10. RESOURCE REQUIREMENT

For any programme to be offered, three basic resources required viz:

- Physical,
- Human and
- Financial

10.1 Physical Resources

These include space requirement, building, equipment etc.

10.1.1 Space requirement

Norms and standards laid down by All India Council for Technical Education (AICTE) are to be followed to work out space requirement in respect of class rooms, tutorial rooms, drawing halls, laboratories, space required for faculty, student amenities and residential area for staff and students. The space requirement is calculated as:

	Unit Area (Sq.m)	Qty	Total Area (Sq.m)
Class rooms	75	2	150
Space for Laboratories	90	6	450
Office space	50	1	50
Faculty rooms	20	8	160
Store Section	50	1	50
Maintenance Section	50	1	50
	Total		**910**

10.1.2 List of Equipment for Instrumentation and Control

Sr. No	Equipment	Qty	Price per unit in Rs
BIOMEDICAL ENGINEERING LABORATORIES			
1.	Polyrite	1	1,50,000/-
2.	ECG Machine	1	17,000/-
3.	Pulse (Bio Feedback) Trainer	1	13,000/-
4.	EEG (Bio Feedback) Machine	1	17,000/-
5.	GSR (Bio Feedback) Machine	1	8,000/-
6.	Temfor (Bio Feedback)	1	12,000/-
7.	EMG (Bio Feedback) Machine	1	14,000/-
8.	Computer system along with multimedia, printer UPS etc.	1	60,000/-
9.	Hemoglobin Analyzer	1	3,000/-
10.	Electro sleep Apparatus	1	6,000/-
11.	Relevant Software Packages (LS)		50,000/-
CONTROL LABORATORY			
1.	AC Servo Motor Speed Torque Kit	1	10,000/-
2.	DC Position Servo System	1	8,000/-
3.	Process Control Simulator	1	45,000/-
4.	Stepper Motor Study Kit	1	12,000/-
5.	Linear System Simulator	1	7,000/-
6.	Temperature Control System	1	8,000/-
7.	Compensation Design	1	7,000/-
8.	Relay Control System	1	7,000/-
9.	Potentiometric Error Detector	1	4,000/-
10.	Computer system along with multimedia, printer UPS etc.	1	60,000/-
11.	Relevant Software Packages	1	50,000/-
12.	Process Control Simulator Trainer	1	2,00,000/-
13.	PLC Kit with starter control and star delta starter, sequential switching of motor board, water level control, fan control simulator, seven segment display, lift control, pick and place control	1	90,000/-
14.	On/off temperature Controller (indicator cum controller)		
15.	DC Position servomechanism Demonstrator		
16.	DC Motor speed control trainer kit		
17.	DC Voltage Regulator (Closed Loop)		
18.	Synchro Transmitter-Receiving Pair		
19.	PID controller(Analog Type)		
20.	PID controller (Microprocessor based)		
21.	Water level controller (ON/OFF mode)		

Sr. No	Equipment	Qty	Price per unit in Rs
22.	AC position control system		
23.	PID simulator		
24.	Digital control trainer		
25.	Light intensity control trainer		
26.	DC position control		
27.	Designed evaluation of P,PI,PD,PID controller		
28.	Simulation for instrumentation & Control system (Position system)		
29.	Pressure measurement using pneumatic transmitter		
30.	Different pressure measurement using PDPT		
31.	Realization of various process lag		
32.	Realization of electronic/pneumatic/hydraulic transmitter		
33.	Realization of functioning if flapper-nozzel arrangement		
34.	Input/output characteristics of an Electro-pneumatic converter		
35.	Sequencing and interlocking in system		
36.	Feed forward control system kit		
37.	Cascade control system kit		
38.	Ratio-control system kit		
39.	Split-range control system kit		
TRANSDUCER LABORATORY			
1.	Oscilloscope Recorder	1	3,20,000/-
2.	Transducer and Instruments Kit (Three Port)	1	42,000/-
3.	LVDT (Techno)	1	6,000/-
4.	Transducer Kit (Feedback)	1	CBP 4,000/-
5.	Dead Weight Tester	1	45.000/-
6.	Microcomputer Sensing Control Equipment	1	1,70,000/-
7.	LJ Make Transducer and Instrumentation Trainer	2	CBP 5,000/-
8.	Thermocouple Test Kit Set	2	15,000/-
9.	RTD Simulator	2	1000/-
10.	Computer system along with multimedia, printer UPS etc.	1	60,000/-
11.	Relevant Software Packages	1	50,000/-
12.	Load measurement tutor (load cell)		
13.	Pressure measurement tutor		
14.	Temperature measurement tutor(RTD)		
15.	Temperature measurement tutor(Thermocouple)		
16.	Light measurement		
17.	Torque measurement tutor		
18.	RPM/Speed measurement tutor(Photo-Electric Sensor)		
19.	RPM measurement tutor(electro-magnetic)		
20.	Vibration measurement tutor (Strain Gauge sensor)		
21.	Study of inductive Pick Up		

Sr. No	Equipment	Qty	Price per unit in Rs
22.	Study of Capacitive Pick Up		
23.	Experimental kit for signal conditioning & temperature display using Analog to Digital Converter		
24.	Inductive & capacitive transducer trainer kit		
25.	Potentiometer, thermistor, thermocouple trainer kit		
26.	Opto-Electronic trainer kit		
27.	Training kit for signal conditions & temperature display using Analog to Digital Converter		
28.	Tachogenerator trainers kit		
29.	Tachometric feedback kit for control of speed of motor along with motor		
30.	Torsion dynamometer kit for measurement of Torque		
31.	Accelerometer kit for measurement of acceleration		
32.	Capacitive transducer kit for measurement of level		
33.	Optical pyrometer to measure temperature		
34.	Thermostat/ bimetallic Switch		
35.	Rotameter / Venturimeter to measure flow		
36.	Glucometer kit to measure Blood Sugar		
MEASUREMENT LAB			
1.	CRO 20 Mhz	3	15,000/-
2.	Digital Storage Oscilloscope(DSO) 80MIIz	1	40,000/-
3.	Spectrum Analyzer	1	70,000/=-
4.	Precise LCR Meter	1	$ 17,000
5.	LCR Q meter	1	13,000/-
6.	Function Generator	3	8, 000/-
7.	Cromptons Potentiometer	2	8, 000/-
8.	Wheat stone Bridge (Various AC Bridges)	2	9, 000/-
9.	Digital IC Tester	1	17, 000/-
10.	Frequency Meter	1	2,000/-
11.	Decade LCR Boxes	3	4,000/-
12.	Power supplies	4	4,000/-
13.	Tong Tester	4	-
14.	Lux meter	4	-
15.	Digital non-contact tachometer	4	-
16.	Flux meter	4	-
17.	Power Factor Meter	4	-
18.	Frequency meter (Digital)	4	-
19.	Frequency Counter		

Sr. No	Equipment	Qty	Price per unit in Rs
INSTRUMENTATION WORKSHOP			
1.	Oscilloscope 20 MHz	6	15,000/-
2.	Digital Multimeter	3	5,000/-
3.	Compton Potentio meter	1	8,000/-
4.	Digital Potentiometer	1	5,000/-
5.	Laboratory Recorder	1	17,000/-
6.	Pulse Generator	2	7,000/-
7.	Function Generator	2	8,000/-
8.	High Voltage Regulator P/S	4	1,000/-
9.	Digital Calibrator	10	2,000/-
10.	Dual Variable P/S	10	2,000/-
11.	Computer system along with multimedia, printer UPS etc.	1	60,000/-
12.	Relevant Software Packages	1	50,000/-
]13.	Analog Multimeter		
MICROPROCESSOR LABORATORY			
1.	Microprocessor Kit 8085	3	4,000/-
2.	Microprocessor Kit 8086	1	8,000/-
3.	Microprocessor Kit 68000	1	10,000/-
4.	EPROM Writer	2	
5.	8051 Micro Controller Kit	2	20,000/-
6.	CD Writer	1	
7.	Scanner	1	
8.	Computer system along with multimedia, printer, UPS etc.	1	60,000/-
9.	Relevant Software Packages	1	50,000/-
HYDRAULIC AND PNEUMATICS LABORATORY			
1.	Digital Calibrator	1	2,000/-
2.	Pneumatic Circuit Trainer Kit with Compressor	1	90,000/-
3.	Indicator and Indicating Controller (Analog Type)	1	15,000/-
4.	Level Process Control Trainer	1	1,60,000/-
5.	Auto-range Digital Multi-meter	1	2.000/-
6.	CD Writer	1	
7.	Scanner	1	
8.	Computer system along with multimedia, printer UPS etc.	1	60,000/-
9.	Relevant Software Packages	1	50,000/-
10.	CD ROM Drive	1	6,000/-
11.	Process Control Model Demonstration bench with remote set point control	1	2,80,000/-

Sr. No	Equipment	Qty	Price per unit in Rs
12.	Hydraulic Trainer Unit	1	US $ 10,000
13.	Basic Electro pneumatics trainer kit		
14.	Electro hydraulic trainer with PLC		
15.	Pressure control station		
16.	Temperature control station		
17.	Flow control station		
18.	Compressor		
19.	Electro hydraulic Supplementary kit		
ELECTRICAL WORKSHOP			
1.	Battery Charger 0 – 12 V, 20 A	1	2000/-
2.	Heat Convector (Blower Type)	2	1000/-
3.	Earth Leakage Relay 3 phase	1	2000/-
4.	Energy Meter Single Phase	1	800/-
5.	Automatic Starter Electronics	1	1500/-
6.	Drill Machine (Wolf)	1	3500/-
7.	Dimmer stat 230 V (0 – 270 V), 50 Hz, 15 A (Single phase)	2	2000/-
8.	Dimmer stat 230 V (0 – 270 V) 50 Hz, 20 A (Three phase)	2	4000/-
9.	Frequency Meter Analog	1	2000/-
10.	Shaded Pole Motor 0.5 KW, 1 phase, 50 Hz	1	4200/-
11.	Wattmeter 75/300/600 V, 1.5 A, 20 A	2	2000/-
12.	Earth tester 500 V, 100 Ohm, ¾ Terminal	1	4000/-
13.	Cable Cross Section Model	1	3000/-
14.	House Wiring Model	1	4000/-
15.	Bridge Insulation Tester 500 V, 100 m Ohm	1	5,000/-
16.	Bridge Insulation Tester 100 V, 200 m Ohm	1	5,000/-
17.	Automobile Electrical Wiring Model	1	8,000/-
18.	Coil Welding Machine 15" x 14", 152-C	1	2,000/-
19.	Coil Welding Machine 21" x 14", 162-C	1	2,000/-
20.	Meggar 500 V	1	2,000/-
21.	Meggar 1000 V	1	2,000/-
22.	3-phase Energy Meter 440 V, 10 A	2	1,000/-
23.	Cross Sectional Model of Motar(cut view model)	1	4,000/-
24.	Automatic Coil Wiring Machine Model ER – 001 – C	1	58,000/-
BASIC ELECTRICAL ENGINEERING LABORATORY			
1.	LCR Q meter 20,000 m Farad, 2000 m Farad	1	6,000/-
2.	DC Power Supply 0 – 30 V, 2 A	3	1,000/-
3.	DC Power Supply 0 – 30 V, 3 A	2	3,000/-
4.	DC Power Supply 0 – 30 V, 100 mA	2	3,000/-
5.	DC Power Supply 0 – 300 V, 100 mA	4	5,000/-

Sr. No	Equipment	Qty	Price per unit in Rs
6.	Single Phase Transformer 230 V/115 V, 3 KVA	4	3,000/-
7.	Single Phase Transformer 220 V/600 V, 2 KVA	2	4,000/-
8.	Oil Testing Set	1	10,000/-
9.	Oscilloscope 20 MHz L and T Make	2	13,000/-
10.	3-Phase Transformer 415 V, 50 Hz	2	4,000/-
11.	Relay Testing Kit mode 636	1	14,000/-
12.	3 Digit Multi-meter (MIC – 161 +)	2	2,000/-
13.	Frequency Meter Digital 3.5 digit, 20 – 99 Hz	1	1,000/-
14.	Multi-meter Analog Standard	1	200/-
15.	Portable Power Factor Meter	2	3,000/-
16.	Wattmeter 110/220/440 V, 15 A, 30 A	2	2,000/-
17.	Wattmeter 75/150/300, 1.5 A, 30 A	2	2,000/-
18.	Battery Charger 12/24 V, 30 A	1	3,000/-
19.	Function Generator (Digital Read Out)	2	6,000/-
20.	Wheat Stone Bridge (different AC Bridges)	1	9,000/-
21.	Power Scope Model 522 systronics Make	2	20,000/-
POWER ELECTRONICS LABORATORY			
1.	DC Chopper with firing module 50 V, 2 A	1	11,000/-
2.	Bridge Converters Power Modules + Firing Modules	1	55,000/-
3.	Single Phase half bridge converter (Thyristor based)	1	30,000/-
4.	Single phase inverter firing module UJT firing for SCR	1	15,000/-
5.	R and RC firing circuit	1	2000/-
6.	Pulse Transformer Firing Circuit	1	2000/-
7.	Trainer Kits of SCR, DIAC, TRAIC	1	4000/-
8.	Speed Control of DC motor using SCR	1	5,000/-
9.	Phase Control using SCR/TRAIC (half and full wave)	1	6,000/-
10.	Construction of single phase half and full wave controlled rectifier using SCR	1	4,000/-
11.	Chopper Circuits, Jones and Morgeon FT – 418	1	3,000/-
12.	Relay Demonstration Panel	1	6,000/-
13.	Industrial Control Trainer Kit (15 boards)	1	20,000/-
ELECTRIC MACHINES LABORATORY			
1.	Motor Starter DOL	3	810/-
2.	Motor Generator Set AC/DC (3-Phase AC Motor as prime mover) with complete panel board starter and field regulator	1	37,500/-
3.	MG Set DC/DC, DC shunt Generator Set coupled with DC shunt motor 3 KW, 1440 mm, 230 V complete with appropriate panel board starter and field regulator	1	27,400/-

Sr. No	Equipment	Qty	Price per unit in Rs
4.	DC shunt motor 230 V, 3 KW, 1440 rpm coupled with DC series generator 230 V, 3 KW complete with panel board with starter and field regulator	1	27,400/-
5.	Tong Tester (Clip on Type)	1	1,450/-
6.	Strobo scope (non contact) digital 3S	1	6,290/-
7.	Single phase Induction Motor (Panel Board)	1	4,875-
8.	SC 21 M, 3-Phase, 415 V, 50 Hz	1	9,000/-
9.	Relay Demonstration Panel	1	92,000/-
10.	Star Delta Starter 5 HP (manual)	2	1,500/-
11.	Recitifier (solid State) input 3-phase 440 V, 50 Hz, output 0 – 250 V, 80A	1	47,000/-
12.	Diesel Engine Set 220 V, 3 KVA with auto shunt down panel coupled with alternator	1	20,000/-
13.	Tachometer Non-contact type	2	
14.	Measuring Instruments (multimeters) Analog type, moving coil and moving-iron, wattmeters, ammeters, power factor meter, frequency meter, phase sequence indicator	LS	50,000/-
15.	Slip ring induction motor coupled with DC Generator (Set)	1	
16.	Synchronous motor coupled with DC Generator with Synchronouse	2	
17.	Three phase motor 5 HP for locked rotor and open circuit test	1	

NOTE:

In addition to above laboratories, computer centre will be required for effective implementation of the course. Provision for overhead projector, TV with VCR facility slide cum strip projector, photocopier, PC-XT along with LCD projector facility, drafting machines etc has also to be made.

10.1.3 Furniture Requirement

Norms and standards laid down by AICTE be followed for working out furniture requirement for this course.

- Furniture for laboratories 3.5 lacs
- Furniture for Computer Centre 2.0 lacs

10.2 Human Resources

Weekly work schedule, annual work schedule, student teacher ratio for various group and class size, staffing pattern, work load norms, qualifications, experience and job description of teaching staff workshop staff and other administrative and supporting staff be worked out as per norms and standards laid down by the AICTE.

Faculty Requirement:

It is calculated base on contact hours in theory classes and practical classes. Keeping in view student teacher ratio as 11:1, following faculty strength is required.

Sr. No	Subject	Year			
		I	II	III	Total
1.	Communication skills	1	-	-	1
2.	Mathematics	1	-	-	1
3.	Physics	1	-	-	1
4.	Chemistry	1	-	-	1
5.	Electrical Engineering	-	1	-	1
6.	*Electronics Engineering	-	1	-	1
7.	*Technology Subjects	1	2	4	7
	Total	**6**	**3**	**4**	**13**

Note:

Seven positions out of 13 are in the area of instrumentation and control, electronics and computer engineering. Out of these four positions may be filled with persons holding qualification of B.Tech./M.Tech in Instrumentation and Control Engineering.

Following are the qualifications and experience for the teaching faculty and technician staff

Qualification	Experience
Lecturer in Instrumentation Engineering 1ST Class BE/B.Tech in Instrumentation Engineering OR **Lecturer in Electronics** 1ST Class BE/B.Tech in Electronics and Communication Engineering with specialization in Instrumentation and Control	Nil Nil
Sr.Lecturer 1ST Class BE in Instrumentation Engineering OR 1ST Class ME/M.Tech. in Instruentation Engineering	5 years experience in teaching/ industry/ research at the level of Lecturer or equivalent
Head of Department ME/M.Tech in Instrumentation Engineering	5 years experience in teaching/ industry/ research at the level of Lecturer or equivalent

Note:

Since the norms for qualification are laid down by AICTE. The state Directorate/ Board of Technical Education should consider the latest norms in this regard.

In addition to above, following support staff will be required:

1)	Supporting Staff	
2)	Technicians for laboratories	4 Nos.
3)	Office Assistants	1 No.
4)	Steno/Computer Operator	2 Nos.
5)	Laboratory Attendants	2 Nos.

11. EVALUATION STRATEGY

11.1 INTRODUCTION

Evaluation plays an important role in the teaching-learning process.The major objective of any teaching-learning endeavor is to ensure the quality of the product, which can be assessed through learner's evaluation.

The purpose of student evaluation is to determine the extent to which the general and the specific objectives of curriculum have been achieved. Student evaluation is also important from the point of view of ascertaining the quality of instructional processes and to get feedback for curriculum improvement. It helps the teachers in determining the level of appropriateness of teaching experiences provided to learners to meet their individual and professional needs. Evaluation also helps in diagnosing learning difficulties of the students.

Evaluation is of two types: **Formative and Summative (Internal and External Evaluation)**

Formative Evaluation

It is an on-going evaluation process. Its purpose is to provide continuous and comprehensive feedback to students and teachers concerning teaching-learning process. It provides corrective steps to be taken to account for curricular as well as co-curricular aspects.

Summative Evaluation

It is carried out at the end of a unit of instruction like topic, subject, semester or year. The main purpose of summative evaluation is to measure achievement for assigning course grades, certification of students and ascertaining accountability of instructional process. The student evaluation has to be done in a comprehensive and systematic manner since any mistake or lacuna is likely to affect the future of students.

In the present educational scenario in India, where summative evaluation plays an important role in educational process, there is a need to improve the standard of summative evaluation with a view to bring validity and reliability in the end-term examination system for achieving objectivity and efficiency in evaluation.

11.2 NATURE OF SUBJECTS FOR STUDENTS EVALUATION

The student evaluation is carried out for the following category of subjects:

- Theory
- Drawing
- Practical Work (Laboratory Experiments and Workshop Exercises)
- Project Work
- Professional Industrial Training

11.2.1 Theory

Evaluation in theory aims at assessing students' understanding of concepts, principles and procedures related to a course/subject, and their ability to apply learnt principles and solve problems. The formative evaluation for theory subjects may be caused through sessional/class-tests, home-assignments, tutorial-work, seminars, and group discussions etc. For end-term evaluation of theory, the question paper may comprise of three sections.

Section-I

It should contain objective type items e.g. multiple choice, matching and completion type. Total weightage to Section-1 should be of the order of 20 percent of the total marks and no choice should be given in this section. The objective type items should be used to evaluate students' performance in knowledge, comprehension and at the most application levels of domain only.

Section-II

It should contain short answer/completion items. The weightage to this section should be of the order of 40 percent of the total marks. Again, no choice should be given in section-II

Section-III

It may contain two to three essay type questions. Total weightage to this section should be of the order of 40 percent of the total marks. Some built-in, internal choice of about 50 percent of the questions set, can be given in this section

Table II : Suggested Weightage to be given to different ability levels

Abilities	Weightage to be assigned
Knowledge	10-30 percent
Comprehension	40-60 percent
Application	20-30 percent
Higher than application i.e. Analysis, Synthesis and Evaluation	Up to 10 percent

11.2.2 Drawing

The main purpose of evaluation is to assess students ability to read and interpret engineering drawing. A question paper in engineering drawing for summative evaluation aims at testing following abilities in the students:

- Reading and interpreting engineering drawing
- Preparing drawing as per given scale, dimensions, size and proportion, line work, specification and accuracy.

Formative evaluation should be based on the portfolio prepared by the students throughout the session. Summative evaluation may comprise of a question paper set by an external examiner based on weightage to proportion, quality of drawing and time to complete the drawing. It should be followed by a viva-voce.

11.2.3 Practical Work

Evaluation of students performance in practical work (Laboratory experiments and workshop exercises) aims at assessing students ability to apply or practice learnt concepts, principles and procedures, manipulative skills, ability to observe and record, ability to interpret and draw conclusions and work related attitudes. Formative and summative evaluation may comprise of weightages to performance on task, quality of product, general behaviour and it should be followed by viva-voce.

11.2.4 Project Work

The purpose of evaluation of project work is to assess students ability to apply, in an integrated manner, learnt knowledge and skills in solving real life problems, manipulative skills, ability to observe, record, creativity and communication skills. The formative and summative evaluation may comprise of weightage to nature of project, quality of product, quality of report and quality of presentation followed by viva-voce.

11.2.5 Professional Industrial Training

Evaluation of professional industrial training report and viva-voce/ presentation aims at assessing students' understanding of materials, industrial processes, practices in the industry/field and their ability to engage in activities related to problem-solving in industrial setting as well as understanding of application of learnt knowledge and skills in real life situation. The formative and summative evaluation may comprise of weightages to performance in testing, general behaviour, quality of report and presentation during viva-voce.

11.3 ASPECTS OF QUESTION PAPER SETTING

Validity and reliability are the most important considerations in the selection and construction of evaluation procedures. First and foremost are the evaluation tools to measure the specific outcomes for which they are intended to measure. Next in importance is reliability, and following that is a host of practical features that can be classified under the heading of usability.

For weightage of marks assigned to formative (internal) and summative (external) evaluation and duration of evaluation has been given in the study and evaluation scheme of the curriculum document. Teachers/Paper-setters/Examiners may use Manual for Students' Evaluation developed by National Institute of Technical Teachers' Training and Research, Sector-26, Chandigarh to bring objectivity in the evaluation system.

12. RECOMMENDATIONS FOR EFFECTIVE CURRICULUM IMPLEMENTATION

Teachers are educational managers at class room level and their success in achieving course level objectives lies in using course plan and their judicious execution which is very important for the success of programme by achieving its objectives.

Polytechnic teachers are required to plan various instructional experiences viz. theory lecture, expert lectures, lab/workshop practicals, guided library exercises, field visits, study tours, camps etc. In addition, they have to carry out progressive assessment of theory, assignments, library, practicals and field experiences. Teachers are also required to do all these activities within a stipulated period of 16 weeks which is made available to them.. With the amount of time to their credit, it is essential for them to use it judiciously by planning all above activities properly and ensure execution of the plan effectively.

Following is the gist of suggestions for subject teachers to carry out T-L process effectively:

1. Teachers are required to prepare a course plan, taking into account departmental academic plan, number of weeks available, course to be taught, different learning experiences required to be developed etc.

2. Teachers are required to prepare lesson plan for every theory class. This plan may comprise of content to be covered, learning material (transparencies, Video Films, Models etc.) for execution of a lesson plan. They may follow steps for preparing lesson plan e.g. drawing attention, state instructional objectives, help in recalling pre-requisite knowledge, deliver planned subject content, check desired learning outcome and reinforce learning etc.

3. Teachers are required to plan for expert lectures from field/industry. Necessary steps are to plan in advance, identify field experts, make correspondence to invite them, take necessary budgetary approval etc.

4. Teachers are required to plan for guided library exercises by identification of course specific experience requirement, setting time, assessment, etc. The tutorial, assignment and seminar can be thought of as terminal outcome of library experiences.

5. Concept and content based field visits may be planned and executed for such content of course which otherwise is abstract in nature and no other requisite resources are readily available in institute to impart them effectively.

6. There is a dire need for planning practical experiences in right perspective. These slots in a course are the avenues to use problem based learning/activity learning/ experiential learning approach effectively. The development of lab instruction sheets for the course is a good beginning to provide lab experiences effectively.

7. Planning of progressive assessment encompasses periodical assessment in a semester, preparation of proper quality question paper, assessment of answer sheets immediately and giving constructive explicit feed back to every student. It hasto be planned properly; otherwise the very purpose of the same is lost.

8. The co-curricular activities like camp, social gathering, study tour, hobby club , NCC, NSS, Library studies, Civil Defence and Disaster Management etc. may be used to develop generic skills like task management, problem solving, managing self, collaborating with others etc.

9. Wherever possible, it is essential to use activity based learning rather than relying on delivery based conventional teaching all the time.

10. While imparting instructions, emphasis may be laid on the development of cognitive,psychomotor, reactive and interactive skills in the students.

11. Teachers may take working drawings from the industry/field and provide practices in reading these drawings.

12. Teachers may take initiative in establishing liaison with industries and field organizations for imparting field experiences to their students.

13. Students be made aware about issues related to ecology and environment, safety, concern for wastage of energy and other resources etc.

14. Students may be given relevant and well thought out minor and major project assignments, which are purposeful and develop practical skills. This will help students in developing creativity and confidence for their gainful employment (wage and self).

15. A Project bank may be developed by the concerned department of the polytechnics in consultation with related Industry, Research Institutes and other relevant field organizations in the state.

13. LIST OF EXPERTS

1. The following experts participated/contributed in the revision of curricula being offered in the polytechnics of J&K State on 26th April, 2011 at Govt. Polytechnic, Jammu

Sr.No.	Name and Designation (Sh/Smt/Ms)	Name of the Institute/College/ Polytechnic
1.	N.H. Malik, Principal	Govt. Polytechnic, Jammu
2.	Shaista Shamim, Principal	KG Polytechnic, Srinagar
3.	Shahzada Aziz, Head Textile Deptt.	Govt. Women Polytechnic, Srinagar
4.	Talat Mahmood , Dy. Registrar	State Board of Technical Education, J&K
5.	H.A. Bhardwaj, Training and Placement Officer	Govt. Polytechnic Jammu
6.	K.R. Sharma, Principal	North Polytechnic , Jammu
7.	Syed Tabassum Geelani, Lecturer, MLT	Govt. Women Polytechnic , Jammu
8.	K.G. Gupta, Principal (Mechanical Engg)	IECS Purkoo Camp, Jammu
9.	Rafiq Ahmed Khan	Master pro Institute of Technology, Srinagar
10.	Manzur Ahmad, Lecturer Maths	Master pro Institute of Technology, Srinagar
11.	Irshad Ahmad wani	Master pro Institute of Technology, Srinagar
12.	Asiya Mushtaq, Lecturer	Master pro Institute of Technology, Srinagar
13.	Bintul Zehra, Lecturer	Master pro Institute of Technology, Srinagar
14.	Altaf Hussain Rather, Asstt. Professor	SSM College of Engg. & Technology, Srinagar
15.	Syed Arshad Hussian, Asstt. Professor	SSM College of Engg. & Technology, Srinagar
16.	Mohd. Yousf Mir, HOD, Computer Engineering	Kite Polytechnic College, Srinagar
17.	Mohd. Arif Sheikh, HOD, Electrical	Kite Polytechnic College, Srinagar
18.	Rani Devi Rakwal, Lecturer, Computer	Govt. Women Polytechnic, Jammu
19.	M.L. Sharma, Lecturer, MOP	Govt. Polytechnic for Women, Jammu
20.	Suket Gupta Incharge, HOD, Textile Designing	Govt. Polytechnic for Women, Jammu
21.	Vivek Mahajan, HOD, Computer Engineering Department	K.G. Polytechnic, Srinagar

Sr.No.	Name and Designation (Sh/Smt/Ms)	Name of the Institute/College/ Polytechnic
22.	Zubeda Sharma	Directorate of Technical Education J&K
23.	Neena Dulloo, Lecturer Maths	Govt. Women Polytechnic, Jammu
24.	Gurbachan Singh, Principal for (Civil Engineering)	Govt. Polytechnic for Women, Jammu
25.	Purnima Chaudhri, Principal	Vocational Oriented Womens Polytechnic, OPP. Janipur Police Station, Upper Ploura, Jammu
26.	Savinder Gupta, Director	NITS Polytechnic, Miran Sahib, Jammu
27.	Syed Mushtaq Ahmad, Principal	Royal Polytechnic College, Srinagar
28.	Dr. V.K. Kaul, Director	Royal Polytechnic College, Srinagar
29.	Mrs. Qazi Dilaf Roza, Principal	SSM Polytechnic, Srinagar
30.	K.S. Katal, Lecturer	Govt. Polytechnic for Women, Srinagar
31.	Rajesh Khajuria, Lecturer(Maths)	Govt. Polytechnic , Jammu
32.	P.L. Kher, HOD, Electrical Engineering	NITS Polytechnic, Miran Sahib, Jammu
33.	Arun Bangotra, HOD, (Mechanical Engineering)	Govt. Polytechnic , Jammu
34.	Ritu Jamwal, Workshop Superintendent, Mechanical Engineering	Govt. Polytechnic, Jammu
35.	Shafkat Yussouf, HOD, Instrumentation & Control	Govt. Polytechnic, Jammu
36.	Neelanjana Manwati, HOD Computer Engineering	Govt. Polytechnic, Jammu
37.	Dr. GH Mustafa Malik, HOD, Travel and Tourism	Govt Polytechnic, Jammu
38.	Jawaharlal Bhatt, Professor of Physics	NITS Polytechnic, Miran Sahib, Jammu
39.	Ashok Choudhary, HOD (Applied Maths)	NITS Polytechnic, Miran Sahib, Jammu
40.	S.M.T. Andrabi, Joint Director	Directorate of Technical Education J&K
41.	Viyoma Sarup, Lecturer,	Vocational Oriented Womens Polytechnic, Opp. Janipur Police Station, Upper Ploura, Jammu
42.	K.B. Gupta, Lecturer, Electronics & Communication Engineering	NITS Polytechnic, Miran Sahib, Jammu
43.	Prof. K.C. Gupta, Principal (Mechanical Engg)	NITS Polytechnic, Miran Sahib, Jammu

Sr.No.	Name and Designation (Sh/Smt/Ms)	Name of the Institute/College/ Polytechnic
44.	Mr.BA Roniyal	Govt. of J&K state
45.	Saurabh Bhagat, DTE	J&K State
46.	Sangeeta Puri, Lecturer	Govt. Polytechnic, Jammu
47.	Anjali Dogra	Govt. Polytechnic, Jammu
48.	Rukhsa Nazir	State Board of Technical Education, J&K
49.	Nelofar	State Board of Technical Education, J&K
50.	K.A. Dewan	State Board of Technical Education, J&K
51.	S.L. Suri, HOD, Architectural Assistantship	Govt. Polytechnic , Jammu
52.	Neetu Maini, HOD, Electronics and Communication Engineering	Govt. Polytechnic for Women, Jammu
53.	Jatinder Kesar	State Board of Technical Education, J&K
54.	H.P Singh, HOD (Civil Engineering Department)	NITS Polytechnic, Miran Sahib, Jammu
55.	Sanjay Gupta, Lecturer, Electronics and Communication Engineering	Govt. Polytechnic , Jammu
56.	Kuldip Singh Bhatia, Lecturer, Mechanical Engineering Department	Govt. Polytechnic , Jammu
FROM NITTTR, CHANDIGARH		
57.	Dr. AB Gupta, Prof. and Head, Curriculum Development Centre	
58.	Prof. PK Singla, Associate Professor, Curriculum Development Centre	
59.	Prof. SK Gupta, Associate Professor, Curriculum Development Centre	
60.	Shri TN Thukral, Curriculum Development Centre	

2. The following experts participated/contributed for revising the contents of first year subjects for various diploma programmes being offered in the polytechnics of J&K State from 27-28 June, 2011 at Govt. Polytechnic for Women, Srinagar, J&K

Sr. No.	Name and Designation (Sh/Smt/Ms)	Name of the Institute/College/ Polytechnic
1.	M.S. Bhat, Registrar	J&K State Board of Technical Education, Srinagar
2.	Mohd. Iqbal Akhoon, HOD, Maths	SSM College, Baramulla

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3.	Ajaz Ahmad Kanth Sr. Associate Professor, Chemistry	KG Polytechnic, Srinagar
4.	Parvaiz Ahmad Bhat , Lecturer-1, E&C	Govt. Polytechnic for Women, Srinagar
5.	K.S. Katal, Lecturer-1	Govt. Polytechnic for Women, Srinagar
6.	Mudasir Mubarik, Lecturer	Kite Polytechnic, Srinagar
7.	Mohd. Ayub Bhat, Lecturer	Kite Polytechnic, Srinagar
8.	Assadullah Ganai, Demonstrator	KG Polytechnic, Srinagar
9.	Manjeet Kour, Lecturer	Kite Polytechnic, Srinagar
10	Mariya Qureshi, Lecturer	Govt. Polytechnic for Women, Srinagar
11	Foziya Rafiq Mir, Lecturer	Govt. Polytechnic for Women, Srinagar
12	Sabina Masoodi, Lecturer	Govt. Polytechnic for Women, Srinagar
13	Samira Khan, Lecturer	Govt. Polytechnic for Women, Srinagar
14	Shafquat Ara, Lecturer-1	Govt. Polytechnic for Women, Srinagar
15	Bashir Ahmad Dar, Workshop Superintendent	Kite Polytechnic, Srinagar
16	Mohd. Qasim Mir, Lecturer, Electrical	Kite Polytechnic, Srinagar
17	Shahid Mehraj Khawaja , Demonstrator E&C	KG Polytechnic, Srinagar
18	Harminder Pal Singh, Lecturer-1 E&C	KG Polytechnic, Srinagar
19	Foziya Mir, Lecturer Garment Technology	Govt. Polytechnic for Women, Srinagar
20	Shaheen Nasir, Sr. Lecturer	Ssm College, Baramulla
21	Ali Mohammad Khan, Lecturer Incharge, HOD, ECE	KG Polytechnic, Srinagar
22	Mohd. Arif Sheikh, HOD, Electrical Engg.	Kite Polytechnic, Srinagar
23	Syed Arshad Hussain, HOD, Chemistry	Ssm College, Baramulla
24	Mushtaq Ahmad Rather, HOD, Mech Engg.	Ssm College, Baramulla
25	Munir Ahmad Mir, Lecturer Mathematics	KG Polytechnic, Srinagar
26	Inderjeet Singh, Workshop Superintendent	KG Polytechnic, Srinagar

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27	Sheikh Sajad Ahmad, Lecturer/ Incharger, MLT	Govt. Polytechnic for Women, Srinagar
28	Rayees Ahmad Bhat, Lecturer MLT	Govt. Polytechnic, for Women, Srinagar
29	Latif Ahmad Bhat, Guest Lecturer	Govt. Polytechnic, for Women, Srinagar
30	Javid Iqbal Bhat, I/C, HOD, Wood Technology	KG Polytechnic, Srinagar
31	Gul Amreen, Lecturer,	Royal Polytechnic, Srinagar
32	Tanzeela Ismail, Lecturer	Royal Polytechnic, Srinagar
33	Shazia Yousuf, Lecturer	Royal Polytechnic, Srinagar
34	Masrat Khan, Lecturer	Royal Polytechnic, Srinagar
35	Altaf Hussain Rather, HOD App. Physics	Ssm College, Baramulla
36	Gulam Nabi Bhat, HOD Electrical	Ssm College, Baramulla
37	Shahzada Aziz, HOD Textile	Govt. Polytechnic for Women, Srinagar
38	Ashaq Hussain, Workshop Instructor	Govt. Polytechnic for Women, Srinagar
39	Shaista Shamim, Principal	KG Polytechnic, Srinagar
40	Benish Yasin, Lecturer, Food Technology	Govt. Polytechnic for Women, Srinagar
41	Aruqa, Lecturer	Kite Polytechnic, Srinagar
42	Raziya Majeed, Lecturer, OMCA & Enterprenuership	Govt. Polytechnic for Women, Srinagar
43	Mahmood Ahmad, Principal	Govt. Polytechnic, Kargil/ Leh
44	Parvaiz Ahmad Rather	KG Polytechnic, Srinagar
45	B.R. Verma, Secretary SBOTE J&K	SBOTE, Srinagar
46	Ajaz Ahmad Kakroo, Incharge Comp Engg.	KG Polytechnic, Srinagar
47	S.M.T. Andrabi	Joint Director Polytechnics
48	Nusrat Jan, Incharge OMCA	Govt. Polytechnic, for Women, Srinagar
49	Yasmeen Hassan, HOD, E&C	Govt. Polytechnic, for Women, Srinagar
50	SSA Rufai, TPO	KG Polytechnic, Srinagar

Sr.No.	Name and Designation (Sh/Smt/Ms)	Name of the Institute/College/ Polytechnic
51	Sadaf Riyaz, Lecturer, Civil Engg.	Royal Polytechnic, Srinagar
52	Muzamil Wani, Lecturer Computer Engg.	Royal Polytechnic, Srinagar
53	Hilal Ahmad, Lecturer, MLT Deptt.	Govt. Polytechnic, for Women, Srinagar
54	Nasreen Fayaz, Instructor, Garment Tech	Govt. Polytechnic, for Women, Srinagar
55	Junaid Gilani, Lecturer-1 E&C	Govt. Polytechnic, for Women, Srinagar
56	Mudassir Nazir Mattoo, Lecturer, Comp Engg.	Govt. Polytechnic, for Women, Srinagar
57	Yasmin Sofi, Lecturer-1 E&C	Govt. Polytechnic, for Women, Srinagar
58	Asif Wani, Principal	Kite Polytechnic, Srinagar
59	Nighat Jalali, Lecturer Computer Engg.	Govt. Polytechnic, for Women, Srinagar
60	Arjumand Amin, Lecturer Textile Deptt.	Govt. Polytechnic for Women, Srinagar
61	Mohd. Ashraf, HOD	Kite Polytechnic, Srinagar
62	Shakila Riyaz, Lecturer English	KG Polytechnic, Srinagar
63	Rifat Jan, Lecturer English	KG Polytechnic, Srinagar
64	Manzoor Ahmade Mir	SSM College, Srinagar
65	Yasmeen	SSM College, Srinagar
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66	Dr. AB Gupta, Prof. and Head, Curriculum Development Centre	
67	Prof. PK Singla, Associate Professor, Curriculum Development Centre	
68	Prof. SK Gupta, Associate Professor, Curriculum Development Centre	
69	Shri TN Thukral, Curriculum Development Centre	

3. The following experts participated/contributed for finalizing the curricula of three years diploma programme in 'Instrumentation and Control' from 27-28 September, 2011 at this institute.

Sr. No.	Name, Designation and Official address
From Polytechnics	
1.	Mr. Sunil Panjeta, HOD, Seth Jai Prakash Polytechnic, Damla, Yamuna Nagar
2.	Mr. V.M. Kalra, HOD, Seth Jai Prakash Polytechnic, Damla, Yamuna Nagar
3.	Mr. Rajeev Goel, Lecturer, Seth Jai Prakash Polytechnic, Damla, Yamuna Nagar
4.	Mr. Manish Kumar, Lecturer, Govt. Polytechnic, Jammu
5.	Mr. Rajat Thakral, Lecturer, Govt. Polytechnic, Hissar
6.	Mr. Punit Kaushik, Lecturer, Govt. Polytechnic, Sonepat
7.	Mr. Kanwal Sachdeva, Lecturer, Govt. Polytechnic, Sonepat
From NITTTR, Chandigarh	
8.	Sh. TN Thukral, Curriculum Development Centre **Coordinator**