pattar Phodulu, Chakketakare, **Thuraka** Kasha
15. Other Muslim groups excluding  
Syed, Saiyed, Sayyad, Mushaik;  
Mughal, Moghal;  
Pathans;  
Irani;  
Arab;  
Bohara, Bohra;  
Shia Imami Ismaili, Khoja;  
Cutchi-Memon;  
Jamayat;  
Navayat;  
and all the synonyms and sub-groups of the excluded groups; and except those who have been already included in the State List of Backward Classes.

**N.B.: 1. The above list is for information and subject to confirmation with reference to G.O.Ms.No. 58, SW(J) Department, dated 12/05/1997 and time to time orders.**

**2. On account of any reason whatsoever in case of any doubt/ dispute arising in the matter of community status (SC/ST/BC/OC) of any candidate, subject to satisfaction with regard to relevant rules and regulations in force the decision of the Commission shall be final in all such cases.**