

**Direct Recruitment in the cadre of Telecom Technical Assistants (TTAs) in BSNL,
Andhra Pradesh Telecom – Recruitment Year-2012.**

Closing Date for submission of applications : 13.05.2013

Examination Date : 30.06.2013 (10.00 to 13.00Hrs)

Applications are invited from the eligible Indian Citizens for the post of **Telecom Technical Assistants (TTAs)** in the non-executive category, which is a Secondary Switching Area (SSA) Cadre. Selection of candidates will be through a Competitive Examination.

1. Scale of Pay : Rs. 13600 – 25420 (Revised IDA pay scales).

2. Selection for a particular Secondary Switching Area (SSA) and Service Liability : On Selection / Appointment, candidate has to serve in the SSA / other non-recruiting Units of BSNL, like Southern Telecom. Region (STR), Southern Telecom. Projects (STP), Quality Assurance (QA) and Testing & Development (T&D) etc., and as per TTA Recruitment Rules-2001.

3. Eligibility :

(a) Indian Nationals are only Eligible to apply.

(b) Education :

3 Years Engineering Diploma from a recognized Institution / University in any of the following disciplines

- i. Telecommunications Engineering
- ii. Electronics Engineering
- iii. Electrical Engineering
- iv. Radio Engineering
- v. Computer Engineering
- vi. Instruments Technology
- vii. Information Technology or
- viii. M.Sc (Electronics).

(c) Age : Applicant should be between 18 and 27 years, as on the closing date for submission of applications.

- i. However, the upper age limit is relaxable by 3 years for OBC candidates and by 5 years for SC/ST candidates.
- ii. For PH candidates, the age is relaxable by 10 years for OC candidates, 13 years for OBC, 15 years for SC/ST candidates.
- iii. In case of BSNL Employees, age is relaxed upto 40 years for OC candidates, upto 43 years for OBC and upto 45 years for SC/ST candidates.
- iv. Ex. Servicemen are eligible for relaxation in age as prescribed by the Central Government.

(d). In respect of Physically Handicapped persons, candidate with following physical disability only will be eligible.

- a). Hearing impairment – (PD) Partially deaf
- b). Locomotive impairment – OL - One leg affected, or
BL - Both legs affected but no arms

Attested copy of medical certificate(in Annexure-A) in support of his/her claim should be enclosed along with the application. Minimum degree of disability is 40% in order for a person to be eligible for claiming any concession/benefit.

4. Registration in Employment Exchange : Registration in Employment Exchange is not mandatory. However, it would be preferable if the applicant has registration in the employment exchange of the SSA concerned to which the applicant applies.

5. Disqualification : No person, (a). who has entered into or contracted a marriage with a person, having a spouse living or (b) who having a spouse living, has entered into or contracted a marriage with any person, shall be eligible for the appointment for the said post.

6. Examination Fee : An Examination Fee of Rs. 500/- is payable in the form of Indian Postal Order or crossed - Bank Demand Draft in favor of the Accounts Officer of respective SSAs, where the candidate desires to apply for the vacancies, as shown against SSA. The fee shall not be accepted in any other form. The SC/ST/PH candidates are exempted from paying Examination fee. For PH candidates, this exemption will, however, be available to only those handicapped persons who would otherwise be eligible for appointment to the post on the basis of the standards of medical fitness prescribed for that post and who enclose with the application form, necessary certificate from a Govt. Hospital / Medical Board in support of his claim for being handicapped. The fee once paid neither be refunded under any circumstances nor can not be held in reserve for any other examination / selection.

7. Enclosures to Application form : Attested True Copies of (a) Educational Qualifications (b) Age Proof (SSLC / SSC Certificate showing date of birth) (c.) In respect of PH candidate, Medical Certificate (d) Community Certificate in respect of OBC/SC/ST. OBC candidate should produce community certificate as per the proforma for the appointment of OBC in Central Government Service (with creamy layer clause) (e) Attested copy of Discharge Certificate in case of Ex. Servicemen. (f) No objection Certificate from the present employer if applicable. (g) Hall permit (Original / Duplicate) duly pasted the recent passport size photograph (h) Two self addressed stamped envelopes of 27x12 cms. (i) DD for Rs. 500/ (wherever applicable). (j) Copy of employment exchange registration card, if any.

All enclosures are annexed to the application properly. No column in the application should be left unfilled. The candidate shall affix their signature on all true copies / Xerox copies of certificates apart from attestation by a gazetted officer.

8. SSA wise Vacancies (Table 1) :

Name of the SSA	OC	OBC	SC	ST	Total	PH	Ex-SM	Filled in Applications along with enclosures to be sent to	Examination Fee in the form of DD/IPO to be drawn in favour of
Adilabad	3	2	2	NIL	7	NIL	NIL	Asstt. General Manager (HR&A) %General Manager Telecom 8-1-1/8, Opp. Collectorate, Adilabad-504 001	Accounts Officer(Cash), BSNL,%GMTD, BSNL Adilabad
Ananthapur	13	5	3	1	22	NIL	NIL	Asstt. General Manager (Admn) %General Manager Telecom District, Sri Krishnadevaraya Sanchar Bhavan, HPO Compound, Anantapur-515 001	Accounts Officer(Cash), BSNL,%GMTD, BSNL Anantapur
Chittoor	14	7	4	2	27	1	1	Asstt. General Manager (Admn) %General Manager Telecom District, BSNL, Tirupathi-01	Accounts Officer(Cash), BSNL,%GMTD, BSNL, Tirupathi
Cuddapa	6	4	2	NIL	12	NIL	NIL	General Manager (Admn) %General Manager Telecom District, BSNL, Kadapa-516 001	Accounts Officer(Cash), BSNL,%GMTD, Kadapa
East Godavari	8	7	4	3	22	NIL	NIL	Asstt. General Manager (Admn) %General Manager Telecom Fortgate, Rajahmundry-50	Accounts Officer(Cash), BSNL,%GMTD, EG SSA
Guntur	8	3	1	NIL	12	1	NIL	Asstt. General Manager (A & IT) %General Manager Telecom BSNL, 1st Line Chandramouli Nagar, Guntur-522 007	Accounts Officer(Cash), BSNL,%GMTD, Guntur
Hyderabad	18	10	6	3	37	1	4	Asstt. General Manager (Admn), %P.G.M., Hyderabad Telecom District, Room No.203, 2nd Floor, BSNL Bhavan, Adarshnagar, Hyderabad-500 063	AO(Cash)Main, %PGMT, BSNL, Hyderabad
Karimnagar	4	2	NIL	NIL	6	NIL	NIL	Asstt. General Manager (Admn) %General Manager Telecom BSNL, Near DM&HO Office, Opp.Kalabharathi Lane, Karimnagar-505 001	Accounts Officer(Cash), BSNL,%GMTD, Karimnagar
Khammam	1	NIL	1	NIL	2	NIL	NIL	Asstt. General Manager (Admn) %General Manager Telecom BSNL, Near DRDA Office, Burhanpuram, Khammam-50	Accounts Officer(Cash), BSNL,%GMTD, Khammam
Krishna	12	4	3	1	20	1	4	Asstt. General Manager (Admn) %General Manager Telecom District, BSNL Bhavan, Chuttugunta, Vijayawada-04	Accounts Officer(Cash), BSNL,%GMTD, Vijayawada
Kumool	13	8	4	2	27	1	2	Divisional Engineer (Admn), %General Manager Telecom BSNL Bhavan, Sunkesula Road, Kumool-518 050	Accounts Officer(Cash), BSNL,%GMTD, Kumool
Mahabubnagar	10	4	2	1	17	1	1	Asstt. General Manager (HR), %General Manager Telecom District, BSNL, BSNL Bhavan, Opp. Stn. Road, Mahabubnagar- 509 050	Accounts Officer(Cash), BSNL,%GMTD, Mahabubnagar
Medak	1	NIL	NIL	NIL	1	NIL	NIL	Asstt. General Manager (A), %GMTD, BSNL, balajinagar, Sangareddy-502 050	Accounts Officer(Cash), BSNL,%GMTD, Sangareddy
Nalgonda	7	3	2	1	13	NIL	NIL	Divisional Engineer (Admn), %General Manager Telecom BSNL, Panagal Road, Nalgonda-508 050	Accounts Officer(Cash), %GMTD, Nalgonda
Nellore	5	1	NIL	NIL	6	NIL	NIL	Asstt. General Manager (HR) %General Manager Telecom CTO Compound, Opp. leela Mahal, Nellore-50.	Accounts Officer(Cash), %GMTD,Nellore
Nizamabad	12	NIL	1	1	14	2	1	Asstt. General Manager (HR&A), %General Manager Telecom District, BSNL, Subashnagar, Opp. Nirmal Hridaya High School, Nizamabad-503 050	Accounts Officer(Cash), BSNL,%GMTD, Nizamabad
Prakasham	8	3	1	NIL	12	NIL	NIL	Asstt. General Manager (HR) %General Manager Telecom District, Ramnagar 1st Line, Trunk Road, Ongole-523 052.	Accounts Officer(Cash), BSNL,%GMTD, Ongole
Srikakulam	1	NIL	NIL	NIL	1	NIL	NIL	Asstt. General Manager (HRD), BSNL, 2nd Floor, %General Manager Telecom, Sanchar Bhavan, Srikakulam-01	Accounts Officer(Cash), BSNL,%GMTD, Srikakulam
Vishakapatnam	2	NIL	NIL	NIL	2	NIL	NIL	Asstt. General Manager (Admn) %General Manager Telecom Dabargadens, Visakhapatnam-20	Accounts Officer(Cash), BSNL,%GMTD, Visakhapatnam
Vizianagaram	NIL	NIL	3	1	4	NIL	NIL	Asstt. General Manager (Admn) %General Manager Telecom District, Doorsanchar Bhavan, Vizianagaram-535 002	Accounts Officer(Cash), BSNL,%GMTD, Vizianagaram
Warangal	5	3	2	1	11	NIL	NIL	Asstt. General Manager (Admn) %General Manager Telecom District, BSNL Bhavan, Near KMC, Warangal-506 007.	Accounts Officer(Cash), %GMTD, Warangal
West Godavari	13	7	3	2	25	1	3	Asstt. General Manager (Admn) %General Manager Telecom, BSNL Bhavan, E luru-02 W.G.Dist.	Accounts Officer(Cash), %GMTD, E luru

The above vacancies are provisional and are subject to change. Normal Rules on reservation for OBC/SC/ST/PH/Ex. Servicemen shall be applicable as per instructions of Government of India issued from time to time.

9. Already Employed in Govt. Service : (a) BSNL employees are to be submitted their applications through proper channel only. (b) Candidates working in Government Service Central / State / Public Sector undertakings should send their application through the Head of their Office / Department so as to reach the concerned office on the due date. Application received after the due date from such offices will summarily be rejected.

10. Candidates are advised to send application to **ONE SSA** only and they will be considered for vacancies of that SSA only and they will have to write the examination in the respective Examination centre of that SSA where they have applied. No change of examination centre will be entertained.

11. BSNL Reserves the right to amend any clause in this notification in future according to the rules and regulations prevailing at the time.

12. Application Form : The specimen of the application form is included in this advertisement. Neatly typed (only on one side of paper) in A4 size (30Cms x 20Cms) may be used for making application. Application without the signature of the candidate will be rejected outright. The envelope containing the application form should be superscribed as "**Application for the post of Telecom. Technical Assistant under Direct Recruitment-2012- in SSA**" in bold letters on top of the envelope. The photo copy of the format given in the advertisement should not be used for applying and in case a candidate submits such an application, the same will not be entertained and no correspondence in this regard will be entertained. The applications complete in all respect along with the examination fee and other enclosures should be sent by Regd. Post / Speed Post / by Hand to the SSA concerned.

13. Last Date : Applications should be sent to the concerned respective addresses as shown in Table-1, so as to reach them on or before **13.05.2013, by 5 pm.** Applications received without the required examination fee, attested copies of certificates, the applications received after the due date and incomplete applications will summarily be rejected. No further correspondence will be entertained in this regard.

14. Training and Bond : All candidates provisionally selected against the vacancies for direct recruitment shall execute a bond in the proforma as prescribed by the Company to serve in BSNL for a period of 2 years from the date of their appointment as Telecom. Technical Assistant. The candidates selected have to undergo a training successfully as per the training plan laid down by BSNL before their appointment as Telecom. Technical Assistant for a period as prescribed by BSNL from time to time.

15. Probation : The candidate appointed shall remain on probation for a period of Two years.

16. Jurisdiction : All candidates shall if so required, be liable to serve in the Territorial Army subject to provisions of Section 6A of the Territorial Army Act 1948 (56 of 1948) and the rules made there under.

17. Mode of Selection : Through Competitive Examination, followed by a Medical Test. Appointment and posting will be subject to successful completion of Pre-Appointment Training and other related verifications.

18. Schedule of Examination : Time – Table

Paper-1	Description	Maximum Marks	Date / Time
Part-I	General Ability Test	20	30.06.2013
Part-II	Basic Engineering	90	10.00-13.00Hrs
Part-III	Specialization	90	

Admit Cards will be issued to the eligible candidates by the concerned SSA.

19. Scheme & Syllabus : For Scheme and Syllabus please visit BSNL Andhra Pradesh - website : <http://www.ap.bsnl.co.in>

20. Any dispute in regard to the recruitment will be subject to the Courts / Tribunals having jurisdiction over the place of concerned Unit/Office of BSNL where the candidate submits his/her application.

21. Minimum Qualifying Standards : Minimum qualifying marks for OBC / SC / ST / PH will be as per the rules inforce. The selection of successful candidate in that SSA, will be strictly depending upon his/her position in the merit drawn on the basis of his/her performance in the Competitive Examination and as per the vacancy of that SSAs, as shown at Table 1.

22. The Service Condition Seniority etc. of the selected candidates will be determined as per the rules of the BSNL issued from time to time in this regard.

23. Examination Centers : The respective SSAs will intimate the Center / Venue for conducting the examination along with the Hall Permit.

24. For updates : please visit our official website ap.bsnl.co.in regularly.

13 Educational Qualification (Diploma in Engg & Above)

Name of the Engg Diploma/Degree with Discipline	University/Institute	Month & Year of Passing	As per the Advertisement whether eligible (Yes/No)

14 Permanent Address (in Capital letters)

Name					
Father's/Husband's Name					
Address					

<p>Please affix one recent passport size photograph without attestation</p>

15 Examination Fee (if applicable)

Sl No.	DD / IPO No	Date	Amount	Drawn Bank / Post Office

16. Declaration to be given by OBC candidate only, eligible to avail reservation applicable to OBC:

I son/daughter of Shri
 resident of village/town/city Dist.
 State hereby declare that I belongs to the community which is recognized as a backward class by the Government of India for the purpose of reservation in services as per orders contained in Department of Personnel and Training Office Memorandum No 36012/22/93-Estt(SCT) Dtd 8.9.1993. It is also declared that I do not belong to persons/sections (Creamy Layer) mentioned in column 3 of the Scheduled to the above referred office Memorandum dated 8.9.1993 and amended vide OM No 36033/3/2004-Estt.(Res.) Dtd 14.10.2008.

DECLARATION TO BE SIGNED BY THE APPLICANT

I do hereby declare that all the statements made in the application are true, complete and correct to the best of my knowledge and belief. I understand that in the event of any particular information given above being found false or incorrect, my candidature for the post of Telecom Technical Assistant is liable to be rejected or canceled and in the event of any mis-statement or discrepancy in the particulars being detected after my appointment, my services are liable to be terminated forthwith without any notice to me.

I also understand that if appointed, I would rank junior to any TTA who had been appointed earlier by the erstwhile DoT/DTS/DTO or BSNL or any other candidate who had already qualified in the TTA examination but not appointed as TTA by BSNL so far, Similarly, candidates of TTA examination held prior to my appointment will also en-bloc senior to me.

Place:

Date:

(Signature of the Applicant)



भारत संचार निगम लिमिटेड
(भारत सरकार का उपक्रम)
BHARAT SANCHAR NIGAM LIMITED
(A Govt. of India Enterprise)

**Direct Recruitment Examination for the post of
Telecom Technical Assistants(TTA)-2012 in BSNL,
..... SSA (Andhra Pradesh)**

Hall Permit

Affix latest
passport size
photograph,

1. Name of the Candidate :
2. Father's Name :
3. DOB(dd-mm-yyyy) :
4. Gender : 5. Community: 6. PH Status:

Signature of the Candidate

7. Roll No:

8. Examination Centre :

9. Date & Time of Exam :

(to be filled by the office)

Signature of Issuing Authority(with Stamp)



भारत संचार निगम लिमिटेड
(भारत सरकार का उपक्रम)
BHARAT SANCHAR NIGAM LIMITED
(A Govt. of India Enterprise)

**Direct Recruitment Examination for the post of
Telecom Technical Assistants(TTA)-2012 in BSNL,
..... SSA (Andhra Pradesh)**

Hall Permit

Affix latest
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1. Name of the Candidate :
2. Father's Name :
3. DOB(dd-mm-yyyy) :
4. Gender : 5. Community: 6. PH Status:

Signature of the Candidate

7. Roll No:

8. Examination Centre :

9. Date & Time of Exam :

(to be filled by the office)

Signature of Issuing Authority(with Stamp)

NAME & ADDRESS OF THE INSTITUTE/HOSPITAL

Certificate No.....

Date.....

DISABILITY CERTIFICATE

Recent Photograph of the candidate showing the disability duly attested by the Chairperson of the Medical Board.

This is certified that Shri/Smt/Kum.....
son/wife/daughter of Shri.....
age.....sex..... identification marks(s) is suffering
from permanent disability of following category:

A. Locomotors or cerebral palsy :

- (i) BL - Both legs affected but not arms.
- (ii) OL - One leg affected (right or left) (a) Impaired reach
(b) Weakness of grip
(c) Ataxic
- (iii) BH - Stiff back and hips (Cannot sit or stoop)
- (iv) MW - Muscular weakness and limited physical endurance.

B. Blindness or Low Vision:

- (i) B : Blind
- (ii) PB: Partially Blind

C. Hearing Impairment:

- (i) D - Deaf
- (ii) PD - Partially Deaf

(Delete the category whichever is not applicable)

2. This condition is progressive/non-progressive/likely to improve/ not likely to improve. Re-assessment of this case is not recommended/ is recommended after a period of _____ year's _____ months*.

3. Percentage of disability in his/her case is percent.

4. Sh./Smt./Kum. meets the following physical requirements for discharge of his/her duties:-

- | | | |
|--------|--|--------|
| (i) | F-can perform work by manipulating with fingers. | Yes/No |
| (ii) | PP-can perform work by pulling and pushing. | Yes/No |
| (iii) | L-can perform work by lifting. | Yes/No |
| (iv) | KC-can perform work by kneeling and crouching. | Yes/No |
| (v) | B-can perform work by bending. | Yes/No |
| (vi) | S-can perform work by sitting. | Yes/No |
| (vii) | ST-can perform work by standing. | Yes/No |
| (viii) | W-can perform work by walking. | Yes/No |
| (ix) | SE-can perform work by seeing. | Yes/No |
| (x) | H-can perform work by hearing/speaking. | Yes/No |
| (xi) | RW-can perform work by reading and writing. | Yes/No |

(Dr. _____) (Dr. _____) (Dr. _____)

Member
Medical Board

Member
Medical Board

Chairperson
Medical Board

Countersigned by the
Medical superintendent/CMO/Head of
Hospital (with seal)

*Strike out which is not applicable.

SCHEME & SYLLABUS FOR TTA DIRECT RECRUITMENT EXAMINATION

The standard of Paper in General ability test will be such as may be expected of an Engineering Diploma holder. The standard of papers in other subjects will approximately be that of Diploma level of an Indian Polytechnic. There shall be a single multiple choice objective types Paper of 3 hrs duration as per given below:

<u>Paper</u>	<u>Marks</u>	<u>Time</u>
PART-I GENERAL ABILITY TEST	20	} 3hrs
PART-II BASIC ENGINEERING	90	
PART-III SPECIALIZATION	90	

Note: 1. The candidate is required to obtain minimum qualifying marks in each of these parts as may be prescribed by the BSNL.

Detailed syllabus

PART-I: GENERAL ABILITY TEST – 20 MARKS

The candidate's comprehension and understanding of General English shall be tested through simple exercise such as provision of antonyms and synonyms, fill in the blanks and multiple-choice exercise etc. This shall also include questions on current events, general knowledge and such matters of everyday observation and experiences as may be expected of Diploma holder.

PART-II: BASIC ENGINEERING –90 MARKS

Detailed Syllabus is as under:

- Applied mathematics:** Co-ordinate Geometry, Vector Algebra; Matrix and Determinant; Differential Calculus; Integral Calculus Differential equation of second order; Fourier series; Laplace Transform; Complex Number; Partial Differentiation.
- Applied Physics:** Measurement- Units and Dimension; Waves, Acoustic, Ultrasonic; Light; Laser and its Application, Atomic Structure and Energy Levels.
- Basic Electricity:** Electrostatics; Coulomb's law, Electric field, Gauss's theorem, concept of potential difference, concept of capacitance and capacitors; Ohm's law, power and energy, Kirchhoff's voltage, current laws and their applications in simple DC circuits, Basic Magnetism;

Electric Magnetism; Electromagnetic Induction; Concept of alternating voltage & current; Cells and Batteries, Voltage and Current Sources, The venin's theorem, Norton's theorem and their applications.

4. **Electronics Devices and Circuits:** Classification of materials into conductor, semi conductor, insulator etc, electrical properties, magnetic materials, various types of relays, switches and connectors. Conventional representation of electric & electronics circuits elements. Active and passive components; semi conductor Physics; Semiconductor Diode; Bipolar transistor & their circuits; Transistor Biasing stabilisation of operating point; Single stage transistor amplifier; field effect transistor, Mosfet circuits application.

Multistage Transistor Amplifier; Transistor Audio Power Amplifier; feedback in Amplifier; Sinusoidal; Oscillators; Tuned Voltage Amplifier; Opto Electronics Devices and their applications; Operational Amplifier, Wave shaping and switching circuits.

Block diagram of IC. Timer (such as 555) and its working; Motivation Circuits; Time Base Circuits; Thyristor and UT Regulated Power Supply.

5. **Digital Techniques:** Applications and advantages of digital system; number system (binary and hexadecimal); Logic Gates; Logic Simplification; Codes and Parity; Arithmetic Circuits; Decoders, Display Devices and Associated Circuits, Multiplexers and De- multiplexers; latches and Flip Flops; Counters; Shift Registers; Memories A/D and D/A converters.

PART-III: SPECIALIZATION – 90 MARKS

Detailed Syllabus is as under:-

1. Electrical:

3 phase's vs single-phase supply, Star delta connections, relation between phase & line voltage power factor and their measurements; construction and principles of working of various types of electrical measuring instruments. All types of motor and generator –AC & DC transformers, starters, rectifiers, inverters, battery charges, batteries, servo and stepper motor, contactor control circuits, switchgear, relays, protection devices & schemes, substation, protective relaying, circuit breaker, generator protection. Transformer protection, feeder & lightning protection feeder & bus bar protection, lightning arrester, earthing, voltage stabilizer & regulators, power control devices & circuits phase controlled rectifiers, inverters, choppers dual converters cycloconverters; power electronics application in control of drives, refrigeration and air conditioning.

2. Communication:

Modulation and de- modulation – and principles and operation of various type of AM, FM and PM modulator/demodulator pulse modulation – TDM, PAM, PPM, PWM, Multiplexing. Principle and applications of PCM.

Introduction of basic block diagram of digital and data communication system. Coding error detection and correction techniques; digital modulation techniques – ASK, ICW, FSK, PSK; Characteristic/ working of data transmission circuits; UART, USART; Modems ; protocols and

their function; brief idea of ISDN interfaces; local area Net work, carrier Telephony – futures of carrier telephone system.

Microwave Engineering; Microwave Devices; Waves –guides; microwaves component; microwave Antennas; Microwaves communication systems- block diagram and working principle of microwave communication link.

3. **Network, Filters and Transmission Lines:**

Two port network; Attenuators; Filters; Transmission Lines and their applications characteristic impedance of line; concept of reflection and standing waves on a transmission line; Transmission line equation; principles of impedance matching, Bandwidth consideration of a transmission line.

4. **Instruments and Measurements:**

Specification of instruments- accuracy, precision, sensitivity, resolution range, Errors in measurements and loading effect; principles of voltage, current and resistance measurements; Transducers, measurement of displacement & strain forces & torque measuring devices, pressure measuring devices flow measuring devices, power control devices & circuits. Types of AC milli voltmeters – Amplifier rectifier and rectifier amplifier. Block diagram explanation of a basic CRO and a triggered sweep oscilloscope, front panel controls; impedance Bridges and Q- Meters.

Principles of working and specifications of logic probes, signature analyzer and logic analyzer, signal generator, distortion factor meter, spectrum analyzer.

5. **Control System:**

Basic elements of control system, open and closed loop system, concept of feedback, Block diagram of control system, Time lag, hysteresis, linearity concepts, self regulating and non- self regulating control systems. Transfer function of simple control components, single feedback configuration.

6. **Time response of systems.**

Stability Analysis Characteristics equation, Routh's table, Nyquist criterion, Relative stability, phase margin and gain margin.

Routh Hurwitz criteria, root locus techniques, Bode plot, Power plot, Gain margin and phase margin.

7. **Microprocessors:**

Typical organization of a microprocessor system & functions of its various blocks; Architecture of a Microprocessors; Memories and I/O Interfacing, Brief idea of M/C assembly languages, Machines & Mnemonic codes; Instruction format and Addressing Mode; concept of Instruction set; programming exercises in assembly language; concept of interrupt Data transfer

techniques- sync data transfer, interrupt driven data transfer , DMA, serial output data, serial input data.

8. **Computer:**

Computer and its working, types of computers, familiarisation with DOS and Windows, concept of file, directory, folder, number system. Data representation programming - Elements of a high level programming language, Pascal, C: Use of basic data structures; Fundamentals of computer Architecture, processor design, Control Unit design, memory Organisation. I/O system organisation. Microprocessors - Microprocessors Architecture, instruction set and simple Assembly level programming. Microprocessors based system design; typical examples. Personal computers and their typical uses. Data communication principles, types and working principles of modems. Network principles, OSI model, functions of data link layer and network layer, networking components; Communication protocol- X.25, TCP/IP.

9. **Database Management System:**

Basic concepts, entity relationship model, relational model, DBMS based on relational model.
