

• DesignTech
Technology For Designing The Future

SIEMENS



Government of Andhra Pradesh

Industry Skill Development Initiative

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i. Skill Development – Indian and Global context:

While the developed world is getting older, India is getting younger, a trend that's there to stay till 2030. 65% of Indian population is today under 35 years, giving India an opportunity to reap the demographic dividend. To do this, India needs to adequately skill its workforce. Aided by the growing Indian economy, the need for skilled and semi-skilled workforce is at all-time high. Moreover, India's twin focus on jobs and economic growth necessitates renewed emphasis on skill development, particularly in the area of manufacturing and services sectors.

The importance of promoting manufacturing squarely addresses the dual necessity of creating employment and developing a healthy balance of trade. To make "Make in India" campaign successful, India must invest heavily in developing highly skilled workforce and Intellectual Property, as opposed to low-wage, low-value-add manufacturing. Recognising that India's future growth will depend on a greater supply of skilled workers, the Indian government has adopted the National Policy for Skill Development to increase skills of workers. Adopted in 2009, it aims to create skilled workforce of 500 million people by 2022.

ii. Situation Today in India:

Paradoxically, although India enjoys one of the greatest labour surpluses in the world, Indian employers are experiencing difficulty to hire. A recent study by ManpowerGroup found 67% of Indian employers reported difficulty in hiring capable workers, as large proportion of Indian workers is unskilled. Currently, India churns mostly semi-literate workforce without requisite marketable skills. According to National Council on Skill Development report, among those in 15 to 29 years age group, only 2% have received formal and 8% non-formal vocational training. Also 80% of workforce in rural and urban areas doesn't possess any identifiable skills. Against 128 lakh annual new entrants to workforce, only 31 lakh seats are available for vocational skill training. The real challenge is not to find low-paying jobs for unemployed, but to equip those entering the workforce with necessary skills in a globally competitive environment.

Today India's Professional and Vocational education system is marred by its **lack of currency and relevancy to current industrial needs**. Vocational qualifications standards vary widely across institutions, and schools – often out of touch with industry needs – produce graduates with outdated or irrelevant skills. This lack of skills among Indian workers adversely impacts the

Indian economy as it transitions from agriculture to manufacturing and service. Studies from FICCI and E&Y claim that more than 75% of future job opportunities will be “skill-based”.

Key challenges faced by Technical Education System in India are absence of Industry practices, quality faculty, vocational training, and industry relevant curriculum. This makes the graduates “Unemployable”. Companies spend huge amount of time, effort and resources to train recruits on necessary skills till the recruits turn productive for the company.

iii. Skill Development in Andhra Pradesh (AP):

The demand for skilled workforce as part of overall workforce requirements is estimated ~4.5 million till 2015. Supply of skilled workforce for employment is estimated ~3.4 million till 2015, a 25% shortfall, which is likely to widen to 45% by 2021. Though AP has ~3,000 technical institutions with an annual intake of ~600,000 students, the ITI and Polytechnic infrastructure seems inadequate with ~1,100 centres and capacity of training ~150,000 candidates annually, and ~950 vocational training centres training only ~20,000 candidates.

Availability of skilled workforce is a major factor in localization of industries globally. AP can attract industries by creating critical mass of skilled workforce. AP is emerging as a favourite destination and attracting attention of national and global industrial giants. It has well-developed social, physical and industrial infrastructure and virtual connectivity already.

iv. Siemens Skill Development initiative supported by Siemens Industry Software:

Siemens Skill Development Initiatives offer academic and youth development programs to promote engineering discipline with real-world experience and skills. Today globally, over 11,100 Siemens partners train over 1,135,000 students annually. This program aims to develop an innovative thinking workforce, knowledgeable and efficient in engineering and manufacturing practices, that meets the needs for proficient advanced-technology workforce skills. The industry-academia engagement develops state-of-art evidence based training and interactive student learning experiences, defines what and how students need to learn, and designs curriculum that meets marketplace needs. To complement higher education strategies, the curriculum prepares students with high demand skills and competencies, resulting in well-paying high demand jobs. It incorporates innovative training partnerships responsive to business, academic and labour needs, and delivers a seamless academic delivery system with an uninterrupted route through college. The courses are based on an adaptable technology core that build job specific skills and training, delivers sustainable collaborations that identify and meet community and industry needs, and provides certification and skill advisory services.

v. Proposed way-forward approach:

To break the capacity, context, relevancy and scalability gap of the usual teacher-led class-room based learning, we propose **Digital Interactive Advanced Simulation (DIAS)** approach – mix of technology based platforms together with hands-on training at labs and industrial setups. DIAS allows low-cost yet high-proliferation of technical skills by using advanced visualization and simulation techniques, akin to using simulators to train high-end technical skills. This helps students learn requisite skill in an interactive and immersive online learning environment, accessed from anywhere, anytime. DIAS covers ~80% of learning content and creates scalability by breaking down constrains of classroom size, teacher availability and quality, training periods, and frees up resources for intensive hands-on training where learners can spend quality time to practice concepts already learnt. Backed up by **Product lifecycle management (PLM)** technology from Siemens, DIAS mimics real life environment, where learners can learn in an interactive, self-paced, voice assisted environment. Siemens PLM technology which is at the core of DIAS, is the same technology that global companies use across industries like Automotive, Aerospace, Ship building, Industrial Machineries, etc. to design, build, and maintain real life products.

vi. Modalities of implementation:

DesignTech Systems and Siemens Industry Software will establish, operate, enable and hand over the Centre of Excellence (CoE) and Technical Skill Development Institutes (t-SDI) to AP govt. nominated educational institutions. The proposed timeline for project rollout including setting up of labs, and training of faculty at various engineering college, Polytechnic and ITI in AP is ~8 Months from the date of work order. DesignTech will run these centres for first 2 years from project inception, and then handover the responsibility to host institutes, over 3rd year.

vii. Project Financial Outlay:

S. No.	Particulars	Price	Grant in-Kind by Siemens and DesignTech	Contribution by Government
1	CAPEX	₹ 5,468,418,908	₹ 4,918,418,908	₹ 550,000,000
2	OPEX	₹ 64,397,630	₹ 64,397,630	₹ 0
Total		₹ 5,532,816,537	₹ 4,982,816,537	₹ 550,000,000

viii. List of Annexures

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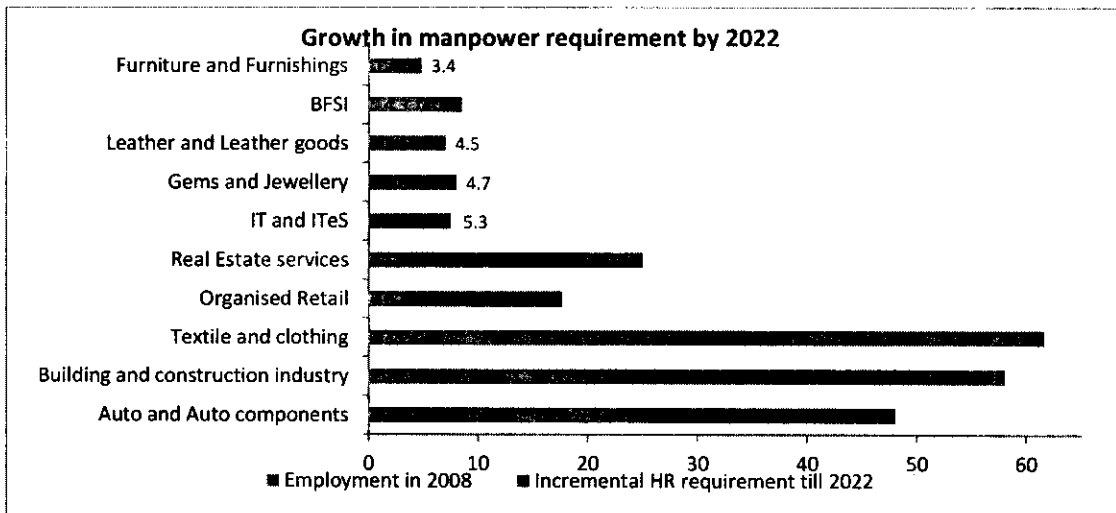
25 BACKGROUND: HUMAN CAPITALITY SKILL DEVELOPMENT

In his Independence Day speech, the Indian Prime Minister spoke of “skilled India” mission to promote holistic development, and build skilled workforce that are globally competent and competitive. The skills of India’s youth have to necessarily match that of world’s best.

i. Demand supply gap

India faces significant gap challenge between the limited supply of trained workforce and anticipated demand by economy and its major sectors. The trend is same across all states although certain states are better equipped for this challenge. India is expected to grow at an average rate of 8% in next 10 years. By 2022, more than 700 million Indians are estimated to be of working age, 500 million of them will require vocational or skill development training.

Government has identified 20 high-growth sectors of industries and services that can provide expanded employment. It consists of 10 high-growth sectors in manufacturing and equal number in services. It is necessary to develop proper skill training mechanisms as skill sets required in manufacturing and services sector are different from agriculture sector.



ii. Demand side estimation

12th Five Year Plan sets a tough challenge to increase formal skilled workforce to 25%. Given that 50–70 million jobs will be created over next 5 years, about 75%–90% of these will require vocational training. The table presents projected employment till 2017 (Source NSDC).

Year	GDP growth Rate	Projected employment (in million)			
		Agriculture	Industry	Services	Total
2011-12	9%	229.2	105	153.5	487.7
	7%	225.4	102	149	476.4
2016-17	5%	221.5	99.1	144.6	465.2
	9%	240.2	126.2	189.5	555.9
	7%	232	116.8	174.8	523.5
	5%	224	108.1	161.2	493.3

This demand will primarily come from the requirements of manufacturing sector to employ 100 million additional people by 2020.

DEMAND SIDE ESTIMATION

Automotive						
Size in 2016 \$Bn	Growth rate	Current Employment (in Mn)	Target employment 2020 (in Mn)	Additional Employment Y-o-Y	Skilling Mission (In Mn by 2020)	States to look out for
145	16%	19	37	NA	NA	Haryana, Gujarat, Maharashtra, Himachal, Tamil Nadu
Electronics Industry						
Size in 2016 \$Bn	Growth rate	Current Employment (in Mn)	Target employment 2020 (in Mn)	Additional Employment Y-o-Y	Skilling Mission (In Mn by 2020)	States to look out for
94.2	15.00%	7.2	28	200000	1	UP, Andhra Pradesh, Haryana
Electrical Equipment Industry ²						
Size in 2016 \$Bn	Growth rate	Current Employment (in Mn)	Target employment 2020 (in Mn)	Additional Employment Y-o-Y	Skilling Mission (In Mn by 2020)	States to look out for
42	9.88%	1.5	3.5	100000	0.25	Rajasthan, Maharashtra, Gujarat, MP

iii. Supply side estimation

The education system is insufficient to meet the need for skill development. Even graduate workforce lacks employable skills. Currently, about 50 million people are employed by manufacturing sector. Of the 12 million people who join workforce every year, where 20% or 3.6 million have technical skills aided by ITIs (1.5 million), Engineering Colleges (0.5 million) and other skill development initiatives like NSDC, Ministry and state technical skill courses. In order to reach the demand of 100 million skilled people by 2020 in manufacturing, the rate of growth of skilled manpower needs to be 10.6% Y-o-Y. Considering only 60% of the above 3.6 million

people are employable, growth of skilled manpower for manufacturing is a dismal 4.3% Y-o-Y against a need for 10.6%

	Pre-primary/Pre-basic School	Primary/Junior basic Schools	Middle / Senior basic Schools	High/ Post basic Schools	Pre-degree junior colleges/Higher Secondary schools	Board of Intermediate Secondary Education	Total
No. of institutions	67,822	823,162	367,745	123,726	66,917	48	1,449,420
Proportion (%)	4.70%	56.80%	25.40%	8.50%	4.60%	—	100%

Source: Knowledge paper on skill development in India by EY

a. Current capacity and enrolment in school education

There are about 1.5 million schools in India with a total enrolment of ~250 million students starting from pre-primary to standard XII. Schools at primary/junior level constitute majority where maximum enrolments occur.

b. Current capacity and enrolment in higher and technical education

The higher education in India comprises of colleges in arts, science and commerce (general education), engineering, technical and architecture, medical, teacher training, polytechnics, others (law, management, etc.), apart from education directly delivered by universities and research institutions. The total enrolment in higher education is ~20.7 million, and students enrolled for open universities and other diploma courses constitute 24.3%. BA (Honors) is the most preferred course in higher education.

c. Current capacity in vocational education and training

Vocational training in India is primarily imparted through government and private industrial training institutes (ITIs). As of 31/12/13, there are total 10,750 ITIs with capacity of 1.5 million. Total number of government ITIs are 2,275 with a total capacity of 490,802. Number of ITIs has risen at (2007–2013) 11.9% CAGR, while total intake has risen at (2007–2013) of 12.5% CAGR.

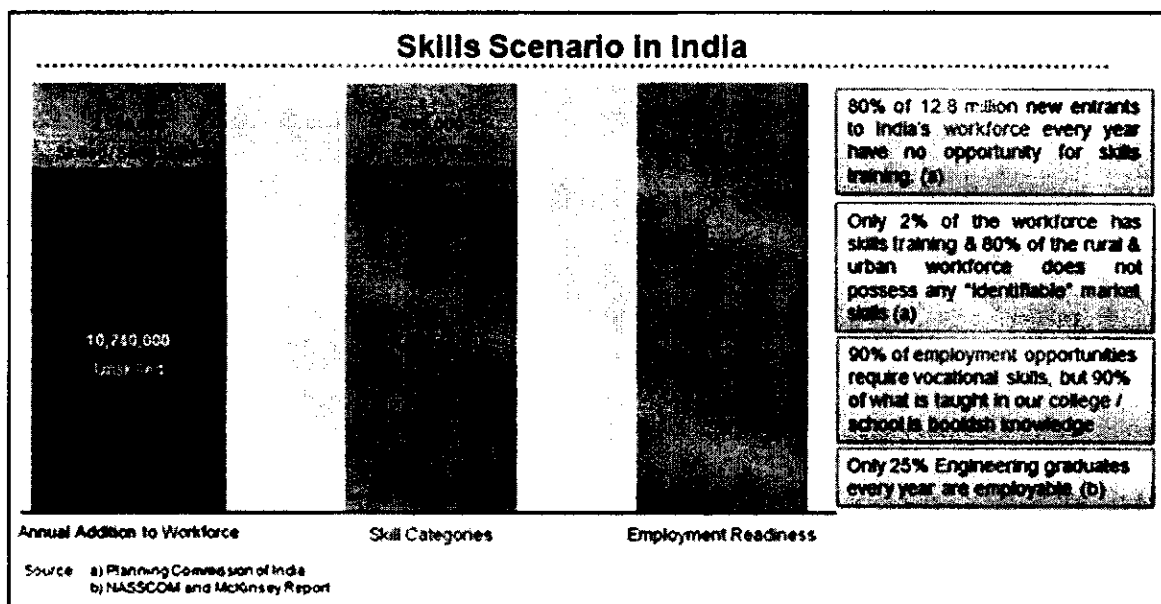
iv. Need for skill development

India's population (1.21 billion) is among the 'youngest', with proportion between 15-59 years of age increasing steadily. However, only 2% of this workforce has undergone skills training. India has a great opportunity to become the global sourcing hub for skilled workforce. India has to reach out to million plus workforce ready population. There is an ever-increasing migration of labour from agriculture, to manufacturing and services. All these workforce needs to be adequately trained, made industry-ready, and therefore globally employable. The government

schemes to empower the young workforce, needs effective implementation at grass root level with equal participation from all concerned stakeholders.

2.1 Gap between Technical Education and Industry needs in India

India's largest and youngest population in the world is also the mostly unemployable as it lacks work skills that create employability. 60% of 1.2 billion people are in the working age group. However, only 10% of 300 million children between 6 and 16 pass school and go beyond. Only 5% of labour force between 19-24 years is estimated to have acquired formal training.



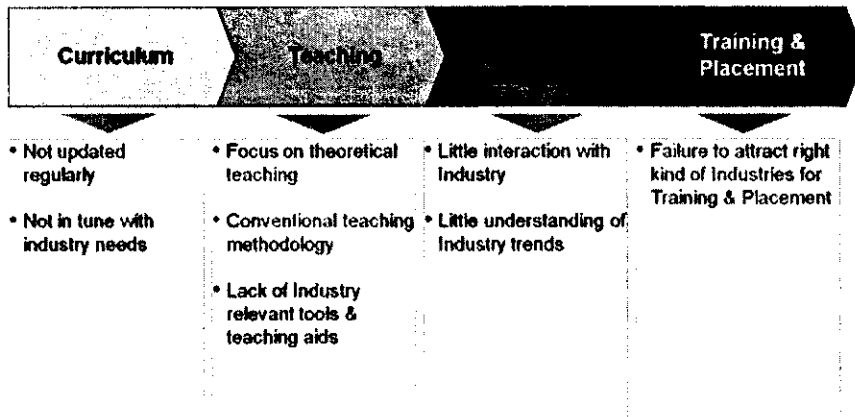
FICCI-Ernst & Young survey estimated that over 75% of new jobs to be created in India will be "skill-based". While overall supply of highly skilled labour marginally exceeds demand, there is shortage of adequately qualified (employable) people, primarily due to inconsistent quality of education and training provided by the training institutions in India. Germany has 75% and UK has 68% skilled work force, compared to India's only 2%. The survey corroborated findings of NASSCOM-McKinsey survey that only 25% of Indian technical professionals are considered "employable" by top employers. The difficulty of employers to fill job vacancies has increased to 67% in 2011 compared with 16% in 2010.

Technical Education System is designed to train engineers, and meet the need for engineers in the economy. As nature of technology and industry changes, the education system needs to be responsive and evolve to changing demands. However, the ever increasing gap between industry

practices and current Indian technical education system has led to serious problem of “Employability”. In absence of necessary employable skills, companies have to spend huge amount of time, effort and resources into training recruits on necessary skills until which, the recruits are unproductive for the company.

Key challenges faced by Technical Education System are:

- Outdated curriculum
- Lack of application based learning for students
- No or very little exposure to Industry practices and trends
- Lack of good quality faculty in Technical Institutes



Andhra Pradesh

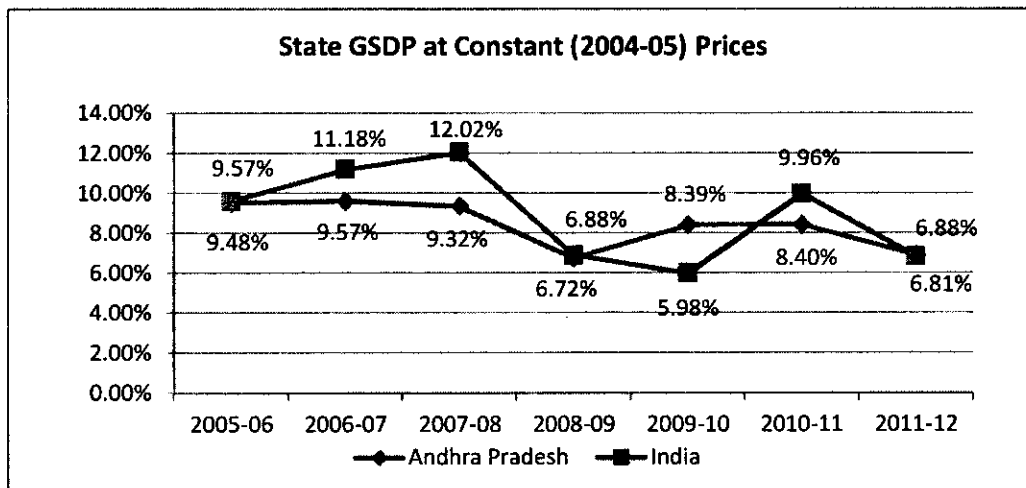
Located in southern India, Andhra Pradesh is bounded in north by Telengana and Orissa, in west by Maharashtra and Karnataka, in south by Tamil Nadu and in east by Bay of Bengal. It has a coast line of 974 Km. By Census 2011:

- 4th by area, 5th by population, 7% of India's population.
- GSDP growth higher than India
- 20% of India's SEZ, 11% of PPP projects.

The top districts of AP in terms of GSDP are Vishakhapatnam, East Godavari and

Krishna. Between 2004-05 and 2012-13, the annual GSDP growth rate was 8.91 percent CAGR.

	AP	INDIA
Demographic Indicators	2011	2011
Total Population (In Millions)	84.6	1210
Sex Ratio (females per 1000 males)	992	940
Percentage Decadal Growth (2001-2011)	11.10	17.64
Density (persons per sq.km)	308	382
Economic Indicators	2012-13	2012-13
GSDP as a percentage of all states GSDP	7.8	100
Human Development Indicators	2011	
HDI Rank(Out of 23)	15	
Poverty Indicators	2011	
People below Poverty Line (%)	21.10	29.80
Industrial Infrastructure	2013	2013
PPP projects (No)	100	881
SEZs (No)	76	385



3.1 Investments by Industries

Various large scale and Micro, Small and Medium Enterprises (MSMEs) have invested in setting up establishments in AP. It has generated employment in considerable manner for AP as well.

Year	Large scale industries proposals established		MSMEs proposals established	
	Investment	Employment	Investment	Employment
2005-06	350	10,875	55.3	15,832
2006-07	1,218.20	26,193	195.7	36,019
2007-08	1,570.80	23,075	537	79,258
2008-09	1,237.20	25,058	572.4	85,211
2009-10	2,448.90	11,933	932.9	64,844
2010-11	2,063.40	20,626	1,076.40	104,620
2011-12	1,816.20	21,543	1,018.10	120,435
2012-13*	977.1	12,959	286.1	52,932

*Till August 2012, Source: IBEF, Andhra Pradesh, August 2013

Government is establishing clusters to push growth in vital sectors like Auto and Electronics

i. Electronics clusters

AP government has unveiled blueprint for IT, electronics and e-

Governance with a vision to develop AP as knowledge and innovation society of global repute. The blueprint envisaged IT investments of Rs.12,000 crore, while the electronics policy sets a target to attract investments up to Rs.30,000 crore by 2020 and create an employment for about five lakh people. An amount of Rs.1,750 crore provided in the budget to provide necessary amenities for IT and electronics sector. The electronics policy, innovation and start-up policy will be announced soon where 20 electronic manufacturing clusters and 200 industries to be set up in Srikakulam, Vizianagaram, Visakhapatnam, Kakinada, Guntur, Nellore, Chittoor, Anantapur and Tirupati. Aside, a mega electronic hub will come up in Visakhapatnam and a hardware-park at Kakinada. The department also plans mega electronic events in Vijayawada, Visakhapatnam and Tirupati, where electronic bazaars are proposed to be set up.

ii. Vijayawada Auto Cluster Development Company Limited (VACDCL)

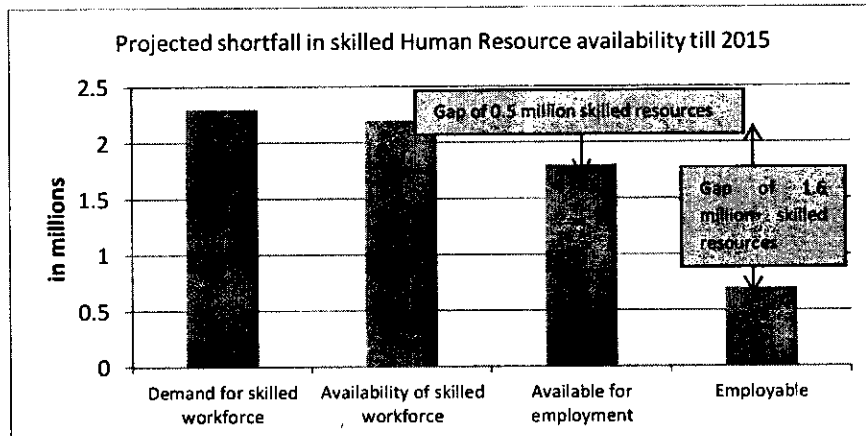
Established under Industrial Infrastructure Upgradation Scheme (IIUS) of Department of Industrial Policy and Promotion, Ministry of Commerce and Industry, Government of India, the Vijayawada Auto Cluster was formed with representatives from the associations of Automobile Technicians, AP Small Industries and other affiliated bodies of Vijayawada to take up Cluster Development project. VACDCL is responsible from conceptualizing to planning, design, construction, commissioning and managing facilities. An organization structure is prepared for 7 proposed activities with 6 members each and a convener nominated from local industries.

iii. Manufacturing Cluster

Central government announced plans to set up industrial clusters on the Vizag-Chennai corridor and develop an industrial smart city in Krishnapatnam as well as hardware manufacturing cluster at Kakinada.

3.2 Incremental Demand and Supply in Andhra Pradesh

The projected deficiencies in workforce availability as a result of mismatch between burgeoning demand and lower supply is 1.6 million. The demand for skilled workforce is estimated to be around 2.3 million till 2015, while the supply of skilled resources is estimated to be around 1.8 million. After factoring in low levels of employability, the available skilled workforce is reduced and estimated to be 0.7 million till 2015. This results in an estimated gap of 1.6 million.

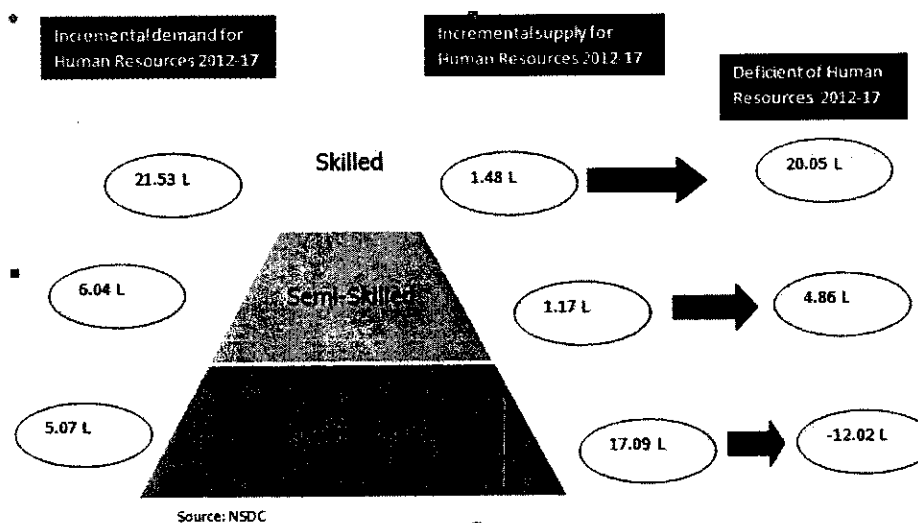


Employable skilled labor constitute only 31% of total demand

Mapping of Human Resources and Skills in Andhra Pradesh -2015, CII

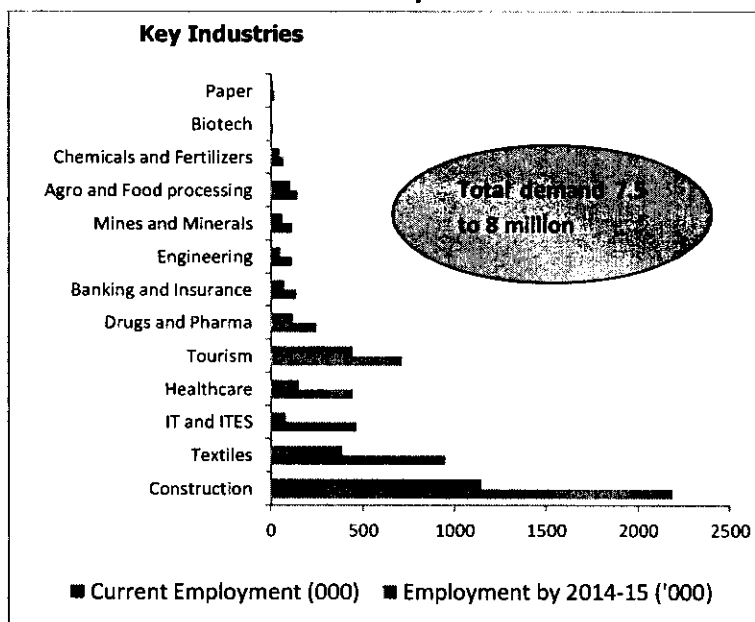
Year	2016-17	2021-2022
Incremental Demand	32,64,122	24,77,564
Incremental Supply	19,74,738	18,58,494

Availability of skilled labour is the major concern area for employers in the future.



- Incremental demand for skilled worker 59%, semi-skilled 18%, and minimally skilled 23%.
- Sectors with largest demand over the years will be Construction, Hospitality, BFSI& IT/ITES.
- Large section of workforce is expected to move from agriculture sector to other activities, resulting in negative demand for workforce in agriculture.
- Current slowdown in manufacturing has lowered need of workforce.
- Districts with high manpower requirements are Guntur and Visakhapatnam
- District with high manpower supply are Kurnool, Anantapur and Guntur
- The state is expected to witness large interstate and inter sector labor migration.
- Lack of availability of skilled labor will impact many sectors mainly construction and textile.

Incremental human resources requirement till 2015



Incremental Human Resources Requirement till 2015 (in 000s)

Paper	6
Biotech	10
Chemicals and Fertilizers	23
Agro and Food processing	43
Mines and Minerals	58
Engineering	60
Banking and Insurance	69
Drugs and Pharma	129
Tourism	268
Healthcare	291
IT and ITES	385
Textiles	562
Construction	1040

Skill Gap (in '000s) 2012-2017	Skilled	Semi-Skilled	Minimally Skilled
Tourism, Travel & Hospitality	881	-116	-161
Construction	423	518	357
Banking & Financial Services Insurance	263	32	7
Other Services	137	-103	-94
IT & ITES Sector	129	14	3
Transportation, Logistics, Warehousing, Packaging	67	34	11
Real estate	62	84	12
Textile & leather*	37	19	18
Chemicals & Pharmaceuticals	33	18	15

Mining & Quarrying	22	-1	21
Auto & Auto components*	20	10	10
Rubber and plastic products*	19	11	9
Food processing	15	0	15
Metals & non-metallic products*	15	7	8
Agriculture & Allied Activities	14	71	268
Wood & Paper products*	7	4	4
Coke, refined petroleum and nuclear fuel*	6	3	3
Electricity, gas & water supply	2	1	1

Demand side estimation

Manufacturing sector attracts major investments with contribution from both large and small-scale industries. During 2012-13, outstanding investments in Andhra Pradesh totalled ~INR 57,634 crore. The electricity sector accounted for 28 %, followed by manufacturing (25%) and services (19%) of total outstanding investments.

Declining trends in projects across sectors for 2012-13 (wrt. preceding year) due to decline in investment, has reduced manpower demand in manufacturing, textiles, IT and construction.

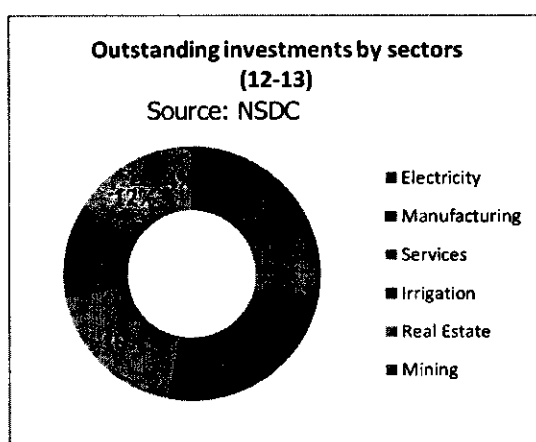


Table 1: Investment in AP in INR Million in Various Sectors (Source NSDC)

Source: NSDC

Industries (Investment: INR million)	2010-11	2011-12	2012-13
Manufacturing	98,266	831,448	210,836
Metal & metal products	34,068	34,088	80,400
Misc. Services	40,194	44,543	17,960
Construction & real estate	207,468	89,073	9,750
Machinery	18,169	117,200	8,850
Transport Services	30,354	435,076	7,686
Recreational Services	817	23,756	6,500
Communication Services	2,500	0	6,000
Transport equipment	36,660	0	5,878
Wholesale & retail trading	23,900	1,536	5,000
Health Services	3,669	11,620	3,900
Hotels & tourism	2,777	810	1,155
Textiles	8,548	1,460	0
Misc. Manufacturing	34,738	25,250	0
Information Technology	0	250	0

3.3 Technical Education in Andhra Pradesh

Supply of adequate workforce in AP is hampered by below average literacy rate and limited capacity of its educational institutions. As per provisional census 2011, in all India literacy rankings, Andhra Pradesh's ranking slipped from 21 to 23 in 2011 as compared to 2001.

- Female literacy remains an area of concern with rate being much below national average; AP stands 29 among 35 total states.
- From 2001 till 2011, the number of total students in school has only increased from 131.2 to 133.91 lakh. However, number of students in primary education has decreased from 89 to 70.8 lakh showing lower enrolment rate.

Course	# Institutions	Intake
Engineering	707	3,35,000
MCA	644	46,795
MBA	926	86,905
B. Pharmacy	290	29,520
Polytechnics	263	76,000
D. Pharmacy	47	2,560
	2,877	241,780

Government initiated a number of skill development programs to address the issue of gap between supply and demand of human resources

- Rajiv Yuva Kiranalu (RYK) is a flagship Program initiated by Government of Andhra Pradesh to provide skill based training and employment to the youth.
- The schemes aims to start candidate's training

within 3 months of registration at website

Other Vocational Training Providers

Government Training Providers	Number of institutions*	Trades Covered
ITIs	148	Electronics, Fitter, Draughtsman Civil
ITCs	670	Welder,
Women	25	Hospital attendants
Polytechnic	251	Dress Making, Computer Operator, Mechanic

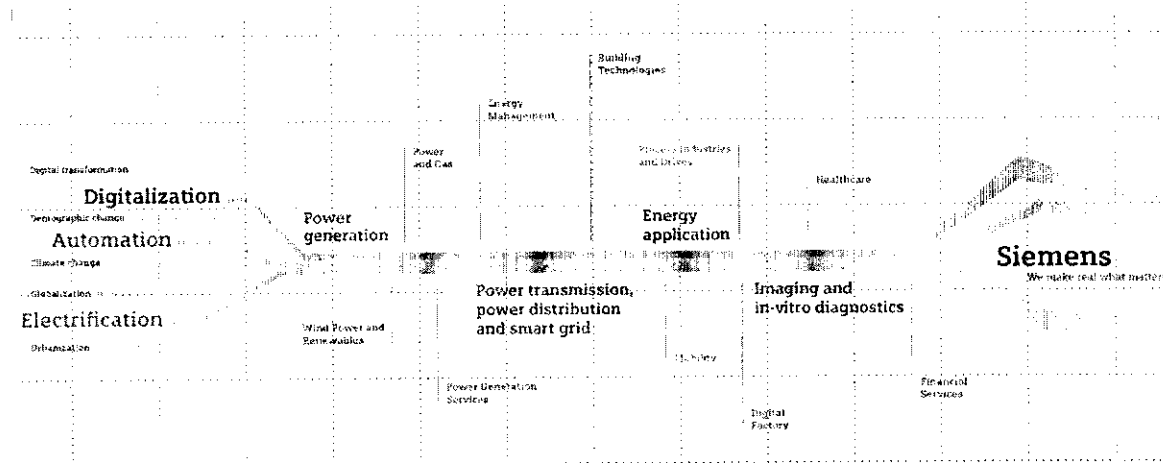
Other Skill Development Schemes

Craftsmen Training Scheme	<ul style="list-style-type: none"> • 140 ITIs, trained 24,250 students in 2012-13 • 658 ITCS, trained 74,500
Vocational Training Improvement Project	<ul style="list-style-type: none"> • Centrally sponsored scheme with World Bank assistance • 25 Government ITIs
Modular Employable Skills Scheme	<ul style="list-style-type: none"> • 950 Vocational Training Providers (454 from Govt.) till March 2012 • 19,078 candidates were trained up to March 2012
Rajiv Udyogasri Society	<ul style="list-style-type: none"> • 8,90 Lakh unemployed youth were provided placements through the efforts of the society up to 31.03.2011

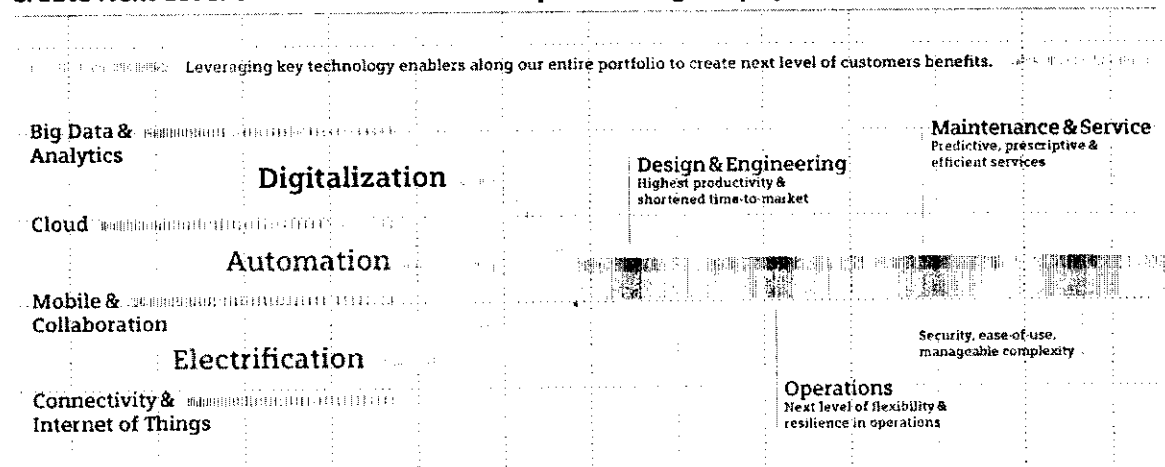
4 Global leader in Digital Technology

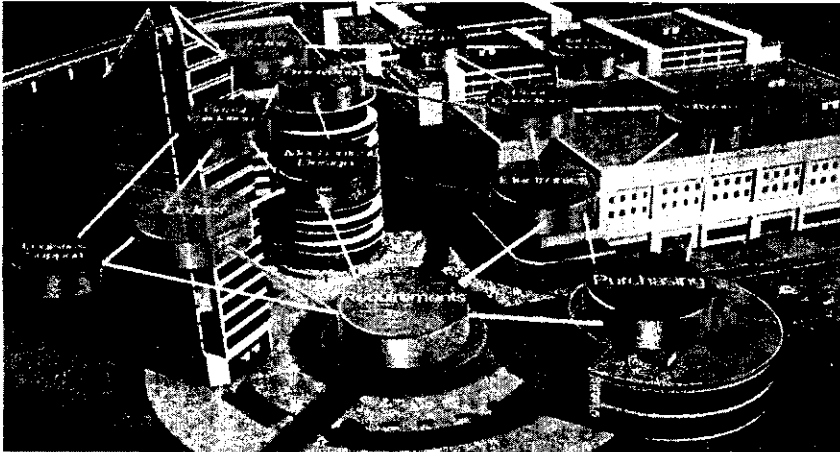
Siemens is an integrated technology company. With business activities across Energy, Healthcare, Industry, Infrastructure & Smart Cities, Siemens is a clear global market and technology leader in its areas of operation. Technology excellence, innovation, quality, reliability and international focus have been Siemens' hallmark for over 160 years. Present in 190 countries, Siemens association with India dates back to 1867 when it laid the first telegraph line linking Britain and India. Siemens currently has over 21 manufacturing plants in India.

Siemens Makes Real What matters: Electrify, Automate and Digitalize the world around us

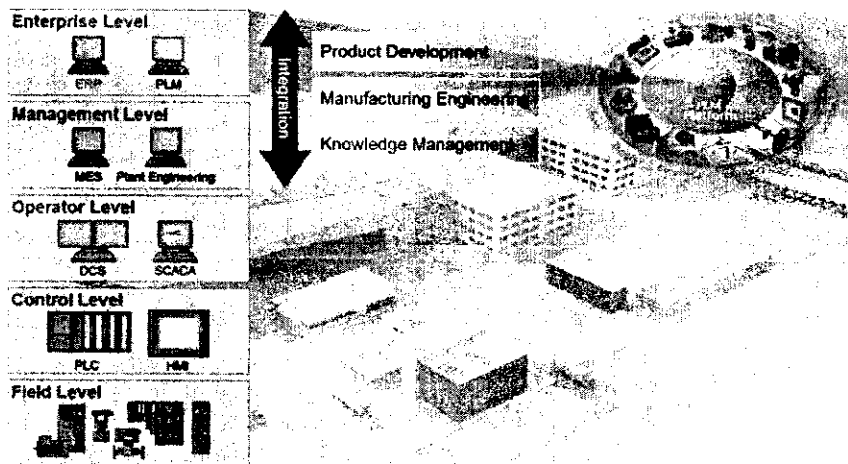


Create Next Level of Customer's Benefits by combining the physical and virtual worlds



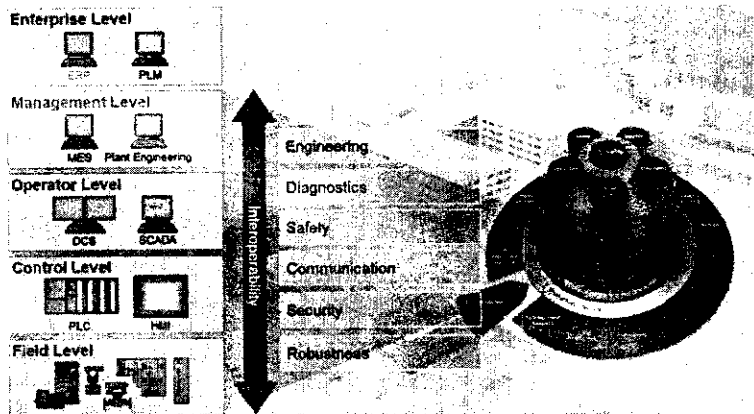


“Siemens Industry Software” provides integrated software solutions for product design, manufacturing planning and lifecycle knowledge management at the enterprise level. The solution integrates entire product information generated across an organization to help build first time right products, and validate the underlying processes required to do so in a digital environment. The solution expands beyond the boundaries of an extended enterprise to include suppliers, partners, and customers. All of these solutions are further integrated with manufacturing execution systems and plant engineering solutions to provide end-to-end visibility and control.

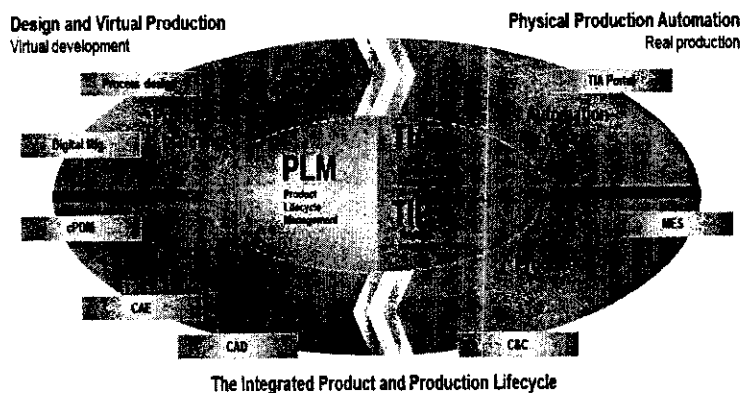


At operations management level, Siemens “Totally Integrated Automation” offers unique open-standards based approach to automate and integrate the entire process ranging from Manufacturing Execution, PLC and HMI programming, and provide field level control. Interoperability with all Siemens and third party applications is its core advantage.

Siemens integrates enterprise level applications with manufacturing operations and plant engineering to shop floor automation. Combining the virtual and the real world, Siemens unifies product knowledge with process innovation. This unique offer from Siemens, for the entire lifecycle of product, process and production, is the foundation for Digital Enterprise. It includes "Totally Integrated Automation" and "Product Lifecycle Management".



Siemens unifies product knowledge with process innovation and manages all value creation elements of enterprise processes. Siemens provides digital enterprise platform that underpins a digital enterprise by creating unified product and production lifecycle – the entire lifecycle of product, process and manufacturing, from its conception, through design and manufacturing, to service, renewal and disposal.



Siemens is the only company in the world who can connect intelligent product and production lifecycle with virtual tools used for product and production design, in order to enable physical production planning validate its complete execution environment.

4.1 Siemens Skill Development Initiative

Dr. APJ Abdul Kalam
Former President of India



17 October 2011

Message

I am delighted to know that SIEMENS Industry Software (India) Private Limited is organizing an event "Skill Development Imperatives for India" as a part of annual "Siemens Answers: Executive Forum" in Bombay on 20th October 2011. I am happy that this forum facilitates interaction between various stakeholders and provides constructive insight to execute the plan as relevant for Indian industry.

I was recently going through an article in the Economist, which talked about the growing strength of Indian workforce. The article says that, in the next ten years, out of every ten new workers around the world, three would be Indians. This workforce will be spread across different sectors of the economy and involved in a variety of services.

The Indian skill development programme has to focus on employability. It is reported that in a decade's time, India will need 300 to 500 million employable skilled youth. Hence, there is a need to completely change the university education syllabus and the secondary school education syllabus. In the secondary school syllabus during the 9th, 10th, 11th, 12th classes, 25% of the time has to be allotted for skill development programme. When the secondary school students come out from the school, they will have two certificates; one for 10+2 qualification, and the other for the unique skill acquired during the four year period. Corporate sector has to work in partnership with government institutions in facilitating this type of transition.

My best wishes to all the participants of Siemens Answers: Executive Forum for success in their deliberations accompanied by implementable action plan.


APJ Abdul Kalam

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Email: apj@abdulkalam.com
www.abdulkalam.com

All industries today face acute problems of skill shortage. In India, most technicians, diploma holders and graduate engineers are not readily employable. Consequently, most Indian companies have to train their new-recruits for as long as 18 – 24 months before they become productive. This seriously affects industry competitiveness and decreases productivity.

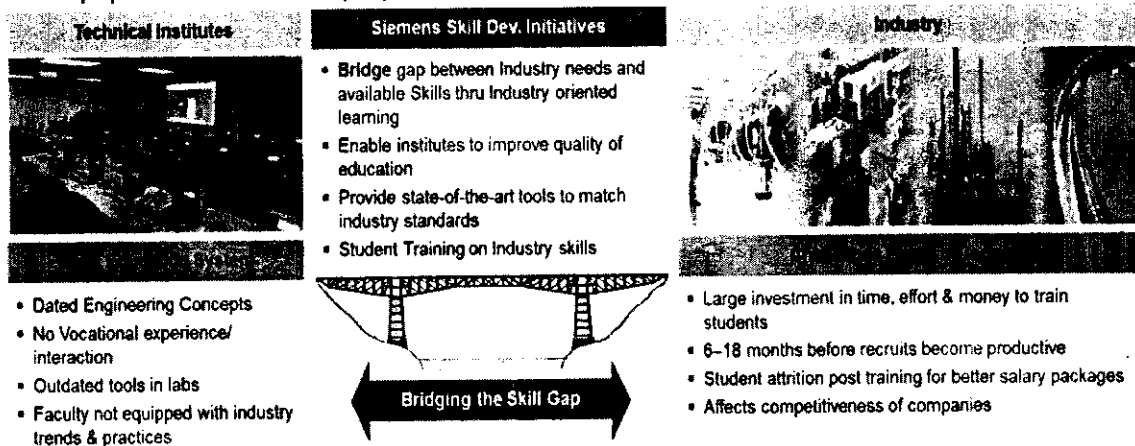
The ideal outcomes of a good vocational education which creates employable youth, are – the skills, sensibilities, working knowledge, care and understanding of tools and resources, wider

skills/dispositions for lifelong learning and orientation for excellence – for which vocational education ought to aim. Vocational subjects are distinct from academic subjects in a number of ways, each of which raises its own concerns for the organization, teaching, and assessment of such subjects. The balance between subject content knowledge and workplace procedural knowledge is more critical for Vocational education. This impacts upon where most of the teaching is done. Some vocations are more conducive than others to learning on the job.

All Technical/Vocational education works with the same three media:

- i. **PHYSICAL MATERIALS:** Imitating, practicing, trial and error as part of real-world problem-solving. Improvements in Labs infrastructure by adopting latest open technologies in engineering design, manufacturing, analysis and management to serve needs of industries.
- ii. **PEOPLE:** Feedback, conversation, simulation, includes role play. Improved faculty competency at Technical Institutions. Intensive train the trainer programs.
- iii. **SYMBOLS (WORDS, NUMBERS AND IMAGES):** Learning through thinking critically, and via virtual environments. Siemens Certified updated Technical Education curriculum that is more aligned with Industry needs.

Siemens Skill Development Initiative proposes a complete learning solution to build specific skills and equip students with employable skills in engineering and manufacturing sector.



Siemens Skill Development Initiatives offer academic and youth development programs to foster and promote the engineering discipline by providing real-world experience and skills. Today, with more than 11,100 partners globally that collectively train over 1,135,000 students annually, Siemens Industry Software is developing a workforce that is experienced in both innovative thinking and efficient production practices. The key objectives of the program are:

- Respond to forecasted needs for a proficient advanced technology workforce
- Incorporate cutting-edge 21st century skills to prepare a skilled workforce

- “Grow your own” technology graduates to enter workforce or transfer to universities for continued higher education and advanced degrees
- Engages industry, business and academia in developing state-of-the-art evidence based training and interactive student learning experiences
- Facilitates valuable industry and academia collaborations to define program requirements and curriculum design that meets marketplace needs
- Provides critically valuable education to result in well-paying, high demand jobs
- Leverages collaborative resources into valuable training linked to jobs

To complement higher education strategies, this educational model offers:

- A curriculum that prepares students with high demand skills and competencies
- Innovative training partnerships responsive to business, academic and labour needs
- A seamless academic delivery system with an uninterrupted route through college
- Skill training and preparation designed to meet workforce needs
- A basic and adaptable technology core for courses to build job specific skills and training
- Sustainable collaborations that identify and meet community and industry needs
- Certification and skill advisory services

To address the need, this initiative proposes a complete training solution to build specific skills and equip the students with employable skills in the engineering sector.

- ENABLEMENT PROGRAM:** Proposes to establish Centres of Excellence (COE) and Technical Skill Development Institutes (t-SDI) at technical universities, polytechnics, ITI and Skill Centres. With these COEs and t-SDIs, we intend to create the right infrastructure, content and faculty training facility that can improve teaching quality and improve learning of students.
- ACADEMIC PROGRAM:** Targets engineering students enrolled in degree, diploma or certificate courses, trains them on industry relevant skills, and makes them employable.
- YOUTH DEVELOPMENT PROGRAM** seeks to cultivate and sustain interest in science, technology, engineering and mathematics, or STEM, fields among students of varying ages with intent to develop the future workforce.

4.2 Siemens Skill Development Initiative – Program Overview

Globally, availability of skilled workforce is a major factor that drives industrial productivity and output. It governs establishment of factories in a given location, which in turn creates demand for local employment. Moreover, India in general suffers from very poor skillsets of its large young population; most Indian graduates lack employability.

To bridge this gap between demand and supply of skilled workforce, AP needs to create and modernize its technical institutions with industry-relevant skills. This should cascade across the Engineering Colleges, Polytechnics, ITIs and SDIs to integrate the whole technical-skill supply chain. This will lead to further economic development, social good and political stability in AP.

We propose to work with the AP government to deploy an industry-relevant skill development program, and equip students with employable engineering and technical skills. The program will provide Learning certification, Skill advisory and Job assistance as per AP relevant growth industry verticals. We propose to set-up multi-skilled **Centres of Excellence (COE)** at top Engineering Colleges/ Polytechnics in the area of Automotive, Aerospace & Defence, Industrial machineries and Shipbuilding. The **Technical Skill Development Institutes (t-SDI)** will be set-up at competent Polytechnics/ITIs in technical vocational trades of Automotive, Electrical, ICT & Electronics, Production-Manufacturing-Fabrication, and Agro & Farm machineries.

4.3 Objectives of the Program

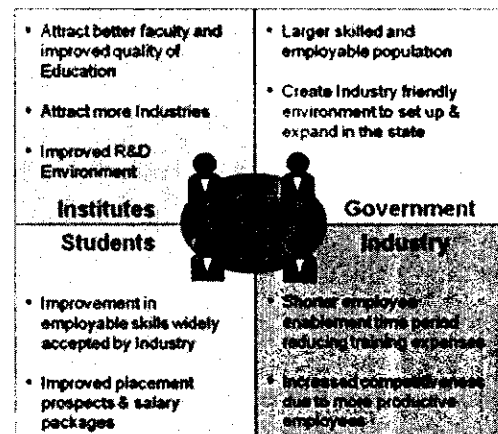
The broad objectives of the Program are as follows:

- i. Set up industry relevant Technical Education infrastructure and pedagogy
 - a. Improvements in Labs by technologies in engineering design, manufacturing, analysis and data management, industrial practice sessions and projects.
 - b. Industry relevance of extra-curricular course and skill up-gradation of faculty.
- ii. Enhance reputation of institutions with state of art equipment, and promote Innovation.
- iii. Industry partnership to improve curriculum relevance and impart employable skills.
- iv. Availability of trained workforce to attract industries to set up units in AP.

4.4 Intended Outcomes of the Project and Benefits to Stakeholders

The intended outcomes of the project are:

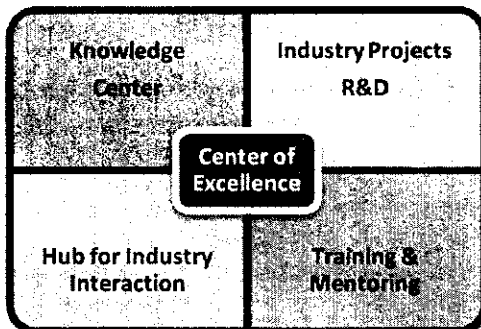
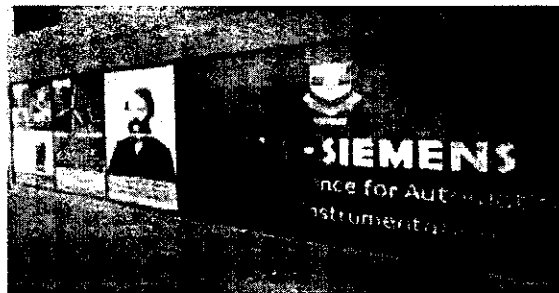
- i. Build a world-class integrated skill development infrastructure in AP.
- ii. Improved faculty competency at institutions.
- iii. Attract better faculty and students.
- iv. Industry-academia partnership
- v. Updated Technical Education curriculum that is more aligned with Industry needs.
- vi. Improved employability and assist better placements of students in colleges.



4.5 Siemens Centres of Excellence

“Siemens Centres of Excellence” are interdisciplinary, industry backed, centres focused on developing skill-excellence for the Engineering and Manufacturing sector.

The mission of Siemens Centre of Excellence is to promote advancement and implementation of industry skills, aided by PLM, through research and education, in partnership with industry. The centre aims to bridge skill gaps of students vis-à-vis industry needs and impart state-of-the-art industry oriented technical training to help foster significant innovation and learning.



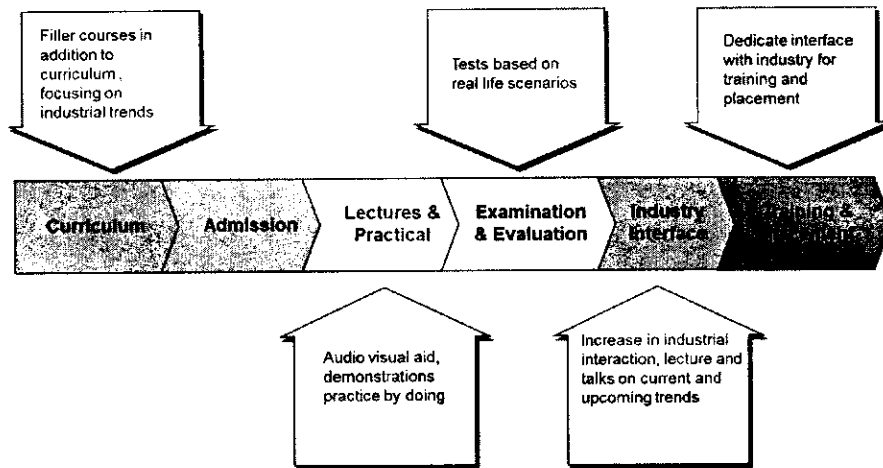
Through the implementation of industry-relevant technology and processes, these centres facilitate multi-disciplinary learning environment across Science, Technology, Engineering, and Management (STEM) faculties, to meet the demands of industries’ ever changing processes. They leverage Siemens’ integrated platform to help build skills around collaboration and innovation, and draw upon expertise from various industry segments and provide

knowledge and tools to the students.

The broad objectives of “Siemens Centres of Excellence” are:

- Establish industry partnerships to guide, support, and validate industry relevant learning
- Assist exploratory research projects to foster relevant industry innovation
- Assist integration of technology into college curricula
- Facilitate the pursuit of career opportunities by graduates
- Enable technology adoption by industry
- Serve as a knowledge base and thought leader for the targeted discipline

4.6 Skill Mapping for Meeting Gaps



4.7 Learning Program

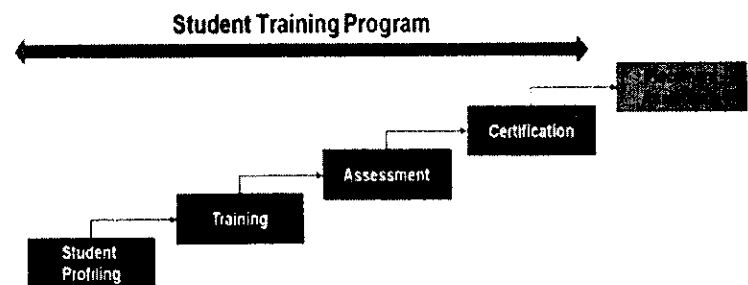
Student Learning Program



cultivate future professionals and academic faculty. The outcomes of this industry-academia partnership are Industry Seminars, Industry Projects, Certifications, and Internships. The program offers courses for Beginner, Intermediate and Advanced Levels.

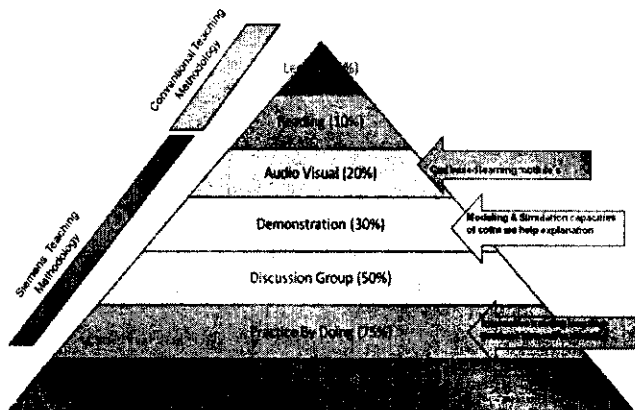
Based on industry experience working with leading manufacturers worldwide, Siemens has identified needs for workforce skill development. These skills are essential for engineering, technology, manufacturing, industrial design, analysis, and detail design.

The program leverages Siemens technologies to develop curriculum as per industry processes to



Target audience for COEs ranges from 1st – 4th year of Engineering students and working professionals. The same for t-SDIs are from Polytechnics and ITIs. The program involves continuous training, monitoring and assessment of students.

- i. **STUDENT PROFILING:** Siemens would create a web based platform, where all students will be enlisted. Students will be continuously assessed on their engineering and industry concepts, tools and the platform will be periodically updated to reflect their updated profiles.
- ii. **TRAINING:** Siemens 'learning methodology' as against traditional 'teaching methodology' involves experiential learning techniques to train students on industry best practices.
- iii. **ASSESSMENT:** Continuous evaluation of students through tests and assignments. The students will be required to complete the assessments before they get certification.
- iv. **CERTIFICATION:** On successful completion of course and assessment, the students will be issued a "*Siemens Certificate*".



Courseware and textbooks

Courseware and Textbooks are available for Siemens PLM Software's broad spectrum of PLM solutions. Other available resources include self-teaching modules, courseware builders and textbooks, which are provided to enable students and faculty to share learning experiences.

To enable students transcend the knowledge barrier, Siemens has designed

self-directed interactive learning solutions that can transform the process of educating novice users on complex products and processes. These self-directed learning solutions provide better retention, shorter learning curves and increase productivity.

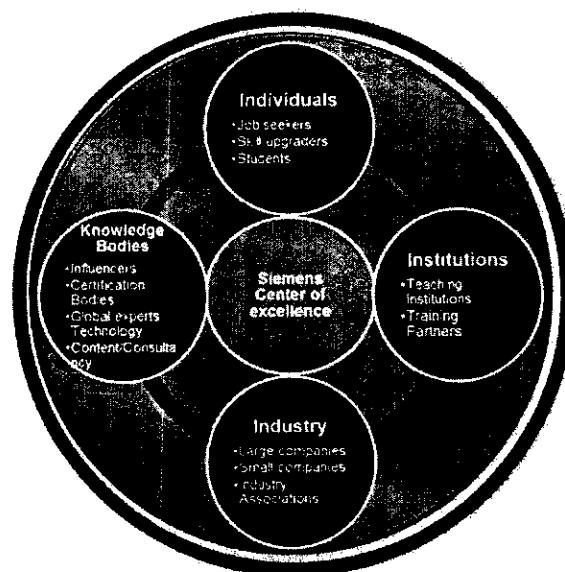
Self-Directed Interactive Digital training approach creates an efficient solution for users to get trained on products and processes. A student is taught to use the product or understand the process in a simulated engineering environment. The effectiveness of learning is enhanced as it engages learners with interactivity and multimedia along with the demonstration of various procedures, practicing the steps, and interactive assessment.

- Flexibility to learn anytime, anywhere
- Self-paced learning and evaluation
- Consistent delivery

Industry Partnership

Siemens has been actively involved in organizing Industry conferences to address skill gap plaguing India. We intend to leverage these centres to build Industry-Academia partnership:

- i. **PRODUCER – CONSUMER INTERACTIONS:** This relationship necessitates some collaboration as the producer (academia) has to ensure that the output satisfies the needs of the consumer (industry) to a large extent, and vice versa. Hence, one form of collaboration, which is more in the nature of a feedback loop, is for the industry to provide inputs back to the academic institutions regarding their perception or evaluation of their products (students).
- ii. **COLLABORATION IN CONTINUING EDUCATION:** One of the core competencies of academic institutions is teaching. Many institutes, who are engaged in education at high end, have the wherewithal to provide training for high-end manpower development in topics relevant to industry. Therefore, a natural collaboration is possible for the institutes to conduct training in various topics of interest for the industry.
- iii. **COLLABORATION IN RESEARCH:** In a world driven by Intellectual Property, there is an increased interest in research collaboration. Though academicians in most good institutes engage in Research, collaboration is only possible when industry has a need for the same. Though the goal of research is to create new knowledge, industry wants is to utilize this to create products and generate revenue. Today academic institutions are conducting both basic and applied researches, the latter of greater interest to industry.
- iv. **INDUSTRY LINKED LEARNING MODEL:** Industry Skill development program aims at linking education system to Industry. The learning model connects the four spokes of Individuals & Institutions to industry and knowledge bodies.



Train the Trainer (Facilitator)

The digitally interactive learning systems necessitate more the role facilitators, rather than teachers/ trainers. The facilitators address student learning problems, coordinate industry projects and interactions, and conduct the various learning administration processes viz. availability of necessary IT infrastructure, centre/ course registration, student certification, etc.



- A certified COE trainer delivers the entire training module
- This gives the trainer candidates an opportunity to see the program and how the various modules fit together



- The hand-on portion covers the following objectives:
 - Explain what, why and how behind each critical topic and skill
 - Handle challenging questions on applications and nuances of the skills
 - Coach and facilitate application of concepts, tools and techniques to real life situations.



- The trainer will work in 1-2 person teams to deliver the training and master trainer will evaluate and make any course corrections.
- Certificate is awarded upon successful completion of the established criteria

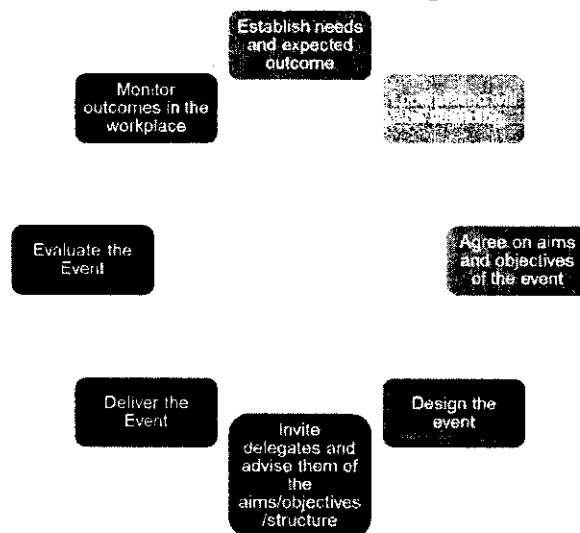


- In order to maintain certification the trainer has to conduct training at least once in every 6 months
- The trainer has to upgrade his skill once annually.

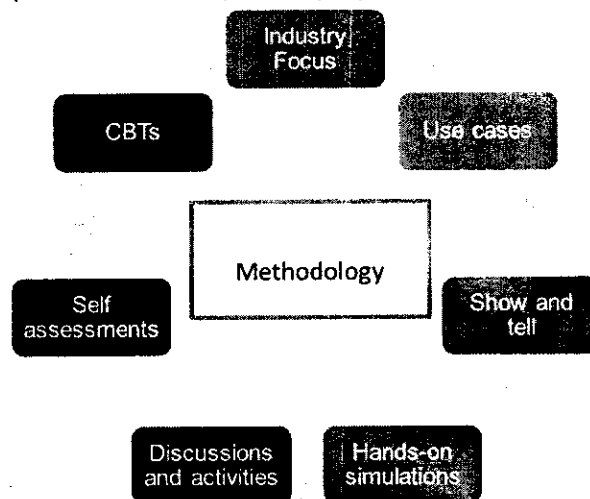
“Train the Trainer” (Facilitator) program aims to develop facilitators equipped with necessary skills and tools to facilitate the self-learning process of students. They are trained to impart training using Verbal, Visual & KINESTHETIC approaches, and are

equipped to train in both Instructor led & Self-paced learning methods.

- i. **UNDERSTANDING THE TRAINING PROCESS:** The program starts by establishing needs and outcome of the training, profiling of trainers attending the training, designing specific training requirements and inviting delegates and trainers. Once the preliminary preparation is done, the training is delivered. The outcome is evaluated both in the training environment and at the institute.

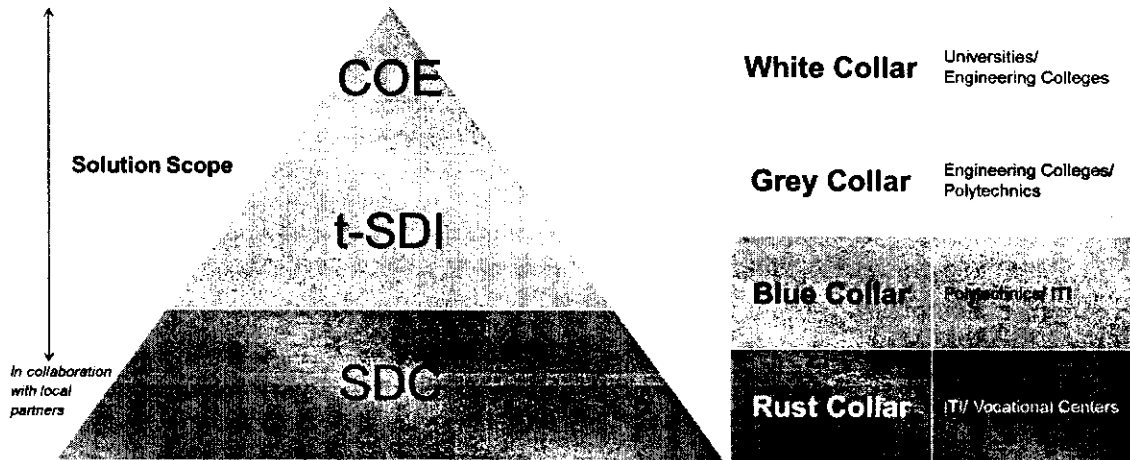


- ii. **ASSESSING TRAINING NEEDS:** Design training program based on specific needs of institute requirement or trainer. A facilitator can be equipped to impart training across functions based on the self-paced learning methods.
- iii. **DESIGN AND DEVELOPMENT OF THE TRAINING PROGRAM:** The program follows “Present, Pair, Co-teach and Assume (Take over)” model. First the candidates are trained by a certified COE trainer. Then the candidates pick up certain topics and present, after which they get paired with a certified trainer to co-teach a class, before they finally assume the complete responsibility and take over the full training session. This rigorous process ensures that the new trainers are evaluated and feedback is provided at all stages of their training.
- iv. **UNDERSTANDING LEARNING STYLES:** Each candidate has his own learning style. The program enables the candidate to access learning styles of their students and modify the pace of the modules accordingly.
- v. **USING VARIOUS TRAINING TECHNIQUES:** A trainer needs to have additional skills other than subject matter expertise. The program is designed to include various training techniques as well as the personal skills required by a good trainer.

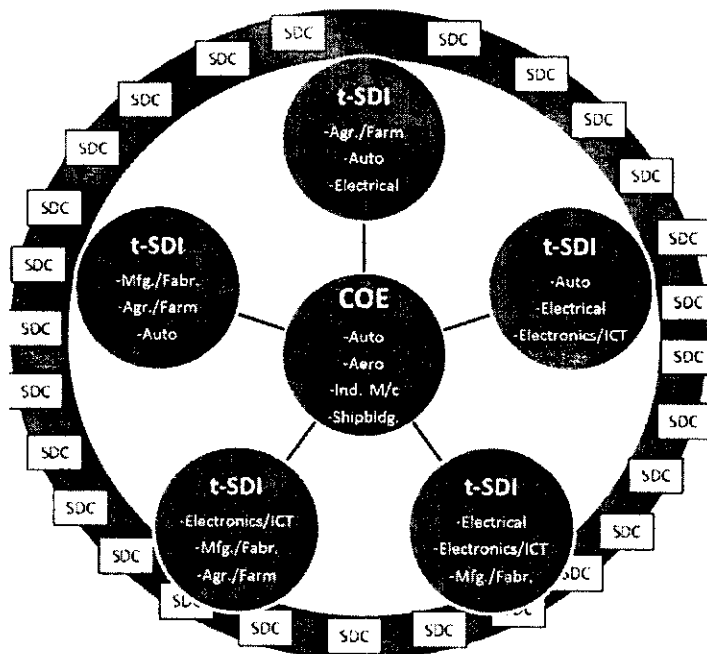


- vi. **PRESENTATION SKILLS TRAINING:** The program includes honing trainer candidate’s presentation skills during presentation & co-train sessions.
- vii. **GIVING AND RECEIVING FEEDBACK, AND ASSESSING TRAINING:** The program includes two-way feedback at different stages.

Model of Industry & Education Collaboration



“COEs” are focused to skill students for relevant growth industries – Automotive, Aerospace & Defense, Industrial Machineries, and Shipbuilding, at competent Engineering Colleges/ large Polytechnics level, whereas “t-SDIs” are focused on skilling students in vocational trades – Automotive, Electrician, Electronics, Manufacturing & Fabrication, and Agro & Farm machineries, at Polytechnic/ ITI level.

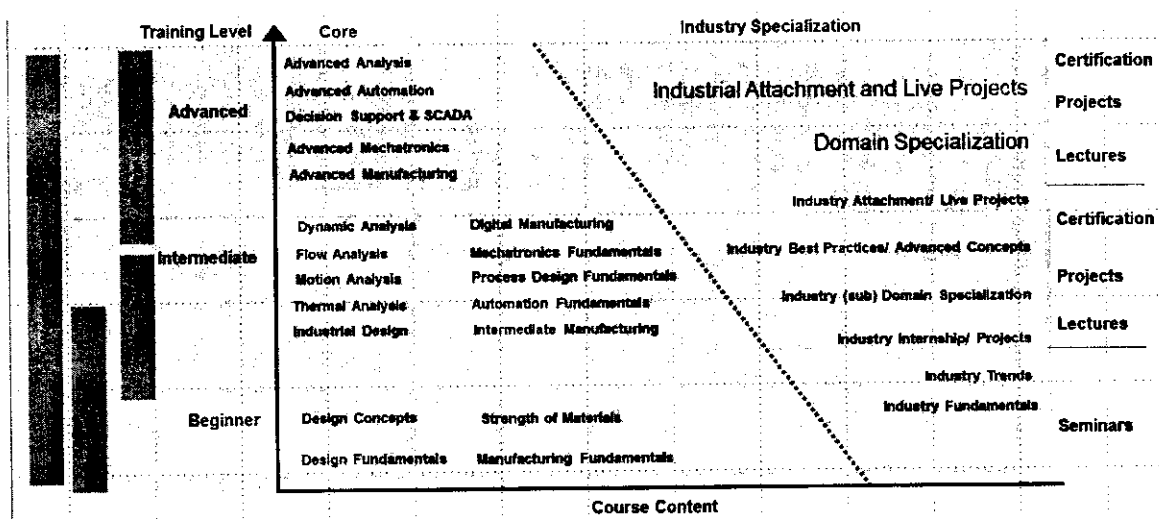


i. **COEs (Centre of Excellence)** are created as **advanced knowledge centres** in Engineering Colleges/ Advanced Polytechnics with focus on student training, R&D, conducting industry sessions, etc. They will host all Industry specializations viz. Automotive, Aerospace & Defence, Shipbuilding and Industrial Machineries, and facilitate multi-skilling

- of students. They will act as hubs for a set of t-SDIs.
- ii. **t-SDIs (technical-Skill Development Institutes)** are designed to train students on technical and vocational trades at polytechnic/ ITI levels. Each COE hub will be linked with 5 unique t-SDIs with a combination of three trades in each one of them.
 - iii. **SDCs (Skill Development Centres)** are local e-enabled centres that will access digital content available with COEs and t-SDIs to help spread beginner level vocational skills across AP.

The COEs will support t-SDIs with latest industry trends, skill upgrade of trainers, and share knowledge through research, while t-SDIs will support SDCs to further spread vocational skills across AP, and ensure learning consistency by using interactive digital learning content. This process of routing all knowledge and industry connects will make the overall system more efficient and ensure consistency. By centralizing control, the overall setup can afford a smaller staff and leaner infrastructure, from a central location.

5.1 Course and Labs in COEs



The COEs are fine-tuned as per the requirements of specific industries. Given the strategic direction of AP, the COEs planned are for **Automotive, Aerospace & Defence, Industrial Machineries, and Shipbuilding.**

Product, Production, Process, Projects Lifecycle Management			
Digital Manufacturing/ Factory Layout & Optimization			
Industrial Automation & Robotics			
Crash/ Safety	Safety Engineering	Mechanisms	Yard planning
Tool & Die Engineering	System Engineering	Value Engineering	Schedule & project Management
Jigs & Fixtures	Composites, Aero Structures	Durability	Structural design
Body – in – white	Aero Engines	Engineer to Order	Outfitting design
Styling	MRO	Agro Machineries	Mechanical design and validation
Transmission	Aero Electricals.....	Farm implements	Process planning & validation
Vehicle Electricals.....		Spl. Purpose machines...	
Product Design / Assembly / Detailing/ Manufacturing Processes			
Engineering Drawing			
Automotive	Aerospace & Defense	Industrial Machineries	Shipbuilding

The learning tracks at COE which cover the above training objectives revolve around:

5.1.1 Design

Design concepts & design fundamentals. This track covers essentials for NX designers and basic design at beginner level moving up to NX Design and Assemblies & Drafting Essentials for intermediate level. The advance level has tracks on Mechanical Freeform, NX Sheet metal Large Assemblies Management, Industrial design, PCB exchange, sketching fundamentals, Product and Manufacturing Information

5.1.2 Validation

Validation is analysis to ensure that the designs are fool proof. The Track on Validation covers NX essentials for finite element analysis, motion simulation, response simulation and laminate composites at the beginner's level. However at an advance level a trainee will be trained to use NX for Thermodynamic analysis, Motion analysis and DDAM analysis and Simulation solutions

5.1.3 Tooling

Design concepts & design fundamentals for tooling. The Track on tooling covers NX essential, Synchronous Modelling and Parametric Design or fundamentals of Synchronous Modelling. As the track moves to Intermediate level, training is given on NX Design and assemblies covering mechanical freeform, NX sheet metal, Mould wizard design and Progressive design wizard.

Practical training on large variety of process-plants will develop interest of student. This lab can be used to train students and trainers.

5.1.13 Mechatronics

This is a high-end lab with pre-requisites drawn from knowledge gathered from other labs. Application of automation, mechanical and electronics knowledge in this set-up and systems level approach to pedagogy gives the student an all-round practical approach to modern-time plants and processes.

5.1.14 Advanced Manufacturing Labs

The Advanced Manufacturing Lab enables:

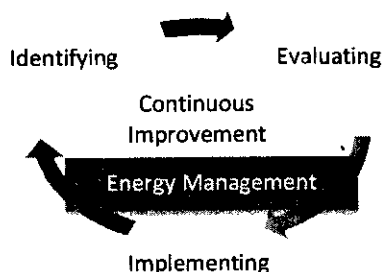
- Knowledge on advanced manufacturing techniques
- Demonstrate a good knowledge in the concept of automation combined with advanced manufacturing technology
- Sequence Planning, Process Planning, Shop Floor Layout Generation for robotic applications and CNC machining
- Learn about Offline / On-line sequence execution techniques for both robotics applications and CNC programming
- Monitoring & Virtual simulation generation for sequences

The Advanced Manufacturing Lab consists of a Machining Lab and a Robotic Lab.

- The Machining Lab consists of a CNC Lathe, CNC Vertical Milling Centre with Siemens Sinumerik 828D Controllers, Siemens 808D Turning and Milling table top controller kit, Sinutrain CNC programming software and 840 DSL complete kits with motor and drive.
- The Robotic Lab consists of three robotics cells for applications such as Material Handling (Pick and Place), Arc Welding and Spot Welding

5.1.15 Energy Lab

Siemens offers a comprehensive and systematic energy management approach. The energy



efficiency portfolio is diversified – from technology to consulting up to services. Siemens has an extensive training program for energy management, where students learn to identify, evaluate and implement reduction potentials. Therefore students can efficiently plan and build up industrial facilities and machinery.

The students will become familiar with the basic aspects of operational energy management. Requirements on a

data acquisition and monitoring system, necessary to achieve transparency of energy flows in industry, institutions and commercial buildings, are conveyed. The students will be able to provide consultation and planning for energy management projects. The training course builds a bridge between theory and application from the operator view.

NOTE:

The next 3 labs though will be centrally hosted in COEs in order to minimize infrastructure and maximize usage, but will be mainly used to train advanced level courses for the t-SDI students.

5.1.16 Automotive Body Repair

This lab will conduct courses and practical hand-on training on automobile repair. This includes denting, painting, dismantling, fusing metal parts by welding rods & oxy-acetylene flame.

5.1.17 Automotive Paint

This lab conducts courses and practical tracks to prepare surfaces for painting, using scrapers, abrasives, chemical removers or other means. This may be designated according to article coated or material used. Selects and mixes paints to produce desired colour consistency, strains and puts coating liquid into spray-gun tank, couples gun to air-hose and adjusts air-pressure valves and nozzle. Press trigger and directs spray of prime and finish coats of paint over surfaces and ensures smooth and even finish. The student may blend colours to get desired shades and test specific gravity of mixture using hydrometer.

5.1.18 Lift Installation and Maintenance

This lab will cover courses which enable students to install, service and maintain various types of elevators in industries, shopping malls, subway stations, airport, multi-storied residential building and perform other related tasks like install various kinds of electrical and electronic control switches, safety devices, control panels, limit switches and power wiring for control drives. They will also be able to Test /check and adjust, replace any defects in controllers, safety devices, wiring by using Megger, Multimeter and related tools, fabricate, test and troubleshoot simple electronic circuit and wiring of controller, alarm, displays, sensors and PLCs.

5.2 Courses and Labs in TSDIs

5.2.1 Engineering Design & Engineering Drawing

5.2.1.1 CAD

Computer aided design (CAD) is an important industrial process extensively used in automotive, shipbuilding, aerospace industries, industrial and architectural design and many more areas. It

helps designers visualize the concept and help create Solid, Surface and Assembly models, Detailed drawing, Drafting with GD&T, etc.

- Work in a design environment that enables your team members to easily connect
- Quickly transformation of ideas into innovative new products
- Minimize Physical prototypes
- Easily test product designs
- Easy to synchronize between 2D and 3D modelling
- Reverse engineering
- Legacy data transfer

5.2.1.2 CAM

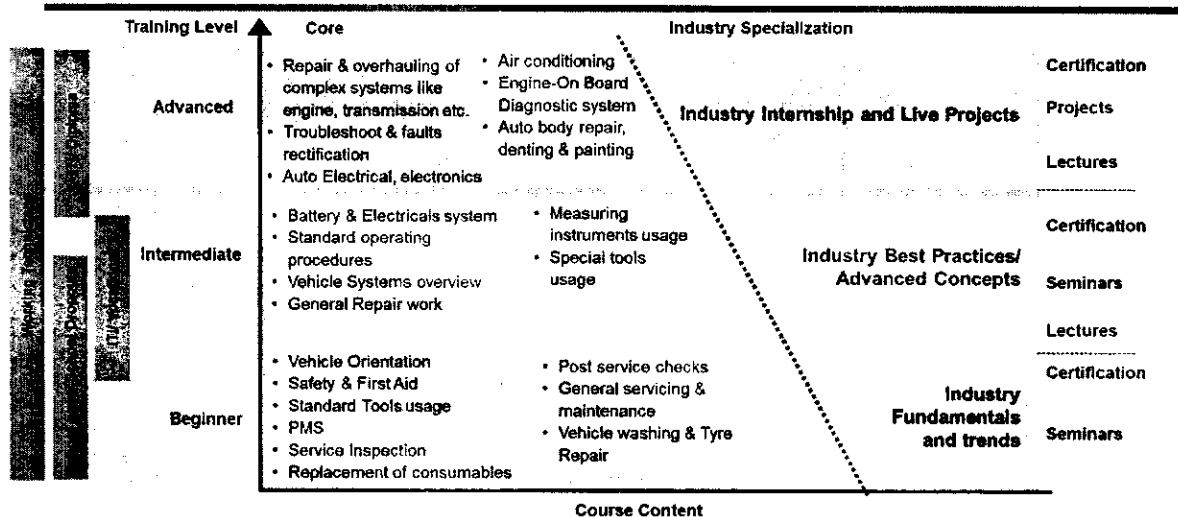
Computer-aided manufacturing (CAM) is using software to control machine tools and related machinery in manufacturing. An integrated CAD/CAM system takes computer-generated design, converts it into multiple computer-controlled processes such as drilling or turning, and feeds it directly into manufacturing. CAD parts can be downloaded and manufactured, without human intervention. This is CAM, and it involves CAD, Networking, and NC programming.

5.2.1.3 Engineering Drawing

An engineering drawing is a type of technical drawing, which is used to fully and clearly define requirements for engineered items. Engineering drawing (the activity) produces engineering drawings (the documents). Below are the features of engineering drawings:

- Geometry – shape of object; represented as views; how the object will look when it is viewed from various angles, such as front, top, side, etc.
- Dimensions – size of object is captured in accepted units.
- Tolerances – allowable variations for each dimension.
- Material – represents what the item is made of.
- Finish – specifies surface quality of an item, functional or cosmetic. For example, a mass-marketed product usually requires a much higher surface quality than, say, a component that goes inside industrial machinery.

5.2.2 Automotive



Trainees will learn to diagnose service, repair and maintain a 2 or a 4-wheeler. This includes the scope of trade specification/ types / Make of Tools, equipment, raw material and consumables, use, care and maintenance of tools & equipment, safety precautions and first aid.

5.2.2.1 Repair-2 Wheeler

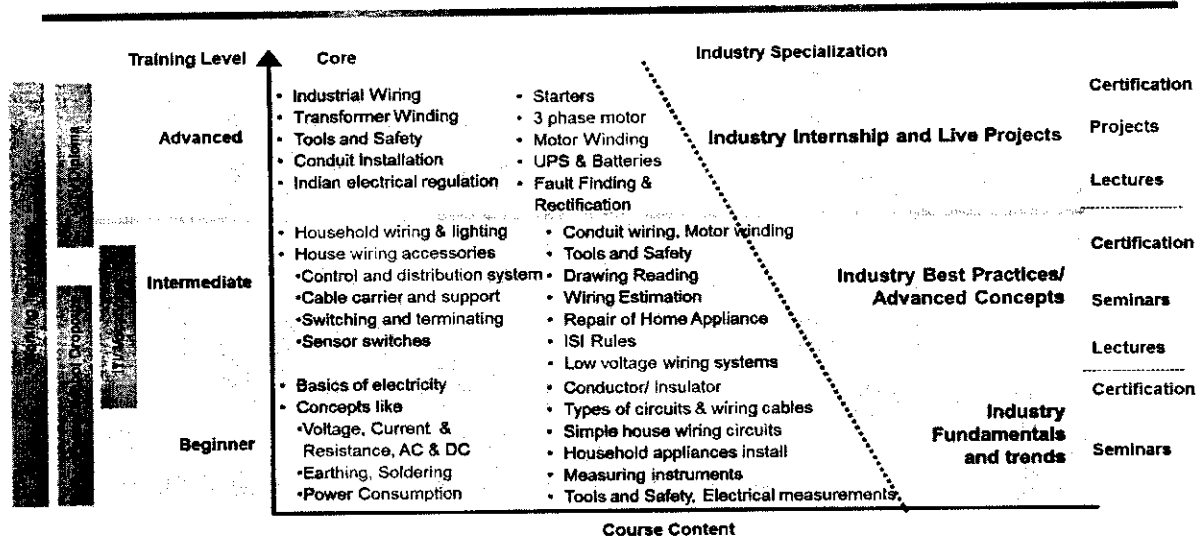
- Repairs, services and overhauls motor cycles, scooters, etc., to make them roadworthy.
- Examines motor cycle or scooter to locate faults by running engine in stationary position or by driving it on road.
- Dismantles parts such as engine, ignition system, dynamo forks, shock absorbers, gear box etc., as necessary.
- Grinds valves, sets timings, refines brakes, re-bushes steering mechanism, replaces worn out parts, assembles gear box clutch etc.
- Performs other tasks to repair, clean and set carburettor, fit driving chain, wheel-silencer, kick, gear, clutch and brake levers and other accessories.

5.2.2.2 Repair-4 Wheeler

- Use workshop tools & measuring instruments and observe safety precautions in workshop
- Understand need and working of various systems (except engine and electrical) on vehicle
- Service a motor vehicle, inspect undercarriage, rotate tyres, remove brake system defects
- Repair suspension and steering system defects
- Overhaul clutch, transmission gear box, and final drive
- Understand the working of various automobile engines
- Understand about engine systems and their working
- Dismount, dismantle, inspect, re-assemble, and re-mount an engine
- Overhaul petrol fuel system (carburettor model)
- Diagnose MPFI system faults
- Tune and troubleshoot a petrol engine

- Diagnose and remove engine lubrication and cooling system faults
- Check and maintain automobile battery
- Repair starting, charging, and lighting system defects, Engineering Drawing and CAD

5.2.3 Electrical



5.2.3.1 Home Electrical & Construction Electricals

Trainees will become Technician and repair different Domestic and Consumer Appliances.

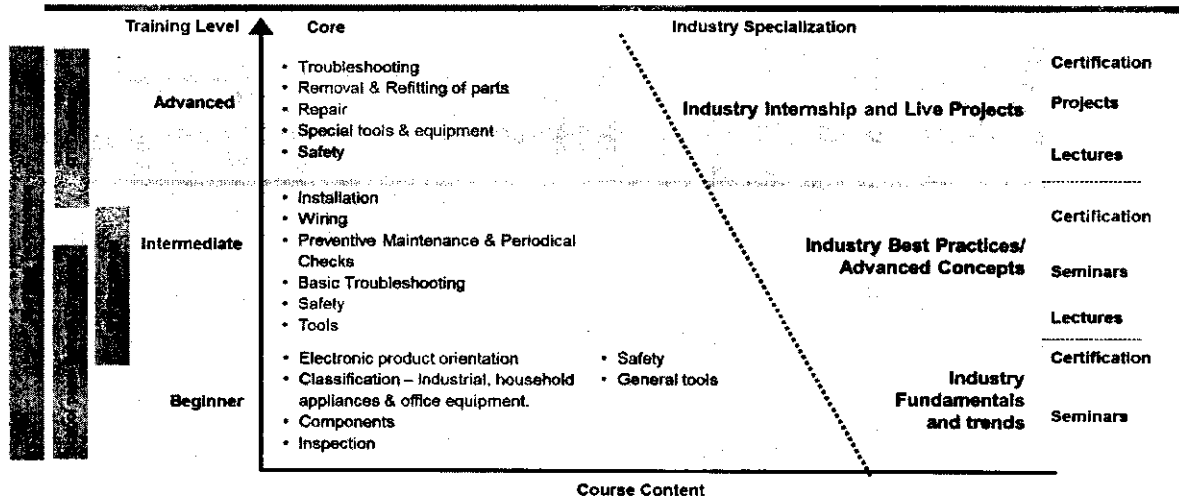
- Carryout Installation, maintenance & repair works of Electrical AC, DC, machinery, lighting circuits, domestic appliances and equipment used in domestic and industries
- Read and interpret the blueprint (Electrical layout Drawing as per BIS specs & standards)
- Carry out Domestic and Industrial wiring, Earthing System
- Test electrical wiring installation, locate and rectify faults by using Megger and Earth tester
- Make and solder wire joints, wires on PCB and do de-soldering technique
- Use of electrical instrument (Analog/Digital) like voltmeter, Ammeter, Wattmeter, Energy Meter, Wheatstone bridge, oscilloscope, Earth tester, Tong Tester, etc. to measure to different electrical quantities
- Armature winding, single & three phase motor winding and small transformer winding
- Operate, maintain and test the switch gears, circuit breakers, relays and transformer
- Identify and maintain the Power Generating stations (conventional and non-conventional), Transmission and distribution system protecting devices.
- construct & test semiconductor devices
- Practice on using fitting carpentry and sheet metal tools.
- Carry out break down, over hauling, routine & preventive maintenance of electrical machines and equipment.

5.2.3.2 Industrial electrical, Refrigeration & Air-conditioning

To repair and service refrigerator, water cooler, bottle cooler, deep freezer, Visi Cooler, Walk in Cooler, Ice candy plant, Cold storage, Ice plant, Split Air Conditioner, Package Air Conditioner, Central Air Conditioner, Auto mobile Air Conditioner, Transport refrigeration, Air craft Air conditioning, Rail way Air conditioning, Ship Refrigeration and Air conditioning, Service, diagnose and rectify faulty electrical, mechanical components and air-conditioning equipment.

- Install, service and repair air-conditioning and refrigeration systems.
- Install, service and repair defective components of water supply and pumping system.
- Install, diagnose and service the control circuits of chilled water system, induction motors air-handling unit and direct digital controllers.
- Install, service and repair air-cooled and water-cooled air-conditioning system.
- Install and carry out performance test on commercial air-conditioners and refrigerators.
- Maintain and repair cooling tower assembly.
- Replace faulty electrical components in air-conditioning and refrigeration equipment.
- Repair air handling unit assembly and air distribution system.
- Troubleshoot and rectify electrical faults in central air-conditioning equipment.
- Measure indoor air quality.

5.2.4 Electronics & ICT



5.2.4.1 Home electronics

- Identify various active and passive components and their applications.
- Handle different types of Electronic measuring Instruments
- Identify different types of faults in electronics equipment.
- Repair & maintenance computer hardware & networking
- Repair and maintenance of SMPS, UPS, Inverter and various Analog and Digital circuits.

5.1.4 Machining

The track on Machining covers Essentials for NX Designers which helps in CMM inspection programming and execution basis. Moving to intermediate level training on NX manufacturing essentials is given which helps in understanding CMM Inspection analysis. At the advance level modules cover topics like Turning manufacturing process, Fixed axis and Multi axis milling, NX Cam Customization and Post building techniques.

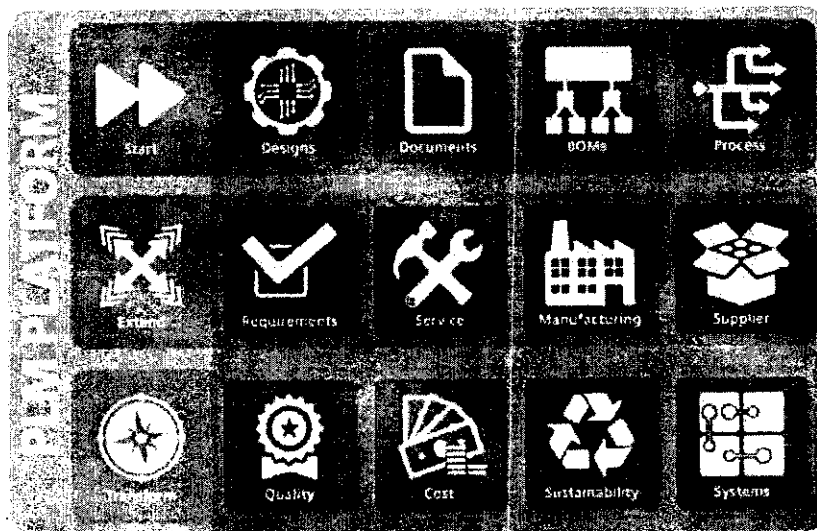
5.1.5 Manufacturing

The track on Manufacturing will consist of Intermediate to advance manufacturing techniques in order to assemble the manufactured parts and produce the final product. This module has 4 sub divisions namely Process Design, Process Simulate, Robotics, Manufacturing Simulation.

5.1.6 Product Lifecycle Management (PLM)

This lab provides students with the digital tools & technology to apply theoretical knowledge of engineering design and development in the real world.

TEAMCENTER



Apps

5.1.7 LMS Imagine

This lab trains engineers in an integrated simulation platform to accurately predict multi-domain performance of intelligent systems. It enables engineers to model, simulate and analyse multi-domain, controlled systems, and offers capabilities to connect to controls design, helping to assess and validate control strategies. It also enables frontloading of testing to save time and

cost. It addresses multiple challenges generated by smart systems engineering. Combining mechatronic system simulation and application expertise, the mechatronic system simulation platform will help students take right decisions earlier in the design process and provide higher-quality results in shorter time.

5.1.8 LMS test

This lab is a complete, integrated solution for test-based engineering, combining high-speed multi-channel data acquisition with a full suite of integrated testing, analysis and report-generation tools. It is the ideal tool for testing departments that need to be future focused: offering the right balance between ease-of-use and functional flexibility. Using this Lab significantly increases a test facility's productivity, delivering more reliable results even when the availability of prototypes is dramatically reduced.

5.1.9 LMS Virtual

This lab is a complete, integrated test centre for test-based engineering, combining high-speed multi-channel data acquisition with full suite of integrated testing, analysis and report-generation tools. It is the ideal tool for digitally designing and testing the noise and vibration components of the overall product.

5.1.10 Automation

This lab imparts skills on complete automation which includes Programmable Logic Controllers (PLC), HMI, SCADA, Networking, etc. Participants are trained on basics, programming & servicing. Labs are based on latest products, technology, configurations this lab gives opportunity to practice/simulate real projects possibility of large variety of application develops interest same lab can be used to students and trainers.

5.1.11 Electric

This lab gives expertise on Switchgear, Motors & Power electronics. Electrical training includes Power electronics, speed control of ac/dc motors, switchgear & motor maintenance/servicing. Participants are trained on basics, programming & commissioning. The lab is based on latest products, technology, configurations and gives an opportunity for students to practice/simulate operations & failures.

5.1.12 Process Instrumentation

This lab imparts expertise on Process Automation & Instrumentation. Instrumentation includes temperature, flow, pressure and level. Labs are based on latest products, technology, configurations this lab gives opportunity to practice/simulate real processes from the industry.

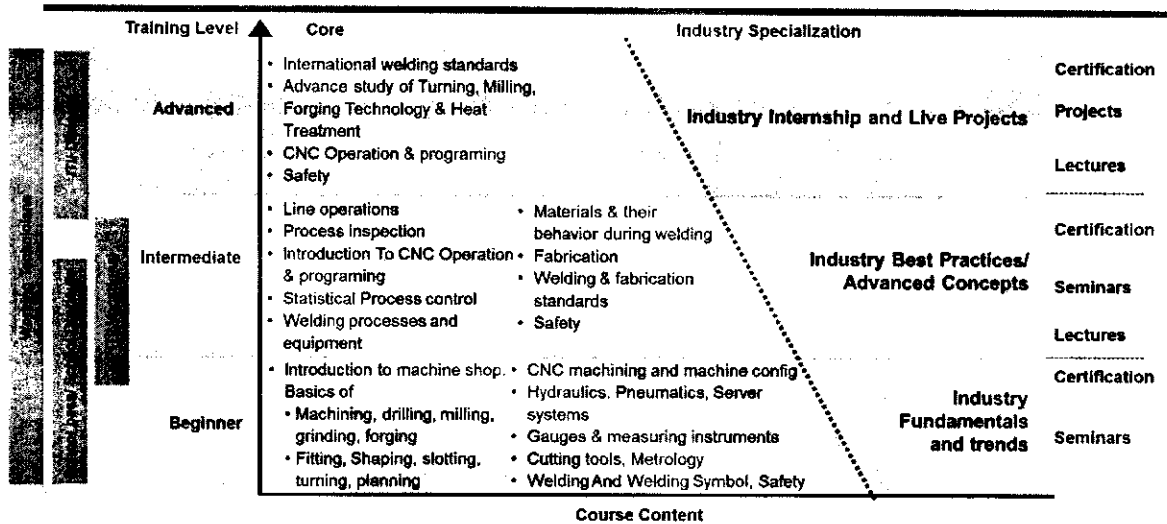
- Repair and maintenance of electronics communication equipment and fibre optics.
- Installation of various transducer, sensor.
- Repair maintenance & installation of LED/ LCD TV, Cell phone (Mobile), DTH.
- Repair maintenance & installation of Consumer electronics equipment: Washing Machine, Mixer Grinder, water purifiers, Vacuum cleaner, Microwave oven, and Induction cook top.
- Repair, maintenance & Installation of various types of printers.
- Repair, maintenance & Installation of Home theatre systems
- Repair, maintenance & Installation of CCTV

5.2.4.2 Office Equipment (Including mobile) Repair & Maintenance

The role of Information & Communication Technology System Maintenance personnel is to support and maintain computer systems, desktops, and peripherals. This includes installation, diagnosis, repair, maintain and upgrade all hardware equipment and ensure optimal hardware performance. The person will troubleshoot problem areas in timely and accurate fashion, and provide end user training and assistance where required. Install, maintain and setup network with computers, printers and other peripheral equipment as well as configure broadband.

- Installing software or hardware
- Maintaining and repairing equipment / peripherals.
- Troubleshooting different computer issues
- Determine and install appropriate security measures
- Provide technical support on-site or via phone or email
- Install, configure, and maintain common end user application software. May train and provide assistance to end users.
- Troubleshoots software and hardware problems related to Internet applications.
- Assist information technology administrators with configuration, maintenance and monitoring of access servers, routers, Microsoft and Linux servers and Internet servers including DNS, radius, web, LDAP, e-mail, network monitoring and print servers.
- Assist in preparing, maintaining, and upholding procedures for logging, reporting, and statistically monitoring PC performance.
- Accurately document instances of hardware failure, repair, installation, and removal.
- Develop long-term strategies and capacity plan to meet future IT hardware needs.
- Support development and implementation of new IT projects and hardware installations.
- Service and maintenance of mobile phones.
- Installation, operation and maintenance of FAX machines and Scanners.

5.2.5 Production and Manufacturing & fabrication



5.2.5.1 Manufacturing techniques and CNC

Trainees will be able to make a career in manufacturing and production using CNC machines.

- Designing
- Manufacturing
- Maintenance of machines
- CNC programming

This program provides practical training on:

- Basic fitting
- Conventional machining
- Hydraulics & pneumatics
- Machine maintenance
- Inspection
- CAD/CAM
- Industrial visits and projects

During the course of this program, students are trained on equipment and machines such as:

- CNC Machining centre
- CNC Turning centre
- Pneumatic & Hydraulic trainer kit

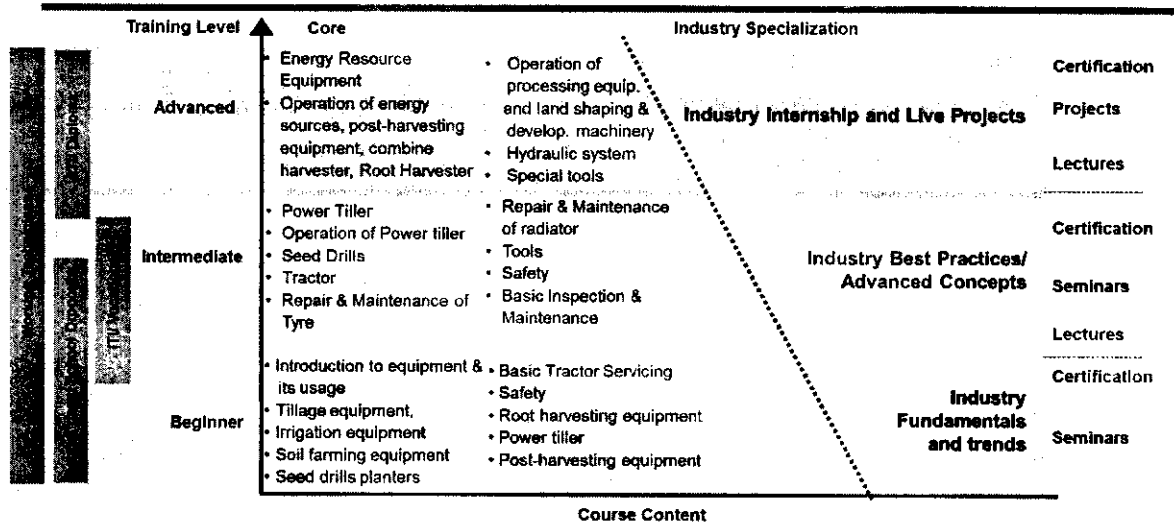
5.2.5.2 Welding and fabrication

Trainees will develop broad base knowledge and skills required for layout, preparation, forming, fitting, joining, and inspection of welded fabrications.

- Welding of M.S. Sheet and M.S. Pipe by GAS welding process.

- Welding of M.S. Plate in all position by SMAW process.
- Straight, bevel & circular cutting on MS. Plate by Oxy-acetylene cutting process.
- Repair & Maintenance works
- GMAW welding on M.S Sheet & M.S plate.
- GTAW Welding on of M.S, SS & Aluminium plate & pipes.
- Operating skills of SPOT Welding machine, PUG cutting machine,
- Welding C.I using SMAW Process.
- Safety in Gas welding & manual metal Arc welding
- Measuring & Marking Tools – Try square, dividers, trammels, marking block, Scriber, Steel rules, Callipers, SWG etc.
- Types of Snips, shears and their uses
- Types and uses Sheet metal working Tools – Mallet, Nylon Hammers, etc. Bench vice, C clamps, Pliers, Bench stokes or sheet formers-.
- Cutting methods – straight, circle, Louver, Nibbling, Slot cutting, and Notching
- Sheet Metal Works – Folding, Bending & Flanging
- Drilling machines, Drill bits, etc.
- Methods of laying out pattern, Parallel line, Radius line, and Triangular line method
- Laying out pattern of cylinder cut obliquely
- Description of roll forming machine types and operators principle
- Different process of metal joints – Bolting – Riveting – Soldering – Brazing, & Welding
- Oxy-acetylene welding – Principles and applications
- Filler rods used in Gas welding
- Welding flux & Brazing applications
- Principles of Arc welding, tools & accessories
- Welding positions and their significance
- Spot Welding Principles
- Electrodes – Types, Functions of flux
- Selection of electrodes
- Welding Symbols

5.2.6 Agriculture



5.2.6.1 Tractor & farm Equipment

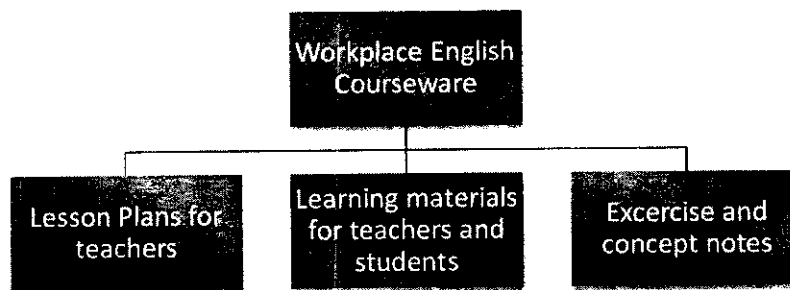
The trainees shall be able to perform the following skills with proper sequence.

- Maintains, services, repairs or overhauls different farm equipment such as Tractors, Power tillers, Sprayers, Drillers, etc.
- Examines and drives vehicle on road or runs engine in stationary position to diagnose troubles and defects.
- Dismantles part or complete engine or unit according to nature of defects.
- Repairs or replaces defective parts, reassembles them with prescribed settings, clearances, timings and adjustments by further tooling as necessary and ensures accuracy of fit.
- Installs assembled or repaired engine securely in position on vehicle controls and other accessories. Starts engine and observes performance for any unusual noise and knocks.
- Adjusts carburettor, fuel pump (Carburettor for petrol engine and fuel pump for diesel engine), sets clearance between tappets and valves, tunes engine, adjusts brakes, makes electrical connections and performs other tasks to ensure stipulated performance.
- May repair and overhaul electric motors, fuel pump, carburettor etc. of engine.
- May weld, braze or solder parts.
- May repair other agricultural machinery for ploughing, levelling, harvesting etc.

5.2.7 Soft Skills on Communication

This curriculum has been specifically designed to train vocational students for entry level employment at any organization. The purpose of the course is to help students to effectively communicate in situations that they are likely to face in their profession.

The course is structured in three parts: Everyday English, Work place English & Role plays. The learning of English is situational. For each of the above parts, relevant situations have been identified for which words, phrases; sentences and conversations are provided in lesson plans. The outcome of session is therefore an understanding of what to say in a particular situation with a fair degree of grammatical correctness.



Scope

6.1 Enablement Program

1. Setting up Centres of Excellence as Hubs
2. Setting up TSDIs as spokes in Polytechnics/ITIs
3. Training of Faculty on all proposed labs
4. Availability of interactive digital learning content at SDC level

6.2 Academic Program

1. Enrolment of students for training courses
2. Training students on various courses and applications; providing all learning materials
3. Certification of students upon successful completion of training
4. Interfacing students & teachers with industry through seminars (one per semester at COE) and projects
5. Assisting trained students for Internship & Placement

6.3 Indicative Number of People Trained

Table 2: Indicative Number of People Trained over 5 Years

Lab Details	COE									
	Capacity	Avg. Course Duration (Days)	Working Days / Mth.	Batches/ Mth.	Training Capacity/ Mth.	Training Capacity / Yr.	No of COE's	Capacity Utilization		
								50%	70%	90%
Automation	24	8	24	3	72	864	6	2,592	3,629	4,666
Electrical	42	8	24	3	126	1,512	6	4,536	6,350	8,165
Mechatronics	24	8	24	3	72	864	6	2,592	3,629	4,666
Process Control	24	8	24	3	72	864	6	2,592	3,629	4,666
Design & Validation	60	8	24	3	180	2,160	6	6,480	9,072	11,664
Advance Mfg.	60	8	24	3	180	2,160	6	6,480	9,072	11,664
Machine	24	8	24	3	72	864	6	2,592	3,629	4,666
Test & Optimization	30	8	24	3	90	1,080	6	3,240	4,536	5,832
Energy Efficiency	24	8	24	3	72	864	6	2,592	3,629	4,666
					936	11,232		33,696	47,174	60,653

t-SDI													
Time Schedule	Trade 1		Trade 2		Trade 3		CAD/CAM	Total Students	Course Duration days	No of Batches year	No of Students per year per t-SDI	No of t-SDI	Total Students per year for 30 t-SDI
0800 - 1000	B1-20		B5-20	20	B9-20	20	B13-20	320	60	4	1,280	30	38,400
1000 - 1200		B2-20	20	B6-20	20	B10-20	B14-20						
	Break												
1300 - 1500	B3-20	20	B7-20	20	B11-20	20	B15-20						
1500 - 1700	20	B4-20	20	B8-20	20	B12-20	B16-20						
Batch Size: 20		Theory		Practical									

** Total Number of days teachers will be trained in batches of 30 teachers / batch

Support Required

7.1 Support Required from Government:

In order to successfully implement the program, DesignTech and Siemens require the following support from Department of Technical Education, Government of Andhra Pradesh:

1. Memorandum of Understanding between Science & Technology Department – Government of Andhra Pradesh, Siemens Industry Software, and DesignTech
 - a. For a duration of 3 years: 2 years of operation, 1 year of handover/ handholding
 - b. Detailing – Scope of Work, Deliverables from Siemens, Timelines for execution as per the proposal, grant allocation to Siemens and Siemens Partner, Stakeholders' roles and responsibilities & other contract conditions mutually agreed
 - c. Recognition of Siemens Certification
2. Identification of Centres of Excellence and t-SDIs
 - a. Communication from Department of Technical Education to all concerned selected institutions about the program
 - b. Allocation of space for Software Labs and Machine Labs at the selected institutions
 - c. Upgrade labs to min. specified configuration (connectivity, electrical wiring etc.)
3. Allocation of funds for the program
4. Appointment of nodal person to coordinate and monitor the program

7.2 Support Required from Engineering Colleges, Polytechnics and ITIs

For successful establishment of the COE, Siemens will setup dedicated labs. The Computer Integrated Manufacturing Unit requires Machine labs with industry grade flooring.

Physical Infrastructure required from the Institute

- Space for Labs
- Flooring, Furniture and Fixtures
- Air Conditioning
- LAN connectivity
- Power supply (incl. Backup)

Activities and Responsibilities

Activity	Govt. of AP	Institutes	Siemens	DesignTech
Agreement with Govt. of AP	✓		✓	✓
Identification of COE and t-SDI	✓			
Communication to COE and t-SDIs heads	✓			
Allocation of Labs Space	✓	✓		
Preparation of Labs	✓	✓		
Installation – Software & Content		✓		✓
Installation – Hardware		✓		✓
Training of Teachers		✓		✓
Training of Students		✓		✓
Industry Interaction Sessions		✓	✓	✓
Space & Logistics for Training of Teachers		✓		
Training of Teachers		✓		✓
Training of Students		✓		✓
Industry Interactive Sessions		✓	✓	✓
Student Contests		✓	✓	✓
Certification Program	✓	✓	✓	

Cluster - 550 cr

One COE - 5-6 SD's

Siemens Smart Manufacturing Initiative

Table 3: Capital Support Required for Siemens Centre of Excellence for Manufacturing

S. No.	Particulars	Amount
1	Capital Support Required	₹ 550,000,000
2	Applicable Taxes	₹ 67,980,000
Total Capital Support Required from the Government		₹ 61,79,80,000

Table 4: Budget for Siemens Centre of Excellence for Manufacturing

S. No.	Particulars	Price	Grant in-Kind by Siemens and DesignTech	Contribution by Government
1	CAPEX	₹ 5,468,418,908	₹ 4,918,418,908	₹ 550,000,000
2	OPEX	₹ 64,397,630	₹ 64,397,630	₹ 0
Total		₹ 5,532,816,537	₹ 4,982,816,537	₹ 550,000,000

Table 5: Capital Expenditure for Siemens Centre of Excellence for Manufacturing

S. No.	Particulars of Laboratories	No of labs	Price	Grant in-Kind by Siemens and DesignTech	Contribution by Government
1	Automation	1	₹546,84,18,908	₹491,84,18,908	₹55,00,00,000
2	Electrical	1			
3	Mechatronics	1			
4	Process Control	1			
5	Design & Validation	1			
6	Advance Manufacturing	1			
7	Machine (CNC, Robotics, RPT)	3			
8	LMS (SAMCEF, Virtual, Imagine, Test)	1			
9	Specialized COE labs for t-SDI (Auto Body Repair, Paint Shop & Escalator labs)	3			
10	t-SDI - 1: Auto, Electrical, Electronics, Design - Manufacturing	4			
11	t-SDI - 2: Electrical, Electronics, Manufacturing, Design - Manufacturing	4			
12	t-SDI - 3: Electronics, Manufacture, Agriculture, Design - Manufacturing	4			
13	t-SDI - 4: Manufacturing, Agriculture, Auto, Design - Manufacturing	4			
14	t-SDI - 5: Agriculture, Auto, Electrical, Design - Manufacturing	4			
Total CAPEX		33	₹546,84,18,908	₹491,84,18,908	₹55,00,00,000

55 x 8 = 330 + taxes - 371 cr Govt Contribution

Table 6: Operational Expenditure for 3 Years

S. No.	Particulars	Units	Price	Grant In-Kind by Siemens and DesignTech	Contribution by Government
1	Training of Trainers (in Trainer Days)	120	₹ 2,696,640	₹ 2,696,640	₹ 0
2	Operations + Mentoring (in Yrs)	3	₹ 1,196,883	₹ 1,196,883	₹ 0
3	Quarterly Industry Seminar	24	₹ 8,089,920	₹ 8,089,920	₹ 0
4	Industry Academia Conference	3	₹ 13,483,200	₹ 13,483,200	₹ 0
5	Other Consumables		₹ 1,123,600	₹ 1,123,600	₹ 0
Total OPEX			₹ 26,590,243	₹ 26,590,243	₹ 0

Table 7: Manpower Expenditure during Operations for 3 years

S. No.	Particulars	Nos.	Annual Salary Expenditure	Total Salary Expenditure	Contribution by Government
1	Centre Head	1	₹ 4,600,000	₹ 13,800,000	₹ 0
2	Senior Trainers	3			
3	Trainers	2			
4	Assistants	2			
Total Manpower Expenditure		8	₹ 4,600,000	₹ 13,800,000	₹ 0

Table 8: t-SDI (Five centres for One COE) – Operational Expenditure for 3 years

S. No.	Particulars	Units	Price	Grant In-Kind by Siemens and DesignTech	Contribution by Government
1	Training of Trainers (in Trainer Days)	150	₹ 1,685,400	₹ 1,685,400	₹ 0
2	Operations + Mentoring (in Yrs)	3	₹ 12,912,847	₹ 12,912,847	₹ 0
5	Contest (Annual)	6	₹ 2,696,640	₹ 2,696,640	₹ 0
Total OPEX			₹ 17,294,887	₹ 17,294,887	₹ 0

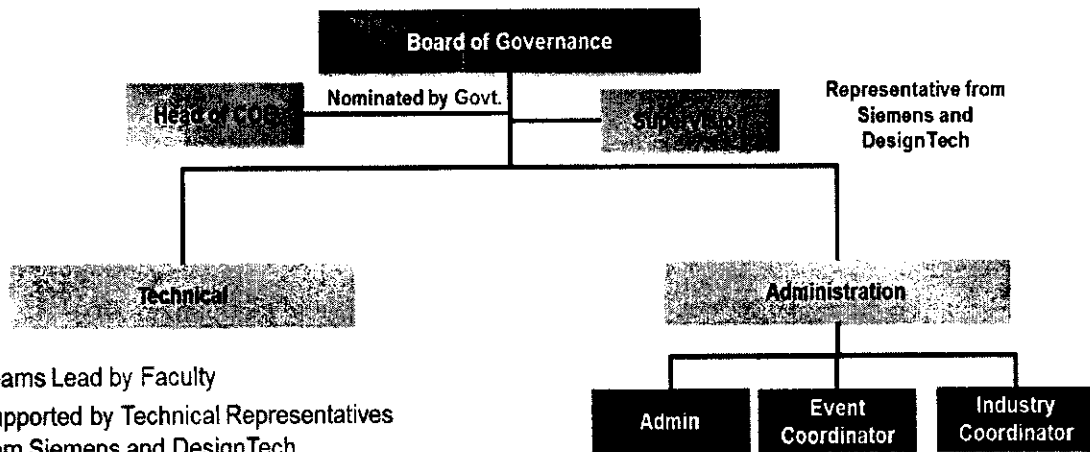
Table 9: t-SDI – Manpower Expenditure during Operations + Mentoring for 3 years

S. No.	Particulars	Nos.	Annual Salary Expenditure	Total Salary Expenditure	Contribution by Government
1	Centre Manager	1	₹ 2,237,500	₹ 6,712,500	₹ 0
2	Senior Trainers	3			
3	Assistants	3			
Total Manpower Expenditure		7	₹ 2,237,500	₹ 6,712,500	₹ 0

10. Terms and Conditions

1. The work order to be placed on DesignTech.
2. Payment: Contribution amount by Government of Andhra Pradesh should be released in full along with work order.
3. The Government of Andhra Pradesh should make available the site requirements as specified in the proposal.
4. The governance structure as suggested:
 - a. Two representatives from the Govt.
 - b. One representative each from SISW and DesignTech.
 - c. One Independent representative mutually agreed among the parties
5. The governing body will have a quarterly review meeting.
6. The governing body can be expanded if required in mutual agreement among Government of Andhra Pradesh, Siemens Industry Software and DesignTech.

Structure of the Center of Excellence



- Teams Lead by Faculty
- Supported by Technical Representatives from Siemens and DesignTech
- Focus Areas
 - Training of faculty
 - Coordination with Skill Development University for revision of course curriculum
 - Research & Development
 - Projects
 - Training of Students on regular course and Vocation Courses

- Administrative staff for operation of COE
 - Staff of Institutes
- Coordinators for
 - Skill Development University
 - Industry Interfacing (Training & Placement Cell)
 - Events to be organized
 - To be staffed by Institutes

Infrastructure II: 100+ Siemens Centres of Excellence

Table 10: Types of Labs in a Siemens Centre of Excellence and indicative space

S. No.	Lab	Nos.	Area (Sq. Ft)
1.	Product Design and Validation Lab	1	800
2	Advanced Manufacturing Lab	1	800
3	Automation Lab	1	800
4	Electrical Lab	1	800
5	Process Control Lab	1	800
6	Mechatronics Lab	1	800
7	Test and Optimisation Lab	1	800
8	Energy Studies Lab	1	800
9	Machine Lab	1	2,000
10	Automotive body Repair Lab	1	1,200
11	Automotive Paint Lab	1	1,200
12	Lift Installation and Maintenance Lab	1	1,200
13	Common Area	1	1,000
	Total Minimum Area		13,000

Table 11: 5 t-SDI Combinations and indicative space

Sector/ Combination	A- Auto	B- Electrical	C- Electronics	D-Manufacturing	E- Agriculture
tSDI -1					
tSDI -2					
tSDI -3					
tSDI -4					
tSDI -5					

S. No.	Lab	Nos.	Area (Sq. Ft)
1.	Automotive Lab	1	2,400
2	Electrical Lab	1	800
3	Electronics Lab	1	800
4	Manufacturing Lab	1	2,400
5	Agriculture Lab	1	2,400
6	CAD/CAM / Robotics Lab		800
	Total Minimum Area		9,600





Table 12: Bill of Material for Siemens Centre of Excellence

S. No.	Particulars	Units
1.	Siemens Digital Product Design Suite	60
2.	Siemens Digital Simulation & Validation Suite	60
3.	Siemens Digital Manufacturing, Robotics & Automation Suite	120
4.	Siemens Digital Manufacturing Plant Simulation & Optimization Suite	120
5.	Siemens Digital Lifecycle Management & Collaboration Suite	60
6.	Siemens Shape Search Suite	60
7.	Siemens JT Open Suite and Translators	60
8.	Siemens Rulestream Suite	60
9.	Siemens Mainstream Design Suite (for t-SDI)	160
10.	Siemens Mainstream Manufacturing Suite (for t-SDI)	100
11.	Siemens S7 1200 PLC with HMI (6 Kits Package)	1
12.	Siemens S7 300 PLC with HMI (1 kit Package)	1
13.	Siemens Total Integrated Automation Software (12 user)	1
14.	Siemens PCS 7 (Trainer Package) (6 licenses)	1
15.	Siemens SIMATIC PCS 7 – Automation System	2
16.	Siemens SINAMICS G120 for 3 AC 400V Standard drives (1 kit Package)	10
17.	Siemens DC Drive - 6RA80	2
18.	Siemens Demo case for LV Switchgear set (Multiple items)	1
19.	Siemens Demo case for LV Motor set (Multiple items)	1
20.	Siemens SIMOCODE	2
21.	Siemens PAC METER	11
22.	Siemens Process Instrumentation Equipment Set	1
23.	Siemens Mechatronics Assembly Set	1
24.	Siemens Mechatronics Pneumatic Press & Documentation	4
25.	Siemens Advance LAB3 (Mechatronics) Train the trainer	2
26.	Siemens HRC Fuses for Incoming and normal feeder	30
27.	Siemens Semiconductor Fuses for Drive feeder	15
28.	Siemens IE3 series Motors	10
29.	Siemens DOL Feeder with SIMOCODE	5
30.	Siemens Load arrangement for motor	10
31.	Siemens Current Transformers	15
32.	Siemens LMS Virtual.Lab	50
33.	Siemens LMS Imagine.Lab	50
34.	Siemens LMS Test.Lab	3
35.	Siemens Sinumerik 840D-SL CNC Training Rack	1
36.	Computer Integrated Manufacturing Unit	1
37.	Rapid Prototyping Unit	1

Table 13: Bill of Material for Siemens technical-Skill Development Institutes

Sl. No.	Item With Specification
I	AUTOMOTIVE: 2 WHEELER
1.	Allen key set of 12 pieces.(2mm to 14 mm)
2.	Caliper inside 15 cm spring
3.	Caliper outside 15 cm spring
4.	Center punch 10 mm. Dia. X 100 mm.
5.	Dividers 15 cm spring
6.	Electrical Screw drivers 250 mm
7.	Hammer ball pen 0.5 kg with handle
8.	Hands file 20 cm. Second cut flat
9.	Philips screw drivers set of 5 pieces (100 mm to 300 mm)
10.	Pliers combination 20 cm.
11.	Screw drivers 20 cm X 9 mm Blade
12.	Screw drivers 30 cm X 9 mm Blade
13.	Scriber 15 cm
14.	Spanner D.E set of 12 pieces (6mm to 32 mm)
15.	Spanner, Ring set of 12 metric sizes 6 to 32 mm.
16.	Spanner socket with speed handle, T-bar, ratchet and universal up to 32 mm
17.	Steel rule 30 cm inch and metric
18.	Steel tool box with lock and key (folding type) 400X200X150mm
19.	Wire cutter stripper
20.	Adjustable Spanner (pipe Wrench350mm)
21.	Air Blow Gun With Standard Accessories
22.	Air Impact Wrench With Standard Accessories
23.	Air Ratchet With Standard Accessories
24.	Allen Key Set Of 12 Pieces(2mm to 14mm)
25.	Ammeter 300A/60A DC With External Shunt
26.	Angle Plate Adjustable 250x150x175
27.	Angle Plate Size 200x100x200mm
28.	Anvil 50kg With Stand
29.	Auto Electrical Test Bench
30.	Battery-Charger
31.	Blow Lamp 1Litre
32.	Caliper Inside 15 cm Spring
33.	Calipers Outside 15cm Spring
34.	Car Jet Washer With Standard Accessories

Sl. No.	Item With Specification
35.	Chisel 10 cm Flat
36.	Chisels Cross Cut 200mmx6mm
37.	Circlip Pliers Expanding And contracting Type 15cm And 20cm Each
38.	Clamps C 100mm
39.	Clamps C 150mm
40.	Clamps C 200mm
41.	Cleaning Tray 45x30cm
42.	Compression Testing Gauge Suitable For Diesel Engine With Standard Accessories
43.	Copper Bit Soldering Iron 0.25kg
44.	Cylinder Bore Gauge Capacity 20 to 160 mm
45.	DC Ohmmeter 0 to 300 Ohms, Mid Scales at 20 Ohms
46.	Depth Micrometer 0-25mm
47.	Dial Gauge Type 1 Gr. A (Complete With Clamping Devices And with magnetic Stand)
48.	Dividers 15 cm spring
49.	Drift Punch Copper 15 cm
50.	Drill Point Angle Gauge
51.	Drill Twist 1.5mm to 15mm (various Sizes) By 0.5mm
52.	Electric Soldering Iron 230 V 60 watts 230 V 25 watts
53.	Electric testing screw drivers
54.	Engineer's square 15 cm Blade
55.	Feeler gauge 20 blades (metric)
56.	File flat 20 cm bastard
57.	File, half round 20 cm second cut
58.	File, Square 20 cm second cut
59.	File, square 30 cm round
60.	File, triangular 15 cm second cut
61.	Files assorted sizes and types including safe edge file (20 NOS)
62.	Flat File 25 cm second cut
63.	Flat File 35 cm bastard
64.	Granite surface plate 1600X1000 with stand and cover
65.	Grease gun
66.	Growler
67.	Hacksaw frame adjustable 20-30 cm
68.	Hammer ball Peen 0.75 kg
69.	Hammer Chipping 0.25 kg
70.	Hammer copper 1 kg with handle
71.	Hammer mallet
72.	Hammer Plastic

Sl. No.	Item With Specification
73.	Hand operated (i)for crimping up to 4 mm and (ii) for crimping up to 10 mm
74.	Hand remers adjustable
75.	Hand shear Universal 250 mm
76.	Hand vice - 37 mm
77.	Hollow Punch Set Of Seven Pieces 6mm to 15mm
78.	Insulated Screw drivers 20cmX9mm blade
79.	Insulated Screw drivers 30cmX9mm blade
80.	Left cut snips 250 mm
81.	Magneto spanner set with 8 spanner
82.	Magnifying glass 75 mm
83.	Marking out table 90X60X90 cm
84.	Multimeter digital
85.	Oil can 0.5/0.25 liter capacity
86.	Oil stone 15X5X2.5 cm
87.	Outside micrometer 0 to 25 mm
88.	Outside micrometer 25 to 50 mm
89.	Outside micrometer 50 to 75 mm
90.	Outside micrometer 75 to 100 mm
91.	Philips Screw Drivers set of 5 pieces (100 mm to 300 mm)
92.	Pipe cutting tool
93.	Pipe flaring tool
94.	Piston ring compressor
95.	Piston ring expander and remover
96.	Piston ring groove cleaner
97.	Pliers combinations 20 cm
98.	Pliers flat nose 15 cm
99.	Pliers round nose 15 cm
100.	Pliers side cutting 15 cm
101.	Portable electric drill Machine
102.	Power supply 0-12 v, lamp
103.	Prick punch 15 cm
104.	Punch letter 4mm (number)
105.	Right cut snips 250 mm
106.	Rivet sets snap and Dolly combined 3mm, 4mm, 6mm
107.	Scooter/Motor Cycle repairing stand
108.	Scraper flat 25 cm
109.	Scraper half round 25 cm
110.	Scraper Triangular 25 cm

Sl. No.	Item With Specification
111.	Scriber 15 cm
112.	Scriber with scribing black universal
113.	Set of stock and dies-Metric
114.	Shear Tin Man's 450X600mm
115.	Sheet metal gauge
116.	Sher Tinmans 300 mm
117.	Soldering Copper Hatchet type 500 gms
118.	Solid Parallels in pairs (Different size) in Metric
119.	Spanner Clyburn 15 cm
120.	Spanner D.E. set of pieces (6mm to 32mm)
121.	Spanner T. flocks for screwing up and up screwing inaccessible
122.	Spanner, adjustable 15 cm
123.	Spanner, rings set of 12 metric sizes 6 to 32 mm
124.	Spanner socket with speed handle, T-bar, ratchet and Universal up to 32 mm
125.	Spark lighter
126.	Spark plug Spanner
127.	Steel measuring tape 10 meter in a case
128.	Steel rule 15 cm inch and metric
129.	Steel rule 30 cm inch and metric
130.	Straight edge gauge 2 ft.
131.	Stud extractor set of 3
132.	Stud remover with socket handle
133.	Surface gauge with dial test indicator plunger type i.e. 0.01 mm
134.	Tachometer (Counting type)
135.	Taps and Dies complete sets (5 types)
136.	Taps and wrench- Metric
137.	Telescope gauge
138.	Temperature gauge with sensor 0-100 deg c
139.	Thread pitch gauge Metric
140.	Torque wrenches 5-35 Nm, 12-68 Nm, & 50-225 Nm
141.	Trammel 30 cm
142.	Tyre pressure gauge with holding nipple
143.	Universal puller for removing pulleys, bearings
144.	V' Block 75X38mm pair with clamps
145.	Vacuum gauge to read 0 to 760 mm of Hg.
146.	Valve lifter
147.	Valve spring compressor universal
148.	Vernier caliper 0-300 mm with least count 0.02 mm

Sl. No.	Item With Specification
149.	Vice grip pliers
150.	Voltmeter 50V/DC
151.	Wire gauge (metric)
152.	Work bench 250X120X60 cm with 4 vices 12 cm jaw
153.	Arbor press hand operated 2 ton capacity
154.	Automotive exhaust 5 gas analyzer (petrol & Diesel) or -Diesel Smoke meter
155.	Battery tester to test 12 V / 24 V
156.	Bench lever shears 250 mm Blade X 3 mm capacity
157.	Cut Section Working model of Continuous Variable transmission
158.	Cut section Working model of Rotary clutch assembly of two wheeler
159.	Demonstration board of magneto ignition system of a two wheeler
160.	Discrete Component Trainer/Basic Electronic Trainer
161.	Drilling machine bench to drill up to 12 along with accessories
162.	Dual Magnetization Yoke: AC/HWDC, 230 VAC, 50Hz
163.	Gas Welding Table 1220 mm X760 mm
164.	Grinding machine (general purpose) D.E. pedestal with 300 mm dia wheels rough & smooth
165.	Ignition coil and CDI unit of four different make
166.	Layout of working model 12 V automobile electrical systems mounted
167.	Liquid penetrant Inspection kit
168.	Motor cycle (four stroke engine) with Digital twin spark ignition
169.	Motor cycle (two stroke engine)
170.	Pipe Bending Machine (Hydraulic type) 12 mm to 30 mm
171.	Pneumatic rivet gun
172.	Ridge cutter
173.	Scooter (four stroke engine)
174.	Scooter (two stroke engine)
175.	Shock absorber for two wheeler four different type
176.	Spring tension tester
177.	Tin smiths bench folder 600X1.6
178.	Trolley type portable single cylinder Air Compressor, 45 liter capacity Air Tank, and accessories, working at 6.5 kg/sq cm pressure
179.	Welding plant Oxy-Acetylene complete (high pressure)
180.	Welding transformer (150-300 Amps)
181.	Working model of electronic ignition system of two wheeler
182.	Automatic Transmission oils
183.	Battery-SMF
184.	Brake fluids
185.	Chalk, Prussian blue

Sl. No.	Item With Specification
186.	Chemical compound for fasteners
187.	Diesel
188.	Different type gasket material
189.	Different type of oil seal
190.	Drill twist (Assorted)
191.	Emery paper-36-60 grit,80-120
192.	Engine oil & Engine coolant
193.	Gear oil
194.	Gloves for Welding (Leather and Asbestos)
195.	Hacksaw blade (consumable)
196.	Hand rubber gloves tested for 5000 v
197.	Holders, lamps teakwood boards plugs sockets
198.	Hydrometer
199.	Lapping abrasive
200.	Leather Apron
201.	Petrol
202.	Power steering oil
203.	Radiators coolants
204.	Safety glasses
205.	Steel wire brush 50X150mm
II	AUTOMOTIVE: 4 WHEELER
1.	Allen Key Set Of 12 Pieces(2mm to 14mm)
2.	Caliper Inside 15 cm Spring
3.	Caliper Outside 15 cm Spring
4.	Center Punch 10 mm Dia *100 mm
5.	Dividers 15 cm Spring
6.	Electrician Screw Driver 250 mm
7.	Hammer Ball Peen 0.5kg With Handle
8.	Hand File 20cm Second Cut File
9.	Philips Screw Driver Set Of 5 Pieces 100mm to 300mm
10.	Pliers Combination 20cm
11.	Screw Driver 20cm x 9mm. Blade
12.	Screw Driver 30cm x 9mm. Blade
13.	Scriber 15cm
14.	Spanner D.E Set Of 12 Pieces(6mm to 32mm)
15.	Spanner Ring Set of 12 Metric Sizes 6 to 32mm

Sl. No.	Item With Specification
16.	Spanner Socket With Speed Handle, T-Bar, Ratchet And Universal Up to 32 mm
17.	Steel Rule 30 cm Inch And Metric
18.	Steel Tool Box With Lock and Key (Folding Type) 400*200*150mm
19.	Wire Cutter And Stripper
20.	AC Alternator Slip Ring Puller
21.	Adjustable Spanner (pipe Wrench) 350mm
22.	Air Blow Gun With Standard Accessories
23.	Air Brake Assembly
24.	Air Impact Wrench With Standard Accessories
25.	Air Ratchet With Standard Accessories
26.	Allen Key Set Of 12 Pieces (2mm to 14mm)
27.	Alternator Assembly Used For LMV
28.	Ammeter 300A/60A DC With External Shunt
29.	Angle Plate Adjustable 250*150*175
30.	Angle Plate Size 200*100*200mm
31.	Anti-Theft Device
32.	Anvil 50kg With Stand
33.	Auto Electrical Test Bench
34.	Battery-Charger
35.	Belt Tensioner Gauge
36.	Blow Lamp 1Litre
37.	Caliper Inside 15 cm Spring
38.	Calipers Outside 15cm Spring
39.	Car Jet Washer With Standard Accessories
40.	Carburetor for Dismantling And Assembling
41.	Carburetor Repair Tool Kit
42.	Chain Pulley Block 3 Ton Capacity With Tripod Stand
43.	Chisel 10 cm Flat
44.	Chisels Cross Cut 200mm*6mm
45.	Circlip Pliers Expanding And Contracting Type 15cm And 20cm Each
46.	Clamps C 100mm
47.	Clamps C 150mm
48.	Clamps C 200mm
49.	Cleaning Tray 45*30cm
50.	Coil Spring Compressor For Suspension Spring
51.	Compression Testing Gauge Suitable For Diesel Engine With Standard Accessories
52.	Connecting Rod Alignment Fixture
53.	Constant Mesh Gear Box With Stand For Dismantling And Assembly

Sl. No.	Item With Specification
54.	Copper Bit Soldering Iron 0.25kg
55.	Cut Section Model Of Mock Layout Of a Motor Car Electrical System Working Model
56.	Cut Section Models Of Shock Absorbers
57.	Cut Section Of Cross Ply And Radial Tyres
58.	Cut Section Working Model Of Automatic Transmission Gear Box
59.	Cut Section Working Model Of Centrifugal Clutch Assembly
60.	Cut Section Working Model Of Diaphragm clutch Assembly
61.	Cut Section working Model Of Single Plate Clutch Assembly
62.	Cylinder Bore Gauge Capacity 20 to 160 mm
63.	Cylinder Liner-Dry & Wet Liner, Press Fit & Slidefit Liner
64.	DC Ohmmeter 0 to 300 Ohms, Mid Scales at 20 Ohms
65.	Demonstration Board Of 2W Ignition System, Ignition Coil
66.	Demonstration Board Of Electronic Ignition System, Ignition Coil
67.	Demonstration Board Of MPFI System
68.	Depth Micrometer 0-25mm
69.	Dial Gauge Type 1 Gr. A (Complete With Clamping Devices And with magnetic Stand)
70.	Different Type Of Engine Bearing Model
71.	Different Type Of Piston Model
72.	Disk Brake With Caliper Assembly
73.	Distributor-Duel Advance Type, Reluctance Type
74.	Dividers 15 cm Spring
75.	Drift Punch Copper 15 cm
76.	Drill Point Angle Gauge
77.	Drill Twist 1.5mm to 15mm (various Sizes) By 0.5mm
78.	Drum Brake Assembly
79.	Electric Soldering Iron 230V,60Watt 230V 25W
80.	Electric Testing Screw Driver
81.	Engineer Square 15 cm Blade
82.	Engineers Stethoscope
83.	Executive Auto Electrical Tool Kit
84.	Feeler Gauge 20 Blades (Metric)
85.	File Flat 20cm Bastard
86.	File Half Round 20cm Second Cut
87.	File Square 20cm Second Cut
88.	File Square 30cm Round
89.	File Triangular 15 cm Second Cut
90.	File Assorted Sizes And Types Including Safe Edge File
91.	File Flat 25cm Second Cut

Sl. No.	Item With Specification
92.	File Flat 35cm Bastard
93.	Front Axle (Rzeppa Joint) With Stand For Dismantling And Assembly
94.	Fuel Feed Pump For Diesel
95.	Fuel Injection Pump (Diesel) Inline
96.	Fuel Injection Pump Dismantling Tool Kit/ Universal vice
97.	Fuel Injection Pump, VE Pump/ Distributor Fuel Rotary Pump (DPC) Pump, and Special Tools And Accessories
98.	Full Floating Axle And Semi-Floating Axle Assembly
99.	Functional/Experiment Model Of Different Type Of Sensors
100.	Garage Stand
101.	Gloves For Welding (Leather And asbestos)
102.	Glow Pug Tester
103.	Granite Surface Plate 1600 x 1000 With Stand and Cover
104.	Grease Gun
105.	Grease Gun Heavy Duty Trolley Type 10kg Capacity
106.	Growler
107.	Hacksaw Frame Adjustable 20-30cm
108.	Hammer Ball Peen 0.75kg
109.	Hammer Chipping 0.25kg
110.	Hammer Copper 1kg With Handle
111.	Hammer Mallet
112.	Hammer Plastic
113.	Hand Operated Crimping Tool For Crimping up to 4mm And crimping up to 10mm
114.	Hand Reamers Adjustable
115.	Hand Shear Universal 250mm
116.	Hand vice 37mm
117.	Hollow Punch Set Of Seven Pieces 6mm to 15mm
118.	Horn And Horn Relay
119.	Impact Screw Driver
120.	Injector Multi Hole Type, Pintle Type
121.	Injector Cleaning Unit
122.	Injector Testing Set (Hand Tester)
123.	Insulated Screw Driver 20cm*9mm Blade
124.	Insulated Screw Driver 30cm*9mm Blade
125.	Left Cut Snip 250mm
126.	Lifting Jack Screw Type 3 Ton,5 Ton &20 Ton Capacity
127.	Magneto Spanner Set With 8 Spanners
128.	Magnifying Glass 75mm

Sl. No.	Item With Specification
129.	Marking Out Table 90*60*90 cm
130.	Multimeter Digital
131.	Multi-point Fuel Injection Pump
132.	Oil Can 0.5/0.25 Liter Capacity
133.	Oil Pump For Dismantling And Assembling
134.	Oil Stone 15cm*5cm*2.5cm
135.	Oscilloscope 20MHz
136.	Outside Micrometer 0 to 25 mm
137.	Outside Micrometer 25 to 50 mm
138.	Outside Micrometer 50 to 75 mm
139.	Outside Micrometer 75 to 100 mm
140.	Petrol Nozzle
141.	Philips Screw Driver Set Of 5 Pieces 100mm to 300mm
142.	Pipe Cutting Tool
143.	Pipe Flaring Tool
144.	Piston Ring Compressor
145.	Piston Ring Expander And Remover
146.	Piston Ring Groove Cleaner
147.	Pliers Combination 20cm
148.	Pliers Flat Nose 15cm
149.	Pliers Round Nose 15cm
150.	Pliers Side Cutting 15 cm
151.	Portable Electric Drill Machine
152.	Prick Punch 15cm
153.	Punch Letter 4mm (Number)
154.	Radiator Cut Section-Cross Flow
155.	Radiator Cut Section-Down Flow
156.	Radiator Pressure Cap
157.	Rear Axle Full Floating Type With Stand For Dismantling And Assembly
158.	Right Cut Snips 250mm
159.	Rivet Sets Snap And Dolly Combined 3mm,4mm,6mm
160.	Scraper Flat 25cm
161.	Scraper Half Round 25cm
162.	Scraper Triangular 25cm
163.	Scriber 15cm
164.	Scriber With Scribing Black Universal
165.	Set Of Stock And Dies-Metric
166.	Shear Tin Mans 450mm*600mm

Sl. No.	Item With Specification
167.	Sheet Metal Gauge
168.	Sher Tinmans 300mm
169.	Soldering Copper Hatchet Type 500kg
170.	Solid Parallels in Pairs(Different Size) in Metric
171.	Spanner Clyburn 15cm
172.	Spanner D.E Set Of 12 Pieces(6mm to 32mm)
173.	Spanner T. Flocks For Screwing up And Screwing Inaccessible
174.	Spanner, Adjustable 15cm
175.	Spanner, Ring Set Of 12 Metric Sizes 6 to 32 mm
176.	Spanners Socket With Speed Handle, T-Bar, Ratchet And Universal
177.	Spark Lighter
178.	Spark Plug Spanner 14mm*18mm Size
179.	Starter Motor Axial Type, Pre-Engagement Type & Co-Axial Type
180.	Steel Measuring Tape 10 Meter in a Case
181.	Steel Rule 15cm Inch And Metric
182.	Steel Rule 30 cm Inch And Metric
183.	Steering Assembly 1) Rack & Pinion, 2) Worm & Roller 3) Recirculating Ball 4) Power Steering
184.	Straight Edge Gauge 2 Ft
185.	Straight Edge Gauge 4 Ft
186.	Stud Extractor
187.	Stud Remover With Socket Handle
188.	Surface Gauge With Dial Test Indicator Plunger Type i.e. 0.01mm
189.	Synchronous Gear Box With Stand For Dismantling And Assembly
190.	Tachometer (Counting Type)
191.	Tandem Master Cylinder With Booster
192.	Taps And Dies Complete Sets BSF
193.	Taps And Wrenches-Metric
194.	Telescope Gauge
195.	Temperature Gauge With Sensor 0-100 Deg. C
196.	Tester Sparking Plug Neon Type
197.	Thermostat
198.	Thread Pitch Gauge Metric, BSW
199.	Timing Lighter
200.	Toe-in, Toe-Out Gauge

Sl. No.	Item With Specification
201.	Torque Wrenches 5-35Nm,12-68Nm & 50-225Nm
202.	Trammel 30cm
203.	Tread Wear Indicator
204.	Tubed Tyre Of Car, Trucks & Motorcycle
205.	Tubeless Tyre Of Car & Trucks
206.	Tubeless Tyre Repair Kit
207.	Turbocharger Cut Sectional View
208.	Tyre & Split Rim Wheel Assembly
209.	Tyre Pressure Gauge With Holding Nipple
210.	Universal Puller For Removing Pulleys, Bearings
211.	V Block 75*38mm Pair With Clamps
212.	Vacuum Assisted Hydraulic Brake Assembly With Vacuum Booster
213.	Vacuum Gauge to Read 0 to 760 mm Of Hg
214.	Valve Lifter
215.	Valve Spring Compressor Universal
216.	Vernier Caliper 0-300mm With Least Count.0.02mm
217.	Vice Grip Pliers
218.	Water Pump For Dismantling And Assembling
219.	Wheel Cylinder
220.	Wiper Motor Assembly
221.	Wire Gauge (Metric)
222.	Work Bench 250x120x60cm With 4 Vices 12 cm Jaw (Only 4 Vices)
223.	Working Model Of Power Windows
224.	Working Model Of Torque Converter
225.	4 Point Relays
226.	5 Point Relays
227.	Air Bag Simulator
228.	Air Conditioned CRDI Vehicle in Running Condition-LMV
229.	Air Conditioning Service Unit (Car)
230.	Air Conditioning Trainer Kit
231.	Arbor Press Hand Operated 2 Ton Capacity
232.	Automotive Exhaust 5 Gas Analyzer (Petrol & Diesel) Or Diesel Smoke Meter
233.	Bench Lever Shears 250mm Blade*3mm Capacity
234.	Diésel Engine- CRDI-4 Stroke For Dismantling And Assembling With Swiveling Stand
235.	Diesel Engine (Running Condition) Stationary Type
236.	Discrete Component Trainer/Basic Electronics Trainer
237.	Drilling Machine Bench to Drill up to 12mm Dia Along With Accessories
238.	Dual Magnetization Yoke: AC/HWDC,230 VAC,50Hz

Sl. No.	Item With Specification
239.	Four Stroke Petrol Engine With CNG Setup-Working Condition
240.	Gas Welding Table 1220mm*760mm
241.	Grinding Machine (general Purpose) D.E Pedestal With 300mm Dia Wheels Rough And Smooth
242.	Hand Operated Hydraulic Press
243.	Heavy Commercial Vehicle Type (Without Body on Frame)
244.	Hydraulic Jack HI-LIFT Type-3Ton Capacity, And 5 Ton Capacity
245.	Liquid Penetrant Inspection Kit
246.	MPFI Petrol Engine With Swiveling Stand, and Special Tools For Dismantling And Assembling
247.	Multi Scan Tool With Oscilloscope
248.	Petrol Engine (2-Stroke) Motor Cycle/Scooter, and Special Tools And Accessories
249.	Pipe Bending Machine (Hydraulic Type)12mm to 30mm
250.	Pneumatic Rivet Gun With Standard Accessories
251.	Spring tension Tester
252.	Tin Smiths Bench Folder 600*1.6mm
253.	Transfer Case With Stand For Dismantling And Assembly
254.	Trolley Type Portable Air Compressor Single Cylinder With 45 Liters Capacity Air Tank, and Accessories & With Working Pressure 6.5 Kg/Sq cm
255.	Tube/Tyre Vulcanizing Machine
256.	Two Post Car Lift-Capacity 4000 Kg
257.	Tyre Changer Machine
258.	Ultrasonic Injection Cleaning Equipment
259.	Welding Plant Oxy-Acetylene Complete (High Pressure)
260.	Welding Transformer (150-300 Amps)
261.	Wheel Alignment Machine-Computerized 3D
262.	Wheel Balancing Machine
263.	Working Condition Of Diesel Engine-CRDI-4 Stroke Engine Assembly With Fault Simulation Board
264.	Working Condition Of Petrol MPFI Engine Assembly With Fault Simulation Board
265.	Automatic Transmission oils
266.	Battery-SMF
267.	Brake Fluids
268.	Chalk, Prussian Blue
269.	Chemical Compound For Fasteners
270.	Diesel
271.	Different Type Gasket Material
272.	Different Type Of Oil Seal
273.	Drill Twist (Assorted)
274.	Emery Paper -36-60 Grit, 80-120
275.	Engine Coolant

Sl. No.	Item With Specification
276.	Engine Oil
277.	Gear Oils
278.	Gloves For Welding (Leather And Asbestos)
279.	Hacksaw Blade (Consumable)
280.	Hand Rubber Gloves Tested For 5000 V
281.	Holder, Lamp Teakwood Boards, Plug Sockets, Solders, Flux Wire, Cables, Batteries, Round Consumable Blocks, other Consumables as required
282.	Hydrometer
283.	Lapping Abrasives
284.	Leather Apron
285.	Petrol
286.	Power Steering Oil
287.	Radiator Coolants
288.	Safety Goggles
289.	Steel Wire Brush 50mm x 150mm
III	AUTOMOTIVE: PAINT (located at COE)
1.	Allen key set of 12 pieces.(2mm to 14 mm)
2.	Bucket, sponge, squeegee, chamois & tack rags
3.	Caliper inside 15 cm spring
4.	Caliper outside 15 cm spring
5.	Center punch 10 mm. Dia. X 100 mm.
6.	Different type of spoon
7.	Dividers 15 cm spring
8.	Electrical Screw drivers 250 mm
9.	General purpose dolly
10.	Hammer ball pen 0.5 kg with handle
11.	Hands file 20 cm. Second cut flat
12.	Paint scrapper, putty mixing board, putty applicator/ knife
13.	Pliers combination 20 cm.
14.	Safety glasses
15.	Screw drivers 20 cm. X 9 mm Blade
16.	Screw drivers 30 cm. X 9 mm Blade
17.	Scriber 15 cm
18.	Spanner D.E set of 12 pieces (6mm to 32 mm)
19.	Spanner, ring set of 12 metric sizes 6 to 32 mm.
20.	Spanner socket with speed handle, T-bar, ratchet and universal up to 32 mm
21.	Steel rule 30 cm inch and metric

Sl. No.	Item With Specification
22.	Steel tool box with lock and key (folding type) 400X200X150mm
23.	Toe dolly
24.	Wire cutter and stripper
25.	Adjustable Spanner (pipe Wrench350mm)
26.	Air Blow Gun With Standard Accessories
27.	Air Impact Wrench With Standard Accessories
28.	Air Ratchet With Standard Accessories
29.	Allen Key Set Of 12 Pieces (2mm to 14mm)
30.	Ammeter 300A/60A DC With External Shunt
31.	Angle Plate Adjustable 250x150x175
32.	Angle Plate Size 200x100x200mm
33.	Anvil 50kg With Stand
34.	Battery-Charger
35.	Blow Lamp 1Litre
36.	Bucket, sponge squeegee, chamois & tack rags
37.	Caliper Inside 15 cm Spring
38.	Calipers Outside 15cm Spring
39.	Car Jet Washer With Standard Accessories
40.	Chain Pulley Block 3 Ton Capacity With Tripod Stand
41.	Chisel 10 cm Flat
42.	Chisels Cross Cut 200mmx6mm
43.	Circlip Pliers Expanding And contracting Type 15cm And 20cm Each
44.	Clamps C 100mm
45.	Clamps C 150mm
46.	Clamps C 200mm
47.	Cleaning Tray 45x30cm
48.	Collapsible panel stands
49.	Colour matching cards/panels (Magnetic, chromalux card or primed metal)
50.	Copper Bit Soldering Iron 0.25kg
51.	Cylinder Bore Gauge Capacity 20 to 160 mm
52.	DC Ohmmeter 0 to 300 Ohms, Mid Scales at 20 Ohms
53.	Depth Micrometer 0-25mm
54.	Dial Gauge Type 1 Gr. A (Complete With Clamping Devices And with magnetic Stand)
55.	Different type of Bumping hammers
56.	Different type of -body hammers
57.	Different type of body picks
58.	Different type of body spoon
59.	Different type of dolly block
60.	Different type of finishing hammers

Sl. No.	Item With Specification
61.	Different type of pick hammers
62.	Digital thermometer
63.	Dividers 15 cm spring
64.	Door handle tool (clip pullers)
65.	Drift Punch Copper 15 cm
66.	Drill Point Angle Gauge
67.	Drill Twist 1.5mm to 15mm (various Sizes) By 0.5mm
68.	Electric Soldering Iron 230 V 60 watts 230 V 25 watts
69.	Electric testing screw drivers
70.	Engineer's square 15 cm Blade
71.	Feeler gauge 20 blades (metric)
72.	File flat 20 cm bastard
73.	File, half round 20 cm second cut
74.	File, Square 20 cm second cut
75.	File, square 30 cm round
76.	File, triangular 15 cm second cut
77.	Files assorted sizes and types including safe edge file (20 NOS)
78.	Flat File 25 cm second cut
79.	Flat File 35 cm bastard
80.	Garage rack
81.	Gloves for Welding (Leather and Asbestos)
82.	Granite surface plate 1600X1000 with stand and cover
83.	Grease gun
84.	Grip Wrench 200mm
85.	Growel
86.	Hacksaw frame adjustable 20-30 cm
87.	Hammer ball Peen 0.75 kg
88.	Hammer Chipping 0.25 kg
89.	Hammer copper 1 kg with handle
90.	Hammer mallet
91.	Hammer Plastic
92.	Hand operated (i)for crimping up to 4 mm and (ii) for crimping up to 10 mm
93.	Hand remers adjustable
94.	Hand shear Universal 250 mm
95.	Hand vice - 37 mm
96.	Hollow Punch Set Of Seven Pieces 6mm to 15mm
97.	Insulated Screw drivers 20cmX9mm blade
98.	Insulated Screw drivers 30cmX9mm blade
99.	Interchangeable driver set

Sl. No.	Item With Specification
100.	Lead light
101.	Left cut snips 250 mm
102.	Lifting Jack Screw Type 3
103.	Magneto spanner set with 8 spanner
104.	Magnifying glass 75 mm
105.	Marking out table 90X60X90 cm
106.	Multimeter digital
107.	Oil can 0.5/0.25 liter capacity
108.	Oil stone 15X5X2.5 cm
109.	Outside micrometer 0 to 25 mm
110.	Outside micrometer 25 to 50 mm
111.	Outside micrometer 50 to 75 mm
112.	Outside micrometer 75 to 100 mm
113.	Paint measuring / mixing stick & jug set
114.	Paint scrapper, putty mixing board, putty applicator /knife
115.	Panel buffing machine (18cm)
116.	Philips Screw Drivers set of 5 pieces (100 mm to 300 mm)
117.	Pipe cutting tool
118.	Pipe flaring tool
119.	Plastic feeler gauges
120.	Pliers combinations 20 cm
121.	Pliers flat nose 15 cm
122.	Pliers round nose 15 cm
123.	Pliers side cutting 15 cm
124.	Portable electric drill Machine
125.	Prick punch 15 cm
126.	Punch letter 4mm (number)
127.	Right cut snips 250 mm
128.	Rivet sets snap and Dolly combined 3mm, 4mm, 6mm
129.	Scraper flat 25 cm
130.	Scraper half round 25 cm
131.	Scraper Triangular 25 cm
132.	Scriber 15 cm
133.	Scriber with scribing black universal
134.	Set of stock and dies-Metric
135.	Shear Tin Man's 450X600mm
136.	Sheet metal cutting pliers-left, right hand and straight-jaw Configuration
137.	Sheet metal gauge
138.	Sher Tinmans 300 mm

Sl. No.	Item With Specification
139.	Soldering Copper Hatchet type 500 gms
140.	Solid Parallels in pairs (Different size) in Metric
141.	Spanner Clyburn 15 cm
142.	Spanner D.E. set of pieces (6mm to 32mm)
143.	Spanner T. flocks for screwing up and up screwing inaccessible
144.	Spanner, adjustable 15 cm
145.	Spanner, rings set of 12 metric sizes 6 to 32 mm
146.	Spanner socket with speed handle, T-bar, ratchet and Universal up to 32 mm
147.	Spark lighter
148.	Spark plug Spanner 14mm x 18mm x Size
149.	Sprit level 2 V 250 , 05 metre
150.	Spring scale
151.	Steel measuring tape 10 meter in a case
152.	Steel rule 15 cm inch and metric
153.	Steel rule 30 cm inch and metric
154.	Steel wire Brush 50mm x 150 mm
155.	Straight edge gauge 2 ft.
156.	Stud extractor set of 3
157.	Stud remover with socket handle
158.	Suction cup
159.	Surface gauge with dial test indicator plunger type i.e. 0.01 mm
160.	Taps and Dies complete sets (5 types)
161.	Taps and wrench- Metric
162.	Telescope gauge
163.	Thread pitch gauge Metric
164.	Torque wrenches 5-35 Nm, 12-68 Nm, & 50-225 Nm
165.	Trammel 30 cm
166.	Trim and upholstery tool
167.	Type pressure gauge with holding nipple
168.	Universal puller for removing pulleys, bearings
169.	V' Block 75X38mm pair with clamps
170.	Vacuum gauge to read 0 to 760 mm of Hg.
171.	Various sanding blocks-soft , hard , speed file & de-nibbling tools
172.	Vernier caliper 0-300 mm with least count 0.02 mm
173.	Vice grip pliers
174.	Voltmeter 50V/DC
175.	Wire gauge (metric)
176.	Work bench 250X120X60 cm with 4 vices 12 cm jaw
177.	Angle grinder (10-12 cm)-for cutting and grinding

Sl. No.	Item With Specification
178.	Arbor press hand operated 2 ton capacity
179.	Belt sander (Narrow surface)
180.	Bench lever shears 250mm Blade x 3mm Capacity
181.	Body Shell for painting- light motor vehicle of different manufactures
182.	Compressed air line -10m (on retractable reel, with high flow connectors) with FRL unit
183.	Computerized colour retrieval unit (Spectrophotometer)
184.	Die Grinding kit
185.	Disc sander 18cm
186.	Discrete Component Trainer/ Basic Electronics Trainer
187.	Down draft booth (7.5 x5 m, combi spray/oven or separate spray/oven)
188.	Drilling Machine bench to drill up to 12mm dia along with accessories
189.	Dual Magnetization Yoke : AC/HWDC, 230 VAC, 50Hz
190.	Dust extraction connections (Vacuum)
191.	Electronic paint mixing scales (accurate to 0.1 grams, explosion proof &
192.	Grinding Machine (general Purpose) D.E Pedestal With 300mm Dia Wheels Rough And Smooth
193.	High pressure hot / cold water blasting unit
194.	Hydraulic Jack HI-LIFT Type-3Ton Capacity, And %Ton Capacity
195.	Infrared drying lamp unit
196.	Liquid penetrant Inspection kit
197.	Motor Vehicle suitable for Body painting- Light Motor Vehicle of different
198.	Paint surface film thickness gauge (electronic)
199.	Paint tinting system mixing machine (exposition proof)
200.	Parts spray booth cabin (ventilated to 30 cubic m / minute)
201.	Pipe Bending Machine (Hydraulic Type)12mm to 30mm
202.	Pneumatic rivet gun
203.	Random / dual action orbital sander (12-15 cm)
204.	Spray gun & mixing equipment cleaning machine (explosion proof) & bench
205.	Spray guns (gravity feed primer, COB/2K colour & clear coat, touch-up set)
206.	Tin Smiths Bench Folder 600x1.6mm
207.	Trolley type portable single cylinder Air Compressor, 45 liter capacity Air Tank, and accessories, working at 6.5 kg/sq cm pressure
208.	Underbody sealer & corrosion proofing materials & spry unit
209.	Ventilated preparation bays (fully illuminated, down or end draught)
210.	Water & oil separation system
211.	Weld through primer application equipment
212.	Battery-SMF
213.	Brake fluids
214.	Chalk, Prussian blue
215.	Chemical compound for fasteners
216.	Diesel

Sl. No.	Item With Specification
217.	Different type gasket material
218.	Different type of oil seal
219.	Drill twist (Assorted)
220.	Engine oil & Engine coolant
221.	Emery paper-36-60 grit,80-120
222.	Gear oil
223.	Hacksaw blade (consumable)
224.	Hand rubber gloves tested for 5000 v
225.	Holders, lamps teakwood boards plugs sockets
226.	Hydrometer
227.	Lapping abrasive
228.	Leather Apron
229.	Petrol
230.	Power steering oil
231.	Radiators coolants
232.	Safety glasses
233.	Steel wire brush 50X150mm
234.	Gloves for Welding (Leather and Asbestos)
235.	Cotton waste / cloth
236.	Body filler (Consumable)
237.	Body filler (Consumable)
238.	Masking paper / plastic & back-masking tape
239.	Refinishing material (Consumable)
IV	AUTOMOTIVE: REPAIR (located at COE)
1.	Allen key set of 12 pieces.(2mm to 14 mm)
2.	Body hammer (long pick)
3.	Body hammer, cross chisel (finishing hammer)
4.	Body hammer, utility pick (short pick)
5.	Caliper inside 15 cm spring
6.	Caliper outside 15 cm spring
7.	Center punch 10 mm. Dia. X 100 mm.
8.	Different type of spoon
9.	Dividers 15 cm spring
10.	Electrical Screw drivers 250 mm
11.	General purpose dolly
12.	Hammer ball pen 0.5 kg with handle
13.	Hands file 20 cm. Second cut flat

Sl. No.	Item With Specification
14.	Pliers combination 20 cm.
15.	Safety glasses
16.	Screw drivers 20 cm X 9 mm Blade
17.	Screw drivers 30 cm X 9 mm Blade
18.	Scriber 15 cm
19.	Spanner D.E set of 12 pieces (6mm to 32 mm)
20.	Spanner, ring set of 12 metric sizes 6 to 32 mm.
21.	Spanner socket with speed handle, T-bar, ratchet and universal up to 32 mm
22.	Steel rule 30 cm inch and metric
23.	Steel tool box with lock and key (folding type) 400X200X150mm
24.	Toe dolly
25.	Wire cutter and stripper
26.	Adjustable Spanner (pipe Wrench350mm)
27.	Air Blow Gun With Standard Accessories
28.	Air Impact Wrench With Standard Accessories
29.	Air Ratchet With Standard Accessories
30.	Allen Key Set Of 12 Pieces(2mm to 14mm)
31.	Ammeter 300A/60A DC With External Shunt
32.	Angle Plate Adjustable 250x150x175
33.	Angle Plate Size 200x100x200mm
34.	Anvil 50kg With Stand
35.	Battery-Charger
36.	Blow Lamp 1Litre
37.	Caliper Inside 15 cm Spring
38.	Calipers Outside 15cm Spring
39.	Car Jet Washer With Standard Accessories
40.	Chain Pulley Block 3 Ton Capacity With Tripod Stand
41.	Chisel 10 cm Flat
42.	Chisels Cross Cut 200mmx6mm
43.	Circlip Pliers Expanding And contracting Type 15cm And 20cm Each
44.	Clamps C 100mm
45.	Clamps C 150mm
46.	Clamps C 200mm
47.	Cleaning Tray 45x30cm
48.	Collapsible panel stands
49.	Copper Bit Soldering Iron 0.25kg
50.	Crow bar 910 x 25 mm
51.	Cylinder Bore Gauge Capacity 20 to 160 mm
52.	DC Ohmmeter 0 to 300 Ohms, Mid Scales at 20 Ohms

Sl. No.	Item With Specification
53.	Depth Micrometer 0-25mm
54.	Dial Gauge Type 1 Gr. A (Complete With Clamping Devices And with magnetic Stand)
55.	Different type of Bumping hammers
56.	Different type of -body hammers
57.	Different type of body picks
V	ELECTRICAL
1.	Steel tape 15 m length
2.	Plier insulated 150 mm
3.	Plier side cutting 150 mm
4.	Screw driver 100 mm
5.	Screw driver 150 mm
6.	Electrician connector screw driver insulated handle thin stem 100 mm
7.	Heavy duty screw driver 200 mm
8.	Electrician screw driver insulated handle thin stem 250 mm
9.	Punch center 150 mm x 9 mm
10.	Knife double bladed electrician
11.	Neon tester
12.	Steel rule 300 mm
13.	Hammer cross peen with handle
14.	Hammer ball peen with handle
15.	Gimlet 6 mm
16.	Bradawl
17.	Scriber (Knurled centre position)
18.	Pincer 150 mm
19.	C- Clamp 200 mm 150 mm and 100 mm
20.	Spanner adjustable 150 mm 300 mm
21.	Blow lamp 0.5 ltr
22.	Melting pot
23.	Label
24.	Chisel cold firmer 25 mm x 200 mm
25.	Chisel 25 mm and 6 mm
26.	Hand drill machine
27.	Portable electric drill machine 12 mm capacity
28.	Pillar electric drill machine 12 mm capacity
29.	Allen key
30.	Oil can 0.12 ltr
31.	Grease gun

Sl. No.	Item With Specification
32.	Outside micrometer
33.	Motorized bench grinder
34.	Rawl plug tool and bit
35.	Pulley puller
36.	Bearing puller
37.	Pipe vice
38.	Thermometer 0 to 100 deg centigrade
39.	Scissors blade 150 mm
40.	Crimping tool
41.	Wire stripper 20 cm
42.	Chisel cold flat 12 mm
43.	Mallet hard wood 0.50 kg
44.	Hammer extractor type 0.40 kg
45.	Hacksaw frame 200 mm 300 mm adjustable
46.	Try square 150 mm blade
47.	Outside and inside driver caliper
48.	Pliers flat nose 150 mm
49.	Pliers round nose 100 mm
50.	Tweezers 100 mm
51.	Snip straight and bent 150 mm
52.	D.E. metric spanner
53.	Drill hand brace
54.	Drill S.S. twist block 2 mm 5 mm 6 mm set of 3
55.	Plane smoothing cutters 50 mm
56.	Gauge wire imperial
57.	File flat 200 mm 2nd cut
58.	File half round 200 mm 2nd cut
59.	File round 200 mm 2nd cut
60.	File flat 150 mm rough
61.	File flat 250 mm bastard
62.	File flat 250 mm smooth
63.	File rasp half round 200 mm bastard
64.	Soldering iron 25 watt 65 watt 125 watt
65.	Copper bit soldering iron 0.25 kg
66.	De-soldering gun
67.	Hand vice 50 mm jaw
68.	Table vice 100 mm jaw
69.	Pipe cutter to cut pipes up to 5 cm dia

Sl. No.	Item With Specification
70.	Pipe cutter to cut pipes above 5 cm dia
71.	Stock and dia set for mm to 50 mm g.l pipe
72.	Stock and dies conduit
73.	Ohm meter series type & shunt type
74.	Multi meter (analog) 0 to 1000 m ohms 2.5 to 500
75.	Digital multi meter
76.	A.C. voltmeter M.L 0-500 v A.C (Table mounting)
77.	Milli voltmeter centre zero 100 - 0 - 100 m volt (Table mounting)
78.	D.C. milli ammeter 0 - 500 m A (Table mounting)
79.	Ammeter MC 0 -5 , 0- 25 A (Table mounting)
80.	A.C. ammeter m.l. 0-5 A , 0- 25 A (Table mounting)
81.	Kilo wattmeter 0 - 1 - 3 kw
82.	A.C. energy meter single phase 5 amp three phase 15 amp
83.	Power factor meter
84.	Frequency meter
85.	Flux meter
86.	Wheat stone bridge with galvanometer and battery
87.	Laboratory type induction coil
88.	DC power supply 0- 30 v , 2 amp
89.	Rheostat (0-1 ohm, 5amp)(0-10 ohm, 5amp)(0-25 ohm,1amp)(0-300 ohm,1amp)
90.	1 Phase variable auto transformer
91.	Battery charger
92.	Hydrometer
93.	Miniature Breaker 16 amp (raw material)
94.	Working bench 2.5m x 1.2m x 0.75m
95.	Fire extinguisher CO2, 2kg
96.	Fire buckets
97.	Tachometer
98.	Current transformer 415volt, 50hz, pt ratio 11kv/110v, 10vA
99.	Potential transformer 415volt, 50hz, pt ratio 11kv/110v, 10vA
100.	Grower
101.	Tong tester/clamp meter 0-100 amp AC
102.	Megger 500 volts
103.	Contactors & auxiliary contacts 3 phase 440 volt 16amp (Raw material)
104.	Contactors & auxiliary contacts 3 phase 440 volt 32amp (Raw material)
105.	Limit switch (raw material)
106.	Rotary switch 16A (Raw material)
107.	Load bank 5KW (Lamp/heater type)

Sl. No.	Item With Specification
108.	Brake test arrangement with two spring balance 0to25 kg rating
109.	Knife switch DPDT fitted with fuse terminals 16amp (Raw material)
110.	Knife switch TPDT fitted with fuse terminals 16amp (Raw material)
111.	Voltage stabilizer input:150-230 volt AC output: 220 volt AC
112.	3-Point D.C starter
113.	4-Point D.C starter
114.	Electrical machine trainer
115.	Motor generator (AC to DC)
116.	Used DC generators-Series shunt & compound type
117.	D.C shunt generator with control panel 2.5kw 220V
118.	D.C compound generator with control panel 2.5kw 220V
119.	Diesel generator set with changeover switch
120.	DC series motor coupled with mechanical load 0.5 to 23kw 220 volts
121.	DC shunt motor 2 to 2.5kw 220 volts
122.	DC compound motor with starter & switch 2 to 2.5kw 220 volts
123.	Single phase transformer core type air cooled 1kva 240/ 415v 50 hz
124.	Three phase transformer shell type oil cooled with all mounting 3kva 415/240v
125.	Oscilloscope dual trace 30 mhz
126.	Function generator
127.	Discrete component trainer
128.	Linear I.C trainer
129.	Digital I.C trainer
130.	Oil testing
131.	Hygrometer
132.	Relays (a) cut out (b) reverse current (c) over current (d) under voltage
133.	Starters for 2to5hp ac motors
134.	Resistance type starter
135.	Direct on line starter
136.	Star delta starter-manual , semi-automatic and automatic
137.	Auto transformer
138.	Motor generator (DC to AC)
139.	Ac squirrel cage motor with star delta starter
140.	Ac phase wound slip ring motor with starter
141.	Ac series type motor with mechanical load 1/4 hp 230v 50hz
142.	Single phase capacitor motor with starter switch 1 hp 230 volt 50 cycles
143.	Universal motor with starter/switch 230 volt 50 cycles 1/4hp
144.	Stepper motor with digital controller
145.	Shaded pole motor

Sl. No.	Item With Specification
146.	Bath impregnating
147.	Oven stove
148.	Synchronous motor 3 phase 3 hp 415 v 50 hz 4 pole with accessories
149.	Lux meter
150.	Inverter 1kva with 12 v battery input 12 volt dc, output 220 volt ac
151.	Electric hot plate 1500 watt
152.	Electric kettle 1500 watt
153.	Electric iron 1500 watt
154.	Immersion heater 1500 watt
155.	A.C fan
156.	Geyser (storage type) 15 ltr minimum
157.	Mixer & Grinder
158.	Thyristor / IGBT controlled D.C motor drive
159.	Thyristor / IGBT controlled A.C motor drive
160.	Pentium IV computer or latest 2.8 ghz & above 1gb ram 80 gb hdd, dvd
161.	Ink jet/ laser printer
162.	Washing machine
163.	Motor pump set 1 hp 1 phase 240 volt
164.	Pin type shackle type & suspension type insulators (raw material)
VI	ELECTRONICS: HOME
1.	Connecting screwdriver 100 mm
2.	Neon tester 500 V
3.	Screw driver set (set of 5)
4.	Insulated combination pliers 150 mm
5.	Insulated side cutting pliers 150 mm
6.	Long nose pliers 150 mm
7.	Soldering iron 25 W. 240 V
8.	Electrician knife
9.	Tweezers 100 mm
10.	Digital Multimeter (3 one /two digit)
11.	Soldering Iron Changeable bits 10 W
12.	De- soldering pump
13.	Steel rule 300 mm
14.	Steel measuring tape-3 m
15.	Tools makers vice 100 mm (clamp)
16.	Tools maker vice 50 mm (clamp)

Sl. No.	Item With Specification
17.	Crimping tool (pliers)
18.	Magneto spanner set
19.	File flat 200 mm bastard
20.	File flat 200 mm Second cut
21.	File flat 200 mm smooth
22.	100 mm flat pliers
23.	100 mm round Nose pliers
24.	Scriber straight 150 mm
25.	Hammer ball pen 0.5 kg
26.	Allen key set (set of 9)
27.	Tubular box spanner (set of 6Nos)
28.	Magnifying lenses 75 mm
29.	Continuity tester
30.	Hacksaw frame adjustable
31.	Cold chisel 20 mm
32.	Scissors 200 mm
33.	Handsaw 450 mm
34.	Hand Drill Machine
35.	First aid kit
36.	Fire Extinguisher
37.	Bench Vice
38.	Dual DC regulated power supply 30-0-30 V 2 Amps
39.	DC regulated variable power supply 0-24 V, 1 Amps
40.	LCR meter (Digital)
41.	CRO Dual Trace 20 MHz (component testing)
42.	Signal Generator, 0-100 KHz
43.	Battery Charger
44.	Analog Multimeter
45.	Function generator (Triangular, square and sine wave)
46.	Dimmer start 3 Amps
47.	Analog Component Trainer
48.	Op Amp trainer
49.	Digital IC Trainer
50.	Digital IC Tester
51.	Digital and Analog Bread Board Trainer
52.	Rheostats various values and ratings
53.	POWER ELECTRONICS TRAINER with 6 no's of onboard applications
54.	Computers in assembled form (including cabinet, motherboards, HDD, DVD, SMPS, Monitor, KB,

Sl. No.	Item With Specification
	Mouse, LAN card, Blu-Ray drive and player), MS Office education version.
55.	Laptops Latest configuration (i7 Processor 3Gen)
56.	Laser jet Printer
57.	Electronic circuit simulation software with 6 user licenses
58.	Different types of electronic and electrical cables, connectors, sockets, terminations.
59.	Different types of Analog electronic components, digital IC s, power electronic components, general purpose PCBs, bread board, MCB, ELCB
60.	Crimping tools as necessary for performing terminations
61.	DSO (color)
62.	Soldering & De soldering Station
63.	SMD Soldering & De soldering Station with necessary accessories
64.	DOL starter
65.	AC motor 1/4 HP
66.	Electrical Trainer with for DOL starter, contactors, relays, MCB, and Motor suitable for electrical control circuit exercises
67.	Frequency modulator and Demodulator trainer kit
68.	PAM, PPM, PWM trainer kit
69.	AM/FM Commercial radio receivers
70.	Microcontroller kits (8051) along with programming software (Assembly level Programming)
71.	Application kits for Microcontrollers 6 different applications
72.	Sensor trainer kit (containing Various sensors like Thermocouple, RTD, Thermocouple, load cell, strain gauge, LVDT, smoke sensors, speed sensor)
73.	Various analog and digital IC s useful for doing project works mentioned in the digital and analog IC applications modules
74.	Different types of electronic and electrical cables, connectors, sockets, terminations.
75.	Fiber optic communication trainer
76.	Seven segment DPM
77.	LCD based DPM
78.	SMPS of different make
79.	UPS trainer
80.	UPS 3 KVA with backup time minimum 30 minutes
81.	Mobile phone (different models) at least one 3 G mobile
82.	Smart phones of different make (android/Windows)
83.	Precision set of screw drivers- T5, T6, T7
84.	Tweezers- Bend tip
85.	Cell phone power source with charger chords for different cell phones
86.	LCD TV (Trainer kit)
87.	LCD TV (21")

Sl. No.	Item With Specification
88.	LED TV (Trainer kit)
89.	LED TV (21")
90.	Home theatre system
91.	Solar Power Inverter 500 VA
92.	LED lighting system
VIII	ELECTRONICS: ICT
1.	White Board Marker
2.	Duster Cloth (2" by 2")
3.	Cleaning Liquid 500 ml
4.	Xerox Paper (A4)
5.	Full Scape Paper (White)
6.	PCB, solder flux etc. & electronic components
7.	Wires, cables plug sockets switches of various types and other consumables
8.	Resistors, Capacitors, Inductors, Diodes, LED, Transistors, Thyristors, IC s etc.
9.	Spare Transformers and power devices required for servicing SMPS
10.	Various types of Button Cells
11.	Dry Cell
12.	Hand Cell (Torch)
13.	Silicon grease
14.	Heat sink agent
15.	RAM 512 MB
16.	Cartridges for printer
17.	Optical Mouse p/s2 or USB
18.	P/s2 or USB key Board
19.	SMPS
20.	CMOS Battery
21.	3 pin power chord
22.	Cat 5/5e/6 cable
23.	Flat Cable
24.	Stapler Small
25.	Stapler Big
26.	AAA battery for remote
27.	AA battery for clock
28.	8 GB pen drives
29.	CDs
30.	DVDs

Sl. No.	Item With Specification
31.	Wall clock
32.	Anti static pads
33.	Anti static wrist wraps
34.	Soldering wire and paste
35.	RJ - 45 Connector
36.	Telephone cable
37.	Co - axial cable
38.	RJ-11 connector, T connector, terminator
39.	BNC connector, T connector, terminator
40.	Keystone jack
41.	Patch / jack Panel
42.	Patch / Mounting cord
43.	RJ-45 Info outlet with faceplate
44.	RJ-45 I/O Box
45.	RJ -45 Cable extender
46.	8- port HUB
47.	LAN Card
48.	Wi-fi LAN Card both PCI and USB
49.	Display Card
50.	USB to RJ-45 converter
51.	RJ-45 to USB converter
52.	USB HDD 500 GB
VIII	ELECTRICAL: LIFT AND ESCALATOR MECHANIC (located at COE)
1.	Steel tape 15 m length
2.	Plier insulated 150 mm
3.	Plier side cutting 150 mm
4.	Screw driver 100 mm
5.	Screw driver 150 mm
6.	Electrician connector screw driver insulated handle thin stem 100 mm
7.	Heavy duty screw driver 200 mm
8.	Electrician screw driver insulated handle thin stem 250 mm
9.	Punch centre 150 mm x 9 mm
10.	Knife double bladed electrician
11.	Neon tester
12.	Steel rule 300 mm
13.	Hammer cross peen with handle

Sl. No.	Item With Specification
14.	Hammer ball peen with handle
15.	Gimlet 6 mm
16.	Bradawl
17.	Scriber (Knurled centre position)
18.	Pincer 150 mm
19.	First aid box
20.	C- Clamp 200 mm 150 mm and 100 mm
21.	Spanner adjustable 150 mm 300 mm
22.	Blow lamp o.5 ltr
23.	Melting pot
24.	Ladle
25.	Chisel cold firmer 25 mm x 200 mm
26.	Chisel 25 mm and 6 mm
27.	Hand drill machine
28.	Portable electric drill machine 12 mm capacity
29.	Pillar electric drill machine 12 mm capacity
30.	Allen key
31.	Oil can 0.12 ltr
32.	Grease gun
33.	Out side micrometer
34.	Motorized bench grinder
35.	Rawl plug tool and bit
36.	Pulley puller
37.	Bearing puller
38.	Pipe vice
39.	Thermometer 0 to 100 deg centigrade
40.	Scissors blade 150 mm
41.	Crimping tool
42.	Wire stripper 20 cm
43.	Chisel cold flat 12 mm
44.	Mallet hard wood 0.50 kg
45.	Hammer extractor type 0.40 kg
46.	Hacksaw frame 200 mm 300 mm adjustable
47.	Try square 150 mm blade
48.	Outside and inside driver caliper
49.	Pliers flat nose 150 mm
50.	Pliers round nose 100 mm
51.	Tweezers 100 mm

Sl. No.	Item With Specification
52.	Snip straight and bent 150 mm
53.	D.E. metric spanner
54.	Drill hand brace
55.	Drill S.S. twist block 2 mm 5 mm 6 mm set of 3
56.	Plane smoothing cutters 50 mm
57.	Gauge wire imperial
58.	File flat 200 mm 2nd cut
59.	File half round 200 mm 2nd cut
60.	File round 200 mm 2nd cut
61.	File flat 150 mm rough
62.	File flat 250 mm bastard
63.	File flat 250 mm smooth
64.	File rasp half round 200 mm bastard
65.	Soldering iron 25 watt 65 watt 125 watt
66.	Copper bit soldering iron 0.25 kg
67.	De-soldering gun
68.	Hand vice 50 mm jaw
69.	Table vice 100 mm jaw
70.	Pipe cutter to cut pipes up to 5 cm dia
71.	Pipe cutter to cut pipes above 5 cm dia
72.	Stock and dia set for mm to 50 mm g.l pipe
73.	Stock and dies conduit
74.	Ohm meter series type & shunt type
75.	Multi meter (analog) 0 to 1000 m ohms 2.5 to 500
76.	Digital multi meter
77.	A.C. voltmeter M.L 0-500 v A.C
78.	Milli voltmeter centre zero 100 - 0 - 100 m volt
79.	D.C. milli ammeter 0 - 500 m A
80.	Ammeter MC 0 -5 , 0- 25 A
81.	A.C. ammeter m.l. 0-5 A , 0- 25 A
82.	Kilo wattmeter 0 - 1 - 3 kw
83.	A.C. energy meter single phase 5 amp three phase 15 amp
84.	Power factor meter
85.	Frequency meter
86.	Flux meter
87.	Wheat stone bridge with galvanometer and battery
88.	Laboratory type induction coil
89.	DC power supply 0- 30 v , 2 amp

Sl. No.	Item With Specification
90.	Rheostat (0-1 ohm, 5amp)(0-10 ohm, 5amp)(0-25 ohm,1amp)(0-300 ohm,1amp)
91.	1 Phase variable auto transformer
92.	Battery charger
93.	Hydrometer
94.	Miniature Breaker 16 amp (raw material)
95.	Working bench 2.5 mx1.20mx0.75m
96.	Dial gauge
97.	Chain pulley block 2 ton
98.	Shackle
99.	Ceiling rope nylon / steel
100.	Control transformer single phase 250 W With 12v, 24v, 48v, 110v, and 240v tapping
101.	Single phase transformer 1 KVA with enclosure and input / output terminals
102.	Current transformer 50 / 5, 20 / 5, 20 / 1 ampere
103.	Potential transformer 240/110, 415/110 volt
104.	Analog / Digital converter with four input / output
105.	Digital / Analog converter with four input / output
106.	Soft starter 3 phase, 415 V, 15 A
107.	Mini welding machine - 150A, 240 V With connecting cable, electrode holder, earthing clamp, safety glass, safety gloves
108.	Elevator control panel suitable for 5/8 passenger lift having separate input, output and cable alley chamber. Fitted with PLC controller and related accessories
109.	DC compound motor 2 KW, 220V with switch fuse unit, voltmeter, ammeter, field regulator, armature regulator and four point starter
110.	Single phase capacitor start induction motor with starting panel- 1KW, 240 V
111.	Universal motor with starting panel - 0.75 KW, 240V
112.	Three phase Squirrel cage induction motor with DOL starting panel - 3 KW, 415 V
113.	Synchronous permanent magnet motor with starting panel - 2 KW, 3 phase, 415 V (used as generator when coupled with DC compound motor)
114.	Digital AC drive trainer - 3 phase, 2KW
115.	Servo motor Trainer - 250 W, 220 / 110 V
116.	Industrial safety hat
117.	Industrial safety shoe (different size)
118.	Fall arrest personnel safety belt
119.	Life line rope - nylon braided made from high tenacity multifilament yarn 13 mm dia.
120.	Safety net 3x3 meter
121.	Head lamp 3W with battery
122.	Slings 2 ton capacity
123.	Elevator rope cutter up to 32 mm

Sl. No.	Item With Specification
124.	Elevator limit switches
125.	Electric Hammer type drill machine 22mm capacity with all accessories - 750W, 240V
126.	Electric Hand grinding machine with 110 mm wheel diameter - 750W, 240V
127.	Electric hand blower - 750W, 240V
128.	Rail alignment gauge
129.	Working Plan 10x20inch
130.	Working model of Escalator
131.	Electromagnet break assembly
132.	Over speed governor for passenger lift
133.	Door simulator set (car door , landing door and door drive unit)
134.	5/8 Passenger lift installed with all control and safety
IX	MANUFACTURING & FABRICATION
1.	Leather Hand Gloves 14"
2.	Cotton Hand Gloves 8"
3.	Leather Apron Leather
4.	S.S Wire Brush 5 Rows And 3 Row
5.	Leather Hand Sleeves 16"
6.	Safety Boots For Welders
7.	Leg Guard Leather
8.	Rubber Hose Clips 1/2"
9.	Rubber Hose Oxygen 8mm Dia x 10mts Long As Per BIS
10.	Rubber Hose Acetylene 8mm Dia x 10 Mts Long As Per BIS
11.	Arc Welding Cables Multi Cored Copper 400/600 amp as Per BIS
12.	Arc Welding Single Colored Glasses 108mm x 82mm x 3mm. DIN 11A & 12 A
13.	Arc Welding Plain Glass 108mm x 82mm x 3mm
14.	Gas Welding Goggles With Color Glass 3 Or 4A DIN
15.	Safety Goggles Plain
16.	Spark Lighter
17.	AG 4 Grinding Wheels
18.	Welding Helmet Fiber
19.	Welding Hand Shield Fiber
20.	Chipping hammer With Metal Handle 250 Grams
21.	Chisel cold flat 19 mmX150 mm
22.	Center punch 9mmX127mm
23.	Dividers 200 mm
24.	Stainless steel rule 300 mm

Sl. No.	Item With Specification
25.	Scriber 150 mm Double Point
26.	File Tong 350mm Long
27.	Hacksaw frame fixed 300 mm
28.	File half round bastard 300 mm
29.	File flat 350 mm Bastard
30.	Hammer ball peen 1 kg with handle
31.	Tip cleaner
32.	Try Square 6"
33.	Spindle Key
34.	Screw Driver 300mm Blade And 250mm Blade
35.	Number Punch 6mm
36.	Letter Punch 6mm
37.	Magnifying glasses 100 mm dia
38.	Universal Weld Measuring Gauge
39.	Earth Clamp 600A
40.	Spanner D.E 6mm to 32 mm
41.	C- Clamps 10 cm And 15cm
42.	Hammer Sledge Double Faced 4kg
43.	S.S Tape 5 Meter Flexible in Case
44.	Electrode Holder 600amp
45.	H.P Welding Torch With 5 Nozzles
46.	Oxygen Gas Pressure Regulator Double Stage
47.	Acetylene Gas Pressure Regulator Double Stage
48.	CO2 Gas Pressure Regulator, With Flow Meter
49.	Argon Gas Pressure Regulator With Flow Meter
50.	Metal Rack 182cm x 152cm x45cm
51.	First Aid Box
52.	Steel Lockers With 8 Pigeon Holes
53.	Steel Amirah/ Cupboard
54.	Black Board And Easel With Stand
55.	Flash Back Arrester (Torch Mounted)
56.	Flash Back Arrester (Cylinder Mounted)
57.	Welding transformer with all accessories
58.	Welding transformer (or) Inverter Based Welding Machine with all accessories (300A, OCV 60-100 V, 60% Duty Cycle)
59.	D.C Arc welding rectifiers set with all accessories
60.	GMAW Welding Machine 400A Capacity With Air Cooled Torch, Regulator, Gas Preheater, Gas Hose And Standard Accessories

Sl. No.	Item With Specification
61.	AC/DC GTAW Welding Machine With Water Cooled Torch 300A, Argon Regulator, Gas Hose, Water Circulating System And Standard Accessories
62.	Air Plasma Cutting Equipment With All Accessories, Capacity to Cut 25cm Clear Cut
63.	Air Compressor Suitable For Air Plasma Cutting System
64.	Auto Darkening Welding Helmet
65.	Spot Welding Machine to 15 KVA With All Accessories
66.	Portable Gas Cutting Machine Capable Of Cutting Straight & Circular With All Accessories
67.	Pedestal Grinder Fitted With Coarse And Medium Grain Size Grinding Wheels Dia 300mm
68.	Bench Grinder Fitted With fine Grain Size Silicon Carbide Green Grinding Wheel Dia 150mm
69.	AG 4 Grinding
70.	Suitable gas welding table with fire bricks
71.	Suitable Arc welding table with positioner
72.	Trolley for cylinder (H.P unit)
73.	Hand Shearing Machine Capacity to Cut 6mm Sheets And Flats
74.	Power Saw Machine 18"
75.	Portable Drilling Machine(Cap.6mm)
76.	Oven, Electrode Drying 0 to 350Deg.C, 10kg Capacity
77.	Work bench 340X120X75 cm with 4 bench vices of 150mm Jaw Opening
78.	Oxy Acetylene Gas Cutting Blow Pipe
79.	Oxygen, Acetylene Cylinders
80.	Co2 Cylinder
81.	Argon Gas Cylinder
82.	Anvil 12 sq. Inches Working Area With Stand
83.	Swage Block
84.	Die Penetrant Testing Kit
85.	Magnetic Particle Testing Kit
86.	Fire Extinguishers (Foam Type And CO2 Type)
87.	Fire Buckets With Stand
88.	Portable Abrasive Cut-Off Machine
89.	Suitable Gas Cutting Table
90.	Welding Simulators For SMAW/GTAW/GMAW
91.	Welding process, Inspection & Codes DVD/CD
92.	Leather Hand Gloves 14"
93.	Cotton Hand Gloves 8"
94.	Leather Apron Leather
95.	S.S Wire Brush 5 Rows And 3 Row
96.	Leather Hand Sleeves 16"
97.	Safety Boots For Welders

Sl. No.	Item With Specification
98.	Leg Guard Leather
99.	Rubber Hose Clips 1/2"
100.	Rubber Hose Oxygen 8mm Dia x 10mts Long As Per BIS
101.	Rubber Hose Acetylene 8mm Dia x 10 Mts Long As Per BIS
102.	Arc Welding Cables Multi Cored Copper 400/600 amp as Per BIS
103.	Arc Welding Single Colored Glasses 108mm x 82mm x 3mm. DIN 11A & 12 A
104.	Arc Welding Plain Glass 108mm x 82mm x 3mm
105.	Gas Welding Goggles With Color Glass 3 Or 4A DIN
106.	Safety Goggles Plain
107.	Spark Lighter
108.	AG 4 Grinding Wheels
109.	Welding Helmet Fiber
110.	Welding Hand Shield Fiber
111.	Chipping hammer With Metal Handle 250 Grams
112.	Chisel cold flat 19 mmX150 mm
113.	Center punch 9mmX127mm
114.	Dividers 200 mm
115.	Stainless steel rule 300 mm
116.	Scriber 150 mm Double Point
117.	File Tong 350mm Long
118.	Hacksaw frame fixed 300 mm
119.	File half round bastard 300 mm
120.	File flat 350 mm Bastard
121.	Hammer ball peen 1 kg with handle
122.	Tip cleaner
123.	Try Square 6"
124.	Spindle Key
125.	Screw Driver 300mm Blade And 250mm Blade
126.	Number Punch 6mm
127.	Letter Punch 6mm
128.	Magnifying glasses 100 mm dia
129.	Universal Weld Measuring Gauge
130.	Earth Clamp 600A
131.	Spanner D.E 6mm to 32 mm
132.	C- Clamps 10 cm And 15cm
133.	Hammer Sledge Double Faced 4kg
134.	S.S Tape 5 Meter Flexible in Case
135.	Electrode Holder 600amp

Sl. No.	Item With Specification
136.	H.P Welding Torch With 5 Nozzles
137.	Oxygen Gas Pressure Regulator Double Stage
138.	Acetylene Gas Pressure Regulator Double Stage
139.	CO2 Gas Pressure Regulator With Flow Meter
140.	Argon Gas Pressure Regulator With Flow Meter
141.	Flash Back Arrester (Torch Mounted)
142.	Flash Back Arrester (Cylinder Mounted)
143.	Auto Darkening Welding Helmet
144.	Welding transformer with all accessories
145.	Welding transformer (or) Inverter Based Welding Machine with all accessories (300A, OCV 60-100 V, 60% Duty Cycle
146.	D.C Arc welding rectifiers set with all accessories
147.	GMAW Welding Machine 400A Capacity With Air Cooled Torch, Regulator, Gas Preheater, Gas Hose And Standard Accessories
148.	AC/DC GTAW Welding Machine With Water Cooled Torch 300A, Argon Regulator, Gas Hose, Water Circulating System And Standard Accessories
149.	Air Plasma Cutting Equipment With All Accessories, Capacity to Cut 25cm Clear Cut
150.	Air Compressor 8 Bar
151.	Power Shearing Machine
152.	Portable Abrasive Cut-Off Machine
153.	Pug Cutting Machine Capable Of Cutting Straight & Circular With All Accessories
154.	Pedestal Grinder Fitted With Coarse And Medium Grain Size Grinding Wheels Dia 300mm
155.	Bench Grinder Fitted With fine Grain Size Silicon Carbide Green Grinding Wheel Dia 150mm
156.	AG 4 Grinding
157.	Die Penetrant Testing Kit
158.	Suitable Arc welding table with positioner
159.	Trolley for cylinder (H.P unit)
160.	Hand Shearing Machine Capacity to Cut 6mm Sheets And Flats
161.	Power Saw Machine 18"
162.	Portable Drilling Machine(Cap.6mm)
163.	Oven, Electrode Drying 0 to 250Deg.C, 10kg Capacity
164.	Work bench 340X120X75 cm with 4 bench vices of 150mm Jaw Opening
165.	Oxy Acetylene Gas Cutting Blow Pipe
166.	Oxygen, Acetylene Cylinders
167.	CO2 Cylinder
168.	Argon Gas Cylinder
169.	Anvil 12 sq. Inches Working Area With Stand
170.	Swage Block

Sl. No.	Item With Specification
171.	Fire Buckets With Stand
172.	Universal Testing Machine
173.	Suitable Gas Cutting Table
174.	Welding Simulators For SMAW/GTAW/GMAW
175.	Welding process, Inspection & Codes DVD/CD
176.	CNC turning & CNC Milling machines with Siemens controllers
177.	Siemens 808D Milling & turning table top controllers
178.	Sinutrain Operator 18 Licenses
X	AGRICULTURE & FARM EQUIPMENT
1.	Allen key set of 12 pieces.(2mm to 14 mm)
2.	Caliper inside 15 cm spring
3.	Caliper outside 15 cm spring
4.	Center punch 10 mm. Dia. X 100 mm.
5.	Dividers 15 cm spring
6.	Electrical Screw drivers 250 mm
7.	Hammer ball pen 0.5 kg with handle
8.	Hands file 20 cm. Second cut flat
9.	Phillips screw drivers set of 5 pieces (100 mm to 300 mm)
10.	Pliers combination 20 cm.
11.	Screw drivers 20 cm X 9 mm Blade
12.	Screw drivers 30 cm X 9 mm Blade
13.	Scriber 15 cm
14.	Spanner D.E set of 12 pieces (6mm to 32 mm)
15.	Spanner, ring set of 12 metric sizes 6 to 32 mm.
16.	Spanner socket with speed handle, T-bar, ratchet and universal up to 32 mm
17.	Steel rule 30 cm inch and metric
18.	Steel tool box with lock and key (folding type) 400X200X150mm
19.	Wire cutter stripper
20.	AC Alternator Slip Ring Puller
21.	Adjustable Spanner (pipe Wrench350mm)
22.	Air Blow Gun With Standard Accessories
23.	Air Impact Wrench With Standard Accessories
24.	Air Ratchet With Standard Accessories
25.	Allen Key Set Of 12 Pieces(2mm to 14mm)
26.	Alternator For tractor- different type
27.	Ammeter 300A/60A DC With External Shunt
28.	Angle Plate Adjustable 250x150x175
29.	Angle Plate Size 200x100x200mm

Sl. No.	Item With Specification
30.	Anvil 50kg With Stand
31.	Arbor press hand operated 2 ton capacity
32.	Auto Electrical Test Bench
33.	Battery-Charger
34.	Belt Tensioner Gauge
35.	Blow Lamp 1Litre
36.	Caliper Inside 15 cm Spring
37.	Calipers Outside 15cm Spring
38.	Car Jet Washer With Standard Accessories
39.	Carburetor Repair Tool Kit
40.	Chain Pulley Block 3 Ton Capacity With Tripod Stand
41.	Chaser hard W/V 9 to 40 T.P.I set of 11 external
42.	Chaser, hand W/W 9 to 40 T.P.I. set of 11 internal
43.	Chisel 10 cm Flat
44.	Chisels Cross Cut 200mmx6mm
45.	Circlip Pliers Expanding And contracting Type 15cm And 20cm Each
46.	Clamps C 100mm
47.	Clamps C 150mm
48.	Clamps C 200mm
49.	Cleaning Tray 45x30cm
50.	Clutches, different type such as cone type, disc type
51.	Compression Testing Gauge Suitable For Diesel Engine With Standard Accessories
52.	Connecting Rod Alignment Fixture
53.	Copper Bit Soldering Iron 0.25kg
54.	Cut section model of fuel filter
55.	Cylinder Bore Gauge Capacity 20 to 160 mm
56.	Cylinder Liner-Dry & Wet Liner, Press Fit & Slide-fit Liner
57.	DC Ohmmeter 0 to 300 Ohms, Mid Scales at 20 Ohms
58.	Depth Micrometer 0-25mm
59.	Dial Gauge Type 1 Gr. A (Complete With Clamping Devices And with magnetic Stand)
60.	Different Type Of Engine Bearing Model
61.	Different Type Of Piston Model
62.	Dividers 15 cm spring
63.	Drift Punch Copper 15 cm
64.	Drift , Copper 10 x 15 1/2
65.	Drill Point Angle Gauge
66.	Drill Twist 1.5mm to 15mm (various Sizes) By 0.5mm
67.	Electric Soldering Iron 230 V 60 watts 230 V 25 watts
68.	Electric testing screw drivers
69.	Engineer's square 15 cm Blade

Sl. No.	Item With Specification
70.	Engineers stethoscope
71.	Equipment puncture, in box
72.	Feeler gauge 20 blades (metric)
73.	File flat 20 cm bastard
74.	File, half round 20 cm second cut
75.	File, Square 20 cm second cut
76.	File, square 30 cm round
77.	File, triangular 15 cm second cut
78.	Files assorted sizes and types including safe edge file (20 NOS)
79.	Flat File 25 cm second cut
80.	Flat File 35 cm bastard
81.	Fuel feed pump for Diesel
82.	Fuel injection pump (Diesel) inline
83.	Glow plug tester
84.	Granite surface plate 1600X1000 with stand and cover
85.	Grease gun
86.	Grover -3, 4, 6mm
87.	Growler
88.	Hacksaw frame adjustable 20-30 cm
89.	Hammer ball Peen 0.75 kg
90.	Hammer Chipping 0.25 kg
91.	Hammer copper 1 kg with handle
92.	Hammer mallet
93.	Hammer Plastic
94.	Hand operated (i)for crimping up to 4 mm and (ii) for crimping up to 10 mm
95.	Hand remers adjustable
96.	Hand shear Universal 250 mm
97.	Hand vice - 37 mm
98.	High rate discharge tester (cell tester)
99.	Hollow Punch Set Of Seven Pieces 6mm to 15mm
100.	Hydraulic jack HI-LIFT type -3 ton capacity
101.	Injector-Multi hole type, Pintle type
102.	Injector cleaning unit
103.	Injector testing set (Hand tester)
104.	Insulated Screw drivers 20cmX9mm blade
105.	Insulated Screw drivers 30cmX9mm blade
106.	Left cut snips 250 mm
107.	Lifting jack screw type 3 ton
108.	Magneto spanner set with 8 spanner

Sl. No.	Item With Specification
109.	Magnifying glass 75 mm
110.	Marking out table 90X60X90 cm
111.	Multi scan Tool
112.	Multimeter digital
113.	Oil can 0.5/0.25 liter capacity
114.	Oil pump dismantling and assembling
115.	Oil stone 15X5X2.5 cm
116.	Oscilloscope 20MHz
117.	Outside micrometer 0 to 25 mm
118.	Outside micrometer 25 to 50 mm
119.	Outside micrometer 50 to 75 mm
120.	Outside micrometer 75 to 100 mm
121.	Pat melting
122.	Philips Screw Drivers set of 5 pieces (100 mm to 300 mm)
123.	Pipe cutting tool
124.	Pipe flaring tool
125.	Piston ring compressor
126.	Piston ring expander and remover
127.	Piston ring groove cleaner
128.	Pliers combinations 20 cm
129.	Pliers flat nose 15 cm
130.	Pliers round nose 15 cm
131.	Pliers side cutting 15 cm
132.	Pocker
133.	Portable electric drill Machine
134.	Portable oil monitoring indicator
135.	Power supply 0-12 v, lamp
136.	Prick punch 15 cm
137.	Punch letter 4mm
138.	Radiator cut section-cross flow
139.	Radiator cut section-down flow
140.	Radiator pressure cap
141.	Rake
142.	Rear axle assembly-gear box steering box assembly of the diesel engine
143.	Ridger
144.	Right cut snips 250 mm
145.	Rivet sets snap and Dolly combined 3mm, 4mm, 6mm
146.	Scraper flat 25 cm
147.	Scraper half round 25 cm

Sl. No.	Item With Specification
148.	Scraper Triangular 25 cm
149.	Scriber 15 cm
150.	Scriber with scribing black universal
151.	Set of stock and dies-Metric
152.	Shear Tin Man's 450X600mm
153.	Sheet metal gauge
154.	Sher Tinmans 300 mm
155.	Shovel
156.	Soldering Copper Hatchet type 500 gms
157.	Solid Parallels in pairs (Different size) in Metric
158.	Spanner Clyburn 15 cm
159.	Spanner D.E. set of pieces (6mm to 32mm)
160.	Spanner T. flocks for screwing up and up screwing inaccessible
161.	Spanner, adjustable 15 cm
162.	Spanner, rings set of 12 metric sizes 6 to 32 mm
163.	Spanner socket with speed handle, T-bar, ratchet and Universal up to 32 mm
164.	Spark lighter
165.	Spark plug Spanner 14mmX18mmXsize
166.	Spirit level 2V 250, 05 metre
167.	Spring tension tester
168.	Stake grooving.
169.	Stake, hatchet
170.	Starter motor for tractor -different type
171.	Steel measuring tape 10 meter in a case
172.	Steel rule 15 cm inch and metric
173.	Steel rule 30 cm inch and metric
174.	Steel wire brush 50mm x150mm
175.	Stone, carborandum 15x 5 x 4 cm smooth and rough.
176.	Straight edge gauge 2 ft.
177.	Straight edge gauge 4ft.
178.	Stud extractor set of 3
179.	Stud remover with socket handle
180.	Surface gauge with dial test indicator plunger type i.e. 0.01 mm
181.	Tachometer (Counting type)
182.	Taps and Dies complete sets (5 types)
183.	Taps and wrench- Metric
184.	Telescope gauge
185.	Temperature gauge with sensor 0-100 deg c
186.	Thermostat
187.	Thread pitch gauge Metric

Sl. No.	Item With Specification
188.	Timing lighter
189.	Torque wrenches 5-35 Nm, 12-68 Nm, & 50-225 Nm
190.	Trammel 30 cm
191.	Turbocharger cut sectional view
192.	Type pressure gauge with holding nipple
193.	Universal puller for removing pulleys, bearings
194.	V' Block 75X38mm pair with clamps
195.	Vacuum gauge to read 0 to 760 mm of Hg.
196.	Valve lifter
197.	Valve spring compressor universal
198.	Vernier caliper 0-300 mm with least count 0.02 mm
199.	Vice grip pliers
200.	Voltmeter 50V/DC
201.	Water pump dismantling and assembling
202.	Wing compass 25 cm
203.	Wire gauge (metric)
204.	Work bench 250X120X60 cm with 4 vices 12 cm jaw
205.	3 furrow disc plough with scraper
206.	9 tine cultivator-spring loaded mounted type
207.	Arbor press hand operated 2 ton capacity
208.	Automotive exhaust 5 gas analyzer (petrol & Diesel) or -Diesel Smoke meter
209.	Bench lever shears 250 mm Blade X 3 mm capacity
210.	Discrete Component Trainer/Basic Electronic Trainer
211.	Drilling machine bench to drill up to 12 along with accessories
212.	Dual Magnetization Yoke: AC/HWDC, 230 VAC, 50Hz
213.	Gas Welding Table 1220 mm X760 mm
214.	Grinding machine (general purpose) D.E. pedestal with 300 mm dia wheels rough and smooth
215.	Liquid penetrant Inspection kit
216.	Multi scan tool with oscilloscope
217.	P.T.O. operated rotary lawn mower
218.	Pipe bending machine (Hydraulic type) 12 mm to 30 mm
219.	Pneumatic rivet gun with standard accessories
220.	Spring tension tester
221.	Tin smiths bench folder 600X1.6
222.	Tractor Diesel Engine 4 stroke for Dismantling and assembling with Trolley type portable single cylinder Air Compressor, 45 liter capacity Air Tank, and accessories,
223.	working at 6.5 kg/sq cm pressure
224.	Welding plant Oxy-Acetylene complete (high pressure)
225.	Welding transformer (150-300 Amps)
226.	Wheel type tractor fitted with diesel engine with standard accessories

Sl. No.	Item With Specification
227.	Automatic Transmission oils
228.	Battery-SMF
229.	Brake fluids
230.	Chalk, Prussian blue
231.	Chemical compound for fasteners
232.	Diesel
233.	Different type gasket material
234.	Different type of oil seal
235.	Drill twist (Assorted)
236.	Emery paper-36-60 grit,80-120
237.	Engine oil & Engine coolant
238.	Gear oil
239.	Hacksaw blade (consumable)
240.	Hand rubber gloves tested for 5000 v
241.	Holdes, lamps teakwood boards plugs sockets
242.	Hydrometer
243.	Lapping abrasive
244.	Leather Apron
245.	Petrol
246.	Power steering oil
247.	Radiators coolants
248.	Safety glasses
249.	Steel wire brush 50X150mm
250.	Engine spare parts
251.	Gloves for Welding (Leather and Asbestos)
XI	ELECTRICAL: AC & REFRIGERATION
1.	File flat rough double cut 200 mm
2.	File, half round fine double cut length 150
3.	File round fine double cut length 150 mm
4.	File flat fine double cut length 150 mm
5.	File square fine double cut length 150 mm
6.	File triangular fine double cut length 150 mm
7.	Scriber 150 mm length'
8.	Center punch length 100 mm
9.	Try square 150 mm
10.	Divider spring joint
11.	Caliper spring joint in side length 150 mm

Sl. No.	Item With Specification
12.	Caliper odd leg spring joint length 150 mm
13.	Hammer ball pain 220 gms
14.	Cold chisel flat and cross cut length 150 mm
15.	Engineers rule 300 mm long
16.	Tap measuring 10 m graduation in mm
17.	Pliers combination insulated length 200 mm
18.	Pliers long nose 200 mm
19.	Pliers flat nose 150 mm
20.	Line tester 500V heavy duty
21.	Tweezers 10 cm
22.	Surface plate 45X45 cms
23.	Oil can 500 ml
24.	Surface gauge universal 150 mm
25.	Bench vice 300 mm jaw
26.	Hack saw tubular metal frame adjustable 300mm
27.	Snip sheet metal straight nose 200 mm
28.	Snip sheet metal curved nose 200 mm
29.	Anvil 100X200 mm
30.	Stakes (different types) 100 mm
31.	Tin smith 400 mm
32.	Wooden mallet/Nylon mallet 500 gm good finish
33.	Round punch 3 mm, 4mm, 6mm
34.	Grover set 4 mm forming
35.	Electrical drill portable drill with chuck and key Capacity 6.4mm
36.	Tape measuring graduation in mm 2 mm
37.	Screw drivers, plastic handle 6 mm TIP length 100mm to 150mm
38.	Screw drivers, Plastic handle flat tip 10 mm TIP length 200mm & 250mm
39.	Philips screw drivers complete set in leather case
40.	Screw drivers plastic handle flat trip handle 3 mm Tip Length 100 150mm Insulator
41.	Soldering iron exchangeable copper tip 65 watts
42.	Knife folded stainless steel 150 mm
43.	Tong tester (clamp on multi meter) 0-10-30 amps 0-500 v
44.	Voltmeter AC/DC portable precision grade digital panel board type 0 to 500 volt
45.	Ammeter, AC/DC portable precision grade digital panel board type Belt 0 to 5 amp
46.	Ammeter, AC/DC portable precision grade digital panel board type 0 to 30amp
47.	Megger 1000V
48.	Wattmeter multi-range up to 1 kw
49.	Multimeter digital type
50.	Tenon saw 250 mm

Sl. No.	Item With Specification
51.	Firmer chisel 6,12,25 mm
52.	Rawal plug tool 6 mm
53.	K.W meter 0-1 kw
54.	Fire extinguisher ABC dry power type 2 kg capacity
55.	Fire buckets 10 liters
56.	D.E spanner 6-32 mm
57.	Ring spanner 6-32 mm
58.	Diagonal cutter 15 cm
59.	Service Oscillator
60.	C.R.O single beam 5 MHz
61.	C.R.O dual trace/Double beam 60 MHz
62.	A.F.O oscillators
63.	Tong close mouth and pick up
64.	Welding table for gas/Arc 1200X760
65.	Flaring tool set single type for tube 4.7 to 16 mm O.D
66.	Swaging tool, punch type, set of size for tube 4.7 mm to 16 mm O.D
67.	Swaging tool, screw type with adaptor set of size or tube 4.7 mm to 16 mm O.D
68.	Bending spring external type for copper tube 3 mm to 16 mm DIA
69.	Pipe cutter miniature for copper tube 3 mm to 16 mm DIA
70.	Pinch of tool for copper tube 6 mm to 18 mm DIA
71.	Ratchet spanner of 6.4 sq. mm reversible
72.	Capillary plug gauge
73.	Piercing pliers & reversing valve access fitting 6-18 mm
74.	Spanner double ended 4.7 mm to 16 mm
75.	Ring spanner off set 4.7 mm to 16 mm
76.	Wrench adjustable length 150 mm
77.	Wrench adjustable length 200 mm
78.	Wrench adjustable length 250 mm
79.	Valve key handle (Treated as consumable) 4.7 mm & 6.4 mm sq.
80.	Pressure gauge Digital type diameter 63 mm with recalibration set
81.	Compound gauge digital type diameter 63 mm, With Recalibration Set Screw, Scale Vacuum 76mm. Pressure 15 kg/sq.cm
82.	Service man thermometer in metal case -30 C to+ 30 C
83.	Scissor gasket cutting steel length 25 mm
84.	L-Allen key set sizes 1.5 mm to 6.4 mm
85.	T-Allen key set sizes 5/32" to 1/8"
86.	Pipe cutter with built in reamer and space cutter for copper tube 3mm to 32mm
87.	Pipe/Tube bender lever type 3-16
88.	Spanner double ended 19 mm to 31.8 mm
89.	Pipe wrench size 50 mm to 150 mm

Sl. No.	Item With Specification
90.	Gas leak detector for halogen gas
91.	Sling psychro meter mounted on aluminum back scale 50 C to +50 C
92.	Lapping plate 250 mmX200 mm
93.	Hammer ball peen 450 gms
94.	Puller 3 legged with flexible arm 300
95.	Hand blower portable complete 1/10 hp
96.	Spirit level precision metallic 200 mm
97.	Stop watch
98.	Tap set with matching drills 3 mm to 16 mm
99.	Tap set with matching drills 1/4"to 5/8"
100.	Refrigerant cylinder 2.5 kg
101.	Vernier caliper length 250 mm
102.	Micrometer outside measurement 0 to 25 mm
103.	Heating kit with infrared bulb (200 w capacity)
104.	Plumbing hammer weight 200 gm
105.	Multimeter analogue type
106.	Tachometer digital, multi 0 rpm to 3000 rpm range or table small size in leather case
107.	Micron vacuum gauge capable of reading up to 20 microns
108.	Sensor thermometer (digital) 50 degree Celsius to 150 degree 23 Celsius
109.	Fin straightened/fin comb with strong steel wire based combing on wood
110.	Filler gauge 0.05 mm - 1 mm
111.	Wire gauge metric and with worth steel plate embossing converse of British & Metric
112.	Digital thermometer remote control armored capillary dial 75 mm to 50 c to + 50 C
113.	Anemometer Digital type
114.	Compressor tester for small hermetic compressor Fixed With Electrical input/output
115.	Engineers square 150 mm with 5' tolerance
116.	Digital thermometer [Treated as consumable]
117.	Temperature & Humidity recorder capacity to record 24 hrs
118.	Instrumentation screw driver set 100 mm
119.	Digital weighing machine 100 kg
120.	Cylinder 134 a 5 kg
121.	Split phase induction motor 1/4 hp, 230V
122.	Capacitor start induction motor 1/2 hp, 230 V
123.	AC 3 phase motor, 400/50 Hz 2 hp
124.	Star delta starter 2 H.P
125.	Auto transformer starter 3 hp
126.	D.O.L starter 2 hp
127.	Portable air-LPC brazing kit 2 kg LPC cylinder torches, houses, stand make
128.	Oxy-acetylene welding set complete cylinder, regulator, welding torches with difference nozzles

Sl. No.	Item With Specification
129.	Refrigerator 165 L carrying with HFC-134a & HC
130.	Frost free refrigerator 200 L carrying with HC blend
131.	3/4 door refrigerator 300 L carrying with HC R-600a
132.	Bench drilling machine 20mm capacity 200-2500rpm
133.	Grinding machine 200 mm, 3000 rpm, Double ended 1/2 hp
134.	Evacuating and refrigerant charging station, consist of a) Rotary two stage vacuum pump and motor b) Manifold with gauges and valves, capable of pulling vacuum up to 50 microns of HG, and with provision of connecting to microns level vacuum gauge c) Graduated charging cylinder with provision for temperature correction and all necessary isolating valves (CAP.2 kg in lieu of (b) above with accuracy of +/-1 g for charging hydrocarbons) (d) Evacuating and charging station as above but fitted with weighing scale
135.	Two stage rotary vacuum pump capacity approx. 60 -10 rpm capable of evacuating up to 50 microns of Hg, and fitted with gas ballast, anti-pack valve and single phase motor
136.	Air compressor two stages for oil-less dry air, Rust proof tank assembly heater and controls, max. pressure 10 kgs/sq.m, capacity 45 ltr., Motor 1 Hp, Reciprocating compressor provision of capacity controls, etc. for demonstration Capacity 2 ton open type
137.	Dry N2 in cylinder 2 stage regular or commercial N2 in cylinder with drier unit and 2 stage regular 7 meter cube
138.	Window A.C 1 ton with R-22 or HFC blend reciprocating compressor
139.	Split A.C 1.5 ton with R134a or R-22 reciprocating compressor
140.	Duct able split A.C 1.5 ton with R 134a or R-22 reciprocating compressor
141.	Recovery unit with cylinder CFS & 134a
142.	Cassette air conditioner 4500 kcal/hr
143.	Descaling pump set with stainless steel impeller and housing, with 1/2 hp motor and accessories
144.	Fan coil unit with water valves (2&3 way)
145.	Shell and tube DX chillers (small) 5 ton with Cu tubing only
146.	Circulating water pump (small) 0.5 hp with stainless steel tank capacity 20 ltrs. Within let/outlet
147.	Shell and tube type condenser 5 ton
148.	Rotary hermetic compressor 2 ton
149.	Screw compressor 5 ton (Available 25ltr)
150.	Bottle cooler visible 200 L carrying with HFC 134 a & compressor
151.	Deep freezers 200 L carrying with HFC 134 a reciprocating compressor
152.	Water cooler storage type 200 L carrying with HFC134 a & reciprocating compressor
153.	Ice candy plant 2 ton capacity, with Forma tray stainless steel tank on a trolley
154.	Air conditioning direct/ indirect system with all controls incl. humidity, capacity 15000Kcal/hr
155.	Package A/C 5 ton capacity Air cooled type with open type compressor reciprocating type
156.	Car AC components (full kit) a) Wobble plate compressor with mounting brackets b) Serpentine evaporator c) Parallel flow condenser d) Hoses, tube, Receiver, Ex. Valve

Sl. No.	Item With Specification
157.	Electrical components & wiring harness
158.	CAR AC tutorial model
58.	Different type of body spoon
59.	Different type of dolly block
60.	Different type of finishing hammers
61.	Different type of pick hammers
62.	Digital thermometer
63.	Dividers 15 cm spring
64.	Door handle tool (clip pullers)
65.	Drift Punch Copper 15 cm
66.	Drill Point Angle Gauge
67.	Drill Twist 1.5mm to 15mm (various Sizes) By 0.5mm
68.	Electric Soldering Iron 230 V 60 watts 230 V 25 watts
69.	Electric testing screw drivers
70.	Engineer's square 15 cm Blade
71.	Feeler gauge 20 blades (metric)
72.	File flat 20 cm bastard
73.	File, half round 20 cm second cut
74.	File, Square 20 cm second cut
75.	File, square 30 cm round
76.	File, triangular 15 cm second cut
77.	Files assorted sizes and types including safe edge file (20 NOS)
78.	Flat File 25 cm second cut
79.	Flat File 35 cm bastard
80.	Garage rack
81.	Granite surface plate 1600X1000 with stand and cover
82.	Grease gun
83.	Grip Wrench 200mm
84.	Growel
85.	Hacksaw frame adjustable 20-30 cm
86.	Hammer ball Peen 0.75 kg
87.	Hammer Chipping 0.25 kg
88.	Hammer copper 1 kg with handle
89.	Hammer mallet
90.	Hammer Plastic
91.	Hand operated (i)for crimping up to 4 mm and (ii) for crimping up to 10 mm
92.	Hand remers adjustable
93.	Hand shear Universal 250 mm
94.	Hand vice - 37 mm

Sl. No.	Item With Specification
95.	Hollow Punch Set Of Seven Pieces 6mm to 15mm
96.	Insulated Screw drivers 20cmX9mm blade
97.	Insulated Screw drivers 30cmX9mm blade
98.	Interchangeable driver set
99.	Lead light
100.	Left cut snips 250 mm
101.	Lifting Jack Screw Type 3
102.	Magneto spanner set with 8 spanner
103.	Magnifying glass 75 mm
104.	Marking out table 90X60X90 cm
105.	Multimeter digital
106.	Oil can 0.5/0.25 liter capacity
107.	Oil stone 15X5X2.5 cm
108.	Outside micrometer 0 to 25 mm
109.	Outside micrometer 25 to 50 mm
110.	Outside micrometer 50 to 75 mm
111.	Outside micrometer 75 to 100 mm
112.	Panel assembly hold/support arms
113.	Panel cutter (two-way nibbler)
114.	Philips Screw Drivers set of 5 pieces (100 mm to 300 mm)
115.	Pipe cutting tool
116.	Pipe flaring tool
117.	Plastic feeler gauges
118.	Pliers combinations 20 cm
119.	Pliers flat nose 15 cm
120.	Pliers round nose 15 cm
121.	Pliers side cutting 15 cm
122.	Portable electric drill Machine
123.	Prick punch 15 cm
124.	Punch letter 4mm (number)
125.	Right cut snips 250 mm
126.	Rivet sets snap and Dolly combined 3mm, 4mm, 6mm
127.	Scraper flat 25 cm
128.	Scraper half round 25 cm
129.	Scraper Triangular 25 cm
130.	Scriber 15 cm
131.	Scriber with scribing black universal
132.	Set of stock and dies-Metric
133.	Shear Tin Man's 450X600mm

Sl. No.	Item With Specification
134.	Sheet metal cutting pliers-left, right hand and straight-jaw Configuration
135.	Sheet metal gauge
136.	Sher Tinmans 300 mm
137.	Soldering Copper Hatchet type 500 gms
138.	Solid Parallels in pairs (Different size) in Metric
139.	Spanner Clyburn 15 cm
140.	Spanner D.E. set of pieces (6mm to 32mm)
141.	Spanner T. flocks for screwing up and up screwing inaccessible
142.	Spanner, adjustable 15 cm
143.	Spanner, rings set of 12 metric sizes 6 to 32 mm
144.	Spanner socket with speed handle, T-bar, ratchet and Universal up to 32 mm
145.	Spark lighter
146.	Spark plug Spanner 14mm x 18mm x Size
147.	Sprit level 2 V 250 , 05 metre
148.	Steel measuring tape 10 meter in a case
149.	Steel rule 15 cm inch and metric
150.	Steel rule 30 cm inch and metric
151.	Steel wire Brush 50mm x 150 mm
152.	Straight edge gauge 2 ft.
153.	Stud extractor set of 4 ft.
154.	Stud extractor set of 3
155.	Stud remover with socket handle
156.	Suction cup
157.	Surface gauge with dial test indicator plunger type i.e. 0.01 mm
158.	Taps and Dies complete sets (5 types)
159.	Taps and wrench- Metric
160.	Telescope gauge
161.	Thread pitch gauge Metric
162.	Torque wrenches 5-35 Nm, 12-68 Nm, & 50-225 Nm
163.	Trammel 30 cm
164.	Trim and upholstery tool
165.	Type pressure gauge with holding nipple
166.	Universal puller for removing pulleys, bearings
167.	V' Block 75X38mm pair with clamps
168.	Vacuum gauge to read 0 to 760 mm of Hg.
169.	Vernier caliper 0-300 mm with least count 0.02 mm
170.	Vice grip pliers
171.	Voltmeter 50V/DC
172.	Wire gauge (metric)

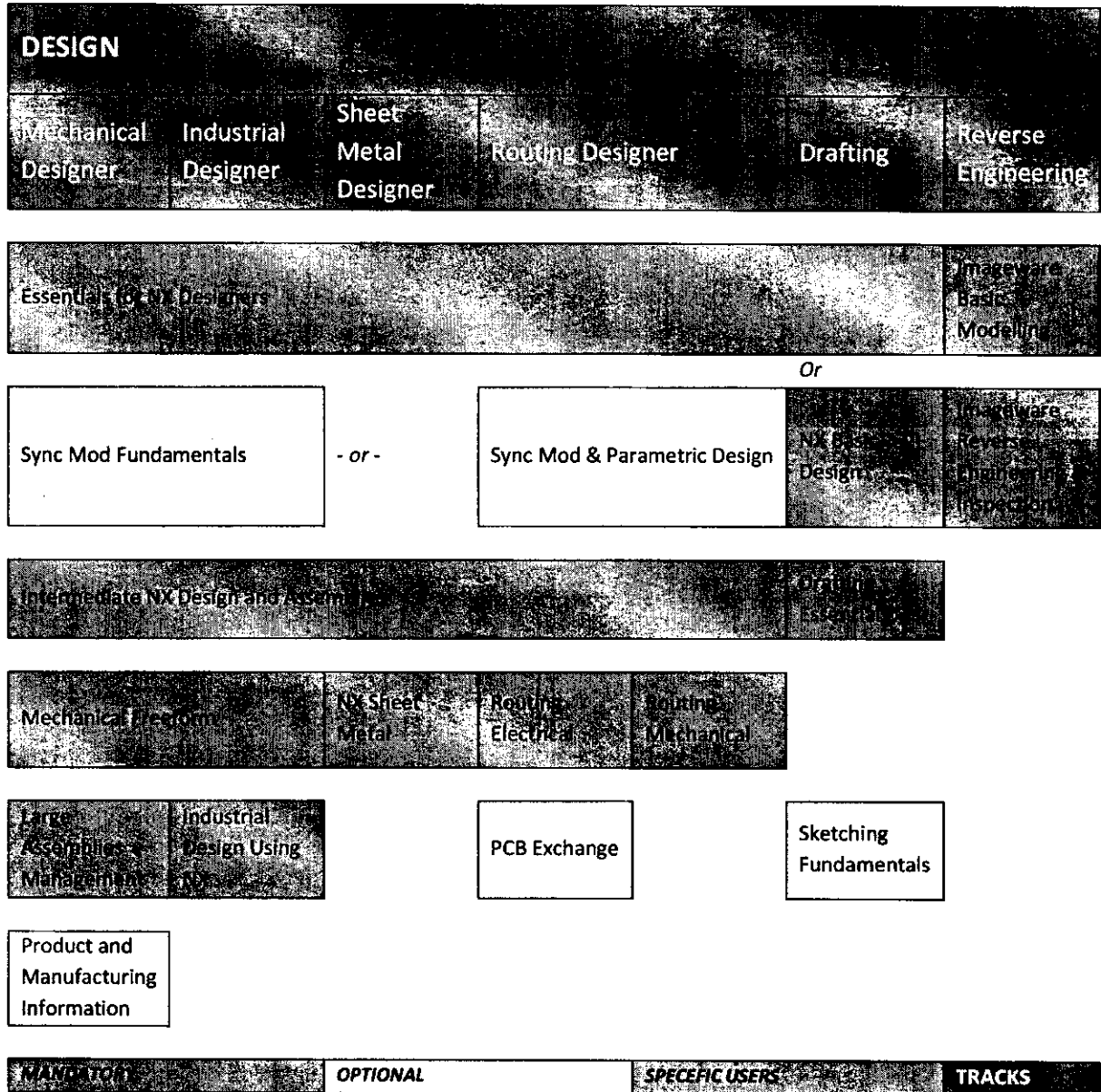
Sl. No.	Item With Specification
173.	Work bench 250X120X60 cm with 4 vices 12 cm jaw
174.	Angle grinder (10-12 cm)-for cutting and grinding
175.	Arbor press hand operated 2 ton capacity
176.	Belt sander (Narrow surface)
177.	Bench lever shears 250mm Blade x 3mm Capacity
178.	Body measurement tools – Gunsight, trammel gauge, 2m straight edge & Measuring tape
179.	Body repair hand tools – Various hammers, dollies, spoons, files, line chisel, hacksaw, clamps, & sanding blocks
180.	Body Shell for painting- light motor vehicle of different manufactures
181.	Bonded auto glass removal & replacement tools
182.	Caulking/ panel seam sealer/ panel adhesive application gun
183.	Chassis alignment equipment (incorporating measurement system)
184.	Compressed air line -10m (on retractable reel, with high flow connectors) with FRL unit
185.	Die Grinding kit
186.	Disc sander 18cm
187.	Discrete Component Trainer/ Basic Electronics Trainer
188.	Drilling Machine bench to drill up to 12mm dia along with accessories
189.	Dual Magnetization Yoke : AC/HWDC, 230 VAC, 50Hz
190.	Dust extraction connections (Vacuum)
191.	Electronic heat shrinking equipment (carbon rod, induction or copper)
192.	Gas Welding Table 1220mm x 760mm
193.	Grinding Machine (general Purpose) D.E Pedestal With 300mm Dia Wheels Rough And Smooth
194.	Hydraulic Jack HI-LIFT Type-3Ton Capacity, And %Ton Capacity
195.	Infrared drying lamp unit
196.	Liquid penetrant Inspection kit
197.	MIG welding machine complete set 400Amps
198.	Motor Vehicle suitable for Body hop repair- Light Motor Vehicle of different Manufactures
199.	OXY-acetylene welding equipment with complete accessories (Low & high)
200.	Pipe bending machine (Hydraulic type) 12 mm to 30 mm
201.	Plasma cutter
202.	Pneumatic rivet gun
203.	Power hacksaw kit
204.	Random /dual action orbital sander (12-15cm)
205.	Spot weld cutter- Drill type, Hole saw type
206.	Spot weld removal kit /drill along with accessories
207.	Spot welder (single and double sided)
208.	Tin smiths bench folder 600X1.6
209.	Trolley type portable single cylinder Air Compressor, 45 liter capacity Air Tank, and accessories, working at 6.5 kg/sq cm pressure
210.	Weld through primer application equipment

Sl. No.	Item With Specification
211.	Welding plant Oxy-Acetylene complete (high pressure)
212.	Welding transformer (200-400 Amps)
213.	Weld-on pin / ring panel puller kit
214.	Battery-SMF
215.	Brake fluids
216.	Chalk, Prussian blue
217.	Chemical compound for fasteners
218.	Diesel
219.	Different type gasket material
220.	Different type of oil seal
221.	Drill twist (Assorted)
222.	Engine oil & Engine coolant
223.	Emery paper-36-60 grit,80-120
224.	Gear oil
225.	Hacksaw blade (consumable)
226.	Hand rubber gloves tested for 5000 v
227.	HOLDERS, lamps teakwood boards plugs sockets
228.	Hydrometer
229.	Lapping abrasive
230.	Leather Apron
231.	Petrol
232.	Power steering oil
233.	Radiators coolants
234.	Safety glasses
235.	Steel wire brush 50X150mm
236.	Gloves for Welding (Leather and Asbestos)

Table 14: Learning Tracks at Siemens Centre of Excellence

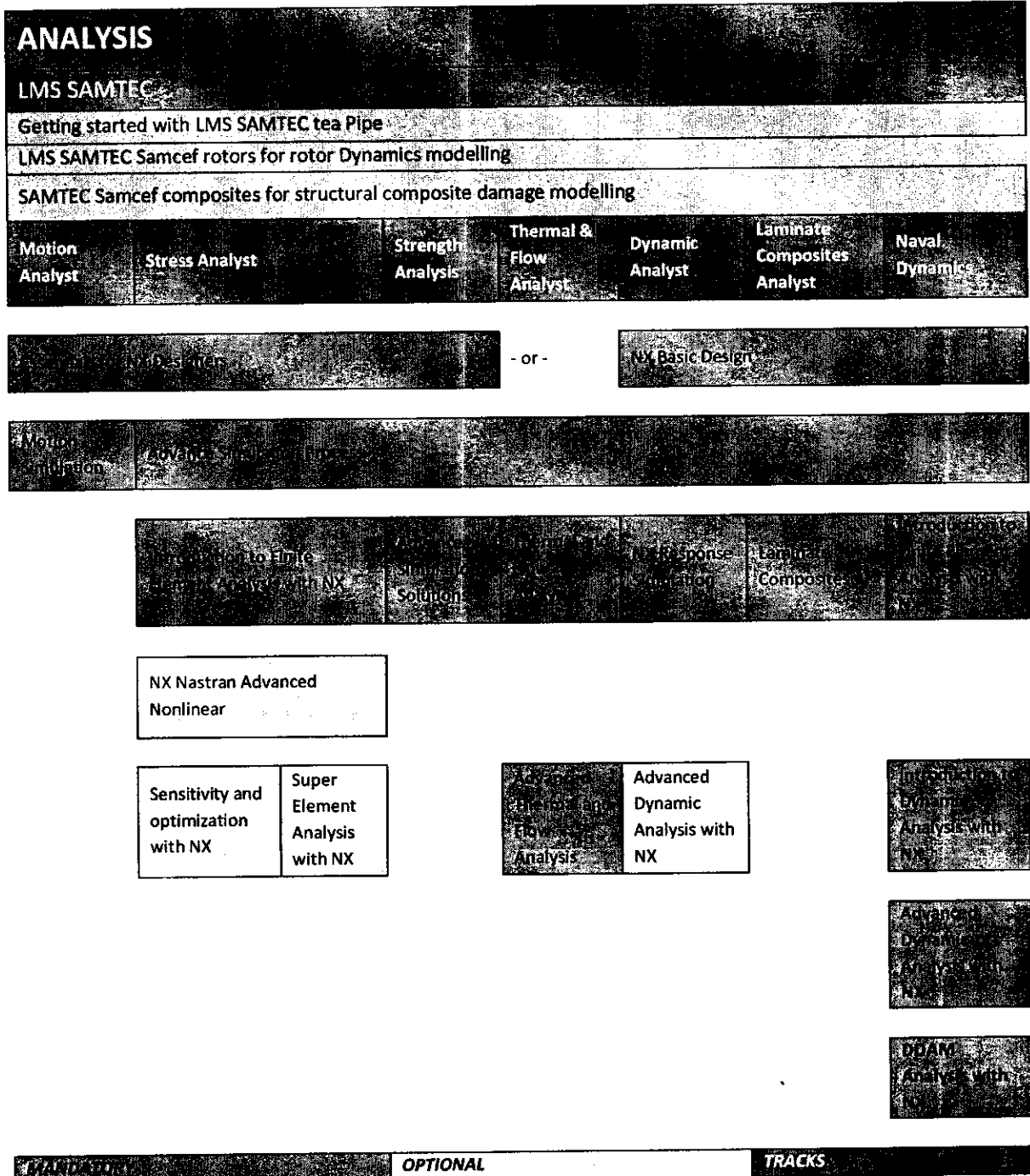
Stage	Phase	Learning Track
Product Lifecycle Management (PLM)	PLM Administration	Customization
		Administration
		Installation
	PLM Usage	Visualization Analyser
		PLM Mfg. Part Planning
		PLM Mfg. Assembly Planning
		PLM Requirements
		PLM Project
		PLM CAD User
		PLM Consumer
PLM Author		
Manufacturing	Simulation	Plant Simulation
	Robotics	Arc Welding
		Paint Automation
		Spot Welding
	Process Simulation	Robotics Simulation
		Human Simulation
		Part Flow Simulation
	Process Design	Body-in-White Process Planner
Mfg. Assembly Process Planner		
Machining	Quality	CMM
	Part & Tool Machining	CNC Programmer Lathe
		CNC Programmer Multi-axis
		CNC System Admin
Tooling	Tool Design	Mold Designer
		Progressive Die Designer
Validation	CAE	Aero Dynamics
		Laminate Composites Analyst
		Dynamic Analyst
		Thermal & Flow Analyst
		Strength Analysis
		Stress Analyst
	Motion	Motion Analyst
Design	Detailing	Drafting
		Routing
	Modelling	Sheet-metal
		Mechanical
		Concept

Table 15: Learning Tracks for Design



Learning tracks start from the top and progress downward.

Table 16: Learning Tracks for Validation



Learning tracks start from the top and progress downward.

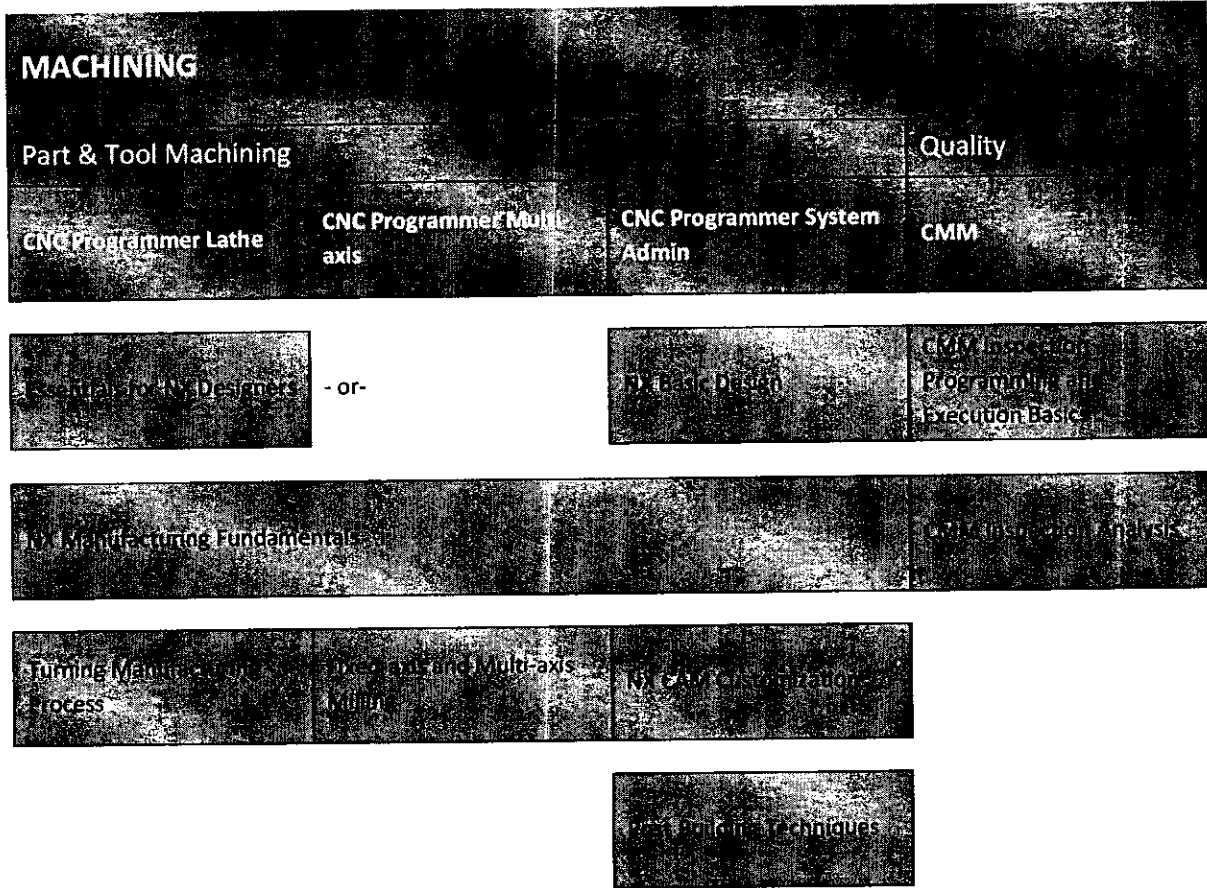
Table 17: Learning Tracks for Tooling

TOOLING	
Mold Designer	Progressive Die Designer
Essential for NX Designers	
Sync Mod Fundamentals - or - Sync Mod & Param Design	
Intermediate NX Designers	
Advanced NX Designers	
	NX Sheet Metal
Advanced NX Design Process	Advanced Die Design

MANDATORY	OPTIONAL	TRACKS
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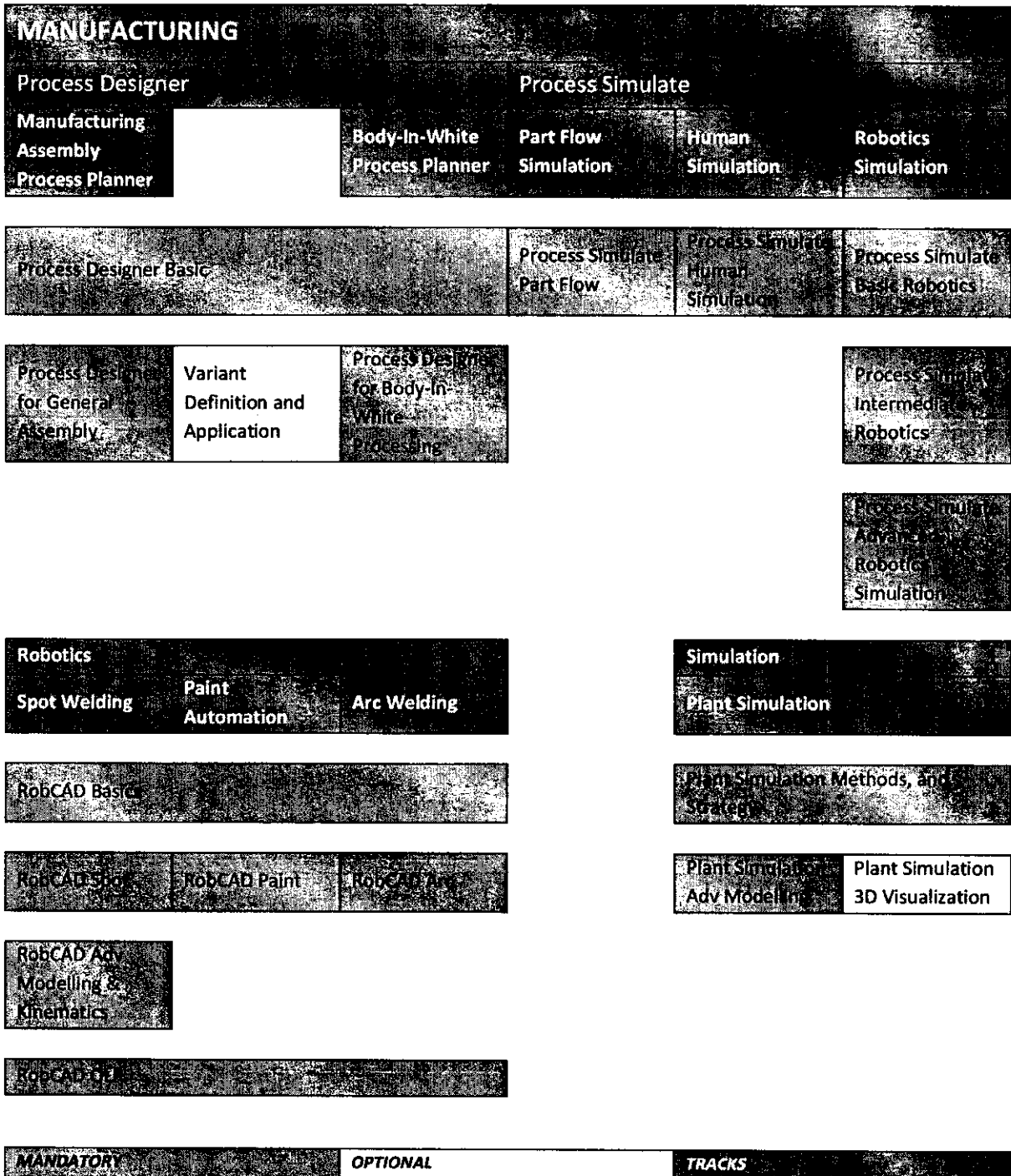
Learning tracks start from the top and progress downward.

Table 18: Learning Tracks for Machining



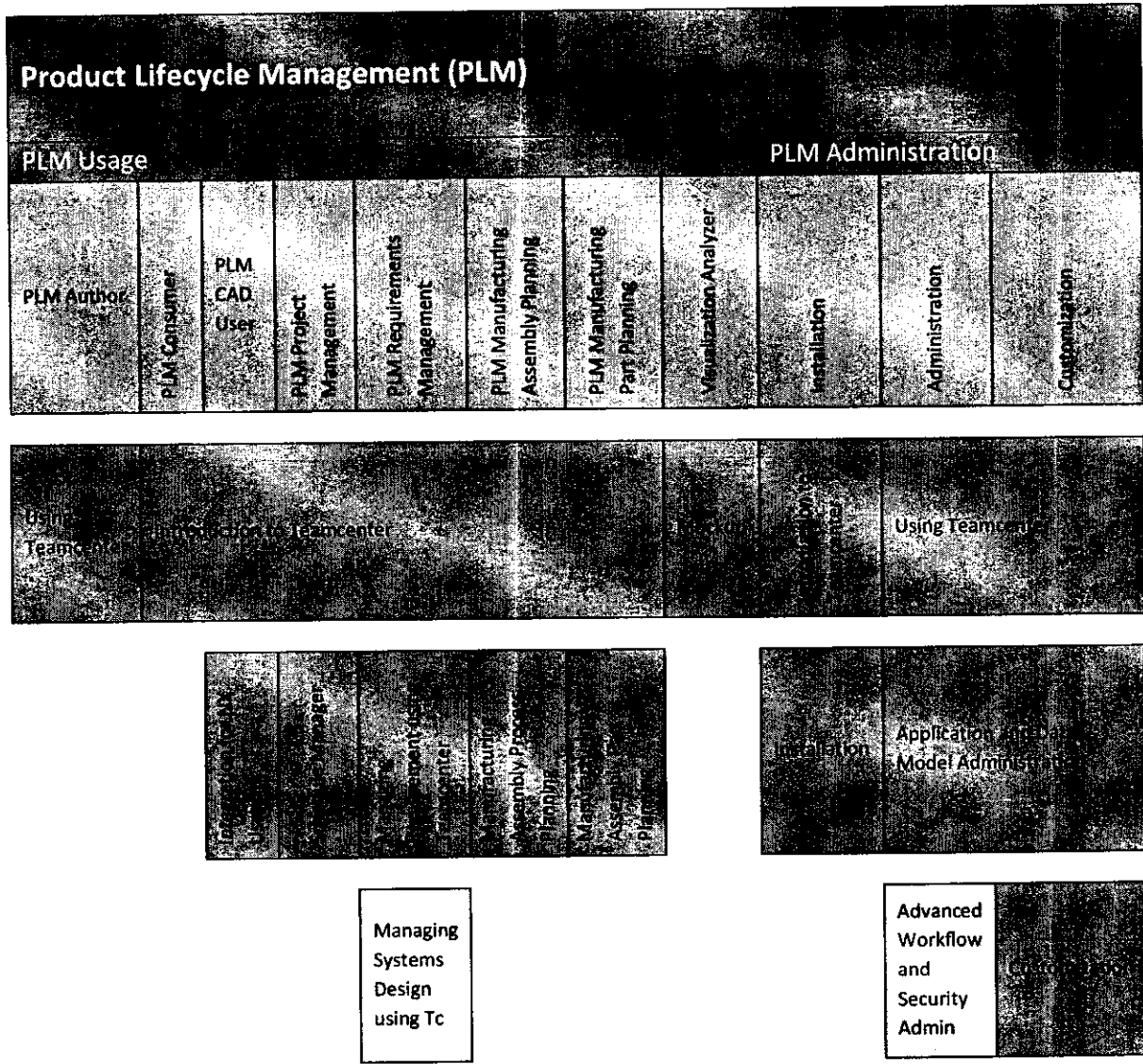
TRACKS
Learning tracks start from the top and progress downward.

Table 19: Learning Tracks for Manufacturing



Learning tracks start from the top and progress downward.

Table 20: Learning Tracks for PLM



MANDATORY **OPTIONAL** **SPECIFIC USERS** **TRACKS**

Learning tracks start from the top and progress downward.

Table 21: Learning Tracks for LMS Imagine. Lab

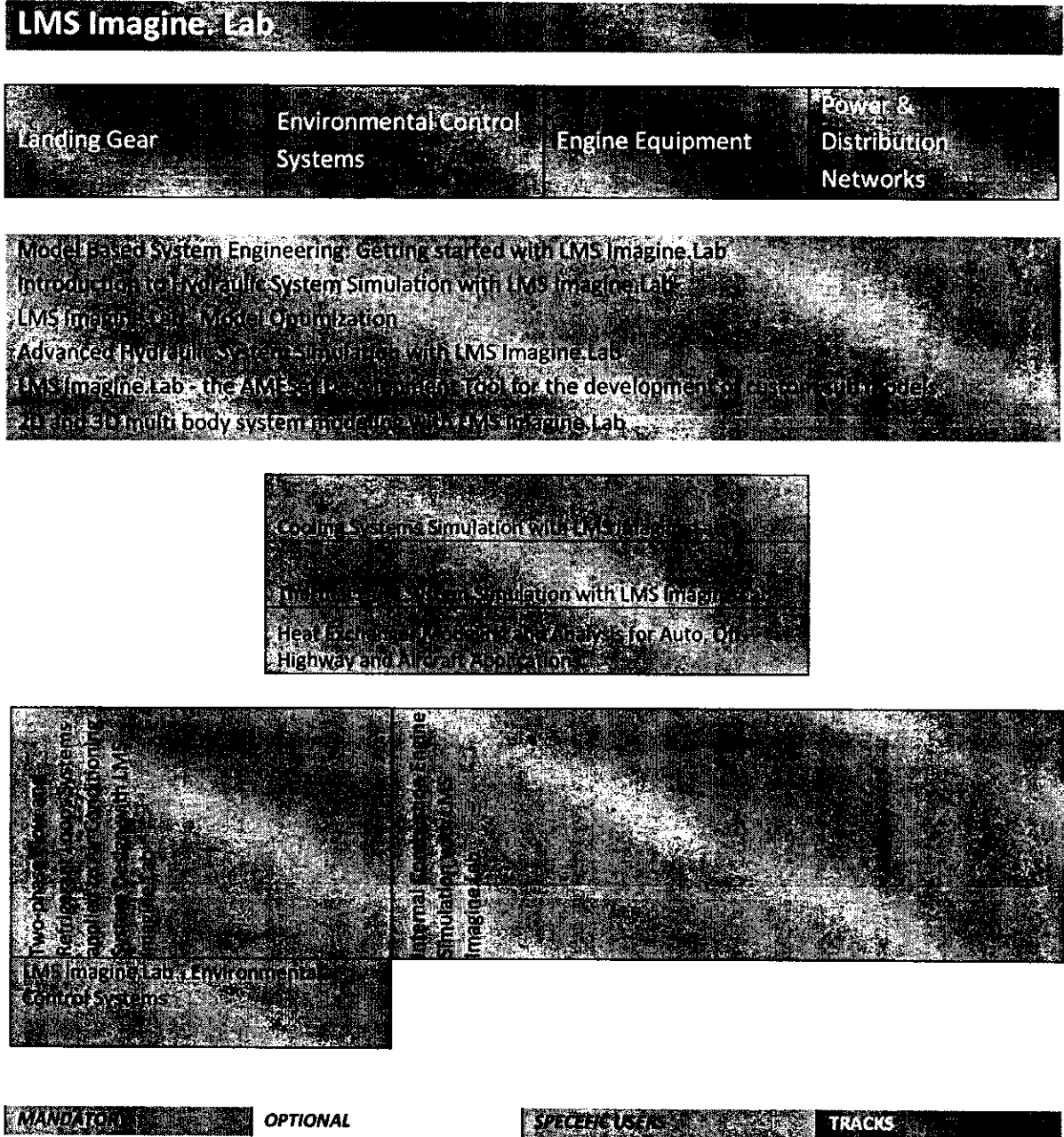


Table 22: Learning Tracks for LMS Test. Lab

LMS Test. Lab			
Structures & GVT Structural Dynamics Testing	Acoustics & General Dynamics Data Acquisition	Rotation & Turbine Testing	Vibration Control Environmental Testing & Durability Engineering
LMS Test Lab Structures Model Testing and Analysis	LMS Test Lab Acoustic Testing and Analysis	LMS Test Lab Machinery - Basic (Understanding the Signature of	LMS Test Lab Environmental Testing Vibration Control
LMS Test Lab Structures Model Testing and Analysis - Advanced	LMS Test Lab Sound Quality Testing and Engineering	Machinery (Angle Dome Processing)	LMS Test Lab Environmental Testing - Vibration Control
	LMS Test Lab Path Analysis - Multi- Info System Dynamics with Test Based Engineering		LMS Test Lab Data Acquisition
			Data Processing

Mandatory **OPTIONAL**

Learning tracks start from the top and progress downward.

Specific User **TRACKS**

Table 23: Learning Tracks for LMS Virtual. Lab

LMS Virtual.Lab			
Motion Durability	Acoustics Noise & Vibration	Correlation & Updating	Optimization
LMS Virtual.Lab Motion - 3D Dynamic Simulation using multibody simulation	LMS Virtual.Lab Acoustics - Acoustic Simulation in FEM	LMS Virtual.Lab Correlation - Insight to Improve FEA Simulation processes	
	LMS Virtual.Lab Acoustics - Advanced Modal Analysis Methods in FEM		
	LMS Virtual.Lab Noise & Vibration - NVH System Simulation		
	LMS Virtual.Lab Correlation - Ray Tracing Applications		

MANDATORY **OPTIONAL** **SPECIFIC USERS** **TRACKS**

Learning tracks start from the top and progress downward.

Table 24: Learning Tracks for Automation Lab

Automation Lab	
Basics of PLC	Basic Scada
<ul style="list-style-type: none"> Conducting a PLC How to work with PLC PLC Work Introduction to HW PLC blocks and structured programs Using Data blocks User Organization Blocks Overview of SIMATIC PLC Design and Graphics displays for human-machine interaction Background processing (Introduction of Global) Access for logging 	

MANDATORY **OPTIONAL** **SPECIFIC USER** **TRACKS**

Learning tracks start from the top and progress downward.

Table 25: Learning Tracks for Electrical Lab

Electrical Lab			
Basic Course on AC - DC Drives	Basic Power Systems	Basics of Induction Motors	Low Voltage Switch gear
DC Motor Basics	Basic Of power distribution	Basics of Electricity	Simulink Curve simulation
DC Drive Basics	Philosophy of Generation distribution in LV, MV & HV	Efficiency of induction motor - various losses in the induction	Low Voltage preferences in Power Distribution in Industry today
Siemens DC Drive (GR180)	Types of network	Product selection in Siemens motor	DIN Fuse - Importance of fuse
AC Motor Basics	Faults & Fault level calculations	Advance control of induction motor - SIMOCODE overview	EMV - why it matters
AC Drives Basics	Basic Of protection	Speed control	Overhead Relay
AC Drives (Sinamics S & G) Ratings	Types of Faults	Characteristics of motor supply variations over motor performance	Overhead Relay
MEDIUM VOLTAGE MV Transformers			

MANDATORY **OPTIONAL** **SPECIFIC USER** **TRACKS**

Learning tracks start from the top and progress downward.

Table 26: Learning Tracks for Process Instrumentation Lab

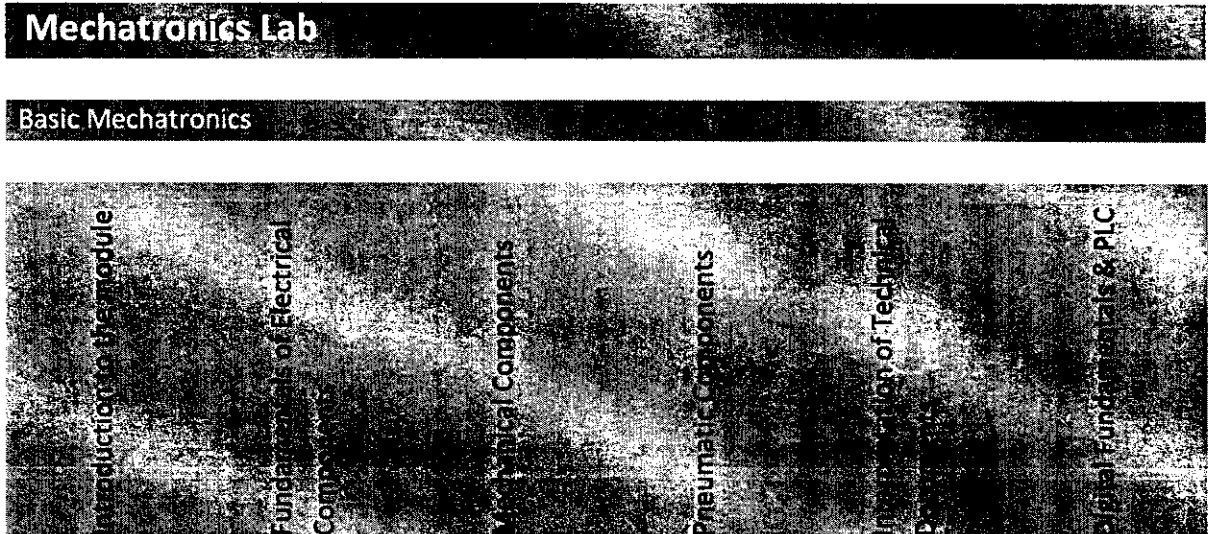
Process Instrumentation Lab					
Basic of Process Instrumentation			SIMATIC PCS 7 Basics		
FLOW measurement	LEVEL measurement		Introduction to standard architecture of PCS 7	Introduction to Automation System Hardware	
PRESSURE Measurement	TEMPERATURE Measurement	ELECTRO-PNEUMATIC CONTROL	Working with SIMATIC Manager in PCS 7 environment	Configuring Hardware (AS 309)	Working with SIMATIC Hierarchy

MANDATORY **OPTIONAL**

Learning tracks start from the top and progress downward.

SPECIFIC USERS **TRACKS**

Table 27: Learning Tracks for Mechatronics Lab



MANDATORY **OPTIONAL** **SPECIFIC USER** **TRACKS**

Learning tracks start from the top and progress downward.

Table 28: Learning Tracks for Robotic & CNC Machine Lab

Robotic Lab		
Robotic Pick & Place	Robotic Arc Welding	Robotic Spot Welding
Introduction to Industrial Robots & Robotic Applications		
Safety & Precautions while operating a Robot		
Robot Controller/PLC Operations		
BUS Configuration & Robotics		
Basic Maintenance & Repair activities		
Robotic Cell Creation		
Robotic Teach/Offline Programming		
Robotic Offline Programming (using AutoCAD/MS Robotics)		
Robotic Material Handling Application Training	Robotic Arc Welding Application Training	Robotic Spot Welding Application Training
CNC Machine Lab		
Machinist & Milling	Turner	
Basic tool and information		
Safety precautions		
Basic information of turning tool & parts		
Making jobs within accuracy & how to cut		
Using measuring instruments & Operating the milling machine	Using measuring instruments & Operating the lathe machine	
Accuracy in angular & fitting jobs with tolerance	Turning/Drilling/Reaming Operations	
Modern subjects & cutting applications		
CNC Programming and Operations		
Introduction to CNC		
Safety & Precautions		
Basic Information of CNC		
CNC Programming		
CNC Operations		

Programming procedure/ Co-ordinate system
Advantages & disadvantages of CNC; Differences in NC & CNC Machine; Symbols & Units
Introduction to programming; G Code & M Code listing
CNC Structure, DNC, offset and tool length compensation
Tooling and Indexing
Simulate in Operate & Sinumerik- 808 (Milling, Turning)

CAD & CAM - Basic Training
CAM - Advance Training

MANDATORY

OPTIONAL

SYNOPSIS

TRACKS

Learning tracks start from the top and progress downward.

Table 29: Learning Tracks for Energy Lab

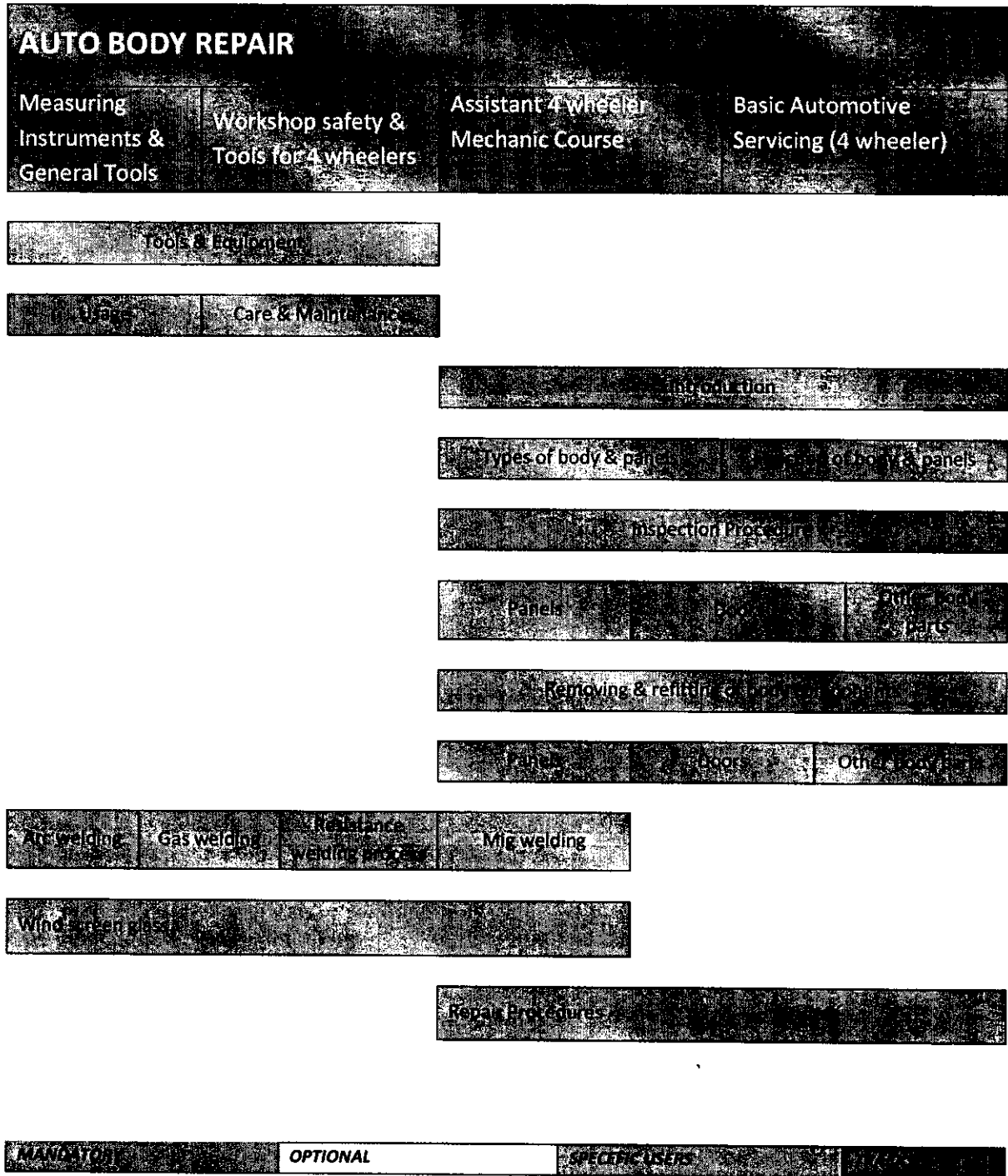
Energy Management Lab			
Basic Power System & Protection	SIRIUS Motor Management Systems (SIMOCODE)	PAC Meter	SINAMICS G120 drive system
Basic Of power distribution	SIMOCODE-PRO	PAC 3100	Basics of energy management
Philosophy of Generation distribution in LV, MV & HV	Basics of energy management	PAC 3000	Energy Management Solution
Types of network	Energy Management Solution	PAC 2000	PAC Meter
Faults & Fault level calculations	Energy Management Solution	Introduction to Powerconfig	Integration with automation system
Basic of protection			Introduction to energy management
Types of protection			Introduction to Energy manager software
Power products range overview			
Single Drive simulation			

MANDATORY **OPTIONAL**

SPECIFIC USER **TRACKS**

Learning tracks start from the top and progress downward.

Table 30: Learning Tracks for Auto Body Repair



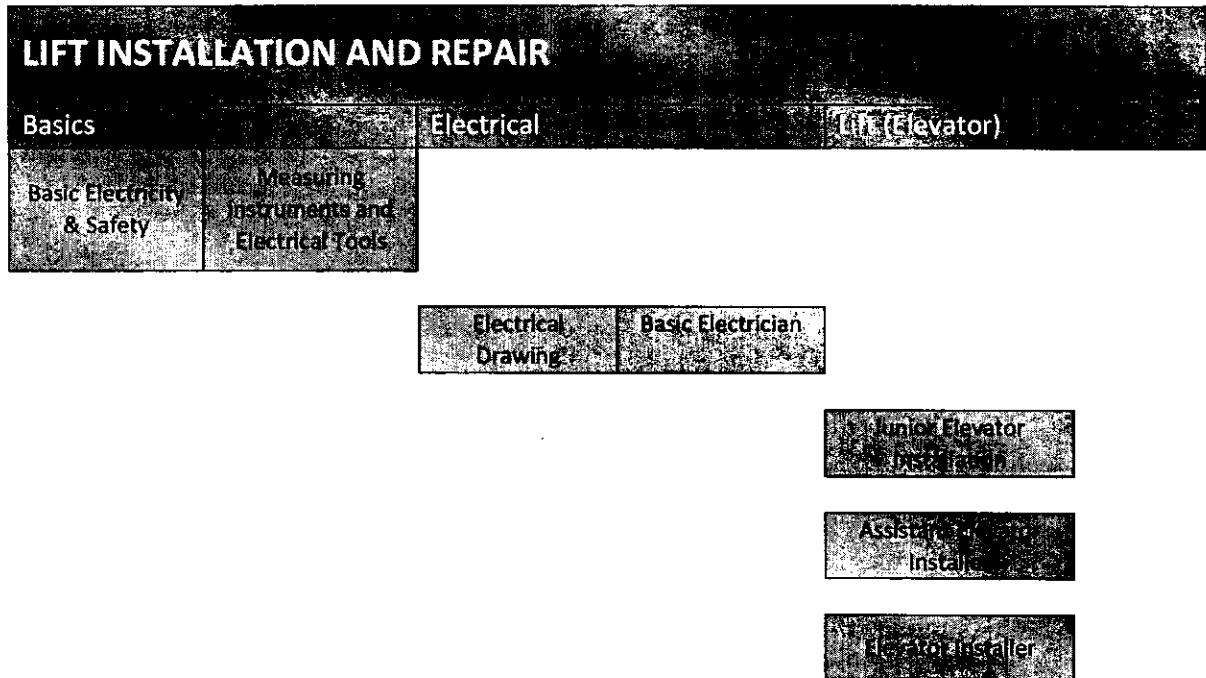
Learning tracks start from the top and progress downward.

Table 31: Learning Tracks for Auto Body paint

AUTO BODY PAINT				
Measuring Instruments & General Tools	Workshop safety & Tools for 4 wheelers	Assistant 4 wheeler Mechanic Course	Basic Automotive Servicing (4 wheeler)	Auto Body Repair
Introduction to body painting				
Selection of consumable		Material used for painting		
Painting Equipment				
Specialty	Auto design	Different Nozzles	Painting Equipment	
Application & Inspection				
Procedure of Painting				
Possible defects in painting, causes and its remedy				
MANDATORY	OPTIONAL	CREDITABLE		

Learning tracks start from the top and progress downward.

Table 32: Learning Tracks for Lift Installation and Repair



MANDATORY	OPTIONAL	SPECIFIC USERS
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Learning tracks start from the top and progress downward.



Table 33: List of Courses Offered at Siemens Centres of Excellence

S. No.	Domain	Course Name	Hours	Curriculum
1	CAD	Essentials for Designers	40	<ul style="list-style-type: none"> • User interface • Sketching • Shell • Datums • Blending • Chamfers • Assembly constraints
2	CAD	Sketcher Fundamentals	16	<ul style="list-style-type: none"> • Sketching in Modelling • Sketch task environment • Creating sketches • Constraining sketches • Projecting • Offsetting • Patterning sketch curves
3	CAD	Synchronous Modelling Fundamentals	10	<ul style="list-style-type: none"> • Modelling modes • Switching Modes • History-free mode • Dimension commands • Pattern Face • Replace Face
4	CAD	Sheet-metal	25	<ul style="list-style-type: none"> • Documenting design intent • Editing parametric models • Associative curve operations • Blending techniques
5	CAD	Advanced Assembly Design	40	<ul style="list-style-type: none"> • Assembly functions • Part Families • Top/down assembly Modelling • Assembly Arrangements • Interpart Modelling • Variable and Overflow blends
6	CAD	Drafting Essentials	25	<ul style="list-style-type: none"> • Create and edit drawings • Create and edit orthographic section • Create and edit symbols • Geometric tolerance symbols • User-defined view boundaries
7	CAD	Class A Free Form Modelling	40	<ul style="list-style-type: none"> • Spline interfaces • Degree • segments and continuity • Bridge curves • Intersection curves • Offset curves • Curve Analysis • Free Form Surfaces • Face Analysis

S. No.	Domain	Course Name	Hours	Curriculum
				<ul style="list-style-type: none"> • Patch Body
8	CAD	Engine Design	35	<ul style="list-style-type: none"> • Spline review • Creating splines • Studio splines, • Construction and reference geometry • Working with raster images • Curve tools
9	CAD	Intermediate Design & Assemblies	40	<ul style="list-style-type: none"> • Assembly functions • Part Families • Top/down assembly Modelling • Assembly Arrangements • Interpart Modelling • Variable and Overflow blends
10	CAE	Advanced Simulation	60	<ul style="list-style-type: none"> • Thermal Simulation • Flow Simulation • Motion Simulation-RecurDyn • Advanced Thermal Simulation • Space Systems Thermal Simulation • Electronic Systems Cooling Simulation • Advanced Durability • Motion Flexible Body
11	CAE	Composite & Aero Structure Assembly	40	<ul style="list-style-type: none"> • Laminate Composites • FiberSIM Composites • SynchroFit • Advanced Durability
11	CAM	Manufacturing Fundamentals	25	<ul style="list-style-type: none"> • Mill holes • Smooth Face Mill tool paths • Avoid tool holder collision • Create milling tools and tool holders • Mill with a chamfer tool
12	CAM	Turning Manufacturing Process	25	<ul style="list-style-type: none"> • Complete Integrated test cut • Probe and finish cut operation in turning
13	PLM	TCUA - Using TC	35	<ul style="list-style-type: none"> • Overview terms and concepts • Rich client user interface • Locate, view • Report on product data • Locate and view visualization data • Perform basic mark-up
14	PLM	TCUA - Installation	35	<ul style="list-style-type: none"> • Common Licensing Server • Corporate server installation • File Management System • Installation of the Business Modeller IDE • Administering the in-production system
15	PLM	TCUA - Integration for NX Users	10	<ul style="list-style-type: none"> • NX data creation • Storage, access, edit, and sharing • Teamcenter capabilities in NX • NX data structure and management • Sharing data • Working in a shared assignment
16	PLM	TCUA - Data Model Administration	15	<ul style="list-style-type: none"> • Business Modeller IDE process • Business objects and properties • Lists of values, Options, constants, and rules

S. No.	Domain	Course Name	Hours	Curriculum
17	PLM	TCUA - Application & Data Model Administration	40	<ul style="list-style-type: none"> • Business Modeller IDE process • Business objects and properties, Options, constants, and rules • Users, groups, and roles, Data Security
18	DM	Tecnomatix – Process	150	<ul style="list-style-type: none"> • Introduction to the Process Designer interface • Working with nodes and creating links • Productivity Tools • Process Designer environment • Searching, Querying, and filtering
19	DM	Tecnomatix – RobCAD	150	<ul style="list-style-type: none"> • Introduction to the Robcad environment • Workcell layout, Modelling and kinematics • Process design and simulation • CAD Integration and transition • Arc • Oip • Paint • Spot
20	DM	Tecnomatix – Flow	150	<ul style="list-style-type: none"> • Procedures for basic FactoryFLOW calculations • Analysing aisle congestion • activity equations and templates • FactoryFLOW data structure • Layout drawing for analysis • Creating routes, Material handling requirements
21	Automation	Basic Automation 1	50	<ul style="list-style-type: none"> • Constituents of PLC • How PLC Work • SIMATIC S7-PLC
22	Automation	Basic Automation 2	50	<ul style="list-style-type: none"> • Terms in communication • RS 232 and RS 485 • Profibus – DP • Drive and PLC over Profibus DP network • PROFINET Communication
23	Electrical	Basic Course on Ac – DC Drives	50	<ul style="list-style-type: none"> • DC Motor Basics • DC Drives Basics • Siemens DC Drives (6RA80) • AC Motor Basics • AC Drives Basics • AC Drives (Sinamics S & G)-Ratings • MEDIUM VOLTAGE • MV Transformers
24	Mechatronics	Basic Mechatronics	50	<ul style="list-style-type: none"> • Introduction to the module • Fundamentals of Electrical Components • Mechanical Components • Pneumatic Components • Interpretation of Technical Documents • Digital Fundamentals & PLC
25	Process Instrumentation	Basic of Process Instrumentation	50	<ul style="list-style-type: none"> • Basics of power distribution • Basics of power distribution • Moulded case circuit breakers • DIN Fuse • Pac meter • Overload Relay



Table 34: Automotive

S. NO.	LEVEL		POD NAME	SUB POD NAME
1	Basic	Automotive	Measuring Instruments & General Tools	
2	Basic	Automotive	Workshop safety & Tools for 2 wheelers	
3	Basic	Automotive	Workshop safety & Tools for 4 wheelers	
4	Basic	2 wheeler	Assistant Motorcycle Mechanic Course	
5	Basic	2 wheeler	Assistant Scooter / Moped Mechanic	
6	Intermediate	2 wheeler	Basic Automotive Servicing (motorcycle)	
				6.1 Motorcycle Inspection
7	Intermediate	2 wheeler	Basic Automotive Servicing (scooter/moped)	
8	Intermediate	2 wheeler	Repair & Overhaul of Scooter / Moped	
9	Advance	2 wheeler	Automobile Electrical system (2wheeler)	
10	Advance	2 wheeler	Automobile Electronic system (2wheeler)	
11	Advance	2 wheeler	Repair & Overhauling of Motorcycle	
				11.1 Engine Service
12	Basic	4 wheeler	Assistant 4 wheeler Mechanic Course	
13	Intermediate	4 wheeler	Basic Automotive Servicing (4wheeler)	
				13.1 Vehicle Inspection
				13.2 Wheel Alignment & Balancing
				13.3 Minor Repair of Auto Body
14	Intermediate	4 wheeler	Repair & Overhaul of Chassis (LMV)	
15	Intermediate	4 wheeler	Repair & Overhauling of Chassis (HMV)	
16	Intermediate	4 wheeler	Automobile Electrical system (4wheeler)	
17	Intermediate	4 wheeler	Automobile Electronic system (4wheeler)	
18	Intermediate	4 wheeler	Auto body repair, denting & painting	
19	Advance	4 wheeler	4 wheeler Expert Mechanic Course	
				19.1 Engine Service
				19.2 Auto Body Painting
				19.3 Diesel Fuel injection Technician
				19.4 Control Technology (Light Vehicles)
20	Advance	4 wheeler	Repair of Auto Air Conditioning system	
21	Advance	4 wheeler	Automotive Sensor Technology	
22	Advance	4 wheeler	Repair Overhaul of Engine System (Petrol)	
				22.1 Engine Technology
				22.2 Engine Management
23	Advance	4 wheeler	Repair Overhaul of Engine System (Diesel)	
				23.1 Engine Technology
				23.2 Engine Management
24	Advance	4 wheeler	Transmission systems	
				24.1 Transmission Technology (Light Vehicles)
				24.2 Electronic Control Transmission

Table 35: Electrical

S. NO.	LEVEL	POD NAME	SUB POD NAME
1	Basic	Basics Electricity & safety	
			1.1 Earthing
2	Basic	Measuring instruments and electrical tools	
3	Basic	Electrical Drawing	
4	Basic	Basic Electrician	
			4.1 Electrical Circuits
			4.2 Crimping
			4.3 Electro technology I
5	Basic	Electric Motors	
			5.1 Motor control
			5.2 Starters
6	Basic	Electronic Choke & CFL Assembling	
7	Basic	Repairing of Home appliances	
			7.1 Repair, Maintenance of Steam iron
			7.2 Installation, Maintenance of Water heater
			7.3 Installation, Repair, Maintenance of washing machine
			7.4 Installation, Repair, Maintenance of microwave oven
			7.5 Repair, Maintenance of Mixer Grinder, Food Processor
			7.6 Installation, Maintenance of Water purifier
			7.7 Repair, Maintenance of Ceiling Fan, Table Fan
			7.8 Repair, Maintenance of Electric Kettle
			7.9 Repair, Maintenance of Dish Washer
			7.10 Repair, Maintenance of water coolers
			7.11 Repair, Maintenance of air coolers
8	Basic	House Wiring	
9	Basic	Repair of Electrical Power Tools	
10	Basic	Basic winding	
			10.1 Rewinding of AC/DC Motors
			10.2 Armature Winding
11	Basic	Maintenance of Batteries	
12	Basic	Junior Assistant – Elevator Installation	
13	Basic	Escalator mechanic	
14	Basic	Installation, Maintenance of Air-conditioner – Consumers	
15	Basic	Installation, Maintenance of Refrigerator - Consumers	
16	Intermediate	Transformer winding	
17	Intermediate	Cables and Industrial Equipment (Inverter, Lead Acid Battery & Operation of DG set)	
18	Intermediate	Electrical Equipment Maintenance	
19	Intermediate	Assistant Elevator Installation mechanic	
20	Intermediate	Escalator mechanic	
21	Intermediate	Installation, Maintenance of Air conditioner - Industrial	
22	Intermediate	Installation, Maintenance of Refrigerator - Industrial	
			22.1 Repair, Maintenance of Deep Freezers
23	Advance	Industrial Wiring	

S. NO.	LEVEL	POD NAME	SUB POD NAME
			23.1 Electrical Installations and Design
			23.2 Industrial Systems and Network Cabling
			23.3 Electro technology II
			23.4 Electro technology III
24	Advance	Elevator Installer	
25	Advance	Escalator expert mechanic	
26	Advance	Service, Maintenance of Air Conditioning Plant	
27	Advance	Repairing of Auto Air Conditioning System	

Table 36: Production, Manufacturing & Fabrication

S. NO.	LEVEL	SECTOR	POD NAME	SUB POD NAME
1	Basic	PMF	Safety	Work Place Personal Safety
2	Basic	PMF	Measuring Instruments, Equipment, General Tools	
3	Basic	Fabrication	Basic Fitting Work	
4	Basic	Fabrication	Basic Sheet Metal Work	
5	Basic	Fabrication	Basic Welding	5.1 Gas Welding 5.2 Arc Welding
6	Basic	Fabrication	Gas Cutting	
7	Intermediate	Fabrication	TIG Welding	
8	Intermediate	Fabrication	Structural Fabrication	
9	Intermediate	Fabrication	Pipe Fabrication	
10	Advance	Fabrication	MAG/ CO2 Welding	
11	Advance	Fabrication	Pipe welding (TIG & ARC)	
12	Basic	Prod.- Mfg.	Turning	
13	Basic	Prod.- Mfg.	Milling	
14	Basic	Prod.- Mfg.	Grinding	14.1 Surface Grinding 14.2 Cylindrical Grinding
15	Basic	Prod.- Mfg.	Basics of Forging Technology & Process	
16	Basic	Prod.- Mfg.	Machinist-Operator	16.1 Drilling & Boring
17	Basic	Prod.- Mfg.	Quality control	
18	Intermediate	Prod.- Mfg.	Die Manufacturing, Inspection of Die & Handling	
19	Intermediate	Prod.- Mfg.	Machinist	
20	Advance	Prod.- Mfg.	Turning	20.1 Automatic turning 20.2 Advance turning
21	Advance	Prod.- Mfg.	Advance Milling	
22	Advance	Prod.- Mfg.	Advanced Forging Technology & Heat Treatment	
23	Advance	Prod.- Mfg.	Professional machinist	
24	Basic	CNC	Basic CNC Programming & Operation	23.1 Knowledge of CNC, CNC programming
25	Basic	CNC	Basic CNC PROGRAMMING - LATHE	24.1 Introduction To CNC Technology

S. NO.	LEVEL	SECTOR	POD NAME	SUB POD NAME
				24.2 Introduction To NC Programming
26	Basic	CNC	Basic CNC PROGRAMMNG - MILLING	
				26.1 Introduction To CNC Technology
				26.2 Introduction To NC Programming
27	Intermediate	CNC	CNC Machine tool maintenance	
				27.1 Tool pre-setting
28	Intermediate	CNC	CNC PROGRAMMNG - LATHE	
				28.1 Geometrical Basics For CNC Machines
				28.2 Technological Basics For CNC Machines
29	Intermediate	CNC	CNC PROGRAMMNG - MILLING	
				29.1 Geometrical Basics For CNC Machines
				29.2 Technological Basics For CNC Machines
30	Advance	CNC	CNC Lathe Programming & Machining	
31	Advance	CNC	CNC Milling Programming & Machining	

Table 37: Agriculture & Farm Equipment

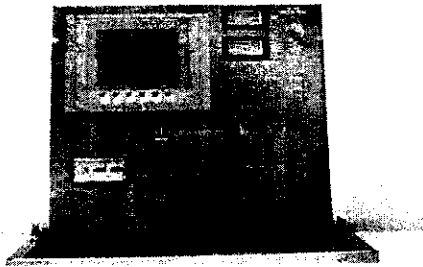
S. NO.	LEVEL	POD NAME	SUB POD NAME
1	Basic	Measuring Instruments & General Tools	
2	Basic	Safety	
3	Basic	Basics of Agriculture & Industrial Machinery	
4	Basic	Basic Tractor Servicing	
			4.1 Repair & Maintenance Of Tyre tube
5	Basic	Repair, Maintenance of Irrigation equipment	
			5.1 Centrifugal pump
			5.2 Submersible pumps
			5.3 Reciprocating pumps (Hand pump)
			5.4 Drip and sprinklers
6	Basic	Repair, Maintenance & field operation of Soil farming equipment	
7	Basic	Repair, Maintenance & field operation of Seed drills	
8	Intermediate	Repair Maintenance of Harvesting & Threshing equipment	
9	Intermediate	Repair, Maintenance & field operation of Tillage equipment	
10	Intermediate	Repair, Maintenance & field operation of Root Harvesting Equipment	
11	Intermediate	Repair, Maintenance & operation of Processing Equipment	
12	Advance	Repair, Overhauling of Tractor	
			12.1 Repair & Maintenance Of radiator
			12.2 Repair & Overhauling of Hydraulic system
13	Advance	Repair, Maintenance & operation of Power Tiller	
14	Advance	Repair, Maintenance & operation of Energy Sources Equipment	
15	Advance	Repair, Maintenance & field operation of Planters	
16	Advance	Repair, Maintenance & operation of post Harvesting Equipment	
17	Advance	Repair, Maintenance & field operation of Combine Harvester	

Table 38: Electronics & ICT

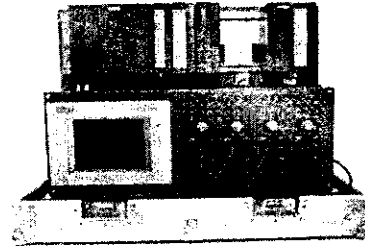
S. NO.	LEVEL	POD NAME	SUB POD NAME
1	Basic	Electronics Instruments, Equipment & General Tools	
			1.1 Knowledge of tools in Electronics Lab
			1.2 General tools usage
			1.3 Electronic Test Equipment
			1.4 Measuring instruments usage
2	Basic	Electronics Lab Safety	
3	Basic	Basic Electronics	
			3.1 Electronic Principles and Measurement
4	Basic	Repair, Maintenance of Home Electronic Appliances	
			4.1 DTH System
			4.2 Mixer Grinder & Food Processor
			4.3 Microwave oven
			4.4 Water heater
			4.5 Induction cooktop
			4.6 Water purifier
			4.7 Washing machine
			4.8 Audio Systems
			4.9 Home security system
			4.10 Dish Washer
5	Basic	Repair, Maintenance of TV	
6	Basic	Repair, Maintenance of laptop & Desktop	
7	Basic	Basic Cellular Phone Repair	
8	Basic	Basics of Refrigeration & Air Conditioning	
9	Intermediate	Repair and maintenance of Office Electronic Equipment	
			9.1 Fax machine
			9.2 Intercom
			9.3 Printer
			9.4 Photocopier
10	Intermediate	Repair, Maintenance of Air Conditioner (consumer)	
			10.1 Window AC
			10.2 Split AC
11	Intermediate	Repair, Maintenance Professional Audio system	
12	Intermediate	Smartphone Repair	
13	Intermediate	Repair, Maintenance of Power supply, inverters and UPS	
14	Intermediate	Repair, Maintenance of Refrigerators (consumers)	
			14.1 Refrigerators
			14.2 Water Coolers
			14.3 Bottle cooler
15	Advance	Repair, Maintenance of Commercial printing machine	
16	Advance	Repair, Maintenance of Refrigerators (industrial)	
			16.1 Deep Freezers
			16.2 Chillers
			16.3 Cold Storage
17	Advance	Service, Maintenance of Air Conditioning Plant	
18	Advance	Repair, Maintenance of Air Conditioner (Industrial)	
			18.1 Central AC
19	Advance	Service, Maintenance of Ice cream plant	
			19.1 Softy ice cream machine
			19.2 Ice candy machine
			19.3 Ice cream storage plant

Automation and Control Systems - Siemens Hardware Components

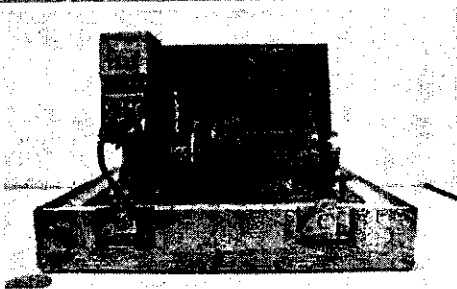
SIMATIC S7 – 1200 Controller



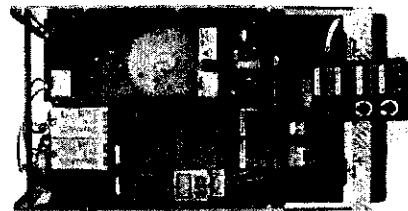
SIMATIC S7 – 300 Controller



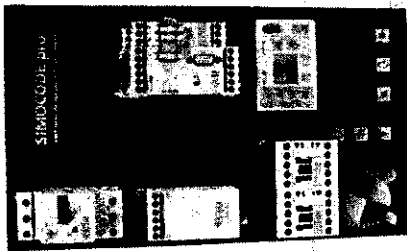
SINAMICS G120 Modular Drive Inverter



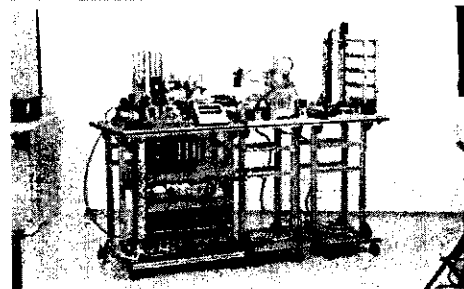
SINAMICS S120 Modular Motion Control



SIMOCOD Electronics Kit



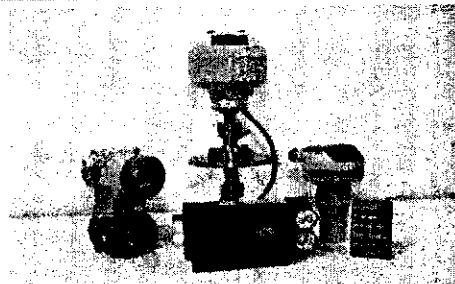
Mechatronics Kit



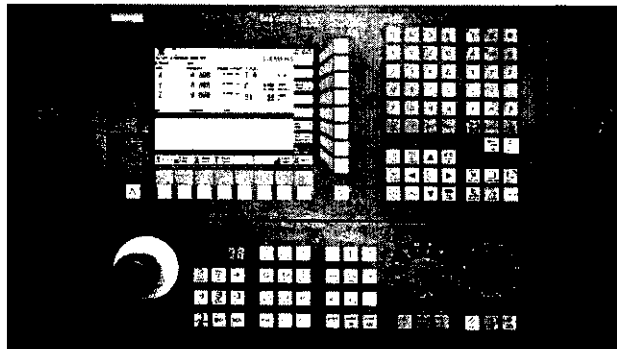
DC Drives Kit



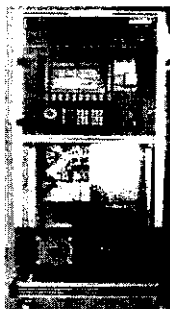
Sensor and Control Devices



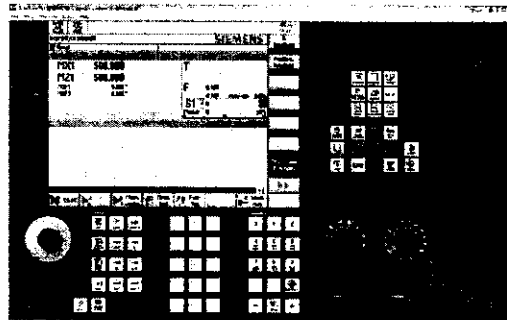
Sinumerik 808D Basic Milling & Turning Demo Kits



Sinumerik 840Dsl Kit With Motors



Sinutrain Operate



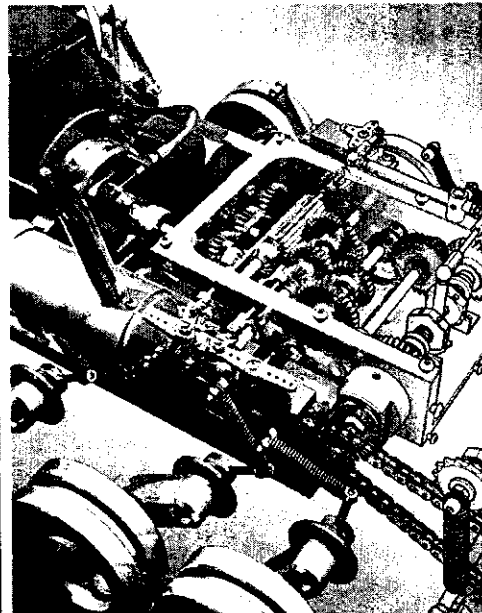
Siemens PLM Software

Product Engineering	NX	Design, simulate and manufacture better products faster.
Manufacturing Engineering	TECNOMATIX	Build and support products more efficiently.
Lifecycle Collaboration	TEAMCENTER	Innovate and collaborate more intelligently.
Mainstream Engineering	SOLID EDGE, FEMAP	Accelerate design for faster time to market

NX Advantages

The most integrated, flexible and efficient solution

- **Unified Environment** – Most complete solution covering design, analysis and manufacturing (CAD, CAE, CAM)
- **Teamcenter Inside** – Seamlessly managed environment for product simplifies of product knowledge management
- **Open, Flexible Modeling** – NX with synchronous technology enables true multi-CAD design with history-free, feature-based or freeform modeling
- **Design Reuse Tools** – Knowledge-driven automation through reuse libraries and process templates



Tecnomatix Advantages

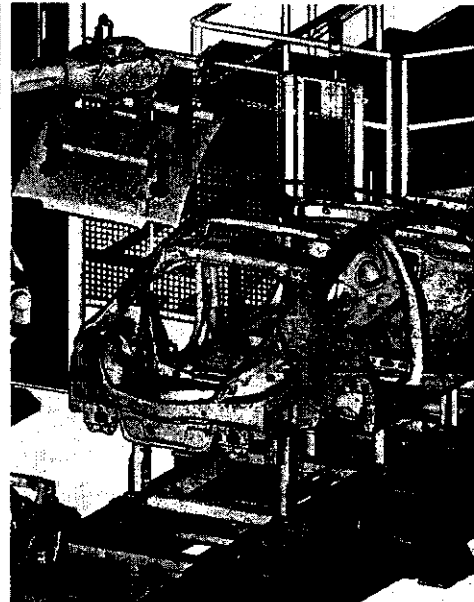
Connecting virtual product and actual production

• **Proven Validation** – seamlessly align the virtual production model and the physical production equipment

• **Efficient Planning** – synchronize product and process development stages faster and with greater collaboration

• **PLM for Manufacturing** – a single source of manufacturing knowledge to support faster collaboration from design to production

• **Optimized Systems** – Analyze the impact of changes quickly and continuously improve with iterative analysis



Teamcenter Advantages

The backbone for immersive decision support

• **Unified suite of applications** – Supporting every phase of the product lifecycle

• **Single source of knowledge** – Integrating multiple sources of product and process information

• **Global collaboration environment** – Connecting distributed people with the right information in the right context in time

• **Open and scalable platform** – a proven, scalable, open PLM platform that customers can easily extend as needed



LMS Test.Lab and LMS SCADAS

The market leading dynamic testing and analysis solution

<p>LMS Test.Lab Structures & GVT Structural Dynamics Testing</p>	<p>LMS Imagine.Lab Acoustics & General Dynamic Data-Acquisition</p>
<p>Small-Scale and large-scale modal tests in hours rather than days</p>	<p>Data acquisition and analysis for noise, vibration and other dynamic phenomena</p>
<ul style="list-style-type: none"> • Complete GVT testing for aero elastic certification • Identify root causes of vibration problems and engineer the best solution 	<ul style="list-style-type: none"> • Cabin comfort • Interior acoustics • Fly-over noise • Advanced aircraft noise & vibration

<p>LMS Test.Lab Rotating & Turbine Testing</p>	<p>LMS Test.Lab Vibration Control & Environmental Testing</p>
<p>All-digital, advanced solution for complex turbine testing processes</p>	<p>Data acquisition and analysis for noise, vibration and other dynamic phenomena</p>
<ul style="list-style-type: none"> • Data acquisition • Data storage & management • On-line monitoring alarming • Analysis and reporting • Updating 	<ul style="list-style-type: none"> • Basic component vibration qualification testing • Advanced 3D multi-shaker vibration control • Closed loop shaker control and real-time monitoring of shakedown tests • Safe Operation

LMS Imagine.Lab

An open multi-domain simulation approach for Model-Based System Engineering

<p>LMS Imagine.Lab Landing Gear</p>	<p>LMS Imagine.Lab Environmental Control Systems</p>
<p>Helps designing any landing gear system and its multi-disciplinary nature</p>	<p>Simulate and analyze complex fluid systems</p>
<ul style="list-style-type: none"> • Actuation systems • Braking systems • Steering systems • Shock absorber 	<ul style="list-style-type: none"> • Bleed air • Anti-icing • Ventilation circuit • Oxygen and life systems

<p>LMS Imagine.Lab Engine Equipment</p>	<p>LMS Imagine.Lab Power & Distribution Networks</p>
<p>Design fuel systems and controls as well as engine control actuators</p>	<p>Size and optimize complete aircraft power and distribution networks</p>
<ul style="list-style-type: none"> • Fuel system • Lubrication • Heat exchangers • Thrust reversers • Accessory gearbox 	<ul style="list-style-type: none"> • Hydraulic system • Pneumatic system • Electrical wire harness • Electrical aircraft

LMS Virtual.Lab

3D system simulation for functional performance analysis

LMS Virtual.Lab Motion Durability	LMS Virtual.Lab Acoustics Noise & Vibration
Scalable modelling, sizing & analysis of mechanical systems	Simulation & analysis of system vibro-acoustics
<ul style="list-style-type: none"> • Controls • Actuation systems • Flexible structures • Kinematic and dynamic functional & performance specifications for safety, reliability and stability 	<ul style="list-style-type: none"> • Accurately predicts aircraft interior and exterior noise & vibration • Address structural and airborne transmission paths • Reduce noise of structures, engines, power equipment, ECS • Optimize passenger comfort

LMS Virtual.Lab Correlation & Updating	LMS Virtual.Lab Optimization
De-risk physical structural dynamic testing via virtual testing	Multi-disciplinary sensitivity analysis and optimization
<ul style="list-style-type: none"> • Increase productivity by combining test-based and virtual component models into system-level models • Correlate noise & vibration data sets: Test-FEM, Test-Test, FEM-FEM • Update FE models with data systematically 	<ul style="list-style-type: none"> • Reach optimal design with multiple performance targets • Easily identify key variables that influence the functional multi-attribute performance of a mechanical system

Digital Product Design Suite

Table 39 List of Software Modules in NX Academic Bundle

S. No.	Particulars
1	NX Mach 3 Progressive Die Design
2	NX Advanced Simulation - Add On
3	NX Knowledge Fusion Author
4	NX Open Toolkits Author
5	NX Open GRIP Author
6	NX Body Design
7	NX General Packaging
8	NX Human Modelling
9	NX Human Modelling Posture Prediction
10	NX Aerospace Sheet Metal
11	NX Weld Assistant
12	NX Electrode Design
13	NX WAVE Control
14	NX DraftingPlus
15	NX Issue Management
16	NX Integration to Geolus
17	HD3D Visual Reporting
18	NX Ship Design
19	NX Ship Structure Detail Design
20	NX Ship Structure Manufacturing Prep
21	NX Routing HVAC
22	NX Routing P&ID
23	NX Rules Based Structure Welding
24	NX Ship Drafting
25	NX Routing Cabling
26	NX Routing Base
27	NX Mold Wizard
28	NX Die Structure Design
29	NX Die Engineering
30	NX 5 Axis Machining Add-on
31	NX 3 to 5 Axis Milling Add-on
32	NX Wire EDM Add-on

S. No.	Particulars
33	NX 2.5 Axis Milling Add-on
34	NX 3 Axis Milling Add-on
35	NX NC Simulation Add-on
36	NX CAM Teamcenter Client Add-on
37	NX Design Simulation
38	NX Thermal Simulation
39	NX Flow Simulation
40	Ansys Environment
41	ABAQUS Environment
42	NX Motion Simulation-RecurDyn
43	NX Advanced Thermal Simulation
44	NX Space Systems Thermal Simulation
45	NX Electronic Systems Cooling Simulation
46	NX Response Simulation
47	NX Laminate Composites
48	NX LS-Dyna Environment
49	NX Motion Control Simulation
50	Mechatronics Concept Designer for NX
51	NX Topology Optimization
52	NX One-Step Formability Analysis
53	NX Greater China Toolkit
54	CAM Express 3 to 5 Axis Milling Add-on
55	NX Nastran Desktop Advanced
56	NX Nastran Desktop Rotor Dynamics
57	NX Nastran Desktop Optimization
58	NX Nastran Desktop Advanced Nonlinear Solver
59	NX EPak
60	NX Schematics
61	Progressive Die Wizard Manufacturing Bundle
62	NX Render
63	NX Freeform Shape
64	NX Visualize Shape
65	NX Analyze Shape
66	NX Optimization Wizard
67	NX Turning
68	NX Post Builder

S. No.	Particulars
69	NX Post Adv Kinematics Library
70	Machining Wizard Builder
71	NX Fabric Flattener
72	NX Advanced FEM
73	NX Advanced Durability
74	NX Motion Flexible Body
75	NX EasyFill Analysis
76	NX Molded Part Validation
77	NX Routing Piping and Tubing
78	NX Routing Harness
79	NX Shape Optimization
80	NX CMM Inspection Programming Add-on

Digital Product Lifecycle Management

Table 40 List of Software Modules in Teamcenter Unified Academic Bundle

S. No.	Particulars
1	Teamcenter Author
2	Teamcenter Open (SDK)
3	Multi-Site Collaboration
4	STEP AP 203/214 Translator
5	Visualization Mockup
6	Teamcenter Visualization & Illustration
7	Visualization Quality Producer
8	NX Embedded Client
9	Integration for Mentor Board Station
10	Integration for Cadence Allegro
11	Integration for ClearCase
12	Simulation Author
13	RTT Author & Alignment
14	Process Simulate on Teamcenter Named User
15	Teamcenter Manufacturing Resource Library
16	As-Built Management User
17	Issue Management and CAPA
18	Teamcenter Consumer
19	MRO Materials Management
20	MRO Maintenance Planning & Execution
21	Logistics Records Management
22	Logistics Structure Management

Digital Manufacturing Plant Simulation and Optimization Suite

Table 41 List of Software Modules in Tecnomatix Manufacturing Academic Bundle

S. No.	Particulars
1	FactoryCAD Floating
2	In Context Editor (ICE) - AutoCAD/FactoryCAD - Node Locked
3	Jack
4	Jack Motion Capture Toolkit
5	Jack Occupant Packaging Toolkit
6	Jack Task Analysis Tool Kit
7	RealNC Float
8	Machine Configurator Advanced Float
9	RealNC Optimization Float
10	Process Designer Concurrent
11	Alternative Planning Concurrent
12	Process Simulate Concurrent
13	Process Simulate Spot Concurrent
14	Robotics Concurrent
15	Commissioning Concurrent
16	Process Simulate Human Concurrent
17	Process Simulate Human Advanced (Jack) Concurrent
18	KUKA KRC OLP Float
19	ABB Rapid OLP Float
20	KAWASAKI AS OLP Float
21	Plant Simulation Education Concurrent
22	Plant Simulation Options Pack for EDU. Licenses Concurrent
23	Process Simulate on Teamcenter Float
24	Teamcenter Visualization Mockup
25	Teamcenter Visualization Animation Creation Option
26	RobotExpert
27	KUKA KRC OLP for RobotExpert
28	ABB RAPID OLP FOR RobotExpert
29	FANUC RJ OLP for RobotExpert
30	YASKAWA INFORM OLP for RobotExpert
31	KAWASAKI AS OLP for RobotExpert

Digital Manufacturing Robotics and Automation Suite

Table 42 List of Software Modules in Tecnomatix RobCAD Academic Bundle

S. No.	Particulars
1	Robcad Concurrent
2	Robcad Spot Concurrent
3	Arc Concurrent
4	Cut and Seal Concurrent
5	Paint Concurrent
6	Cable Simulation Concurrent
7	Rose Development Kit Concurrent
8	ABB Rapid S4 OLP Package Concurrent
9	ABB Rapid S4 Paint OLP Package Concurrent
10	Fanuc RG2 OLP Package Concurrent
11	Fanuc RJ OLP Package Concurrent
12	FANUC F100iA OLP Float
13	Kawasaki 400PC OLP Package Concurrent
14	Kawasaki AD OLP package Concurrent
15	Kawasaki C-CKE OLP Package Concurrent
16	Kobelco OLP Package Concurrent
17	Kuka OLP Package Concurrent
18	Nachi AP OLP Package Concurrent
19	Nachi AR OLP package Concurrent
20	Nachi AW OLP package Concurrent
21	Nachi AX OLP package Concurrent
22	Yaskawa NX OLP Package Concurrent
23	Yaskawa XRC OLP Package Concurrent
24	Robcad Catia V5 Interface Concurrent
25	Robcad Pro Engineer Interface Concurrent
26	Robcad Standard Interfaces Concurrent
27	Process Simulate Continuous Manufacturing Concurrent
28	Catia V5 Interface Concurrent
29	VKRC1/2 (KUKA - VW) OLP Float
30	COMAU PDL OLP Float
31	FANUC RJ OLP Float
32	YASKAWA INFORM OLP Float

Digital Simulation and Validation Suite

Table 43 List of Software Modules in NX Nastran Academic Bundle

S. No.	Particulars
1	NX PCB Exchange
2	NX Nastran Basic
3	NX Nastran Advanced
4	NX Nastran Dynamic Response
5	NX Nastran Aeroelasticity
6	NX Nastran Optimization
7	NX Nastran Super Elements
8	NX Nastran DMAP
9	NX Nastran DMP
10	NX Nastran Rotor Dynamics
11	NX Nastran Advanced Nonlinear Solver

Table 44 List of Software Modules in FEMAP Academic Bundle

S. No.	Particulars
1	FEMAP Flow Solver (Floating)
2	FEMAP with NX Nastran : Dynamic Response (Floating)
3	FEMAP with NX Nastran : Aeroelasticity (Floating)
4	FEMAP with NX Nastran : Design Optimization (Floating)
5	FEMAP with NX Nastran : Superelements (Node Locked)
6	FEMAP with NX Nastran: Super Elements (Floating)
7	FEMAP with NX Nastran : DMAP (Floating)
8	FEMAP with NX Nastran: Advanced Nonlinear Solver (Floating)
9	FEMAP with NX Nastran: Rotor Dynamics (Floating)
10	FEMAP with NX Nastran: Topology Optimization (Floating)

Table 45 List of Software Modules in Vistagy Academic Bundle

S. No.	Particulars
1	Fibersim for NX Academic Bundle
2	Seat Design Environment for NX Academic Bundle

ANNEXURE 10 – Details of Siemens Sinumerik 840D SL Training Rack

Table 46 Siemens Sinumerik Training Racks

S. No.	Training kits	Benefits
1	Sinumerik 840D SL	<ul style="list-style-type: none"> • CNC programming simulator kit • Learning of Turning & Mill programming • Hands on CNC service and maintenance training can be undertaken • PLC programming training can also be undertaken • Drive commissioning can also be undertaken.

Additional Specifications for Rapid Prototyping Unit

Table 47 Specifications for Rapid Prototyping Unit

Machine Type	Non Laser Based Rapid Prototyping Machine
Technology Application	Process variety of engineering thermoplastics for different applications. Physical parts used for fit, form, visualization, functional testing, jigs & fixtures, patterns for Investment & Sand Casting and final use. Manufacture complex assemblies in single build
Part Manufacturing	Extrusion process depositing uniform layers one above the other. Doesn't involve any toxic, hazardous resin/ solvent/ liquid photo – polymer/ powder based materials
Build Envelope	Minimum 400 x 350 x 400 mm
Layer Thickness	0.2 mm or lesser
Materials Characteristics	<ul style="list-style-type: none"> a. Process Industrial grade thermoplastics ABS (Acrylonitrile Butadiene Styrene). b. Process high strength thermoplastics material of Aerospace Grade having tensile strength of 70 MPa or more and flexural strength of 100 MPa or more. Raw material should have necessary certification from agencies like FAA. c. Process high heat resistant thermoplastic materials that can withstand more than 180°C. Material chemically resistant to corrosive media like gasoline. d. Process temporary support structures automatically by software during building of part; it should be either water soluble or can be easily removable by hand. e. No expiry date for raw material. Material change easy.
Software	<ul style="list-style-type: none"> a. Automatic pre-processing, slicing, support generation, part packing/ nesting. b. Create programs for custom & standard sparse builds parts. c. Pause the build to embed inserts during part manufacturing process.
Facility Requirement	<ul style="list-style-type: none"> a. No special facility required; machine works in office environment. b. Includes all necessary accessories. c. Installation layout diagram provided.
Network Connectivity	TCP/IP 10/100 base T Connection Ethernet Protocol.
Workstation Compatibility	Windows 2000/ XP/7
Operator	Unattended lights out operation. Limited attendance for job start and stop required.
Environmental Requirements	The materials output /waste is eco-friendly and recyclable per Govt. norms.

Annexure XI - Recommended Specifications of Computer Workstation

Table 48 Recommended Specifications and Components of Computer Workstation

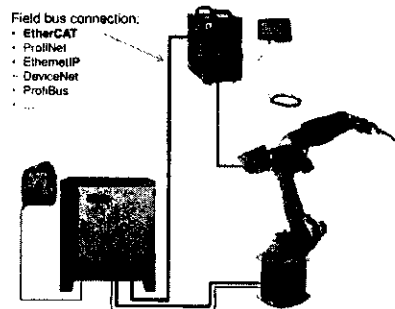
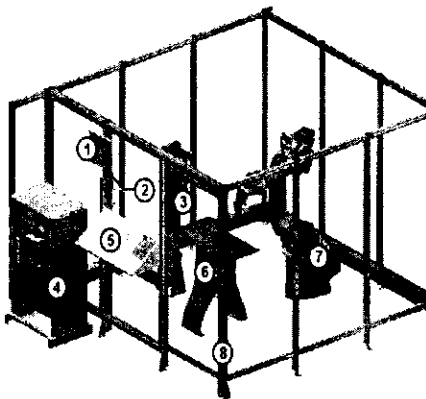
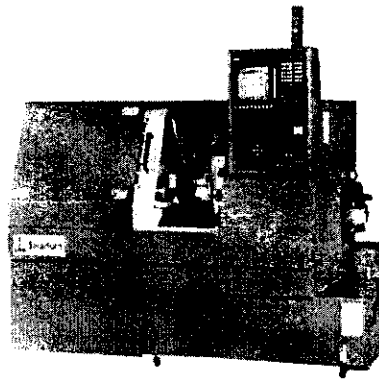
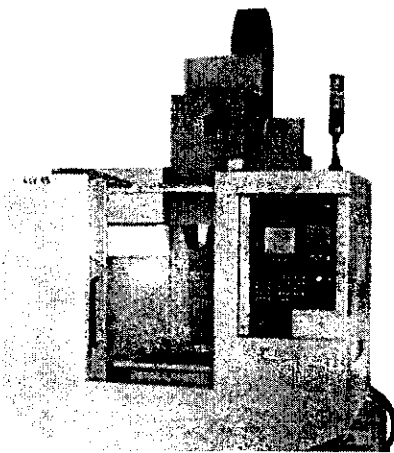
S. No.	Specifications
1	Microsoft Windows 7 Professional Edition 64bit OS
2	Intel Xeon E3-1225v2 3.2 GHz (up to 3.6 GHz) 8MB 77W GT2 4C CPU
3	16GB DDR3-1600 nECC (4x4GB) Unbuffered RAM
4	500GB 7200 RPM SATA 6G 1st Hard Drive
5	16X SuperMulti DVDRW SATA 1st ODD
6	USB Keyboard
7	PS/2 Mouse
8	NVIDIA Quadro K600 1GB DL-DVI(I)+DP 1st No cables included Graphics
9	18.5 inch TFT Monitor

Computer Hardware will be procured from and serviced by globally recognized brands like HP, DELL, IBM, Lenovo, Fujitsu, etc.

Advanced Manufacturing Lab

The Advanced Manufacturing Lab enables knowledge on:

- Advanced manufacturing techniques
- Automation combined with advanced manufacturing technology
- Sequence Planning, Process Planning, Shop Floor Layout generation for robotic applications and CNC machining
- Offline / On-line sequence execution techniques for both robotics and CNC programming
- Monitoring & Virtual simulation generation for sequences



List of Parts

Table 49 List of Part Components in Advanced Manufacturing Lab

S. No.	Particulars
1	SMATURN CNC Turning Lathe Machine With SIEMENS Industrial Controller
2	CNC Vertical Milling Machine with SIEMENS Industrial Controller
3	Pick and Place Robotic Cell
4	Arc Welding Robotic Cell
5	Spot Welding Robotic Cell

SMATURN CNC Turning Lathe Machine

CNC Turning Centre with Industrial Control Panel with closed loop servo motor control with further option of linking to CAD/CAM Manufacturing System.

Table 50 Specifications of SMATURN CNC Lathe Machine

S.No	Title	Description	Unit	Data	S.No	Title	Description	Unit	Data
7	LUBRICATION				1	CAPACITY			
7.1		Spindle bearings	type	Grease packed	1.1		Swing over bed, dia	mm	480
7.2		Guideways and ball screws	type	Automatic pressure lubrication with low level detection	1.2		Swing over carriage, dia	mm	260
					1.3		Adjust between casters	mm	345
					1.4		Maximum turning length (with chuck)	mm	2600
7.3		Lubrication tank capacity	litres	3	1.5		Maximum turning diameter	mm	200
					1.6		Chuck size, dia	mm	165
8	COOLANT				2	TRAVERSE			
8.1		Coolant tank capacity	litres	80	2.1		Cross travel (X Axis)	mm	105
8.2		Coolant pump motor	NW	0.2	2.2		Longitudinal travel (Z Axis)	mm	320
9	POWER SOURCE				3	SPINDLE			
9.1		Electrical power supply - Voltage	V	AC 415 ± 10 %	3.1		Spindle nose	type	Flat (dia 140mm)
9.2		Frequency	Hz	50 ± 1	3.2		Spindle bore taper	type	1:20
9.3		Electrical power requirement	kva	15	3.3		Hole through spindle, dia	mm	53
9.4		Compressed air requirement (at NTP)	lpm	ml	3.4		Max. bar capacity, dia	mm	42
					3.5		Spindle speed	rpm	4300
10	MACHINE SIZE (approximate)				3.6		Spindle front bearing ID	mm	80
10.1		Machine Front x Side x Height	mm	2275 x 1640 x 1620	3.7		Spindle motor power, AC - Cont/ 58-40% (SIEMENS)	kw	7/10.5
10.2		Machine weight, excluding accessories	kg	2300					
10.3		Colour - Machine	Shade	Green & Beige	4	FEED SYSTEM			
11	ACCURACY (mm)				4.1		Rapid traverse rate - X & Z Axis	mm / min	20000
11.1		Positioning accuracy - X Axis	mm	0.015	4.2		Ball screw - Dia x Pitch - X Axis	mm	25 X 10
		- Z Axis	mm	0.025			- Z Axis	mm	32 X 10
11.2		Repeatability - X/Z Axis	mm	± 0.003	4.4		Feed motor torque - X & Z Axis (SIEMENS)	Nm	8
12	STANDARD ITEMS				4.5		Feed back elements	type	Absolute Encoder
12.1		Coolant system, 50 lpm @ 0.55 bar			4.6		Guideways	type	Linear Motion Bearing
12.2		Graphic display			5	TURRET			
12.3		Automatic lubrication unit			5.1		Actuation	type	Hydraulic
12.4		Machine lamp			5.2		Turned clamp	type	Hydraulic
12.5		Sliding door interlock			5.3		No. of stations	nos	8
12.6		Built-in AC (Indigenous)			5.4		Tool shank size	mm	20 X 20
12.7		Foot switch for chucking			5.5		Maximum turning bar diameter	mm	32
12.8		Coolant nozzle above headstock			5.6		Indexing system		Bi directional, Shortest path
12.9		Manual Pulse generator							
12.10		Set or turret tool holders	set	1					
12.11		Leveling pads	set	1	6	TAILSTOCK			
12.12		Machine manuals	set	1	6.1		Quill dia	mm	85
12.13		Maintenance tools	set	1	6.2		Quill stroke	mm	80
12.14		Process completion lamp (3 bar)			6.3		Quill taper	type	MT-4
12.15		Absolute encoder							
12.16		Tool life management							

Table 51 Tooling Package for SMATURN CNC Lathe Machine

S. No.	Particulars
1	External turning carbide tool holders with inserts
2	Internal boring carbide tool holders with inserts
3	Centre Drill
4	Twist Drill

CNC Vertical Milling Machine

A 3 Axes CNC Vertical Milling Machine with closed loop servo motor control fitted with Industrial Control Panel with further option of linking with CAD/CAM a Manufacturing System.

Table 52 Specifications of CNC Vertical Milling Machine

Title	Description	Unit	LV 45
Stroke	X Axis	mm	450
	Y Axis	mm	350
	Z Axis	mm	350
	Distance from spindle nose to table top	mm	200 – 550
Table	Table Size	mm	600 x 350
	No. of T Slots x Size x Pitch	nos. x mm x mm	3 x 14 x 125
	Max. Load on table	kgs	200
Spindle	Spindle bore taper	type	BT – 40
	Spindle speed	rpm	8000
	Spindle Motor power (Cont./15mins.)	kW	3.7 / 5.5
Feed System	Rapid traverse rate – X & Y Axes	m/min	36 & 36
	Rapid traverse rate – Z Axis	m/min	24
	Cutting feed rate	m/min	10
Automatic ToolChanger	ATC		Armless Umberlla
	No. of tools	nos	16
	Tool shank	type	BT – 40
	Max. tool diameter with adjacent tool	mm	80
	Max. tool length	mm	160
	Max. tool weight	kg	8
CNC System	Tool change time (tool to tool)	sec	6.5
	Controller	type	Siemens 282D
Machine size	Front x Side	mm	1780 x 2716
	Machine weight (Approx)	kg	2000

Table 53 Specifications of CNC Controller System – Siemens 282 D

S.No	Title	Description	Specification
CONTROL			
1.1		Number of controlled axes	Two (X & Z)
1.2		Simultaneously controllable axes	Two
1.3		Incremental input & output	Minimum : 0.001mm
FEED FUNCTIONS			
2.1		Rapid traverse rate	X : 20 m / min ; Z : 20 m / min
2.2		Rapid traverse override steps	0 - 120%
2.3		Cutting feed rate override steps	0 - 120%
2.4		Manual jog feed rate	0 to 1200 mm/min in 16 steps
2.5		Manual handle feed	In steps of 0.001, 0.01 & 0.1mm
2.6		Backlash compensation	Compensation of mechanical play separately settable for each axes
2.7		Stored pitch error compensation	Correction of ball screw pitch error separately settable for each axes
2.8		Dwell	By G04 : 0 to 99999.999 sec
SPINDLE FUNCTIONS			
3.0			
3		Spindle speed command	S - 4 digit direct
TOOL FUNCTIONS			
4.1		Tool function	Tool commanded by a 2 digits T code Offset commanded by a 2 digits D Code - Ex: T01D01
4.2		Cutter radius compensation	G40 : Tool nose radius compensation - Cancel G41 : Tool nose radius compensation - Left G42 : Tool radius compensation - Right
4.3		Tool offset	Max T/D=8/64
PROGRAMMING FUNCTIONS			
5			
5.1		Part program storage	1 MB
5.2		No. of programs registerable	100
5.3		Sub program	Subroutines are called in a program (main or subprogram) with their names. To do this, a separate block is required. Call of the subroutine L785 - Ex: L785 (Any name) Call of the subroutine SHAFT 7 - Ex: SHAFT 7 (Any name) If a subroutine is to be executed several times in succession, write the number of times it is to be executed in the block of the call after the subroutine name under the address "P". A maximum of 9999 passes are possible (P1.. P9999) Ex: N10 L785 P3; Call of the subroutine L785, 3 passes Subroutines can also be called from a subroutine, not only from a main program. Totally, 8 program levels, including the main program level are available for such a nested call Sub program call by : xxxx : Sub program name is xxxx. Nesting depth : 8
5.4		Inch / Metric selection	G70 : Inch input G71 : Metric input G700: Feed Inch Input ; G710 Feed Metric input
5.5		Absolute / Incremental selection	X, Z : Absolute input I, K : Incremental input IC/AC: Incremental / Absolute command For Eg: N10 G90 X10 Z=IC(20) Z - Incremental dimension X - Absolute dimension
5.6		Positioning	G00
5.7		Linear Interpolation	G01
5.8		Circular interpolation	G02 - Clockwise G03 - Counter clockwise CIP - Circular interpolation via intermediate point CT - Circular interpolation, tangential transition Capable of interpolation circular arcs extending along all the Four quadrants
5.9		Miscellaneous functions	2 digit M code
5.10		Fixed cycles	Simplified commands for machining operations Cycle 90 Thread milling Cycle 93 Grooving Cycle 93 Grooving cycle Cycle 94 Undercut DIN 76 (Forms E and F) finishing Cycle 95 Stock removal with relief cutting Cycle 97 Thread cutting Cycle 81 Drilling & Centering Cycle 82 Drilling & Counterboring Cycle 83 Deep - hole drilling Cycle 84 Rigid tapping cycle Cycle 840 Tapping with compensating chuck cycle Cycle 85 Reaming Cycle 86 Boring Cycle 87 Boring 3 Cycle 88 Boring with stop Cycle 89 Boring 5

Robotics Pick and Place Cell – Material Handling Application

The pick and place robotic cell introduces students to the robotic material handling application.

The students will get to learn and understand:

- About industrial robots and their applications
- About a robotic cell
 - Layout and robot placement
- Robotics Programming
 - Teach Pendant Programming
 - Off-Line Programming
- Material handling application using robots (Pick and Place)

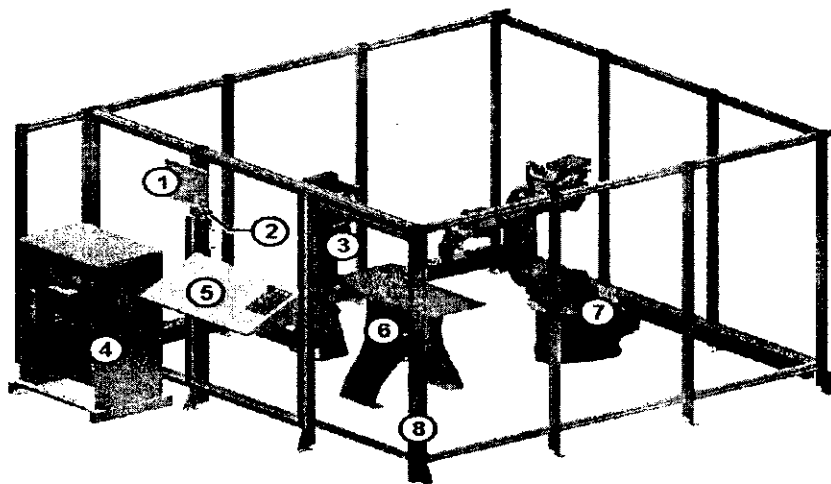


Table 54 Technical Specifications for Pick and Place Robotic Cell

Equipment Specification	
1	Robot – KUKA KR 6 R900 Robot
2	Robot Controller – KUKA KRC Robot Controller
3	Monitor
4	Release Device
5	Magazine
6	Control Panel
7	Table
8	Safety Fence
9	Voltage Stabilizer with Isolation Transformer
10	Air Compressor

Robotic Arc Welding Cell – Arc Welding Application

The arc welding robotic cell introduces students to the robotic arc welding application.

- About industrial robots and their applications
- About a robotic cell
 - Layout and robot placement
- Robotics Programming
 - Teach Pendant Programming
 - Off-Line Programming
- Arc welding application using robots
 - Rake angle/ Approach angle
 - Arc On/ Arc Off

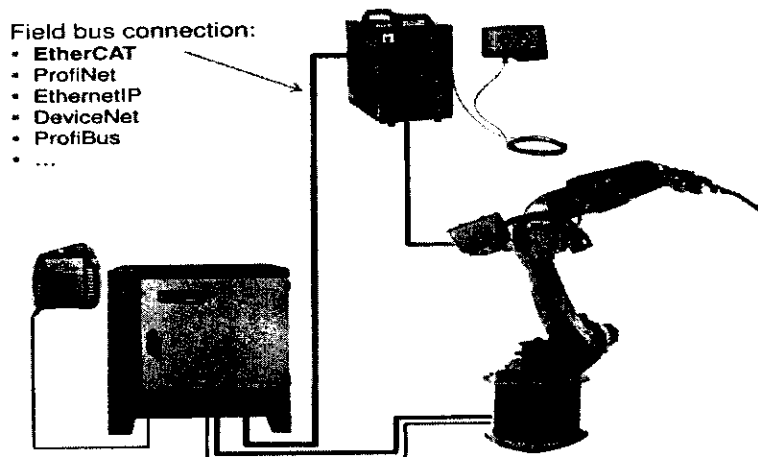


Table 55 Specifications for ARC Welding Robotic Cell

Equipment Specification	
1	Robot – KUKA KR16 Robot
2	Robot Controller – KUKA KRC Robot Controller
3	Welding Machine – Fronius/ Lincoln Kemppi/ Miller
4	Robotic Torch
5	Wire Feeder
6	Wire Spool
7	Stationery Work bench
8	Voltage Stabilizer with Isolation Transformer
9	Mixed gas with Cylinder and regulator
10	Torch Cleaning and Wire Cutter Station

Robotic Spot Welding Cell – Spot Welding Application

The spot welding robotic cell introduces students to the robotic spot welding application.

- About industrial robots and their applications
- About a robotic cell
 - Layout and robot placement
- Robotics Programming
 - Teach Pendant Programming
 - Off-Line Programming
- Spot welding application using robots
 - Weld Gun positions (Open/ Close)
 - Current requirement for spot welding
- IO Signals for communication between Robot/ Weld Gun/ Tooling (Fixtures)

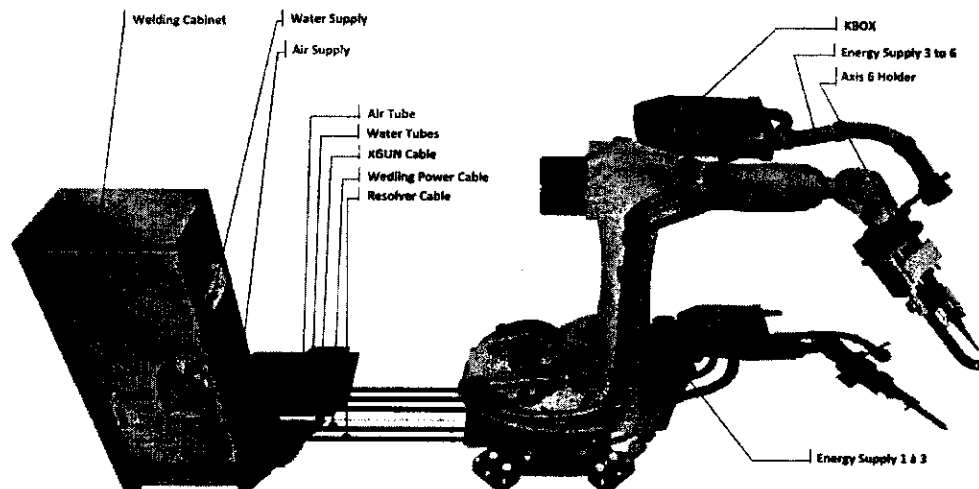


Table 56 Specifications for SPOT Welding Robotic Cell

Equipment Specification	
1	Robot – KUKA KR 219 R 2700 Extra Robot
2	Robot Controller – KUKA KRC Robot Controller
3	Spot welding gun and standard accessories
4	Tip Dresser Station
5	Air Compressor
6	Voltage Stabilizer with Isolation Transformer
7	Water circulation system